Developer Guide

AWS HealthImaging

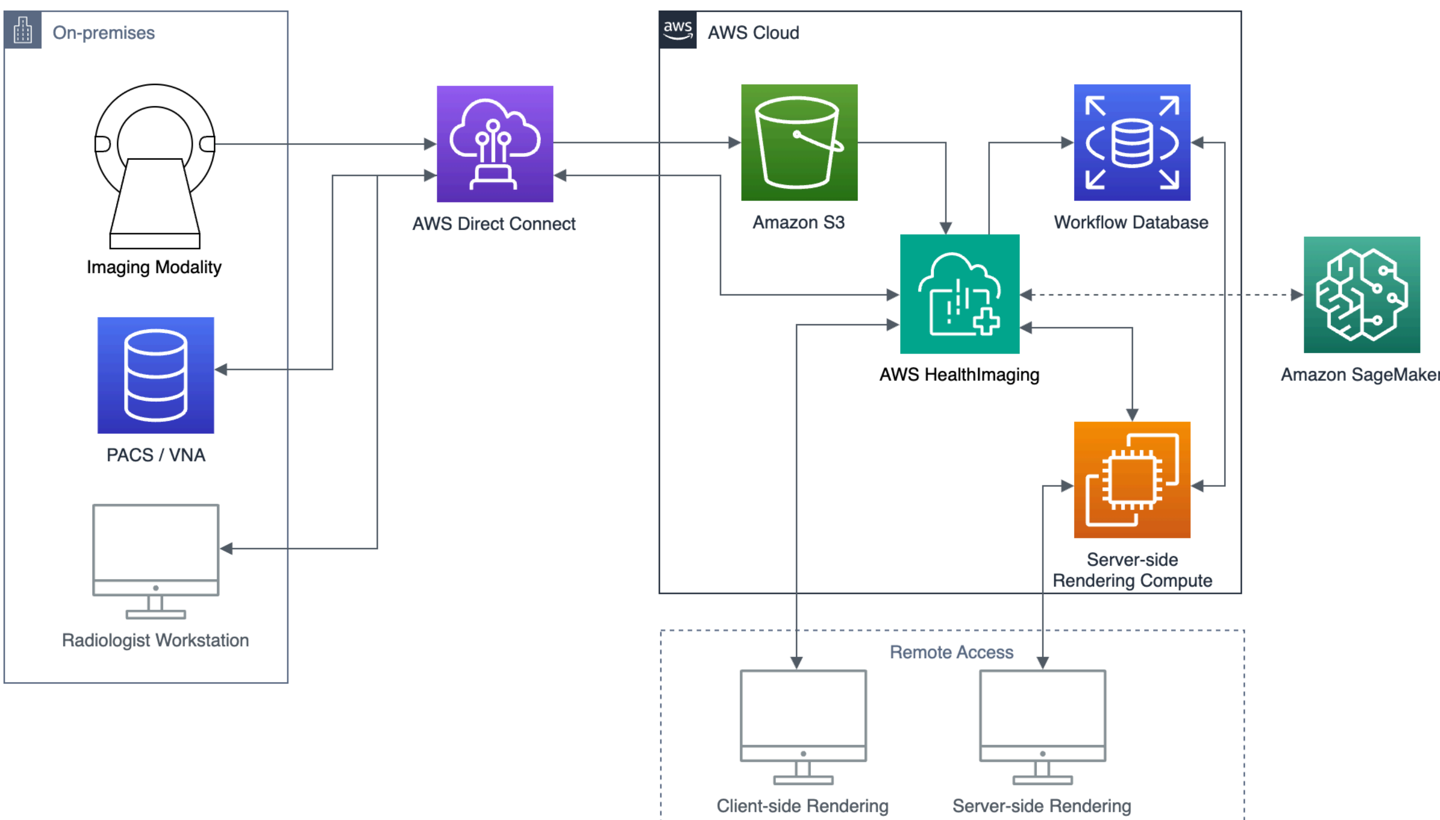
AWS HealthImaging: Developer Guide

Table of Contents

What is AWS HealthImaging?

AWS HealthImaging is a HIPAA eligible service that empowers health care providers, life science organizations, and their software partners to store, analyze, and share medical images in the cloud at petabyte scale. HealthImaging use cases include:

- **Enterprise imaging** – Store and stream your medical imaging data directly from AWS Cloud while preserving low-latency performance and high availability.
- **Long-term image archival** – Save cost on long-term image archival while maintaining subsecond image retrieval access.
- **AI/ML development** – Run artificial intelligence and machine learning (AI/ML) inference over your imaging archive with support from other tools and services.
- **Multimodal analysis** – Combine your clinical imaging data with AWS HealthLake (health data) and AWS HealthOmics (omics data) to deliver insights for precision medicine.



AWS HealthImaging provides access to image data (e.g. X-Ray, CT, MRI, Ultrasound) so that medical imaging applications built in the cloud can achieve performance previously only possible on-premises. With HealthImaging, you reduce infrastructure costs by running your medical imaging applications at scale from a single, authoritative copy of each medical image in AWS Cloud.

Topics

Important notice

AWS HealthImaging is not a substitute for professional medical advice, diagnosis, or treatment, and is not intended to cure, treat, mitigate, prevent, or diagnose any disease or health condition. You are responsible for instituting human review as part of any use of AWS HealthImaging, including in association with any third-party product intended to inform clinical decision-making. **AWS HealthImaging should only be used in patient care or clinical scenarios after review by trained medical professionals applying sound medical judgment.**

Features of AWS HealthImaging

AWS HealthImaging provides the following features.

Developer-friendly DICOM metadata

AWS HealthImaging simplifies application development by returning DICOM metadata in a developer-friendly format. After importing your imaging data, individual metadata attributes are accessible using human-friendly keywords rather than unfamiliar group/element hexadecimal numbers. Patient, Study, and Series level DICOM elements are normalized, eliminating the need for application developers to deal with inconsistencies between SOP Instances. In addition, metadata attribute values are directly accessible in native runtime types.

SIMD-accelerated image decoding

AWS HealthImaging returns image frames (pixel data) encoded as High Throughput JPEG 2000 (HTJ2K) images, an advanced image compression codec. HTJ2K takes advantage of single instruction multiple data (SIMD) on modern processors to deliver new levels of performance. HTJ2K is an order of magnitude faster than JPEG2000 and at least twice as fast as all other DICOM transfer syntaxes. WASM-SIMD can be utilized to bring this extreme speed to zero footprint web viewers. For more information, see Supported transfer syntaxes.

Pixel data verification

AWS HealthImaging provides built-in pixel data verification by checking the lossless encoding and decoding state of every image during import. For more information, see Pixel data verification.

Industry-leading performance

AWS HealthImaging sets a new standard for image loading performance thanks to its efficient metadata encoding, lossless compression, and progressive resolution data access. Efficient metadata encoding enables image viewers and AI algorithms to understand the contents of a DICOM study without having to load the image data. Images load faster without any compromise in image quality thanks to advanced image compression. Progressive resolution enables even faster image loading for thumbnails, regions of interest, and low-resolution mobile devices.

Scalable DICOM imports

AWS HealthImaging imports leverage modern cloud native technologies to import multiple DICOM studies in parallel. Historical archives can be imported quickly without impacting clinical workloads for new data. For information about supported SOP instances and transfer syntaxes, see DICOM.

Service managed DICOM data hierarchy

AWS HealthImaging automatically organizes DICOM P10 data on import by Patient, Study, and Series level DICOM data elements. The service organizes this DICOM data into image sets that correspond to DICOM series, simplifying post import workflows. The Study and Series level organization is maintained as new data is imported.

DICOMweb API compatibility

AWS HealthImaging offers DICOMweb conformant APIs to simplify integrations and enable interoperability with existing applications. The service also offers cloud-native APIs that enable actions not supported by the DICOMweb standard, like metadata update operations.

Related AWS services

AWS HealthImaging features tight integration with other AWS services. A knowledge of the following services is useful to fully leverage HealthImaging.

- AWS Identity and Access Management – Use IAM to securely manage identities and access to HealthImaging resources.
- Amazon Simple Storage Service – Use Amazon S3 as a staging area to import DICOM data into HealthImaging.
- Amazon CloudWatch – Use CloudWatch to observe and monitor HealthImaging resources.
- AWS CloudTrail – Use CloudTrail to track HealthImaging user activity and API usage.
- AWS CloudFormation – Use CloudFormation to implement infrastructure as code (IaC) templates to create resources in HealthImaging.
- AWS PrivateLink – Use Amazon VPC to establish connectivity between HealthImaging and Amazon Virtual Private Cloud without exposing data to the internet.
- Amazon EventBridge – Use EventBridge to create scalable, event-driven applications by creating rules that route HealthImaging events to targets.

Accessing AWS HealthImaging

You can access AWS HealthImaging using the AWS Management Console, AWS Command Line Interface and the AWS SDKs. This guide provides procedural instructions for the AWS Management Console and code examples for the AWS CLI and AWS SDKs.

AWS Management Console

The AWS Management Console provides a web-based user interface for managing HealthImaging and its associated resources. If you've signed up for an AWS account, you can sign in to the HealthImaging console.

AWS Command Line Interface (AWS CLI)

The AWS CLI provides commands for a broad set of AWS products, and is supported on Windows, Mac, and Linux. For more information, see the *AWS Command Line Interface User Guide*.

AWS SDKs

AWS SDKs provide libraries, code examples, and other resources for software developers. These libraries provide basic functions that automate tasks such as cryptographically signing your requests, retrying requests, and handling error responses. For more information, see Tools to Build on AWS.

HTTP requests

You can call HealthImaging actions using HTTP requests, but you must specify different endpoints depending on the type of actions being used. For more information, see Supported API actions for HTTP requests.

HIPAA eligibility and data security

This is a HIPAA Eligible Service. For more information about AWS, U.S. Health Insurance Portability and Accountability Act of 1996 (HIPAA), and using AWS services to process, store, and transmit protected health information (PHI), see HIPAA Overview.

Connections to HealthImaging containing PHI and personally identifiable information (PII) must be encrypted. By default, all connections to HealthImaging use HTTPS over TLS. HealthImaging stores encrypted customer content and operates according to the AWS Shared Responsibility Model.

For information about compliance, see Compliance validation for AWS HealthImaging.

Pricing

HealthImaging helps you automate the lifecycle management of clinical data with intelligent tiering. For more information, see Cost Optimization.

For general pricing information, see AWS HealthImaging pricing. To estimate costs, use the AWS HealthImaging pricing calculator.

Getting started with AWS HealthImaging

To start using AWS HealthImaging, set up an AWS account and create an AWS Identity and Access Management user. To use the AWS CLI or the AWS SDKs, you must install and configure them.

After learning about HealthImaging concepts and setting up, a short tutorial with code examples is available to help get you started.

Topics

AWS HealthImaging concepts

The following terminology and concepts are central to your understanding and use of AWS HealthImaging.

Concepts

Data store

A data store is a repository of medical imaging data that resides within a single AWS Region. An AWS account can have zero or many data stores. A data store has its own AWS KMS encryption key, so data in one data store can be physically and logically isolated from data in other data stores. Data stores support access control using IAM roles, permissions, and attribute-based access control.

For more information, see Managing data stores and Cost Optimization.

Image set

An image set is an AWS concept that defines an abstract grouping mechanism for optimizing related medical imaging data. When you import your DICOM P10 imaging data into an AWS HealthImaging data store, it is transformed into image sets comprised of metadata and image frames (pixel data). HealthImaging attempts to organize imported data according to the DICOM hierarchy of Study, Series, and Instance. DICOM instances that are successfully added to the HealthImaging managed hierarchy are denoted as primary image sets. Importing DICOM P10 data will either: create a new primary image set; merge instances into an existing primary image set if the instances already exist in the primary collection; or, in the case of metadata element conflicts, create a new non-primary image set.

For more information, see Importing imaging data and Understanding image sets.

Metadata

Metadata is the non-pixel attributes that exist within an image set. For DICOM, this includes patient demographics, procedure details, and other acquisition-specific parameters. AWS HealthImaging separates the image set into metadata and image frames (pixel data) so applications can access it quickly. This is helpful for image viewers, analytics, and AI/ML use cases that don't require pixel data. DICOM data normalizes at the Patient, Study, and Series levels, eliminating inconsistencies. This simplifies use of the data, increases safety, and improves access performance.

For more information, see Getting image set metadata and Metadata normalization.

Image frame

An image frame is the pixel data that exists within an image set to make up a 2D medical image. Some files retain their original transfer syntax encoding during import, while others are transcoded. Amazon Web Services data stores can be configured to transcode lossless image frames to either High-Throughput JPEG 2000 (HTJ2K) lossless or JPEG 2000 lossless. If an image frame is encoded in HTJ2K or JPEG 2000, it must be decoded prior to viewing in an image viewer. For more information, see Supported transfer syntaxes, Getting image set pixel data, and Image frame decoding libraries.

Setting up AWS HealthImaging

You must set up your AWS environment before using AWS HealthImaging. The following topics are prerequisites for the tutorial located in the next section.

Topics

- [Sign up for an AWS account]
- [Create S3 buckets]
- [Create a data store]
- [Create an IAM user with HealthImaging full access permission]
- [Create an IAM role for import]
- [Install the AWS CLI (optional)]

Sign up for an AWS account

To get started with AWS, you need an AWS account. For information about creating an AWS account, see Getting started with an AWS account in the *AWS Account Management Reference Guide*.

Create S3 buckets

To import DICOM P10 data into AWS HealthImaging, two Amazon S3 buckets are recommended. The Amazon S3 input bucket stores the DICOM P10 data to be imported and HealthImaging reads from this bucket. The Amazon S3 output bucket stores the processing results of the import job and HealthImaging writes to this bucket. For a visual representation of this, see the diagram at Understanding import jobs.

> **Note**
>
> Due to AWS Identity and Access Management (IAM) policy, your Amazon S3 bucket names must be unique. For more information, see Bucket naming rules in the *Amazon Simple Storage Service User Guide*.

For the purpose of this guide, we specify the following Amazon S3 input and output buckets in the IAM role for import.

- Input bucket: `arn:aws:s3:::`*`amzn-s3-demo-source-bucket`*
- Output bucket: `arn:aws:s3:::`*`amzn-s3-demo-logging-bucket`*

For additional information, see Creating a bucket in the *Amazon S3 User Guide*.

Create a data store

When you import your medical imaging data, the AWS HealthImaging data store holds the results of your transformed DICOM P10 files, which are called image sets. For a visual representation of this, see the diagram at Understanding import jobs.

> **Tip**
>
> A `datastoreID` is generated when you create a data store. You must use the `datastoreID` when completing the trust relationship for import later in this section.

To create a data store, see Creating a data store.

Create an IAM user with HealthImaging full access permission

> **Best practice**
>
> We suggest you create separate IAM users for different needs such as importing, data access, and data management. This aligns with Grant least privilege access in the *AWS Well-Architected Framework*.
> For the purposes of the Tutorial in the next section, you will be using a single IAM user.

To create an IAM user

1. Follow the instructions for Creating an IAM user in your AWS account in the *IAM User Guide*. Consider naming the user `ahiadmin` (or similar) for clarification purposes.
2. Assign the `AWSHealthImagingFullAccess` managed policy to the IAM user. For more information, see AWS managed policy: AWSHealthImagingFullAccess.

   > **Note**
   >
   > IAM permissions can be narrowed. For more information, see AWS managed policies for AWS HealthImaging.

Create an IAM role for import

Note

The following instructions refer to an AWS Identity and Access Management (IAM) role that grants read and write access to Amazon S3 buckets for importing your DICOM data. Although the role is required for the tutorial in the next section, we recommend you add IAM permissions to users, groups, and roles using AWS managed policies for AWS HealthImaging, because they are easier to use than writing policies yourself.

An IAM role is an IAM identity that you can create in your account that has specific permissions. To start an import job, the IAM role that calls the `StartDICOMImportJob` action must be attached to a user policy that grants access to the Amazon S3 buckets used for reading your DICOM P10 data and storing the import job processing results. It must also be assigned a trust relationship (policy) that enables AWS HealthImaging to assume the role.

To create an IAM role for import purposes

1. Using the IAM Console, create a role named `ImportJobDataAccessRole`. You use this role for the tutorial in the next section. For more information, see Creating IAM roles in the *IAM User Guide*.

   Tip

   For the purposes of this guide, the code examples in Starting an import job reference the `ImportJobDataAccessRole` IAM role.

2. Attach an IAM permission policy to the IAM role. This permission policy grants access to the Amazon S3 input and output buckets. Attach the following permission policy to the IAM role `ImportJobDataAccessRole`.

   JSON

```
{
    "Version":"2012-10-17",
    "Statement": [
        {
```

```
                "Action": [
                    "s3:ListBucket"
                ],
                "Resource": [
                    "arn:aws:s3:::amzn-s3-demo-source-bucket",
                    "arn:aws:s3:::amzn-s3-demo-logging-bucket"
                ],
                "Effect": "Allow"
            },
            {
                "Action": [
                    "s3:GetObject"
                ],
                "Resource": [
                    "arn:aws:s3:::amzn-s3-demo-source-bucket/*"
                ],
                "Effect": "Allow"
            },
            {
                "Action": [
                    "s3:PutObject"
                ],
                "Resource": [
                    "arn:aws:s3:::amzn-s3-demo-logging-bucket/*"
                ],
                "Effect": "Allow"
            }
        ]
}
```

3. Attach the following trust relationship (policy) to the `ImportJobDataAccessRole` IAM role. The trust policy requires the `datastoreId` that was generated when you completed the section [Create a data store](). The [tutorial]() following this topic assumes you are using one AWS HealthImaging data store, but with data store-specific Amazon S3 buckets, IAM roles, and trust policies.

> **Note**
>
> The `Condition` block in this trust policy helps prevent the confused deputy problem by ensuring that only your specific AWS HealthImaging data store can be accessed.

For more information about this security measure, see Cross-service confused deputy prevention in HealthImaging.

JSON

```
{
  "Version":"2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "medical-imaging.amazonaws.com"
      },
      "Action": "sts:AssumeRole"
    }
  ]
}
```

To learn more about creating and using IAM policies with AWS HealthImaging, see Identity and Access Management for AWS HealthImaging.

To learn more about IAM roles in general, see IAM roles in the *IAM User Guide*. To learn more about IAM policies and permissions in general, see IAM Policies and Permissions in the *IAM User Guide*.

Install the AWS CLI (optional)

The following procedure is required if you are using the AWS Command Line Interface. If you're using the AWS Management Console or AWS SDKs, you can skip the following procedure.

To set up the AWS CLI

1. Download and configure the AWS CLI. For instructions, see the following topics in the *AWS Command Line Interface User Guide*.
   - Installing or updating the latest version of the AWS CLI
   - Getting started with the AWS CLI
2. In the AWS CLI `config` file, add a named profile for the administrator. You use this profile when running the AWS CLI commands. Under the security principle of least privilege,

we recommend you create a separate IAM role with privileges specific to the tasks being performed. For more information about named profiles, see Configuration and credential file settings in the *AWS Command Line Interface User Guide*.

```
[default]
aws_access_key_id = default access key ID
aws_secret_access_key = default secret access key
region = region
```

3. Verify the setup using the following `help` command.

```
aws medical-imaging help
```

If the AWS CLI is configured correctly, you see a brief description of AWS HealthImaging and a list of available commands.

AWS HealthImaging tutorial

Objective

The objective of this tutorial is to import DICOM P10 binaries (`.dcm` files) into an AWS HealthImaging data store and transform them into image sets comprised of metadata and image frames (pixel data). After importing the DICOM data, you use HealthImaging cloud native actions to access the image sets, metadata, and image frames based on your access preference.

Prerequisites

All procedures listed in Setting up are required to complete this tutorial.

Tutorial steps

1. Start import job
2. Get import job properties
3. Search image sets
4. Get image set properties
5. Get image set metadata
6. Get image set pixel data
7. Delete data store

Managing data stores with AWS HealthImaging

With AWS HealthImaging, you create and manage data stores for medical image resources. The following topics describe how to use HealthImaging cloud native actions to create, describe, list, and delete data stores using the AWS Management Console, AWS CLI, and AWS SDKs.

> **Note**
>
> The last topic in this chapter is about cost optimization. After you import your medical imaging data into a HealthImaging data store, it automatically moves between two storage tiers based on time and usage. The storage tiers have different pricing levels, so it's important to understand the tier movement process and the HealthImaging resources that are recognized for billing purposes.

Topics

Creating a data store

Use the `CreateDatastore` action to create an AWS HealthImaging data store for importing DICOM P10 files. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `CreateDatastore` in the *AWS HealthImaging API Reference*. When you create a data store, you can select the default transfer syntax that AWS HealthImaging used to transcode and store lossless image frames. This configuration cannot be changed after the data store is created.

High Throughput JPEG 2000 (HTJ2K)

HTJ2K (High Throughput JPEG 2000) is the default storage format for HealthImaging datastores. It is an extension of the JPEG 2000 standard that offers significantly improved encoding and decoding performance. When you create a datastore without specifying a `–lossless-storage-`

`format`, HealthImaging automatically uses HTJ2K. See the *AWS CLI and SDKs* section below for creating a data store using HTJ2K.

JPEG 2000 Lossless

JPEG 2000 Lossless encoding allows creation of datastores that persist and retrieve lossless image frames in JPEG 2000 format without transcoding, enabling lower latency retrieval for applications that require JPEG 2000 Lossless (DICOM Transfer Syntax UID 1.2.840.10008.1.2.4.90) see Supported transfer syntaxes for more details. See the *AWS CLI and SDKs* section below for creating a data store using JPEG 2000 lossless format.

> **Important**
>
> - Do not name data stores with protected health information (PHI), personally identifiable information (PII), or other confidential or sensitive information.
> - The AWS Console supports creation of data stores with default settings. Use the AWS CLI or AWS SDK to create a data store with an optional `–lossless-storage-format` specified.

To create a data store

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Create data store page.
2. Under **Details**, for **Data store name**, enter a name for your data store.
3. Under **Data encryption**, choose an AWS KMS key for encrypting your resources. For more information, see Data protection in AWS HealthImaging.
4. Under **Tags - *optional***, you can add tags to your data store when you create it. For more information, see Tagging a resource.
5. Choose **Create data store**.

AWS CLI and SDKs

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}

###############################################################################
# function imaging_create_datastore
#
# This function creates an AWS HealthImaging data store for importing DICOM P10
 files.
#
# Parameters:
#       -n data_store_name - The name of the data store.
#
# Returns:
#       The datastore ID.
#    And:
#       0 - If successful.
#       1 - If it fails.
###############################################################################
function imaging_create_datastore() {
  local datastore_name response
  local option OPTARG # Required to use getopts command in a function.

  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_create_datastore"
    echo "Creates an AWS HealthImaging data store for importing DICOM P10 files."
    echo "  -n data_store_name - The name of the data store."
    echo ""
  }

  # Retrieve the calling parameters.
```

```
  while getopts "n:h" option; do
    case "${option}" in
      n) datastore_name="${OPTARG}" ;;
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1

  if [[ -z "$datastore_name" ]]; then
    errecho "ERROR: You must provide a data store name with the -n parameter."
    usage
    return 1
  fi

  response=$(aws medical-imaging create-datastore \
    --datastore-name "$datastore_name" \
    --output text \
    --query 'datastoreId')

  local error_code=${?}

  if [[ $error_code -ne 0 ]]; then
    aws_cli_error_log $error_code
    errecho "ERROR: AWS reports medical-imaging create-datastore operation
 failed.$response"
    return 1
  fi

  echo "$response"

  return 0
}
```

- For API details, see CreateDatastore in *AWS CLI Command Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

CLI

AWS CLI

Example 1: To create a data store

The following `create-datastore` code example creates a data store with the name `my-datastore`. When you create a datastore without specifying a `--lossless-storage-format`, AWS HealthImaging defaults to HTJ2K (High Throughput JPEG 2000).

```
aws medical-imaging create-datastore \
    --datastore-name "my-datastore"
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "datastoreStatus": "CREATING"
}
```

Example 2: To create a data store with JPEG 2000 Lossless storage format

A data store configured with JPEG 2000 Lossless storage format will transcode and persist lossless image frames in JPEG 2000 format. Image frames can then be retrieved in JPEG 2000 Lossless without transcoding. The following `create-datastore` code example creates a data store configured for JPEG 2000 Lossless storage format with the name `my-datastore`.

```
aws medical-imaging create-datastore \
    --datastore-name "my-datastore" \
    --lossless-storage-format JPEG_2000_LOSSLESS
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "datastoreStatus": "CREATING"
}
```

- For API details, see [CreateDatastore](#) in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static String createMedicalImageDatastore(MedicalImagingClient
 medicalImagingClient,
            String datastoreName) {
        try {
            CreateDatastoreRequest datastoreRequest =
 CreateDatastoreRequest.builder()
                    .datastoreName(datastoreName)
                    .build();
            CreateDatastoreResponse response =
 medicalImagingClient.createDatastore(datastoreRequest);
            return response.datastoreId();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return "";
    }
```

- For API details, see [CreateDatastore](#) in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

JavaScript

SDK for JavaScript (v3)

```
import { CreateDatastoreCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreName - The name of the data store to create.
 */
export const createDatastore = async (datastoreName = "DATASTORE_NAME") => {
  const response = await medicalImagingClient.send(
    new CreateDatastoreCommand({ datastoreName: datastoreName }),
  );
  console.log(response);
  // {
  //   '$metadata': {
  //       httpStatusCode: 200,
  //       requestId: 'a71cd65f-2382-49bf-b682-f9209d8d399b',
  //       extendedRequestId: undefined,
  //       cfId: undefined,
  //       attempts: 1,
  //       totalRetryDelay: 0
  //    },
  //    datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //    datastoreStatus: 'CREATING'
  // }
  return response;
};
```

- For API details, see CreateDatastore in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def create_datastore(self, name):
        """
        Create a data store.

        :param name: The name of the data store to create.
        :return: The data store ID.
        """
        try:
            data_store =
 self.health_imaging_client.create_datastore(datastoreName=name)
        except ClientError as err:
            logger.error(
                "Couldn't create data store %s. Here's why: %s: %s",
                name,
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return data_store["datastoreId"]
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see CreateDatastore in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_name = 'my-datastore-name'
        oo_result = lo_mig->createdatastore( iv_datastorename =
iv_datastore_name ).
        DATA(lv_datastore_id) = oo_result->get_datastoreid( ).
        MESSAGE 'Data store created.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict. Data store may already exist.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migservicequotaexcdex.
        MESSAGE 'Service quota exceeded.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see CreateDatastore in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Getting data store properties

Use the `GetDatastore` action to retrieve AWS HealthImaging data store properties. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `GetDatastore` in the *AWS HealthImaging API Reference*.

To get data store properties

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

   The **Data store details** page opens. Under the **Details** section, all data store properties are available. To view associated image sets, imports, and tags, choose the applicable tab.

AWS CLI and SDKs

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}
```

```
###############################################################################
# function imaging_get_datastore
#
# Get a data store's properties.
#
# Parameters:
#       -i data_store_id - The ID of the data store.
#
# Returns:
#       [datastore_name, datastore_id, datastore_status, datastore_arn,
 created_at, updated_at]
#    And:
#       0 - If successful.
#       1 - If it fails.
###############################################################################
function imaging_get_datastore() {
  local datastore_id option OPTARG # Required to use getopts command in a
 function.
  local error_code
  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_get_datastore"
    echo "Gets a data store's properties."
    echo "  -i datastore_id - The ID of the data store."
    echo ""
  }

  # Retrieve the calling parameters.
  while getopts "i:h" option; do
    case "${option}" in
      i) datastore_id="${OPTARG}" ;;
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1
```

```
  if [[ -z "$datastore_id" ]]; then
    errecho "ERROR: You must provide a data store ID with the -i parameter."
    usage
    return 1
  fi

  local response

  response=$(
    aws medical-imaging get-datastore \
      --datastore-id "$datastore_id" \
      --output text \
      --query "[ datastoreProperties.datastoreName,
 datastoreProperties.datastoreId, datastoreProperties.datastoreStatus,
 datastoreProperties.datastoreArn,  datastoreProperties.createdAt,
 datastoreProperties.updatedAt]"
  )
  error_code=${?}

  if [[ $error_code -ne 0 ]]; then
    aws_cli_error_log $error_code
    errecho "ERROR: AWS reports list-datastores operation failed.$response"
    return 1
  fi

  echo "$response"

  return 0
}
```

- For API details, see GetDatastore in *AWS CLI Command Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

Example 1: To get a data store's properties

The following `get-datastore` code example gets a data store's properties.

```
aws medical-imaging get-datastore \
    --datastore-id 12345678901234567890123456789012
```

Output:

```
{
    "datastoreProperties": {
        "datastoreId": "12345678901234567890123456789012",
        "datastoreName": "TestDatastore123",
        "datastoreStatus": "ACTIVE",
        "losslessStorageFormat": "HTJ2K"
        "datastoreArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012",
        "createdAt": "2022-11-15T23:33:09.643000+00:00",
        "updatedAt": "2022-11-15T23:33:09.643000+00:00"
    }
}
```

Example 2: To get data store's properties configured for JPEG2000

The following `get-datastore` code example gets a data store's properties for a data store configured for JPEG 2000 Lossless storage format.

```
aws medical-imaging get-datastore \
    --datastore-id 12345678901234567890123456789012
```

Output:

```
{
    "datastoreProperties": {
        "datastoreId": "12345678901234567890123456789012",
        "datastoreName": "TestDatastore123",
```

```
        "datastoreStatus": "ACTIVE",
        "losslessStorageFormat": "JPEG_2000_LOSSLESS",
        "datastoreArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012",
        "createdAt": "2022-11-15T23:33:09.643000+00:00",
        "updatedAt": "2022-11-15T23:33:09.643000+00:00"
    }
}
```

- For API details, see GetDatastore in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static DatastoreProperties
 getMedicalImageDatastore(MedicalImagingClient medicalImagingClient,
            String datastoreID) {
        try {
            GetDatastoreRequest datastoreRequest = GetDatastoreRequest.builder()
                    .datastoreId(datastoreID)
                    .build();
            GetDatastoreResponse response =
 medicalImagingClient.getDatastore(datastoreRequest);
            return response.datastoreProperties();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see GetDatastore in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetDatastoreCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreID - The ID of the data store.
 */
export const getDatastore = async (datastoreID = "DATASTORE_ID") => {
  const response = await medicalImagingClient.send(
    new GetDatastoreCommand({ datastoreId: datastoreID }),
  );
  console.log(response);
  // {
  //   '$metadata': {
  //       httpStatusCode: 200,
  //       requestId: '55ea7d2e-222c-4a6a-871e-4f591f40cadb',
  //       extendedRequestId: undefined,
  //       cfId: undefined,
  //       attempts: 1,
  //       totalRetryDelay: 0
  //    },
  //   datastoreProperties: {
  //        createdAt: 2023-08-04T18:50:36.239Z,
  //         datastoreArn: 'arn:aws:medical-imaging:us-
east-1:xxxxxxxxx:datastore/xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //         datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //         datastoreName: 'my_datastore',
  //         datastoreStatus: 'ACTIVE',
  //         updatedAt: 2023-08-04T18:50:36.239Z
  //   }
  // }
  return response.datastoreProperties;
};
```

- For API details, see GetDatastore in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_datastore_properties(self, datastore_id):
        """
        Get the properties of a data store.

        :param datastore_id: The ID of the data store.
        :return: The data store properties.
        """
        try:
            data_store = self.health_imaging_client.get_datastore(
                datastoreId=datastore_id
            )
        except ClientError as err:
            logger.error(
                "Couldn't get data store %s. Here's why: %s: %s",
                id,
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return data_store["datastoreProperties"]
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
```

```
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetDatastore in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        oo_result = lo_mig->getdatastore( iv_datastoreid = iv_datastore_id ).
        DATA(lo_properties) = oo_result->get_datastoreproperties( ).
        DATA(lv_name) = lo_properties->get_datastorename( ).
        DATA(lv_status) = lo_properties->get_datastorestatus( ).
        MESSAGE 'Data store properties retrieved.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Data store not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see GetDatastore in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Example availability

Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Listing data stores

Use the `ListDatastores` action to list available data stores in AWS HealthImaging. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `ListDatastores` in the *AWS HealthImaging API Reference*.

To list data stores

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

- Open the HealthImaging console Data stores page.

  All data stores are listed under the **Data stores** section.

AWS CLI and SDKs

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}

###############################################################################
# function imaging_list_datastores
#
```

```
# List the HealthImaging data stores in the account.
#
# Returns:
#       [[datastore_name, datastore_id, datastore_status]]
#    And:
#       0 - If successful.
#       1 - If it fails.
###############################################################################
function imaging_list_datastores() {
  local option OPTARG # Required to use getopts command in a function.
  local error_code
  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_list_datastores"
    echo "Lists the AWS HealthImaging data stores in the account."
    echo ""
  }

  # Retrieve the calling parameters.
  while getopts "h" option; do
    case "${option}" in
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1

  local response
  response=$(aws medical-imaging list-datastores \
    --output text \
    --query "datastoreSummaries[*][datastoreName, datastoreId, datastoreStatus]")
  error_code=${?}

  if [[ $error_code -ne 0 ]]; then
    aws_cli_error_log $error_code
    errecho "ERROR: AWS reports list-datastores operation failed.$response"
    return 1
```

```
    fi

    echo "$response"

    return 0
}
```

- For API details, see ListDatastores in *AWS CLI Command Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To list data stores

The following `list-datastores` code example lists available data stores.

```
aws medical-imaging list-datastores
```

Output:


```
{
    "datastoreSummaries": [
        {
            "datastoreId": "12345678901234567890123456789012",
            "datastoreName": "TestDatastore123",
            "datastoreStatus": "ACTIVE",
            "datastoreArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012",
            "createdAt": "2022-11-15T23:33:09.643000+00:00",
            "updatedAt": "2022-11-15T23:33:09.643000+00:00"
        }
    ]
}
```

- For API details, see ListDatastores in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static List<DatastoreSummary>
listMedicalImagingDatastores(MedicalImagingClient medicalImagingClient) {
        try {
            ListDatastoresRequest datastoreRequest =
ListDatastoresRequest.builder()
                    .build();
            ListDatastoresIterable responses =
medicalImagingClient.listDatastoresPaginator(datastoreRequest);
            List<DatastoreSummary> datastoreSummaries = new ArrayList<>();

            responses.stream().forEach(response ->
datastoreSummaries.addAll(response.datastoreSummaries()));

            return datastoreSummaries;
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see ListDatastores in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { paginateListDatastores } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

export const listDatastores = async () => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = {};
  const paginator = paginateListDatastores(paginatorConfig, commandParams);

  /**
   * @type {import("@aws-sdk/client-medical-imaging").DatastoreSummary[]}
   */
  const datastoreSummaries = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    datastoreSummaries.push(...page.datastoreSummaries);
    console.log(page);
  }
  // {
  //   '$metadata': {
  //       httpStatusCode: 200,
  //       requestId: '6aa99231-d9c2-4716-a46e-edb830116fa3',
  //       extendedRequestId: undefined,
  //       cfId: undefined,
  //       attempts: 1,
  //       totalRetryDelay: 0
  //   },
  //   datastoreSummaries: [
  //     {
  //       createdAt: 2023-08-04T18:49:54.429Z,
  //       datastoreArn: 'arn:aws:medical-imaging:us-east-1:xxxxxxxxx:datastore/
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //       datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //       datastoreName: 'my_datastore',
  //       datastoreStatus: 'ACTIVE',
  //       updatedAt: 2023-08-04T18:49:54.429Z
```

```
  //     }
  //     ...
  //   ]
  // }

  return datastoreSummaries;
};
```

- For API details, see [ListDatastores](#) in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_datastores(self):
        """
        List the data stores.

        :return: The list of data stores.
        """
        try:
            paginator =
 self.health_imaging_client.get_paginator("list_datastores")
            page_iterator = paginator.paginate()
            datastore_summaries = []
            for page in page_iterator:
                datastore_summaries.extend(page["datastoreSummaries"])
        except ClientError as err:
            logger.error(
                "Couldn't list data stores. Here's why: %s: %s",
```

```
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return datastore_summaries
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListDatastores in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    oo_result = lo_mig->listdatastores( ).
    DATA(lt_datastores) = oo_result->get_datastoresummaries( ).
    DATA(lv_count) = lines( lt_datastores ).
    MESSAGE |Found { lv_count } data stores.| TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see ListDatastores in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Deleting a data store

Use the `DeleteDatastore` action to delete an AWS HealthImaging data store. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `DeleteDatastore` in the *AWS HealthImaging API Reference*.

> **Note**
>
> Before a data store can be deleted, you must first delete all image sets within it. For more information, see Deleting an image set.

To delete a data store

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.
3. Choose **Delete**.

The **Delete data store** page opens.

4. To confirm data store deletion, enter the data store name in the text input field.
5. Choose **Delete data store**.

AWS CLI and SDKs

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}

###############################################################################
# function imaging_delete_datastore
#
# This function deletes an AWS HealthImaging data store.
#
# Parameters:
#       -i datastore_id - The ID of the data store.
#
# Returns:
#       0 - If successful.
#       1 - If it fails.
###############################################################################
function imaging_delete_datastore() {
  local datastore_id response
  local option OPTARG # Required to use getopts command in a function.

  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_delete_datastore"
    echo "Deletes an AWS HealthImaging data store."
    echo "  -i datastore_id - The ID of the data store."
    echo ""
```

```
  }

  # Retrieve the calling parameters.
  while getopts "i:h" option; do
    case "${option}" in
      i) datastore_id="${OPTARG}" ;;
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1

  if [[ -z "$datastore_id" ]]; then
    errecho "ERROR: You must provide a data store ID with the -i parameter."
    usage
    return 1
  fi

  response=$(aws medical-imaging delete-datastore \
    --datastore-id "$datastore_id")

  local error_code=${?}

  if [[ $error_code -ne 0 ]]; then
    aws_cli_error_log $error_code
    errecho "ERROR: AWS reports medical-imaging delete-datastore operation
 failed.$response"
    return 1
  fi

  return 0
}
```

- For API details, see [DeleteDatastore](#) in *AWS CLI Command Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

CLI

AWS CLI

To delete a data store

The following `delete-datastore` code example deletes a data store.

```
aws medical-imaging delete-datastore \
    --datastore-id "12345678901234567890123456789012"
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "datastoreStatus": "DELETING"
}
```

- For API details, see DeleteDatastore in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void deleteMedicalImagingDatastore(MedicalImagingClient 
 medicalImagingClient,
            String datastoreID) {
        try {
            DeleteDatastoreRequest datastoreRequest = 
 DeleteDatastoreRequest.builder()
                    .datastoreId(datastoreID)
                    .build();
            medicalImagingClient.deleteDatastore(datastoreRequest);
        } catch (MedicalImagingException e) {
```

```
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see [DeleteDatastore](#) in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

JavaScript

SDK for JavaScript (v3)

```
import { DeleteDatastoreCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store to delete.
 */
export const deleteDatastore = async (datastoreId = "DATASTORE_ID") => {
  const response = await medicalImagingClient.send(
    new DeleteDatastoreCommand({ datastoreId }),
  );
  console.log(response);
  // {
  //   '$metadata': {
  //           httpStatusCode: 200,
  //           requestId: 'f5beb409-678d-48c9-9173-9a001ee1ebb1',
  //           extendedRequestId: undefined,
  //           cfId: undefined,
  //           attempts: 1,
  //           totalRetryDelay: 0
  //        },
  //     datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //     datastoreStatus: 'DELETING'
  // }
```

```
  return response;
};
```

- For API details, see DeleteDatastore in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def delete_datastore(self, datastore_id):
        """
        Delete a data store.

        :param datastore_id: The ID of the data store.
        """
        try:
            self.health_imaging_client.delete_datastore(datastoreId=datastore_id)
        except ClientError as err:
            logger.error(
                "Couldn't delete data store %s. Here's why: %s: %s",
                datastore_id,
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see DeleteDatastore in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '12345678901234567890123456789012'
    oo_result = lo_mig->deletedatastore( iv_datastoreid = iv_datastore_id ).
    MESSAGE 'Data store deleted.' TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict. Data store may contain resources.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Data store not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see DeleteDatastore in *AWS SDK for SAP ABAP API reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Example availability

Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Using DICOMweb with AWS HealthImaging

You can retrieve DICOM objects from AWS HealthImaging using a representation of DICOMweb APIs, which are web-based APIs that follow the DICOM standard for medical imaging. This functionality enables you to interoperate with systems that utilize DICOM Part 10 binaries while simultaneously taking advantage of HealthImaging's cloud native actions. The focus of this chapter is how to use HealthImaging's implementation of DICOMweb APIs to return DICOMweb responses.

> **Important**
>
> HealthImaging stores DICOM data as image sets. Use HealthImaging cloud-native actions to manage and retrieve image sets. HealthImaging's DICOMweb APIs can be used to return image set information with DICOMweb-conformant responses.
> The APIs listed in this chapter are built in conformance to the DICOMweb standard for web-based medical imaging. Because they are representations of DICOMweb APIs, they are not offered through AWS CLI and AWS SDKs.

Topic

Storing instances with STOW-RS

AWS HealthImaging offers a representation of the `DICOMweb STOW-RS` APIs for importing data. Use these APIs to synchronously store DICOM data to your HealthImaging data store.

The following table describes the HealthImaging representations of DICOMweb STOW-RS APIs available for importing data.

HealthImaging representations of DICOMweb STOW-RS APIs

Name	Description
`StoreDICOM`	Store one or more instances to a HealthIma ging data store.
`StoreDICOMStudy`	Store one or more instances corresponding to a specified Study Instance UID to a HealthIma ging data store.

Data imported with the `StoreDICOM` and `StoreDICOMStudy` actions will be organized as new primary image sets, or added to existing primary image sets, using the same logic as asynchronous import jobs. If the metadata elements of newly imported DICOM P10 data conflict with existing primary image sets, the new data will be added to non-primary image sets.

Note

- These actions support upload of up to 1GB of DICOM data per request.
- The API response will be in the JSON format, conformant to the DICOMweb STOW-RS standard.

To initiate a StoreDICOM request

1. Collect your AWS region, HealthImaging `datastoreId`, and DICOM P10 file name.
2. Construct a URL for the request of the form: `https://dicom-medical-imaging.`*`region`*`.amazonaws.com/datastore/`*`datastore-id`*`/studies`
3. Determine the content length of the DICOM P10 file using your preferred command, for example `$(stat -f %z $FILENAME)`.
4. Prepare and send your request. `StoreDICOM` uses a HTTP POST request with AWS Signature Version 4 signing protocol.

Example 1: To store a DICOM P10 file using the StoreDICOM action

Shell

```
curl -X POST -v \
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/studies' \
  --aws-sigv4 "aws:amz:$AWS_REGION:medical-imaging" \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header "x-amz-content-sha256: STREAMING-AWS4-HMAC-SHA256-PAYLOAD" \
  --header "x-amz-decoded-content-length: $CONTENT_LENGTH" \
  --header 'Accept: application/dicom+json' \
  --header "Content-Type: application/dicom" \
  --upload-file $FILENAME
```

Example 2: To store a DICOM P10 file using the StoreDICOMStudy action

The only difference between StoreDICOM and StoreDICOMStudy is that a Study Instance UID is passed as a parameter to StoreDICOMStudy, and the uploaded instances must be members of the specified study.

Shell

```
curl -X POST -v \
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457'
 \
  --aws-sigv4 "aws:amz:$AWS_REGION:medical-imaging" \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header "x-amz-content-sha256: STREAMING-AWS4-HMAC-SHA256-PAYLOAD" \
  --header "x-amz-decoded-content-length: $CONTENT_LENGTH" \
  --header 'Accept: application/dicom+json' \
  --header "Content-Type: application/dicom" \
  --upload-file $FILENAME
```

Example 3: To store DICOM P10 files with a multi-part HTTP payload

Multiple P10 files can be uploaded with a single multi-part upload action. The following shell commands demonstrate how to assemble a multi-part payload containing two P10 files, and upload it with the `StoreDICOM` action.

Shell

```
#!/bin/sh
FILENAME=multipart.payload
BOUNDARY=2a8a02b9-0ed3-c8a7-7ebd-232427531940
boundary_str="--$BOUNDARY\r\n"
mp_header="${boundary_str}Content-Type: application/dicom\r\n\r\n"

##Encapsulate the binary DICOM file 1.
printf '%b' "$mp_header" > $FILENAME
cat file1.dcm >> $FILENAME

##Encapsulate the binary DICOM file 2 (note the additional CRLF before the part
 header).
printf '%b' "\r\n$mp_header" >> $FILENAME
cat file2.dcm >> $FILENAME

## Add the closing boundary.
printf '%b' "\r\n--$BOUNDARY--" >> $FILENAME

## Obain the payload size in bytes.
multipart_payload_size=$(stat -f%z "$FILENAME")

# Execute CURL POST request with AWS SIGv4
curl -X POST -v \
  'https://iad-dicom.external-healthlake-imaging.ai.aws.dev/datastore/
b5f34e91ca734b39a54ac11ea42416cf/studies' \
  --aws-sigv4 "aws:amz:us-east-1:medical-imaging" \
  --user "AKIAIOSFODNN7EXAMPLE:wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY" \
  --header "x-amz-content-sha256: STREAMING-AWS4-HMAC-SHA256-PAYLOAD" \
  --header "x-amz-decoded-content-length: ${multipart_payload_size}" \
  --header 'Accept: application/dicom+json' \
  --header "Content-Type: multipart/related; type=\"application/dicom\"; boundary=
\"${BOUNDARY}\"" \
  --data-binary "@$FILENAME"

# Delete the payload file
```

```
rm $FILENAME
```

Retrieving DICOM data from HealthImaging

AWS HealthImaging offers representations of `DICOMweb WADO-RS` APIs to retrieve data at the series and instance levels. With these APIs, it is possible to retrieve all metadata for a DICOM series from a HealthImaging data store. It is also possible to retrieve a DICOM instance, DICOM instance metadata, and DICOM instance frames (pixel data). HealthImaging's `DICOMweb WADO-RS` APIs offer flexibility in how you retrieve data stored in HealthImaging and provide interoperability with legacy applications.

> **Important**
>
> HealthImaging stores DICOM data as image sets. Use HealthImaging cloud native actions to manage and retrieve image sets. HealthImaging's DICOMweb APIs can be used to return image set information with DICOMweb-conformant responses.
> The APIs listed in this section are built in conformance to the DICOMweb (WADO-RS) standard for web-based medical imaging. Because they are representations of DICOMweb APIs, they are not offered through AWS CLI and AWS SDKs.

The following table describes all HealthImaging representations of DICOMweb WADO-RS APIs available for retrieving data from HealthImaging.

HealthImaging representations of DICOMweb WADO-RS APIs

Name	Description
`GetDICOMSeriesMetadata`	Retrieve DICOM instance metadata (`.json` file) for a DICOM series in a HealthImaging data store by specifying the Study and Series UIDs associated with a resource. See Retrieve series metadata.
`GetDICOMInstance`	Retrieve a DICOM instance (`.dcm` file) from a HealthImaging data store by specifying the

Name	Description
	Series, Study, and Instance UIDs associated with a resource. See Retrieve an instance.
`GetDICOMInstanceMetadata`	Retrieve DICOM instance metadata (`.json` file) from a DICOM instance in a HealthImaging data store by specifying the Series, Study, and Instance UIDs associated with a resource. See Retrieve instance metadata.
`GetDICOMInstanceFrames`	Retrieve single or batch image frames (`multipart` request) from a DICOM instance in a HealthImaging data store by specifying the Series UID, Study UID, Instance UIDs, and frame numbers associated with a resource. See Retrieve frames.

Topics

Getting a DICOM instance from HealthImaging

Use the `GetDICOMInstance` action to retrieve a DICOM instance (`.dcm` file) from a HealthImaging data store by specifying the Series, Study, and Instance UIDs associated with the resource. The API will only return instances from primary image sets unless the optional image set parameter is provided. You can retrieve any instance (from primary or non-primary image sets) in the data store by specifying the `imageSetId` as a query parameter. DICOM data can be retrieved in either its stored transfer syntax or as uncompressed (ELE) format.

To get a DICOM instance (`.dcm`)

1. Collect HealthImaging `datastoreId` and `imageSetId` parameter values.
2. Use the `GetImageSetMetadata` action with the `datastoreId` and `imageSetId` parameter values to retrieve associated metadata values for `studyInstanceUID`, `seriesInstanceUID`, and `sopInstanceUID`. For more information, see Getting image set metadata.
3. Construct a URL for the request using the values for `datastoreId`, `studyInstanceUID`, `seriesInstanceUID`, `sopInstanceUID`, and `imageSetId`. To view the entire URL path in the following example, scroll over the **Copy** button. The URL is of the form:

```
GET https://dicom-medical-imaging.region.amazonaws.com/datastore/datastore-id/
studies/study-instance-uid/series/series-instance-uid/instances/sop-instance-uid?
imageSetId=image-set-id
```

4. Prepare and send your request. `GetDICOMInstance` uses a HTTP GET request with AWS Signature Version 4 signing protocol. The following code example uses the `curl` command line tool to get a DICOM instance (`.dcm` file) from HealthImaging.

Shell

```
curl --request GET \
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/
studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457/
series/1.3.6.1.4.1.5962.1.3.4.1.20040825185059.5457/
instances/1.3.6.1.4.1.5962.1.1.4.1.1.20040826186059.5457?
imageSetId=459e50687f121185f747b67bb60d1bc8' \
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/dicom; transfer-syntax=1.2.840.10008.1.2.1' \
  --output 'dicom-instance.dcm'
```

Note

The `transfer-syntax` UID is optional and defaults to Explicit VR Little Endian if not included. Supported transfer syntaxes include:

- Explicit VR Little Endian (ELE) - `1.2.840.10008.1.2.1` (default for lossless image frames)

- If `transfer-syntax=*` then the image frame(s) will be returned in the stored transfer syntax.
- High-Throughput JPEG 2000 with RPCL Options Image Compression (Lossless Only) - `1.2.840.10008.1.2.4.202` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.202`
- JPEG 2000 Lossless - `1.2.840.10008.1.2.4.90` - if the instance is stored in HealthImaging as lossless.
- JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8-bit Image Compression - `1.2.840.10008.1.2.4.50` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.50`
- JPEG 2000 Image Compression - `1.2.840.10008.1.2.4.91` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.91`
- High-Throughput JPEG 2000 Image Compression - `1.2.840.10008.1.2.4.203` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.203`
- JPEG XL Image Compression - `1.2.840.10008.1.2.4.112` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.112`
- Instances stored in HealthImaging with one or more image frames encoded in the MPEG family of Transfer Syntaxes (which includes MPEG2, MPEG-4 AVC/H.264 and HEVC/H.265) may be retrieved with the corresponding transfer-syntax UID. For example, `1.2.840.10008.1.2.4.100` if the instance is stored as MPEG2 Main Profile Main Level.

For more information, see Supported transfer syntaxes and Image frame decoding libraries for AWS HealthImaging.

Getting DICOM instance metadata from HealthImaging

Use the `GetDICOMInstanceMetadata` action to retrieve the metadata from a DICOM instance in a HealthImaging data store by specifying the Series, Study, and Instance UIDs associated with the resource. The API will only return instance metadata from primary image sets unless the optional image set parameter is provided. You can retrieve any instance metadata (from primary or non-primary image sets) in the data store by specifying the `imageSetId` as a query parameter.

To get DICOM instance metadata (`.json`)

1. Collect HealthImaging `datastoreId` and `imageSetId` parameter values.
2. Use the [`GetImageSetMetadata`] action with the `datastoreId` and `imageSetId` parameter values to retrieve associated metadata values for `studyInstanceUID`, `seriesInstanceUID`, and `sopInstanceUID`. For more information, see [Getting image set metadata].
3. Construct a URL for the request using the values for `datastoreId`, `studyInstanceUID`, `seriesInstanceUID`, `sopInstanceUID`, and `imageSetId`. To view the entire URL path in the following example, scroll over the **Copy** button. The URL is of the form:

```
GET https://dicom-medical-imaging.region.amazonaws.com/datastore/datastore-id/
studies/study-instance-uid/series/series-instance-uid/instances/sop-instance-uid/
metadata?imageSetId=image-set-id
```

4. Prepare and send your request. `GetDICOMInstanceMetadata` uses a HTTP GET request with [AWS Signature Version 4] signing protocol. The following code example uses the `curl` command line tool to get DICOM instance metadata (`.json` file) from HealthImaging.

Shell

```
curl --request GET \
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/
studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457/
series/1.3.6.1.4.1.5962.1.3.4.1.20040825185059.5457/
instances/1.3.6.1.4.1.5962.1.1.4.1.1.20040826186059.5457/metadata?
imageSetId=459e50687f121185f747b67bb60d1bc8' \
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/dicom+json'
```

> **Note**
>
> The Transfer Syntax UID indicated in the metadata matches the Stored Transfer Syntax UID (`StoredTransferSyntaxUID`) in HealthImaging.

Getting DICOM series metadata from HealthImaging

Use the `GetDICOMSeriesMetadata` action to retrieve the metadata for a DICOM series (`.json` file) from a HealthImaging data store. You can retrieve series metadata for any primary image set in the HealthImaging data store by specifying the Study and Series UIDs associated with the resource. You can retrieve series metadata for non-Primary image sets by providing the image set ID as a query parameter. The series metadata is returned in `DICOM JSON` format.

To get DICOM series metadata (.json)

1. Collect HealthImaging `datastoreId` and `imageSetId` parameter values.
2. Construct a URL for the request using the values for `datastoreId`, `studyInstanceUID`, `seriesInstanceUID`, and optionally `imageSetId`. To view the entire URL path in the following example, scroll over the **Copy** button. The URL is of the form:

```
GET https://dicom-medical-imaging.region.amazonaws.com/datastore/datastore-id/
studies/study-instance-uid/series/series-instance-uid/metadata
```

3. Prepare and send your request. `GetDICOMSeriesMetadata` uses a HTTP GET request with AWS Signature Version 4 signing protocol. The following code example uses the `curl` command line tool to get metadata (`.json` file) from HealthImaging.

Shell

```
curl --request GET \
 'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/
studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457/
series/1.3.6.1.4.1.5962.1.3.4.1.20040825185059.5457/metadata \
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/dicom+json' \
  --output 'series-metadata.json'
```

With the optional `imageSetId` parameter.

Shell

```
curl --request GET \
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/
studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457/
series/1.3.6.1.4.1.5962.1.3.4.1.20040825185059.5457/metadata?
imageSetId=459e50687f121185f747b67bb60d1bc8' \
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/dicom+json' \
  --output 'series-metadata.json'
```

Note

- The `imageSetId` parameter is required to retrieve series metadata for non-primary image sets. The `GetDICOMInstanceMetadata` action will only return series metadata for primary image sets if the `datastoreId`, `studyInstanceUID`, `seriesInstanceUID` are specified (without an `imagesetID`).

Getting DICOM instance frames from HealthImaging

Use the `GetDICOMInstanceFrames` action to retrieve single or batch image frames (`multipart` request) from a DICOM instance in a HealthImaging data store by specifying the Series UID, Study UID, Instance UIDs, and frame numbers associated with a resource. You can specify the image set from which instance frames should be retrieved by providing the image set ID as a query parameter. The API will only return instance frames from primary image sets unless the optional image set parameter is provided. You can retrieve any instance frame (from primary or non-primary image sets) in the data store by specifying the `imageSetId` as a query parameter.

DICOM data can be retrieved in either its stored transfer syntax or as uncompressed (ELE) format.

To get DICOM instance frames (`multipart`)

1. Collect HealthImaging `datastoreId` and `imageSetId` parameter values.

2. Use the [GetImageSetMetadata] action with the `datastoreId` and `imageSetId` parameter values to retrieve associated metadata values for `studyInstanceUID`, `seriesInstanceUID`, and `sopInstanceUID`. For more information, see Getting image set metadata.
3. Determine the image frames to retrieve from the associated metadata to form the `frameList` parameter. The `frameList` parameter is a comma-separated list of one or more non-duplicate frame numbers, in any order. For example, the first image frame in the metadata will be frame 1.
   - Single-frame request: `/frames/1`
   - Multi-frame request: `/frames/1,2,3,4`
4. Construct a URL for the request using the values for `datastoreId`, `studyInstanceUID`, `seriesInstanceUID`, `sopInstanceUID`, `imageSetId`, and `frameList`. To view the entire URL path in the following example, scroll over the **Copy** button. The URL is of the form:

```
GET https://dicom-medical-imaging.region.amazonaws.com/datastore/datastore-id/
studies/study-instance-uid/series/series-instance-uid/instances/sop-instance-uid/
frames/1?imageSetId=image-set-id
```

5. Prepare and send your request. `GetDICOMInstanceFrames` uses a HTTP GET request with AWS Signature Version 4 signing protocol. The following code example uses the `curl` command line tool to get image frames in a `multipart` response from HealthImaging.

   Shell

```
curl --request GET \
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/
studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457/
series/1.3.6.1.4.1.5962.1.3.4.1.20040825185059.5457/
instances/1.3.6.1.4.1.5962.1.1.4.1.1.20040826186059.5457/frames/1?
imageSetId=459e50687f121185f747b67bb60d1bc8' \
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: multipart/related; type=application/octet-stream; transfer-
syntax=1.2.840.10008.1.2.1'
```

Note

The `transfer-syntax` UID is optional and defaults to Explicit VR Little Endian if not included. If transcoding to ELE is not feasible (due to import with warning) then pixels will be returned without transcoding. Supported transfer syntaxes include:

- Explicit VR Little Endian (ELE) - `1.2.840.10008.1.2.1` (default for lossless image frames)
- If `transfer-syntax=*` then the image frame(s) will be returned in the stored transfer syntax.
- High-Throughput JPEG 2000 with RPCL Options Image Compression (Lossless Only) - `1.2.840.10008.1.2.4.202` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.202`
- JPEG 2000 Lossless - `1.2.840.10008.1.2.4.90` - if the instance is stored in HealthImaging as lossless.
- JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8-bit Image Compression - `1.2.840.10008.1.2.4.50` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.50`
- JPEG 2000 Image Compression - `1.2.840.10008.1.2.4.91` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.91`
- High-Throughput JPEG 2000 Image Compression - `1.2.840.10008.1.2.4.203` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.203`
- JPEG XL Image Compression - `1.2.840.10008.1.2.4.112` - if the instance is stored in HealthImaging as `1.2.840.10008.1.2.4.112`
- Instances stored in HealthImaging with one or more image frames encoded in the MPEG family of Transfer Syntaxes (which includes MPEG2, MPEG-4 AVC/H.264 and HEVC/H.265) may be retrieved with the corresponding transfer-syntax UID. For example, `1.2.840.10008.1.2.4.100` if the instance is stored as MPEG2 Main Profile Main Level.
- You may receive a 406 `NotAcceptableException` if the requested transfer syntax cannot be returned based on the stored transfer syntax, or if there are specific processing warnings for the instance. If this occurs, retry the call with `transfer-syntax=*`.

For more information, see Supported transfer syntaxes and Image frame decoding libraries for AWS HealthImaging.

Getting DICOM bulkdata from HealthImaging

Use the `GetDICOMBulkdata` action to retrieve binary data that has been separated from DICOM metadata in a HealthImaging data store. When retrieving instance or series metadata, binary attributes larger than 1MB will be represented by a `BulkDataURI` instead of inline values. You can retrieve the binary data for any primary image set in the HealthImaging data store by using the `BulkDataURI` provided in the metadata response. You can retrieve bulkdata for non-Primary image sets by providing the image set ID as a query parameter.

To get DICOM bulkdata

When you retrieve DICOM metadata from a HealthImaging DICOMweb WADO-RS action, such as `GetDICOMInstanceMetadata` or `GetDICOMSeriesMetadata`, large binary attributes will be replaced in-line with BulkDataURIs, as shown below:

```
"00451026": {
    "vr": "UN",
    "BulkDataURI": "https://dicom-medical-imaging.us-west-2.amazonaws.com/datastore/
<datastoreId>/studies/<StudyInstanceUID>/series/<SeriesInstanceUID>/instances/
<SOPInstanceUID>/bulkdata/<bulkdataUriHash>"
}
```

To retrieve a DICOM element with the `GetDICOMBulkdata` action, use the following steps.

1. Construct a URL for the request using the values from the `BulkDataURI`, of the form:

```
https://dicom-medical-imaging.region.amazonaws.com/datastore/datastore-id/
studies/study-instance-uid/series/series-instance-uid/instances/sop-instance-uid/
bulkdata/bulkdata-uri-hash
```

2. Issue your `GetDICOMBulkdata` command as an HTTP GET request with AWS Signature Version 4 signing protocol. The following code example uses the `curl` command line tool to retrieve a DICOM element from a primary image set:

```
curl --request GET \
```

```
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/
studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457/
series/1.3.6.1.4.1.5962.1.3.4.1.20040825185059.5457/
instances/1.2.840.10008.5.1.4.1.1.7/bulkdata/b026324c6904b2a9cb4b88d6d61c81d1' \
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/octet-stream' \
  --output 'bulkdata.bin'
```

To retrieve a DICOM data element from a non-primary image set, supply an `ImageSetId` parameter:

```
curl --request GET \
  'https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/
d9a2a515ab294163a2d2f4069eed584c/
studies/1.3.6.1.4.1.5962.1.2.4.20040826285059.5457/
series/1.3.6.1.4.1.5962.1.3.4.1.20040825185059.5457/
instances/1.2.840.10008.5.1.4.1.1.7/bulkdata/b026324c6904b2a9cb4b88d6d61c81d1?
imageSetId=459e50687f121185f747b67bb60d1bc8' \
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/octet-stream' \
  --output 'bulkdata.bin'
```

> **Note**
>
> The `imageSetId` parameter is required to retrieve bulkdata for non-primary image sets. The GetDICOMBulkdata action will only return bulkdata for primary image sets if the `datastoreId`, `studyInstanceUID`, `seriesInstanceUID`, and `SOPInstanceUID` are specified (without an `imagesetID`).

Searching DICOM data in HealthImaging

AWS HealthImaging offers representations of [DICOMweb QIDO-RS] APIs to search for studies, series, and instances by Patient ID, and receive their unique identifiers for further usage.

HealthImaging's DICOMweb QIDO-RS APIs offer flexibility in how you search for data stored in HealthImaging and provide interoperability with legacy applications.

> **Important**
>
> HealthImaging's DICOMweb APIs can be used to return image set information with QIDO-RS. HealthImaging DICOMweb APIs reference only primary image sets unless otherwise noted. Use HealthImaging cloud native actions, or the optional image set parameter of DICOMweb actions to retrieve non-primary image sets. HealthImaging's DICOMweb APIs can be used to return image set information with DICOMweb-conformant responses. HealthImaging DICOMweb QIDO-RS actions can return a maximum of 10,000 records. In the case that more than 10,000 resources exist, they will not be retrievable via the QIDO-RS actions, but may be retrieved via DICOMweb WADO-RS actions or cloud native actions. The APIs listed in this section are built in conformance to the DICOMweb (QIDO-RS) standard for web-based medical imaging. They are not offered through AWS CLI and AWS SDKs.

DICOMweb search APIs for HealthImaging

The following table describes all HealthImaging representations of DICOMweb QIDO-RS APIs available for searching data in HealthImaging.

HealthImaging representations of DICOMweb QIDO-RS APIs

Name	Description
`SearchDICOMStudies`	Search for DICOM studies in HealthImaging by specifying search query elements using a GET request. Study search results are returned in JSON format, ordered by last update, date descending (latest to oldest). See Search for studies.
`SearchDICOMSeries`	Search for DICOM series in HealthImaging by specifying search query elements using a GET request. Series search results are returned in JSON format, ordered by `Series Number`

Name	Description
	(0020, 0011) in ascending order (oldest to latest). See Search for series.
SearchDICOMInstances	Search for DICOM instances in HealthImaging by specifying search query elements using a GET request. Instance search results are returned in JSON format, ordered by Instance Number (0020, 0013) in ascending order (oldest to latest). See Search for instances.

Supported DICOMweb query types for HealthImaging

HealthImaging supports QIDO-RS hierarchical resource queries at the Study, Series, and SOP Instance levels. When using QIDO-RS hierarchical search for HealthImaging:

- Searching for studies returns a list of Studies
- Searching for a Study's Series requires a known StudyInstanceUID and returns a list of Series
- Searching a list of Instances requires a known StudyInstanceUID and SeriesInstanceUID

The following table describes supported QIDO-RS hierarchical query types for searching data in HealthImaging.

HealthImaging supported QIDO-RS query types

Query type	Example
Attribute value queries	Search for all series in a Study where modality=CT . .../studies/1.3.6.1.4.1.14519.5.2.1.6279.6001.101370605276577556143013894866/series?00080060=CT

Query type	Example
	Search all studies where patient ID and study date are these values, respectively. `…/studies?PatientID=11235813&StudyDate=20130509`
Keyword queries	Search all series using the `SeriesInstanceUID` keyword. `.../studies/1.3.6.1.4.1.14519.5.2.1.6279.6001.101370605276577556143013894866/series?SeriesInstanceUID=1.3.6.1.4.1.14519.5.2.1.6279.6001.101370605276577556143013894868`
Tag queries	Search for tags using query parameters passed in group/element form. {group}{element} like 0020000D
Range queries	`...?Modality=CT&StudyDate=AABBYYYY-BBCCYYYY`
Result paging with `limit` and `offset`	`.../studies?limit=1&offset=0&00080020=20000101` You can use the limit and offset parameters to paginate search responses. The default value of limit is 1000, and see [AWS HealthImaging endpoints and quotas](#) for the maximum value. Max limit = 1000, Max offset = 9000

Query type	Example

Wildcard queries	Wildcard queries provide more flexibility on search using "*" and "?". "*" matches any sequence of characters (including a zero length value) and "?" matches any single character.
	
	Search for all studies in a datastore where StudyDescription contains "Nuclear":
	
	`.../studies?StudyDescription=*Nuclear*`
	
	Search for all studies where StudyDescription ends with "Nuclear":
	
	`.../studies?StudyDescription=*Nuclear`
	
	Search for all studies where StudyDescription starts with "Nuclear":
	
	`.../studies?StudyDescription=Nuclear*`
	
	Search for all studies where PatientID has exactly any 3 characters after 200965981:
	
	`.../studies?PatientID=200965981???`

Query type	Example
FuzzyMatching queries	Enable fuzzy matching on name DICOM attributes (PatientName (0010,0010), ReferringPhysicianName(0008,0090)) by adding the fuzzymatching optional query parameter: `.../studies?fuzzymatching=true&PatientName="Thomas^Albert"` This query performs case-insensitive prefix word matching on any part of the PatientName value. It returns results with PatientName values like "thomas", "Albert", "Thomas Albert", "Thomas^Albert", but not "hom" or "ber".

Query type	Example

IncludeField queries	Use the `includefield` query parameter to request additional DICOM attributes beyond the default response set.
	
	Return specific attributes by tag:
	
	`.../studies?PatientID=11235813&includefield=00101081&includefield=PatientWeight`
	
	Return all available attributes:
	
	`.../studies?PatientID=11235813&includefield=all`
	
	Return sequence (SQ) sub-attributes using dotted notation:
	
	`.../studies?PatientID=11235813&includefield=00080096.00080100`
	
	Return private data elements:
	
	`.../instances?includefield=00191001&00190010=Philips`

Using IncludeField in QIDO-RS queries

The `includefield` query parameter lets you request additional DICOM attributes beyond the default response set in HealthImaging QIDO-RS queries. You can use `includefield` at the study, series, and instance levels.

Syntax

Use the following GET request format to include additional fields in your QIDO-RS queries:

```
GET .../studies?<query_params>&includefield=<tag_or_keyword>
GET .../studies/<StudyInstanceUID>/series?<query_params>&includefield=<tag_or_keyword>
GET .../studies/<StudyInstanceUID>/series/<SeriesInstanceUID>/instances?
<query_params>&includefield=<tag_or_keyword>
```

You can specify multiple `includefield` parameters in a single request:

```
GET .../studies?
PatientID=11235813&includefield=00101081&includefield=00101030&includefield=00101010
```

Supported values for includefield

The following table describes the supported values for the `includefield` parameter.

Supported includefield values

Value type	Description	Example
DICOM tag (8 hex characters)	Request a specific DICOM attribute by its tag in GGGGEEEE format.	`includefield=00081030`
`all`	Request all available DICOM attributes for the resource level.	`includefield=all`
Dotted SQ path	Request a specific sub-attribute within a Sequence (SQ) attribute using dot notation: <parent_tag>.<child_tag>.	`includefield=00080096.00080100`
Private data element tag	Request a private tag (odd-group element). Requires the `privateCreatorElement` parameter.	`includefield=00191001`
Standard DICOM attributes including bulkdata	Request specific single or multiple attributes by tag or keyword.	`includefield=00102201`

Behavior and rules

The following rules apply to `includefield` queries:

- **Default response** – Without `includefield`, the QIDO-RS response returns only the standard set of attributes.
- **includefield=all** – Returns all available attributes at the requested level. When `all` is combined with other `includefield` values, `all` takes priority.
- **Maximum tags** – A request can include up to 50 `includefield` parameters.
- **Duplicate tags** – Duplicate `includefield` values are deduplicated and treated as a single request.
- **Invalid or missing tags** – If a requested tag does not exist in the DICOM data or is invalid, it is silently omitted from the response. Other valid `includefield` attributes are still returned.

Sequence (SQ) attributes

Use dot notation to request nested attributes within a Sequence (SQ) attribute:

```
includefield=<parent_SQ_tag>.<child_tag>
```

For example, to retrieve CodeValue (0008,0100) within ReferringPhysicianIdentificationSequence (0008,0096):

```
GET .../studies?PatientID=11235813&includefield=00080096.00080100
```

Multi-level nesting is supported. For example:

```
includefield=00081115.00081199.00081150
```

Private tags

Private DICOM data elements (odd-group tags) are supported at all resource levels. To request private tags, include the `privateCreatorElement` query parameter.

Use the following syntax:

```
GET .../instances?includefield=<private_tag>&<creator_tag>=<creator_name>
```

For example:

```
GET .../instances?includefield=00191001&00190010=Philips
```

The following rules apply to private tags:

- The `privateCreatorElement` tag and creator name must be provided as a match parameter if the private tag is requested.
- If the specified `privateCreatorElement` is not found, the private tag is silently omitted.
- Requesting only a `privateCreatorElement` tag without a private data element returns the creator element name and value only. It does not return all tags belonging to that creator's block.

Bulkdata tags

DICOM attributes with bulkdata VRs (OB, OD, OF, OL, UN, OW, OV) with binary value greater than 1 MB requested as part of the `includefield` are returned as `bulkdataURI` instead of the raw binary value. For more information about retrieving bulkdata, see Retrieving DICOM bulkdata in HealthImaging.

What does includefield=all return at each level?

When `includefield=all` is specified, the response includes all attributes at the specific resource level.

Study level (includefield=all)

The following table lists all attributes returned at the study level when `includefield=all` is specified.

Study level attributes for includefield=all

Tag	Name	VR
00080005	SpecificCharacterSet	CS
00080020	StudyDate	DA
00080030	StudyTime	TM
00080050	AccessionNumber	SH
00080051	IssuerOfAccessionNumberSequence	SQ

Tag	Name	VR
00080056	InstanceAvailability	CS
00080061	ModalitiesInStudy	CS
00080062	SOPClassesInStudy	UI
00080090	ReferringPhysicianName	PN
0008009C	ConsultingPhysicianName	PN
00080201	TimezoneOffsetFromUTC	SH
00081030	StudyDescription	LO
00081048	PhysiciansOfRecord	PN
00081060	NameOfPhysiciansReadingStudy	PN
00081080	AdmittingDiagnosesDescription	LO
00081190	RetrieveURL	UR
00100010	PatientName	PN
00100020	PatientID	LO
00100021	IssuerOfPatientID	LO
00100022	TypeOfPatientID	CS
00100026	SourcePatientGroupIdentificationSequence	SQ
00100027	GroupOfPatientsIdentificationSequence	SQ
00100028	SubjectRelativePositionInImage	US
00100030	PatientBirthDate	DA
00100032	PatientBirthTime	TM

Tag	Name	VR
00100033	PatientBirthDateInAlternativeCalendar	LO
00100034	PatientDeathDateInAlternativeCalendar	LO
00100035	PatientAlternativeCalendar	CS
00100040	PatientSex	CS
00100050	PatientInsurancePlanCodeSequence	SQ
00100101	PatientPrimaryLanguageCodeSequence	SQ
00100102	PatientPrimaryLanguageModifierCodeSequence	SQ
00100200	QualityControlSubject	CS
00100201	QualityControlSubjectTypeCodeSequence	SQ
00100213	StrainNomenclature	LO
00100214	StrainStockNumber	LO
00100215	StrainSourceRegistryCodeSequence	SQ
00100217	StrainSource	LO
00100219	StrainCodeSequence	SQ
00100223	GeneticModificationsNomenclature	LO
00100229	GeneticModificationsCodeSequence	SQ
00101001	OtherPatientNames	PN
00101005	PatientBirthName	PN
00101010	PatientAge	AS
00101020	PatientSize	DS

Tag	Name	VR
00101021	PatientSizeCodeSequence	SQ
00101022	PatientBodyMassIndex	DS
00101023	MeasuredAPDimension	DS
00101024	MeasuredLateralDimension	DS
00101030	PatientWeight	DS
00101040	PatientAddress	LO
00101060	PatientMotherBirthName	PN
00101080	MilitaryRank	LO
00101081	BranchOfService	LO
00102000	MedicalAlerts	LO
00102110	Allergies	LO
00102150	CountryOfResidence	LO
00102152	RegionOfResidence	LO
00102154	PatientTelephoneNumbers	SH
00102160	EthnicGroup	SH
00102180	Occupation	SH
001021A0	SmokingStatus	CS
001021C0	PregnancyStatus	US
001021D0	LastMenstrualDate	DA
001021F0	PatientReligiousPreference	LO

Tag	Name	VR
00102201	PatientSpeciesDescription	LO
00102202	PatientSpeciesCodeSequence	SQ
00102203	PatientSexNeutered	CS
00102210	AnatomicalOrientationType	CS
00102292	PatientBreedDescription	LO
00102293	PatientBreedCodeSequence	SQ
00102295	BreedRegistrationNumber	LO
00102296	BreedRegistryCodeSequence	SQ
00102297	ResponsiblePerson	PN
00102298	ResponsiblePersonRole	CS
00102299	ResponsibleOrganization	LO
00109431	ExaminedBodyThickness	FL
0020000D	StudyInstanceUID	UI
00200010	StudyID	SH
00201206	NumberOfStudyRelatedSeries	IS
00201208	NumberOfStudyRelatedInstances	IS
00321032	RequestingPhysician	PN
00321033	RequestingService	LO
00321060	RequestedProcedureDescription	LO
00321070	RequestedContrastAgent	LO

Tag	Name	VR
00380010	AdmissionID	LO
00380016	RouteOfAdmissions	LO
00380020	AdmittingDate	DA
00380021	AdmittingTime	TM
00380050	SpecialNeeds	LO
00380060	ServiceEpisodeID	LO
00380062	ServiceEpisodeDescription	LO
00380300	CurrentPatientLocation	LO
00380400	PatientInstitutionResidence	LO
00380500	PatientState	LO
00400244	PerformedProcedureStepStartDate	DA
00400245	PerformedProcedureStepStartTime	TM
00400250	PerformedProcedureStepEndDate	DA
00400251	PerformedProcedureStepEndTime	TM
00400253	PerformedProcedureStepID	SH
00081032	ProcedureCodeSequence	SQ
00100024	IssuerOfPatientIDQualifiersSequence	SQ
00321034	RequestingServiceCodeSequence	SQ
00321064	RequestedProcedureCodeSequence	SQ
00401012	ReasonForPerformedProcedureCodeSequence	SQ

Series level (includefield=all)

The following table lists the series-level attributes returned when `includefield=all` is specified. The series level also returns all study-level attributes listed in the preceding table.

Series level attributes for includefield=all

Tag	Name	VR
00080021	SeriesDate	DA
00080031	SeriesTime	TM
00080060	Modality	CS
00080064	ConversionType	CS
00080068	PresentationIntentType	CS
00080070	Manufacturer	LO
00080080	InstitutionName	LO
00080082	InstitutionCodeSequence	SQ
00081010	StationName	SH
0008103E	SeriesDescription	LO
0008103F	SeriesDescriptionCodeSequence	SQ
00081040	InstitutionalDepartmentName	LO
00081041	InstitutionalDepartmentTypeCodeSequence	SQ
00081050	PerformingPhysicianName	PN
00081070	OperatorsName	PN
00081090	ManufacturerModelName	LO
00180010	ContrastBolusAgent	LO

Tag	Name	VR
00180015	BodyPartExamined	CS
00180050	SliceThickness	DS
00180088	SpacingBetweenSlices	DS
00181000	DeviceSerialNumber	LO
00181016	SecondaryCaptureDeviceManufacturer	LO
00181018	SecondaryCaptureDeviceManufacturerModelName	LO
00181019	SecondaryCaptureDeviceSoftwareVersions	LO
00181020	SoftwareVersions	LO
00181030	ProtocolName	LO
00181050	SpatialResolution	DS
00181200	DateOfLastCalibration	DA
00181201	TimeOfLastCalibration	TM
00185100	PatientPosition	CS
0020000D	StudyInstanceUID	UI
0020000E	SeriesInstanceUID	UI
00200011	SeriesNumber	IS
00200052	FrameOfReferenceUID	UI
00200060	Laterality	CS
00201209	NumberOfSeriesRelatedInstances	IS
00540081	NumberOfSlices	US

Tag	Name	VR
00540101	NumberOfTimeSlices	US
00541000	SeriesType	CS

Instance level (includefield=all)

At the instance level, `includefield=all` returns the full instance-level DICOM metadata. This includes all attributes stored in the instance metadata in HealthImaging storage. Every DICOM tag present in the original DICOM file for that instance is returned, except the pixel data attribute.

Topics

Searching for DICOM studies in HealthImaging

Use the `SearchDICOMStudies` API to search for DICOM studies in a HealthImaging data store. You can search for DICOM studies in HealthImaging by constructing a URL that includes supported DICOM data elements (attributes). Study search results are returned in JSON format, ordered by last update, date descending (latest to oldest).

To search for DICOM studies

1. Collect HealthImaging `region` and `datastoreId` values. For more information, see Getting data store properties.
2. Construct a URL for the request, including all applicable Study elements. To view the entire URL path in the following example, scroll over the **Copy** button. The URL is of the form:

```
GET https://dicom-medical-imaging.region.amazonaws.com/datastore/datastoreId/
studies[?query]
```

Study elements for `SearchDICOMStudies`

DICOM element tag	DICOM element name
`(0008,0020)`	`Study Date`
`(0008,0030)`	`StudyTime`
`(0008,0050)`	`Accession Number`
`(0008,0061)`	`Modalities in Study`
`(0008,0090)`	`Referring Physician Name`
`(0008,1030)`	`Study Description`
`(0010,0010)`	`Patient Name`
`(0010,0020)`	`Patient ID`
`(0010,0030)`	`Patient BirthDate`
`(0010,0032)`	`Patient BirthTime`
`(0020,000D)`	`Study Instance UID`
`(0020,0010)`	`Study ID`

3. Prepare and send your request. `SearchDICOMStudies` uses a HTTP GET request with AWS Signature Version 4 signing protocol. The following example uses the `curl` command line tool to search for information about DICOM studies.

   curl

```
curl --request GET \
  "https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/datastoreId/
studies[?query]"
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/dicom+json' \
```

```
  --output results.json
```

Study search results are returned in JSON format, ordered by last update, date descending (latest to oldest).

Searching for DICOM series in HealthImaging

Use the `SearchDICOMSeries` API to search for DICOM series in a HealthImaging data store. You can search for DICOM series in HealthImaging by constructing a URL that includes supported DICOM data elements (attributes). Series search results are returned in JSON format, ordered by ascending (oldest to latest).

To search for DICOM series

1. Collect HealthImaging `region` and `datastoreId` values. For more information, see Getting data store properties.
2. Collect the `StudyInstanceUID` value. For more information, see Getting image set metadata.
3. Construct a URL for the request, including all applicable Series elements. To view the entire URL path in the following example, scroll over the **Copy** button. The URL is of the form:

```
GET https://dicom-medical-imaging.region.amazonaws.com/datastore/datastoreId/
studies/StudyInstanceUID/series[?query]
```

Series elements for `SearchDICOMSeries`

DICOM element tag	DICOM element name
`(0008,0060)`	`Modality`
`(0020,000E)`	`Series Instance UID`

4. Prepare and send your request. `SearchDICOMSeries` uses a HTTP GET request with AWS Signature Version 4 signing protocol. The following example uses the `curl` command line tool to search for DICOM series information.

curl

```
curl --request GET \
```

```
  "https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/datastoreId/
studies/StudyInstanceUID/series[?query]"
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/dicom+json' \
  --output results.json
```

Series search results are returned in JSON format, ordered by `Series Number (0020,0011)` in ascending order (oldest to latest).

Searching for DICOM instances in HealthImaging

Use the `SearchDICOMInstances` API to search for DICOM instances in a HealthImaging data store. You can search for DICOM instances in HealthImaging by constructing a URL that includes supported DICOM data elements (attributes). The Instance results are returned in JSON format, ordered by ascending (oldest to latest).

To search for DICOM instances

1. Collect HealthImaging `region` and `datastoreId` values. For more information, see Getting data store properties.
2. Collect values for `StudyInstanceUID` and `SeriesInstanceUID`. For more information, see Getting image set metadata.
3. Construct a URL for the request, including all applicable search elements. To view the entire URL path in the following example, scroll over the **Copy** button. The URL is of the form:

```
GET https://dicom-medical-imaging.region.amazonaws.com/datastore/datastoreId/
studies/StudyInstanceUID/series/SeriesInstanceUID/instances[?query]
```

Instance elements for `SearchDICOMInstances`

DICOM element tag	DICOM element name
(0008,0016)	SOP Class UID
(0008,0018)	SOP Instance UID

DICOM element tag	DICOM element name
(0008,1196)	WarningReason

HealthImaging uses the DICOM element (0008,1196) to persist import warning codes. The import warning codes are searchable at the instance level. Import warning codes may be searched with wildcard or specific warning codes. See HealthImaging Warning Codes.

4. Prepare and send your request. `SearchDICOMInstances` uses a HTTP GET request with AWS Signature Version 4 signing protocol. The following example uses the `curl` command line tool to search for information about DICOM instances.

curl

```
curl --request GET \
  "https://dicom-medical-imaging.us-east-1.amazonaws.com/datastore/datastoreId/
studies/StudyInstanceUID/series/SeriesInstanceUID/instances[?query]"
  --aws-sigv4 'aws:amz:us-east-1:medical-imaging' \
  --user "$AWS_ACCESS_KEY_ID:$AWS_SECRET_ACCESS_KEY" \
  --header "x-amz-security-token:$AWS_SESSION_TOKEN" \
  --header 'Accept: application/dicom+json' \
  --output results.json
```

Instance search results are returned in JSON format, ordered by `Instance Number (0020,0013)` in ascending order (oldest to latest)

OIDC authentication for DICOMweb APIs

AWS HealthImaging supports OAuth 2.0-based authentication for DICOMweb API requests using OpenID Connect (OIDC), in addition to the existing AWS Signature Version 4 (SigV4) authentication. OIDC enables you to integrate HealthImaging directly with external identity providers (IdPs) and enables you to provide standards-based applications access to your medical imaging data through HealthImaging DICOMweb endpoints without requiring each application to have AWS credentials.

Topics

Custom Token Verification with Lambda Authorizers

HealthImaging implements OIDC support through an architecture that uses Lambda authorizers, allowing customers to implement their own token verification logic. This design gives you flexible control over how tokens are validated and how access decisions are enforced, accommodating for a diverse landscape of OIDC-compatible Identity Providers (IdPs) and varying token verification methods.

Authentication Flow

Here's how the authentication works at a high level:

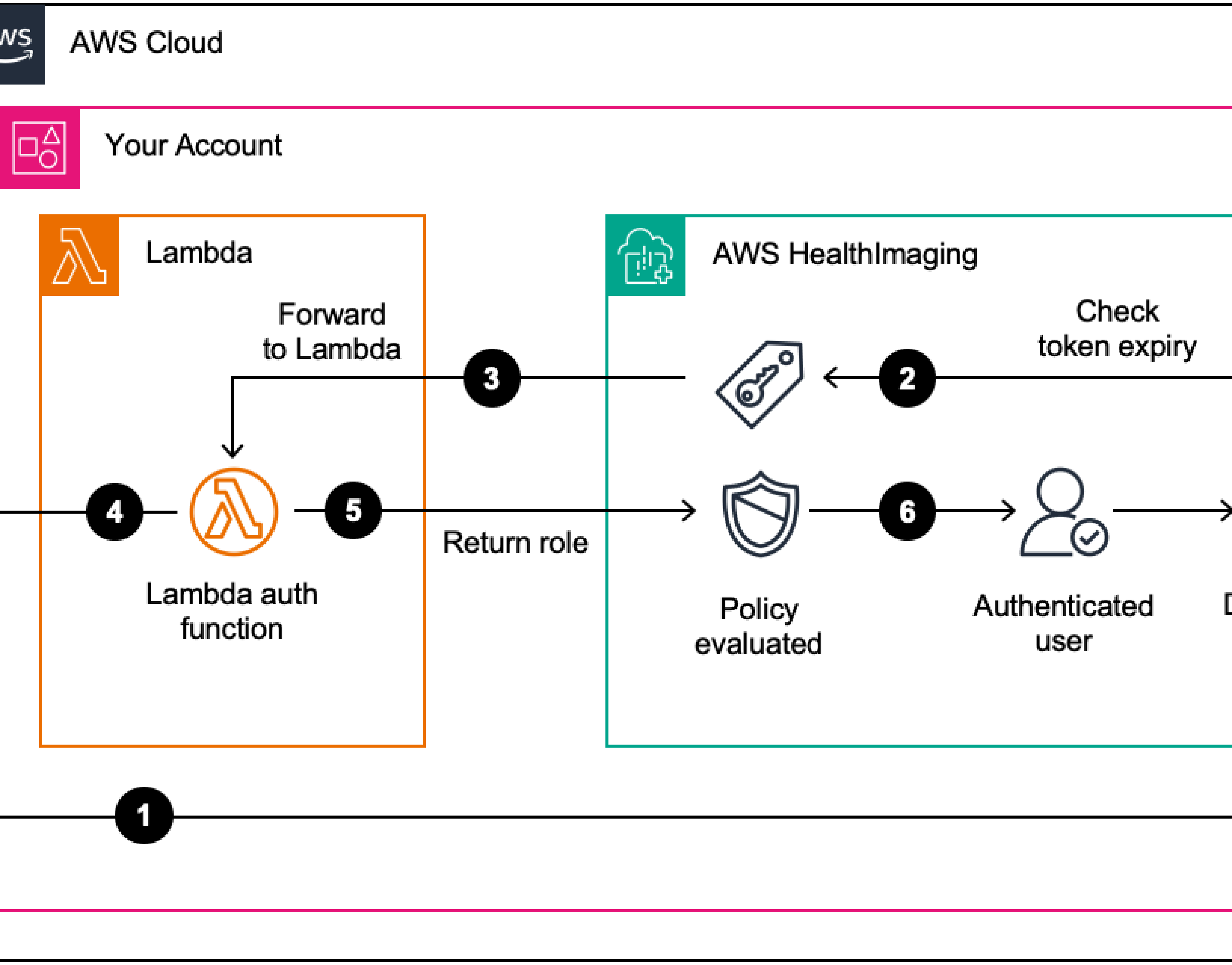
1. **Client calls the DICOMweb API:** Your application authenticates with your chosen OIDC identity provider and receives a signed ID token (JWT). For each DICOMweb HTTP request, the client must include the OIDC access token in the Authorization header (typically a Bearer token). Before the request reaches your data, HealthImaging extracts this token from the incoming request and calls a Lambda authorizer that you configure.
    a. The header typically follows the format: `Authorization: Bearer <token>`.
2. **Initial verification:** HealthImaging verifies access token claims in order to quickly reject any obviously invalid or expired tokens without invoking the Lambda function unnecessarily. HealthImaging performs an initial verification of certain standard claims in the access token before invoking the Lambda authorizer:
    a. `iat` (Issued At): HealthImaging checks if the token's issue time is within acceptable limits.
    b. `exp` (Expiration Time): HealthImaging verifies that the token has not expired.
    c. `nbf` (Not Before Time): If present, HealthImaging ensures the token is not being used before its valid start time.
3. **HealthImaging invokes a Lambda authorizer:** If the initial claim verification passes, HealthImaging then delegates further token verification to the customer-configured Lambda authorizer function. HealthImaging passes the extracted token and other relevant request information to the Lambda function. The Lambda function verifies the token's signature and claims.
4. **Verify with an identity provider:** The Lambda contains custom code that checks the ID token signature, performs more extensive token verification (e.g., issuer, audience, custom claims), and validates those claims against the IdP when necessary.
5. **Authorizer returns an access policy:** After successful verification, the Lambda function determines the appropriate permissions for the authenticated use. The Lambda authorizer then

returns the amazon resource name (ARN) of an IAM role that represents the set of permissions to be granted.

6. **Request execution:** If the assumed IAM role has the necessary permissions, HealthImaging proceeds with returning the requested DICOMWeb resource. If the permissions are insufficient, HealthImaging denies the request and returns an appropriate error response error (i.e., 403 Forbidden).

> **Note**
>
> The authorizer lambda function it not managed by AWS HealthImaging service. It executes in your AWS account. Customers are charged for the function invocation and execution time separately then their HealthImaging charges.

Architecture Overview



OIDC authentication workflow with Lambda authorizer

Prerequisites

Access Token Requirements

HealthImaging requires the access token to be in JSON Web Token (JWT) format. Many Identity Providers (IDPs) offer this token format natively, while others allow you to select or configure the access token form. Ensure your chosen IDP can issue JWT tokens before proceeding with the integration.

Token Format

The access token must be in JWT (JSON Web Token) format

Required Claims

`exp` (Expiration Time)

Required claim that specifies when the token becomes invalid.

- Must be after the current time in UTC
- Represents when the token becomes invalid

`iat` (Issued At)

Required claim that specifies when the token was issued.

- Must be before the current time in UTC
- Must NOT be earlier than 12 hours before the current time in UTC
- This effectively enforces a maximum token lifetime of 12 hours

`nbf` (Not Before Time)

Optional claim that specifies the earliest time the token can be used.

- If present, will be evaluated by HealthImaging
- Specifies the time before which the token must not be accepted

Lambda authorizer response time requirements

HealthImaging enforces strict timing requirements for Lambda authorizer responses to ensure optimal API performance. Your Lambda function **must** return within 1 second.

Best practices

Optimize Token Verification

- Cache JWKS (JSON Web Key Sets) when possible
- Cache valid access tokens when possible
- Minimize network calls to your Identity Provider
- Implement efficient token validation logic

Lambda Configuration

- Python and Node.js based functions typically initialize faster
- Reduce the amount of external libraries to load
- Configure appropriate memory allocation to ensure consistent performance
- Monitor execution times using CloudWatch metrics

OIDC Authentication Enablement

- OIDC authentication can **only** be enabled when creating a **new** datastore
- Enabling OIDC for existing datastores is not supported through the API
- To enable OIDC on an existing datastore, customers must contact AWS Support

Set up an AWS Lambda authorizer for OIDC authentication

This guide assumes you have already configured your Identity Provider (IdP) of choice to provide access tokens compatible with the requirements of the HealthImaging OIDC authentication feature.

1. Configure IAM Roles for DICOMWeb API Access

Before configuring the Lambda authorizer, create IAM roles for HealthImaging to assume when processing DICOMWeb API requests. The authorizer Lambda function returns one of these roles ARN after successful token verification, allowing HealthImaging to execute the requests with appropriate permissions.

1. Create IAM policies defining the desired DICOMWeb API privileges. Refer to the "Using DICOMweb" section of the HealthImaging documentation for available permissions.

2. Create IAM roles that:
   - Attach these policies
   - Include a trust relationship allowing the AWS HealthImaging service principal (`medical-imaging.amazonaws.com`) to assume these roles.

Here is an example of a policy allowing associated roles to access to HealthImaging DICOMWeb read-only API:

JSON

```
{
    "Version":"2012-10-17",
    "Statement": [
        {
            "Sid": "MedicalImagingDicomWebOperations",
            "Effect": "Allow",
            "Action": [
                "medical-imaging:SearchDICOMInstances",
                "medical-imaging:GetImageSetMetadata",
                "medical-imaging:GetDICOMSeriesMetadata",
                "medical-imaging:SearchDICOMStudies",
                "medical-imaging:GetDICOMBulkdata",
                "medical-imaging:SearchDICOMSeries",
                "medical-imaging:GetDICOMInstanceMetadata",
                "medical-imaging:GetDICOMInstance",
                "medical-imaging:GetDICOMInstanceFrames"
            ],
            "Resource": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/datastore-123"
        }
    ]
}
```

Here is an example of the trust relationship policy that should be associated to the role(s):

JSON

```
{
```

```
    "Version":"2012-10-17",
    "Statement": [
        {
            "Sid": "OIDCRoleFederation",
            "Effect": "Allow",
            "Principal": {
                "Service": "medical-imaging.amazonaws.com"
        },
            "Action": "sts:AssumeRole"
        }
    ]
}
```

The Lambda authorizer you'll create in the next step can evaluate the token claims and return the ARN of the appropriate role. AWS HealthImaging will then impersonate this role to execute the DICOMWeb API request with the corresponding permissions.

For example:

- A token with "admin" claims might return an ARN for a role with full access
- A token with "reader" claims might return an ARN for a role with read-only access
- A token with "department_A" claims might return an ARN for a role specific to that department's access level

This mechanism allows you to map your IdP's authorization model to specific AWS HealthImaging permissions through IAM roles.

2. Create and Configure Lambda Authorizer Function

Create a Lambda function that will verify the JWT token and return the appropriate IAM role ARN based on the token claims evaluation. This function is invoked by the health imaging service and passed an event that contains the HealthImaging datastore Id, the DICOMWeb operation, and the access token found in the HTTP request:

```
{
  "datastoreId": "{datastore id}",
  "operation": "{Healthimaging API name e.g. GetDICOMInstance}",
  "bearerToken": "{access token}"
}
```

The Lambda authorizer function must return a JSON response with the following structure:

```
{
  "isTokenValid": {true or false},
  "roleArn": "{role arn or empty string meaning to deny the request explicitly}"
}
```

You can refer to the implementation example for more information.

> **Note**
>
> Because the DICOMWeb request is only answered after the access token is verified by the lambda authorizer, it is important that the execution of this function be as fast as possible to provide with the best DICOMWeb API response time.

For the HealthImaging service to be authorized to invoke the lambda authorizer function, it must have a resource policy that allows HealthImaging service to invoke it. This resource policy can be created in the permission menu of the lambda configuration tab or Using AWS CLI:

```
aws lambda add-permission \
    --function-name YourAuthorizerFunctionName \
    --statement-id HealthImagingInvoke \
    --action lambda:InvokeFunction \
    --principal medical-imaging.amazonaws.com
```

This resource policy allows the HealthImaging service to invoke your Lambda authorizer when authenticating DICOMWeb API requests.

> **Note**
>
> The lambda resource policy can be updated later on with an "ArnLike" condition matching the ARN of a specific HealthImaging datastore.

Here is an example of lambda resource policy:

JSON

```
{
  "Version":"2012-10-17",
  "Id": "default",
  "Statement": [
    {
      "Sid": "LambdaAuthorizer-HealthImagingInvokePermission",
      "Effect": "Allow",
      "Principal": {
        "Service": "medical-imaging.amazonaws.com"
      },
      "Action": "lambda:InvokeFunction",
      "Resource": "arn:aws:lambda:us-east-1:123456789012::function:
{LambdaAuthorizerFunctionName}",
      "Condition": {
        "ArnLike": {
          "AWS:SourceArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/datastore-123"
        }
      }
    }
  ]
}
```

3. Create a New Datastore with OIDC Authentication

To enable OIDC authentication, you must create a new datastore using the AWS CLI with the parameter "lambda-authorizer-arn". OIDC Authentication cannot be enabled on existing datastores without contacting AWS Support.

Here's an example of how to create a new datastore with OIDC authentication enabled:

```
aws medical-imaging create-datastore \
    --datastore-name YourDatastoreName \
    --lambda-authorizer-arn YourAuthorizerFunctionArn
```

You can check if a specific datastore has OIDC authentication feature enabled by using the AWS CLI get-datastore command, and verifying if the attribute "lambdaAuthorizerArn" is present:

```
aws medical-imaging get-datastore --datastore-id YourDatastoreId
```

```
{
    "datastoreProperties": {
        "datastoreId": YourdatastoreId,
        "datastoreName": YourDatastoreName,
        "datastoreStatus": "ACTIVE",
        "lambdaAuthorizerArn": YourAuthorizerFunctionArn,
        "datastoreArn": YourDatastoreArn,
        "createdAt": "2025-09-30T14:16:04.015000-05:00",
        "updatedAt": "2025-09-30T14:16:04.015000-05:00"
    }
}
```

Note

The execution role for the AWS CLI datastore creation command must have appropriate permissions to invoke the Lambda authorizer function. This mitigates privilege escalation attacks where malicious users could execute unauthorized Lambda functions through the datastore authorizer configuration.

Exception Codes

In case of authentication failure HealthImaging returns the following HTTP error response codes and body messages:

Condition	AHI response
Lambda Authorizer does not exist or is invalid	**424** Authorizer Misconfiguration
Authorizer terminated due to execution failure	**424** Authorizer Failed
Any other unmapped authorizer error	**424** Authorizer Failed

Condition	AHI response
Authorizer returned invalid/i ll-formed response	**424** Authorizer Misconfiguration
Authorizer ran more than 1s	**408** Authorizer Timeout
Token is expired or otherwise invalid	**403** Invalid or Expired Token
AHI can't federate the returned IAM Role due to authorizer misconfiguration	**424** Authorizer Misconfiguration
Authorizer returned an empty Role	**403** Access Denied
Returned Role is not callable (assume-role/trust misconfig)	**424** Authorizer Misconfiguration
Request rate exceeds DICOMweb Gateway limits	**429** Too many requests
Datastore, Return Role, or Authorizer Cross Account/C ross Region	**424** Authorizer Cross Account/Cross Region Access

Implementation Example

This Python example demonstrates a lambda authorizer function that verifies AWS Cognito access tokens from HealthImaging events and returns an IAM role ARN with appropriate DICOMWeb privileges.

The Lambda authorizer implements two caching mechanisms to reduce external calls and response latency. The JWKS (JSON Web Key Set) is fetched once every hour and stored in the function's temporary folder, allowing subsequent function invocations to read it locally instead of fetching from the public network. You will also notice that a token_cache dictionary object is instantiated in the global context of this Lambda function. Global variables are shared by all invocations that reuse the same warmed Lambda context. Thanks to this, successfully verified tokens can be stored in this dictionary and looked up quickly during the next execution of this same Lambda function. The caching method represents a generalist approach that could fit access tokens issued from most identity providers. For an AWS Cognito specific caching option, refer to Managing User pool section and caching section of AWS Cognito documentation.

```
import json
import os
import time
import logging
from jose import jwk, jwt
from jose.exceptions import ExpiredSignatureError, JWTClaimsError, JWTError
import requests
import tempfile

# Configure logging
logger = logging.getLogger()
log_level = os.environ.get('LOG_LEVEL', 'WARNING').upper()
logger.setLevel(getattr(logging, log_level, logging.WARNING))

# Global token cache with TTL
token_cache = {}

# JWKS cache file path
JWKS_CACHE_FILE = os.path.join(tempfile.gettempdir(), 'jwks.json')
JWKS_CACHE_TTL = 3600  # 1 hour

# Load environment variables once
USER_POOL_ID = os.environ['USER_POOL_ID']
CLIENT_ID = os.environ['CLIENT_ID']
ROLE_ARN = os.environ.get('AHIDICOMWEB_READONLY_ROLE_ARN', '')

def cleanup_expired_tokens():
    """Remove expired tokens from cache"""
    now = int(time.time())
    expired_keys = [token for token, data in token_cache.items() if now >
 data['cache_expiry']]
    for token in expired_keys:
        del token_cache[token]

def get_cached_jwks():
    """Get JWKS from cache file if valid, otherwise return None """
    try:
        if os.path.exists(JWKS_CACHE_FILE):
```

```
            # Check if cache file is still valid
            cache_age = time.time() - os.path.getmtime(JWKS_CACHE_FILE)
            if cache_age < JWKS_CACHE_TTL:
                with open(JWKS_CACHE_FILE, 'r') as f:
                    jwks = json.load(f)
                    logger.debug(f'Using cached JWKS (age: {int(cache_age)}s)')
                    return jwks
            else:
                logger.debug(f'JWKS cache expired (age: {int(cache_age)}s)')
    except Exception as e:
        logger.debug(f'Error reading JWKS cache: {e}')

    return None

def cache_jwks(jwks):
    """Cache JWKS to file"""
    try:
        with open(JWKS_CACHE_FILE, 'w') as f:
            json.dump(jwks, f)
        logger.debug('JWKS cached successfully')
    except Exception as e:
        logger.debug(f'Error caching JWKS: {e}')

def fetch_jwks(jwks_url):
    """Fetch JWKS from URL and cache it"""
    logger.debug('Fetching JWKS from URL')
    jwks = requests.get(jwks_url, timeout=10).json()
    # Convert to dict for faster lookups
    jwks['keys_by_kid'] = {key['kid']: key for key in jwks['keys']}
    cache_jwks(jwks)
    return jwks

def is_token_cached(token):
    if token not in token_cache:
        return None

    cached = token_cache[token]
    now = int(time.time())

    if now > cached['cache_expiry']:
        del token_cache[token]
        return None

    return cached
```

```
def cache_token(token, payload):
    now = int(time.time())
    token_exp = payload.get('exp')
    cache_expiry = min(now + 60, token_exp)  # 1 minute or token expiry, whichever is
 sooner

    token_cache[token] = {
        'payload': payload,
        'cache_expiry': cache_expiry,
        'role_arn': ROLE_ARN
    }

def handler(event, context):
    cleanup_expired_tokens() # start be removing expired tokens from the cache
    try:
        # Extract token from bearerToken or authorizationToken field
        token = event.get('bearerToken')
        if not token:
            raise Exception('No token provided')

        # Check cache first
        cached = is_token_cached(token)
        if cached:
            logger.debug('Token found in cache, skipping verification')
            return {
                'isTokenValid': True,
                'roleArn': cached['role_arn']
            }

        # Get Cognito configuration
        region = context.invoked_function_arn.split(':')[3]

        # Get JWKS (cached or fresh)
        jwks_url = f'https://cognito-idp.{region}.amazonaws.com/{USER_POOL_ID}/.well-
known/jwks.json'
        jwks = get_cached_jwks()
        if not jwks:
            jwks = fetch_jwks(jwks_url)

        # Decode token header to get kid
        headers = jwt.get_unverified_headers(token)
        kid = headers['kid']
```

```
        # Find the correct key
        key = None
        for jwk_key in jwks['keys']:
            if jwk_key['kid'] == kid:
                key = jwk_key
                break

        if not key:
            # Key not found - try refreshing JWKS in case of key rotation
            logger.debug('Key not found in cached JWKS, fetching fresh JWKS')
            jwks = fetch_jwks(jwks_url)
            for jwk_key in jwks['keys']:
                if jwk_key['kid'] == kid:
                    key = jwk_key
                    break

        if not key:
            raise Exception('Public key not found')

        # Construct the public key
        public_key = jwk.construct(key)

        # Verify and decode the token (includes expiry validation)
        payload = jwt.decode(
            token,
            public_key,
            algorithms=['RS256'],
            audience=CLIENT_ID,
            issuer=f'https://cognito-idp.{region}.amazonaws.com/{USER_POOL_ID}'
        )

        logger.debug('Token validated successfully')
        logger.debug('User: %s', payload.get('username', 'unknown'))

        # Cache the validated token
        cache_token(token, payload)

        # Return authorization response
        return {
            'isTokenValid': True,
            'roleArn': ROLE_ARN
        }

    except ExpiredSignatureError:
```

```
        logger.debug('Token expired')
        return {
            'isTokenValid': False,
            'roleArn': ''
        }
    except JWTClaimsError:
        logger.debug('Invalid token claims')
        return {
            'isTokenValid': False,
            'roleArn': ''
        }
    except JWTError as e:
        logger.debug('JWT validation error: %s', e)
        return {
            'isTokenValid': False,
            'roleArn': ''
        }
    except Exception as e:
        logger.debug('Authorization failed: %s', e)
        return {
            'isTokenValid': False,
            'roleArn': ''
        }
```

Importing imaging data with AWS HealthImaging

Importing is the process of moving your medical imaging data from an Amazon S3 input bucket to an AWS HealthImaging data store. During import, AWS HealthImaging performs a pixel data verification check before transforming your DICOM P10 files into image sets comprised of metadata and image frames (pixel data).

> **Important**
>
> HealthImaging import jobs process DICOM instance binaries (`.dcm` files) and transform them into image sets. Use HealthImaging cloud native actions (APIs) to manage data stores and image sets. Use HealthImaging's representation of DICOMweb services to return DICOMweb responses.

The following topics describe how to import your medical imaging data into an HealthImaging data store using the AWS Management Console, AWS CLI, and AWS SDKs.

Topics

Understanding import jobs

After creating a data store in AWS HealthImaging, you must import your medical imaging data from your Amazon S3 input bucket into your data store to create image sets. You can use the AWS Management Console, AWS CLI, and AWS SDKs to start, describe, and list import jobs.

When you import your DICOM P10 data to an AWS HealthImaging data store, the service attempts to automatically organize instances according to the DICOM hierarchy of Study UID, Series UID, Instance UID, based on the metadata elements. Imported data will be made primary if the metadata elements of the imported data do not conflict with existing primary image sets in the data store. If the metadata elements of newly imported DICOM P10 data conflict with existing primary image sets, the new data will be added to non-primary image sets. When data imports create non-primary image sets, AWS HealthImaging emits an EventBridge Event with `isPrimary: False`, and the record written to the `success.ndjson` will also have `isPrimary: False` within the `importResponse` object.

When you import data, HealthImaging does the following:

- If instances comprising a DICOM series are imported in one import job and the instances do not conflict with instances already in the data store, then all instances are organized into one primary image set.
- If the instances comprising a DICOM series are imported in two or more import jobs and the instances don't conflict with instances already in the data store, then all instances are organized as one Primary image set.
- If an instance is imported more than once, the latest version will overwrite any older version stored within a primary image set, and the version number of the primary image set will be incremented.

You can update the instances in the primary with the steps described in Updating Image set metadata.

During import, binary values in private tags (with VR types OB, OD, OF, OL, OV, OW, UN) that exceed 1MB in size are stored separately from the metadata. When retrieving metadata for these instances using `GetDICOMInstanceMetadata` or `GetDICOMSeriesMetadata`, these large binary values are replaced with BulkDataURIs, and the actual binary data can be retrieved using the `GetDICOMBulkdata` API.

HealthImaging attempts to import all your medical imaging data. If data non-conformances or unrecognized data elements are encountered during imports, HealthImaging adds warnings to the `warning.ndjson` file for DICOM instances that could still be imported. For a complete list of warning codes, see HealthImaging Warning Codes.

Keep the following points in mind when importing your medical imaging files from Amazon S3 into an HealthImaging data store:

- The instances corresponding to a DICOM Series will be automatically combined in a single image set, denoted primary.
- You can import DICOM P10 data in one import job, or multiple import jobs, and the service will organize the instances into primary image sets that correspond to DICOM Series

- Length constraints apply to specific DICOM elements during import. To ensure a successful import job, verify that your medical imaging data does not exceed the length constraints. For more information, see DICOM element constraints.
- A pixel data verification check is performed at the beginning of import jobs. For more information, see Pixel data verification.
- There are endpoints, quotas, and throttling limits associated with HealthImaging import actions. For more information, see Endpoints and quotas and Throttling limits.
- For each import job, processing results are stored at the `outputS3Uri` location. The processing results are organized as a `job-output-manifest.json` file and `SUCCESS` and `FAILURE` folders.

> **Note**
>
> You can include up to 10,000 nested folders for a single import job.

- The `job-output-manifest.json` file contains `jobSummary` output and additional details about the processed data. The following example shows output from a `job-output-manifest.json` file.

```
{
"jobSummary": {
"jobId": "09876543210987654321098765432109",
        "datastoreId": "12345678901234567890123456789012",
        "inputS3Uri": "s3://medical-imaging-dicom-input/dicom_input/",
        "outputS3Uri": "s3://medical-imaging-output/
job_output/12345678901234567890123456789012-
DicomImport-09876543210987654321098765432109/",
        "successOutputS3Uri": "s3://medical-imaging-
output/job_output/12345678901234567890123456789012-
DicomImport-09876543210987654321098765432109/SUCCESS/",
        "failureOutputS3Uri": "s3://medical-imaging-
output/job_output/12345678901234567890123456789012-
DicomImport-09876543210987654321098765432109/FAILURE/",
        "warningsOutputS3Uri": "s3://medical-imaging-
output/job_output/12345678901234567890123456789012-
DicomImport-09876543210987654321098765432109/WARNING/",
        "numberOfScannedFiles": 5,
        "numberOfImportedFiles": 3,
```

```
        "numberOfFilesWithCustomerError": 2,
        "numberOfFilesWithServerError": 0,
        "numberOfGeneratedImageSets": 2,
        "imageSetsSummary": [{
"imageSetId": "12345612345612345678907890789012",
                "numberOfMatchedSOPInstances": 2
            },
            {
"imageSetId": "12345612345612345678917891789012",
                "numberOfMatchedSOPInstances": 1
            }
        ]
    }
}
```

- The SUCCESS folder holds the success.ndjson file containing results of all imaging files that imported successfully. The following example shows output from a success.ndjson file.

```
{"inputFile":"dicomInputFolder/1.3.51.5145.5142.20010109.1105620.1.0.1.dcm","importResponse
{"imageSetId":"12345612345612345678907890789012", "isPrimary": True}}
{"inputFile":"dicomInputFolder/1.3.51.5145.5142.20010109.1105630.1.0.1.dcm","importResponse
{"imageSetId":"12345612345612345678917891789012", "isPrimary": True}}
```

- The FAILURE folder holds the failure.ndjson file containing results of all imaging files that did not import successfully. The following example shows output from a failure.ndjson file.

```
{"inputFile":"dicom_input/invalidDicomFile1.dcm","exception":
{"exceptionType":"ValidationException","message":"DICOM attribute TransferSyntaxUID
 does not exist"}}
{"inputFile":"dicom_input/invalidDicomFile2.dcm","exception":
{"exceptionType":"ValidationException","message":"DICOM attributes does not
 exist"}}
```

- The WARNING folder holds the warning.ndjson file containing results of all imaging files that imported successfully but with warnings. The following example shows output from a warning.ndjson file.

```
{"inputFile":"dicom_input/warningDicomFile1.dcm","importResponse":
{"imageSetId":"12345612345612345678907890789012","imageSetVersion":1,"isPrimary":true,"warn
[{"warning_reason_code":45330,"type":"InvalidOffsetTable","message":"The file was
```

```
imported but contains an invalid offset table, may see issues when retrieving
certain frames."}]}}
```

- Import jobs are retained in the list of jobs for 90 days and then archived.

Starting an import job

Use the `StartDICOMImportJob` action to start a pixel data verification check and bulk data import into an AWS HealthImaging data store. The import job imports DICOM P10 files or enhances existing DICOM files with JSON metadata. The `inputS3Uri` parameter specifies the Amazon S3 input bucket containing the source files. The import job processing results are stored in the Amazon S3 output bucket specified by the `outputS3Uri` parameter.

> **Note**
>
> Keep the following points in mind before starting an import job:
>
> - HealthImaging supports importing DICOM P10 files with different transfer syntaxes. Some files retain their original transfer syntax encoding during import, while others are transcoded to HTJ2K lossless by default or JPEG 2000 Lossless depending on your datastore configuration. For more information, see Supported transfer syntaxes.
> - HealthImaging supports data imports from Amazon S3 buckets located in other supported Regions. To achieve this functionality, provide the `inputOwnerAccountId` parameter when starting an import job. For more information, see Cross-account import for AWS HealthImaging.
> - HealthImaging applies length constraints to specific DICOM elements during import. For more information, see DICOM element constraints.
> - To import DICOM files with JSON metadata overrides, provide the `importConfiguration` parameter with a `DicomMetadataMapping` that maps DICOM files to their corresponding JSON metadata files. For more information, see `StartDICOMImportJob` in the *AWS HealthImaging API Reference*.

The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `StartDICOMImportJob` in the *AWS HealthImaging API Reference*.

To start an import job

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.
3. Choose **Import DICOM data**.

   The **Import DICOM data** page opens.
4. Under the **Details** section, enter the following information:
   - **Name** (optional)
   - **Import source location in S3**
   - **Source bucket owner's account ID** (optional)
   - **Encryption key** (optional)
   - **Output destination in S3**
5. Under the **Service access** section, choose **Use an existing service role** and select the role from the **Service role name** menu or choose **Create and use a new service role**.
6. Choose **Import**.

AWS CLI and SDKs

C++

SDK for C++

```
//! Routine which starts a HealthImaging import job.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param inputBucketName: The name of the Amazon S3 bucket containing the DICOM
 files.
```

```
  \param inputDirectory: The directory in the S3 bucket containing the DICOM
 files.
  \param outputBucketName: The name of the S3 bucket for the output.
  \param outputDirectory: The directory in the S3 bucket to store the output.
  \param roleArn: The ARN of the IAM role with permissions for the import.
  \param importJobId: A string to receive the import job ID.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
  */
bool AwsDoc::Medical_Imaging::startDICOMImportJob(
        const Aws::String &dataStoreID, const Aws::String &inputBucketName,
        const Aws::String &inputDirectory, const Aws::String &outputBucketName,
        const Aws::String &outputDirectory, const Aws::String &roleArn,
        Aws::String &importJobId,
        const Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient medicalImagingClient(clientConfig);
    Aws::String inputURI = "s3://" + inputBucketName + "/" + inputDirectory +
 "/";
    Aws::String outputURI = "s3://" + outputBucketName + "/" + outputDirectory +
 "/";
    Aws::MedicalImaging::Model::StartDICOMImportJobRequest
 startDICOMImportJobRequest;
    startDICOMImportJobRequest.SetDatastoreId(dataStoreID);
    startDICOMImportJobRequest.SetDataAccessRoleArn(roleArn);
    startDICOMImportJobRequest.SetInputS3Uri(inputURI);
    startDICOMImportJobRequest.SetOutputS3Uri(outputURI);

    Aws::MedicalImaging::Model::StartDICOMImportJobOutcome
 startDICOMImportJobOutcome = medicalImagingClient.StartDICOMImportJob(
            startDICOMImportJobRequest);

    if (startDICOMImportJobOutcome.IsSuccess()) {
        importJobId = startDICOMImportJobOutcome.GetResult().GetJobId();
    }
    else {
        std::cerr << "Failed to start DICOM import job because "
                  << startDICOMImportJobOutcome.GetError().GetMessage() <<
 std::endl;
    }

    return startDICOMImportJobOutcome.IsSuccess();
}
```

- For API details, see StartDICOMImportJob in *AWS SDK for C++ API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To start a dicom import job

The following `start-dicom-import-job` code example starts a dicom import job.

```
aws medical-imaging start-dicom-import-job \
    --job-name "my-job" \
    --datastore-id "12345678901234567890123456789012" \
    --input-s3-uri "s3://medical-imaging-dicom-input/dicom_input/" \
    --output-s3-uri "s3://medical-imaging-output/job_output/" \
    --data-access-role-arn "arn:aws:iam::123456789012:role/
ImportJobDataAccessRole"
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "jobId": "09876543210987654321098765432109",
    "jobStatus": "SUBMITTED",
    "submittedAt": "2022-08-12T11:28:11.152000+00:00"
}
```

- For API details, see StartDICOMImportJob in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static String startDicomImportJob(MedicalImagingClient
medicalImagingClient,
            String jobName,
            String datastoreId,
            String dataAccessRoleArn,
            String inputS3Uri,
            String outputS3Uri) {

        try {
            StartDicomImportJobRequest startDicomImportJobRequest =
StartDicomImportJobRequest.builder()
                    .jobName(jobName)
                    .datastoreId(datastoreId)
                    .dataAccessRoleArn(dataAccessRoleArn)
                    .inputS3Uri(inputS3Uri)
                    .outputS3Uri(outputS3Uri)
                    .build();
            StartDicomImportJobResponse response =
medicalImagingClient.startDICOMImportJob(startDicomImportJobRequest);
            return response.jobId();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return "";
    }
```

- For API details, see StartDICOMImportJob in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { StartDICOMImportJobCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} jobName - The name of the import job.
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} dataAccessRoleArn - The Amazon Resource Name (ARN) of the role
 that grants permission.
 * @param {string} inputS3Uri - The URI of the S3 bucket containing the input
 files.
 * @param {string} outputS3Uri - The URI of the S3 bucket where the output files
 are stored.
 */
export const startDicomImportJob = async (
  jobName = "test-1",
  datastoreId = "12345678901234567890123456789012",
  dataAccessRoleArn = "arn:aws:iam::xxxxxxxxxxxx:role/ImportJobDataAccessRole",
  inputS3Uri = "s3://medical-imaging-dicom-input/dicom_input/",
  outputS3Uri = "s3://medical-imaging-output/job_output/",
) => {
  const response = await medicalImagingClient.send(
    new StartDICOMImportJobCommand({
      jobName: jobName,
      datastoreId: datastoreId,
      dataAccessRoleArn: dataAccessRoleArn,
      inputS3Uri: inputS3Uri,
      outputS3Uri: outputS3Uri,
    }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '6e81d191-d46b-4e48-a08a-cdcc7e11eb79',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
```

```
    //     jobId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
    //     jobStatus: 'SUBMITTED',
    //     submittedAt: 2023-09-22T14:48:45.767Z
    // }
    return response;
};
```

- For API details, see StartDICOMImportJob in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def start_dicom_import_job(
        self, job_name, datastore_id, role_arn, input_s3_uri, output_s3_uri
    ):
        """
        Start a DICOM import job.

        :param job_name: The name of the job.
        :param datastore_id: The ID of the data store.
        :param role_arn: The Amazon Resource Name (ARN) of the role to use for
 the job.
        :param input_s3_uri: The S3 bucket input prefix path containing the DICOM
 files.
        :param output_s3_uri: The S3 bucket output prefix path for the result.
        :return: The job ID.
        """
        try:
            job = self.health_imaging_client.start_dicom_import_job(
```

```
                jobName=job_name,
                datastoreId=datastore_id,
                dataAccessRoleArn=role_arn,
                inputS3Uri=input_s3_uri,
                outputS3Uri=output_s3_uri,
            )
        except ClientError as err:
            logger.error(
                "Couldn't start DICOM import job. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return job["jobId"]
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see StartDICOMImportJob in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_job_name = 'import-job-1'
    " iv_datastore_id = '12345678901234567890123456789012'
    " iv_role_arn = 'arn:aws:iam::123456789012:role/ImportJobRole'
    " iv_input_s3_uri = 's3://my-bucket/input/'
    " iv_output_s3_uri = 's3://my-bucket/output/'
```

```
        oo_result = lo_mig->startdicomimportjob(
          iv_jobname = iv_job_name
          iv_datastoreid = iv_datastore_id
          iv_dataaccessrolearn = iv_role_arn
          iv_inputs3uri = iv_input_s3_uri
          iv_outputs3uri = iv_output_s3_uri ).
        DATA(lv_job_id) = oo_result->get_jobid( ).
        MESSAGE |DICOM import job started with ID: { lv_job_id }.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migservicequotaexcdex.
        MESSAGE 'Service quota exceeded.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see StartDICOMImportJob in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Getting import job properties

Use the GetDICOMImportJob action to learn more about AWS HealthImaging import job properties. For instance, after starting an import job, you can run GetDICOMImportJob to find the status of the job. Once the jobStatus returns as COMPLETED, you're ready to access your image sets.

> **Note**
>
> The jobStatus refers to the execution of the import job. Therefore, an import job can return a jobStatus as COMPLETED even if validation issues are discovered during the import process. If a jobStatus returns as COMPLETED, we still recommend you review the output manifests written to Amazon S3, as they provide details on the success or failure of individual P10 object imports.

The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see GetDICOMImportJob in the *AWS HealthImaging API Reference*.

To get import job properties

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

   The **Data store details** page opens. The **Image sets** tab is selected by default.
3. Choose the **Imports** tab.
4. Choose an import job.

   The **Import job details** page opens and displays properties about the import job.

AWS CLI and SDKs

C++

SDK for C++

```
//! Routine which gets a HealthImaging DICOM import job's properties.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param importJobID: The DICOM import job ID
  \param clientConfig: Aws client configuration.
  \return GetDICOMImportJobOutcome: The import job outcome.
*/
Aws::MedicalImaging::Model::GetDICOMImportJobOutcome
AwsDoc::Medical_Imaging::getDICOMImportJob(const Aws::String &dataStoreID,
                                           const Aws::String &importJobID,
                                           const Aws::Client::ClientConfiguration
 &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::GetDICOMImportJobRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetJobId(importJobID);
    Aws::MedicalImaging::Model::GetDICOMImportJobOutcome outcome =
 client.GetDICOMImportJob(
            request);
    if (!outcome.IsSuccess()) {
        std::cerr << "GetDICOMImportJob error: "
                  << outcome.GetError().GetMessage() << std::endl;
    }

    return outcome;
}
```

- For API details, see GetDICOMImportJob in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To get a dicom import job's properties

The following `get-dicom-import-job` code example gets a dicom import job's properties.

```
aws medical-imaging get-dicom-import-job \
    --datastore-id "12345678901234567890123456789012" \
    --job-id "09876543210987654321098765432109"
```

Output:

```
{
    "jobProperties": {
        "jobId": "09876543210987654321098765432109",
        "jobName": "my-job",
        "jobStatus": "COMPLETED",
        "datastoreId": "12345678901234567890123456789012",
        "dataAccessRoleArn": "arn:aws:iam::123456789012:role/
ImportJobDataAccessRole",
        "endedAt": "2022-08-12T11:29:42.285000+00:00",
        "submittedAt": "2022-08-12T11:28:11.152000+00:00",
        "inputS3Uri": "s3://medical-imaging-dicom-input/dicom_input/",
        "outputS3Uri": "s3://medical-imaging-output/
job_output/12345678901234567890123456789012-
DicomImport-09876543210987654321098765432109/"
    }
}
```

- For API details, see GetDICOMImportJob in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static DICOMImportJobProperties getDicomImportJob(MedicalImagingClient
 medicalImagingClient,
            String datastoreId,
            String jobId) {
```

```
        try {
            GetDicomImportJobRequest getDicomImportJobRequest =
 GetDicomImportJobRequest.builder()
                    .datastoreId(datastoreId)
                    .jobId(jobId)
                    .build();
            GetDicomImportJobResponse response =
 medicalImagingClient.getDICOMImportJob(getDicomImportJobRequest);
            return response.jobProperties();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see GetDICOMImportJob in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetDICOMImportJobCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} jobId - The ID of the import job.
 */
export const getDICOMImportJob = async (
  datastoreId = "xxxxxxxxxxxxxxxxxxxx",
  jobId = "xxxxxxxxxxxxxxxxxxxx",
) => {
```

```
  const response = await medicalImagingClient.send(
    new GetDICOMImportJobCommand({ datastoreId: datastoreId, jobId: jobId }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: 'a2637936-78ea-44e7-98b8-7a87d95dfaee',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     jobProperties: {
  //         dataAccessRoleArn: 'arn:aws:iam::xxxxxxxxxxxx:role/dicom_import',
  //             datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxx',
  //             endedAt: 2023-09-19T17:29:21.753Z,
  //             inputS3Uri: 's3://healthimaging-source/CTStudy/',
  //             jobId: ''xxxxxxxxxxxxxxxxxxxxxxxxx'',
  //             jobName: 'job_1',
  //             jobStatus: 'COMPLETED',
  //             outputS3Uri: 's3://health-imaging-dest/
ouput_ct/'xxxxxxxxxxxxxxxxxxxxxxxxx'-DicomImport-'xxxxxxxxxxxxxxxxxxxxxxxxx'/',
  //             submittedAt: 2023-09-19T17:27:25.143Z
  //     }
  // }

  return response;
};
```

- For API details, see GetDICOMImportJob in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_dicom_import_job(self, datastore_id, job_id):
        """
        Get the properties of a DICOM import job.

        :param datastore_id: The ID of the data store.
        :param job_id: The ID of the job.
        :return: The job properties.
        """
        try:
            job = self.health_imaging_client.get_dicom_import_job(
                jobId=job_id, datastoreId=datastore_id
            )
        except ClientError as err:
            logger.error(
                "Couldn't get DICOM import job. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return job["jobProperties"]
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetDICOMImportJob in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    " iv_job_id = '12345678901234567890123456789012'
    oo_result = lo_mig->getdicomimportjob(
      iv_datastoreid = iv_datastore_id
      iv_jobid = iv_job_id ).
    DATA(lo_job_props) = oo_result->get_jobproperties( ).
    DATA(lv_job_status) = lo_job_props->get_jobstatus( ).
    MESSAGE |Job status: { lv_job_status }.| TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Job not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see GetDICOMImportJob in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Listing import jobs

Use the `ListDICOMImportJobs` action to list import jobs created for a specific HealthImaging [data store](). The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see [`ListDICOMImportJobs`]() in the *AWS HealthImaging API Reference*.

> **Note**
>
> Import jobs are retained in the list of jobs for 90 days and then archived.

To list import jobs

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console [Data stores page]().
2. Choose a data store.

   The **Data store details** page opens. The **Image sets** tab is selected by default.
3. Choose the **Imports** tab to list all associated import jobs.

AWS CLI and SDKs

CLI

AWS CLI

To list dicom import jobs

The following `list-dicom-import-jobs` code example lists dicom import jobs.

```
aws medical-imaging list-dicom-import-jobs \
    --datastore-id "12345678901234567890123456789012"
```

Output:


```
{
    "jobSummaries": [
        {
            "jobId": "09876543210987654321098765432109",
            "jobName": "my-job",
            "jobStatus": "COMPLETED",
            "datastoreId": "12345678901234567890123456789012",
            "dataAccessRoleArn": "arn:aws:iam::123456789012:role/
ImportJobDataAccessRole",
            "endedAt": "2022-08-12T11:21:56.504000+00:00",
            "submittedAt": "2022-08-12T11:20:21.734000+00:00"
        }
    ]
}
```


- For API details, see ListDICOMImportJobs in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static List<DICOMImportJobSummary>
 listDicomImportJobs(MedicalImagingClient medicalImagingClient,
            String datastoreId) {

        try {
            ListDicomImportJobsRequest listDicomImportJobsRequest =
 ListDicomImportJobsRequest.builder()
                    .datastoreId(datastoreId)
                    .build();
            ListDicomImportJobsResponse response =
 medicalImagingClient.listDICOMImportJobs(listDicomImportJobsRequest);
            return response.jobSummaries();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
```

```
        }

        return new ArrayList<>();
    }
```

- For API details, see ListDICOMImportJobs in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { paginateListDICOMImportJobs } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 */
export const listDICOMImportJobs = async (
  datastoreId = "xxxxxxxxxxxxxxxxxx",
) => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = { datastoreId: datastoreId };
  const paginator = paginateListDICOMImportJobs(paginatorConfig, commandParams);

  const jobSummaries = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    jobSummaries.push(...page.jobSummaries);
    console.log(page);
  }
```

```
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '3c20c66e-0797-446a-a1d8-91b742fd15a0',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     jobSummaries: [
  //         {
  //             dataAccessRoleArn: 'arn:aws:iam::xxxxxxxxxxxx:role/
dicom_import',
  //             datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxx',
  //             endedAt: 2023-09-22T14:49:51.351Z,
  //             jobId: 'xxxxxxxxxxxxxxxxxxxxxxxxx',
  //             jobName: 'test-1',
  //             jobStatus: 'COMPLETED',
  //             submittedAt: 2023-09-22T14:48:45.767Z
  // }
  // ]}

  return jobSummaries;
};
```

- For API details, see ListDICOMImportJobs in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client
```

```
    def list_dicom_import_jobs(self, datastore_id):
        """
        List the DICOM import jobs.

        :param datastore_id: The ID of the data store.
        :return: The list of jobs.
        """
        try:
            paginator = self.health_imaging_client.get_paginator(
                "list_dicom_import_jobs"
            )
            page_iterator = paginator.paginate(datastoreId=datastore_id)
            job_summaries = []
            for page in page_iterator:
                job_summaries.extend(page["jobSummaries"])
        except ClientError as err:
            logger.error(
                "Couldn't list DICOM import jobs. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return job_summaries
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListDICOMImportJobs in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '12345678901234567890123456789012345678901234567890'
        oo_result = lo_mig->listdicomimportjobs( iv_datastoreid =
iv_datastore_id ).
        DATA(lt_jobs) = oo_result->get_jobsummaries( ).
        DATA(lv_count) = lines( lt_jobs ).
        MESSAGE |Found { lv_count } DICOM import jobs.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see ListDICOMImportJobs in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Accessing image sets with AWS HealthImaging

Accessing medical imaging data in AWS HealthImaging typically involves searching for an image set with a unique key and getting the associated metadata and image frames (pixel data).

> **Important**
>
> During import, HealthImaging processes DICOM instance binaries (`.dcm` files) and transforms them into image sets. Use HealthImaging cloud native actions (APIs) to manage data stores and image sets. Use HealthImaging's representation of DICOMweb services to return DICOMweb responses.

The following topics explain how to use HealthImaging cloud native actions in the AWS Management Console, AWS CLI, and AWS SDKs to search image sets and get their associated properties, metadata, and image frames.

Topics

Understanding image sets

Image sets are an AWS that resemble a DICOM Series, and serve as the foundation for AWS HealthImaging. Image sets are created when you import your DICOM data into HealthImaging. The service attempts to organize imported P10 data according to the DICOM hierarchy of Study, Series, and Instance.

Image sets were introduced for the following reasons:

- Support a wide variety of medical imaging workflows (clinical and nonclinical) through flexible APIs.

- Provide a mechanism for durably storing and reconciling duplicate and inconsistent data. Imported P10 data that conflicts with primary image sets already in the a store will be persisted as non-primary. After resolving metadata conflicts that data can be made primary.
- Maximize patient safety by grouping only related data.
- Encourage data to be cleaned to help increase the visibility of inconsistencies. For more information, see Modifying image sets.

> **Important**
>
> Clinical use of DICOM data before it has been cleaned can result in patient harm.

The following menus describe image sets in further detail and provide examples and diagrams to help you comprehend their functionality and purpose in HealthImaging.

What is an image set?

An image set is an AWS concept that defines an abstract grouping mechanism for optimizing related medical imaging data that closely resembles a DICOM Series. When you import your DICOM P10 imaging data into an AWS HealthImaging data store, it is transformed into image sets comprised of metadata and image frames (pixel data).

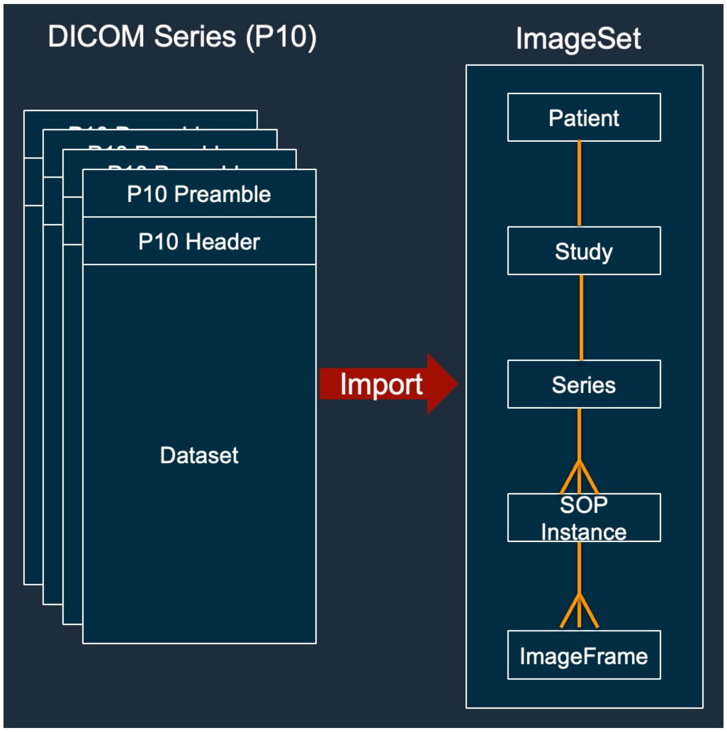
> **Note**
>
> Image set metadata is normalized. In other words, one common set of attributes and values maps to Patient, Study, and Series level elements listed in the Registry of DICOM Data Elements. HealthImaging uses the following DICOM elements when grouping incoming DICOM P10 objects into image sets.
>
> **DICOM elements used for image set creation**
>
> | Element name | Element tag |
> |---|---|
> | **Study level elements** | |
> | `Study Date` | `(0008,0020)` |
> | `Accession Number` | `(0008,0050)` |

Element name	Element tag
Patient ID	(0010,0020)
Study Instance UID	(0020,000D)
Study ID	(0020,0010)
Series level elements	
Series Instance UID	(0020,000E)
Series Number	(0020,0011)

During import, some image sets retain their original transfer syntax encoding, while others are transcoded to High-Throughput JPEG 2000 (HTJ2K) lossless by default. If an image set is encoded in HTJ2K, it must be decoded prior to viewing. For more information, see Supported transfer syntaxes and Image frame decoding libraries.
Image frames (pixel data) are encoded in High-Throughput JPEG 2000 (HTJ2K) and must be decoded prior to viewing.

Image sets are AWS resources, so they are assigned Amazon Resource Names (ARNs). They can be tagged with up to 50 key-value pairs and granted role-based access control (RBAC) and attribute-based access control (ABAC) through IAM. In addition, image sets are versioned, so all changes are preserved and prior versions can be accessed.

Importing DICOM P10 data results in image sets that contain DICOM metadata and image frames for one or more Service-Object Pair (SOP) instances in the same DICOM Series.



Note

DICOM import jobs:

- Always create new image sets or increment the version of existing image sets.
- Do not deduplicate SOP Instance storage. Each import of the same SOP Instance uses additional storage as a new non-primary image set, or incremented version of an existing primary image set.
- Automatically organize SOP instances with consistent, non-conflicting metadata as primary image sets, which contain instances with consistent Patient, Study, and Series metadata elements.
  - If the instances comprising a DICOM series are imported in two or more import jobs, and the instances do not conflict with instances already in the data store, then all instances will be organized in one Primary image set.
- Create non-primary image sets containing DICOM P10 data that conflicts with primary image sets already in the data store.
- Persist the most recently received data as the latest version of a primary image set.

- If the instances comprising a DICOM series are primary image sets, and one instance is imported again, the new copy will be inserted into the primary image set, and the version will be incremented.

What does image set metadata look like?

Use the `GetImageSetMetadata` action to retrieve image set metadata. The returned metadata is compressed with `gzip`, so you must unzip it before viewing. For more information, see Getting image set metadata.

The following example shows the structure of image set metadata in JSON format.

```
{
 "SchemaVersion": "1.1",
 "DatastoreID": "2aa75d103f7f45ab977b0e93f00e6fe9",
 "ImageSetID": "46923b66d5522e4241615ecd64637584",
 "Patient": {
  "DICOM": {
   "PatientBirthDate": null,
   "PatientSex": null,
   "PatientID": "2178309",
   "PatientName": "MISTER^CT"
  }
 },
 "Study": {
  "DICOM": {
   "StudyTime": "083501",
   "PatientWeight": null
  },
  "Series": {
   "1.2.840.113619.2.30.1.1762295590.1623.978668949.887": {
    "DICOM": {
        "Modality": "CT",
     "PatientPosition": "FFS"
    },
    "Instances": {
     "1.2.840.113619.2.30.1.1762295590.1623.978668949.888": {
      "DICOM": {
       "SourceApplicationEntityTitle": null,
       "SOPClassUID": "1.2.840.10008.5.1.4.1.1.2",
       "HighBit": 15,
```

```
        "PixelData": null,
        "Exposure": "40",
        "RescaleSlope": "1",
       "ImageFrames": [
        {
         "ID": "0d1c97c51b773198a3df44383a5fd306",
         "PixelDataChecksumFromBaseToFullResolution": [
          {
           "Width": 256,
           "Height": 188,
           "Checksum": 2598394845
          },
          {
           "Width": 512,
           "Height": 375,
           "Checksum": 1227709180
          }
         ],
         "MinPixelValue": 451,
         "MaxPixelValue": 1466,
         "FrameSizeInBytes": 384000
        }
       ]
      }
     }
    }
   }
  }
 }
```


Image set creation example: multiple import jobs

The following example shows how multiple import jobs always create new image sets and *never* add to existing ones.

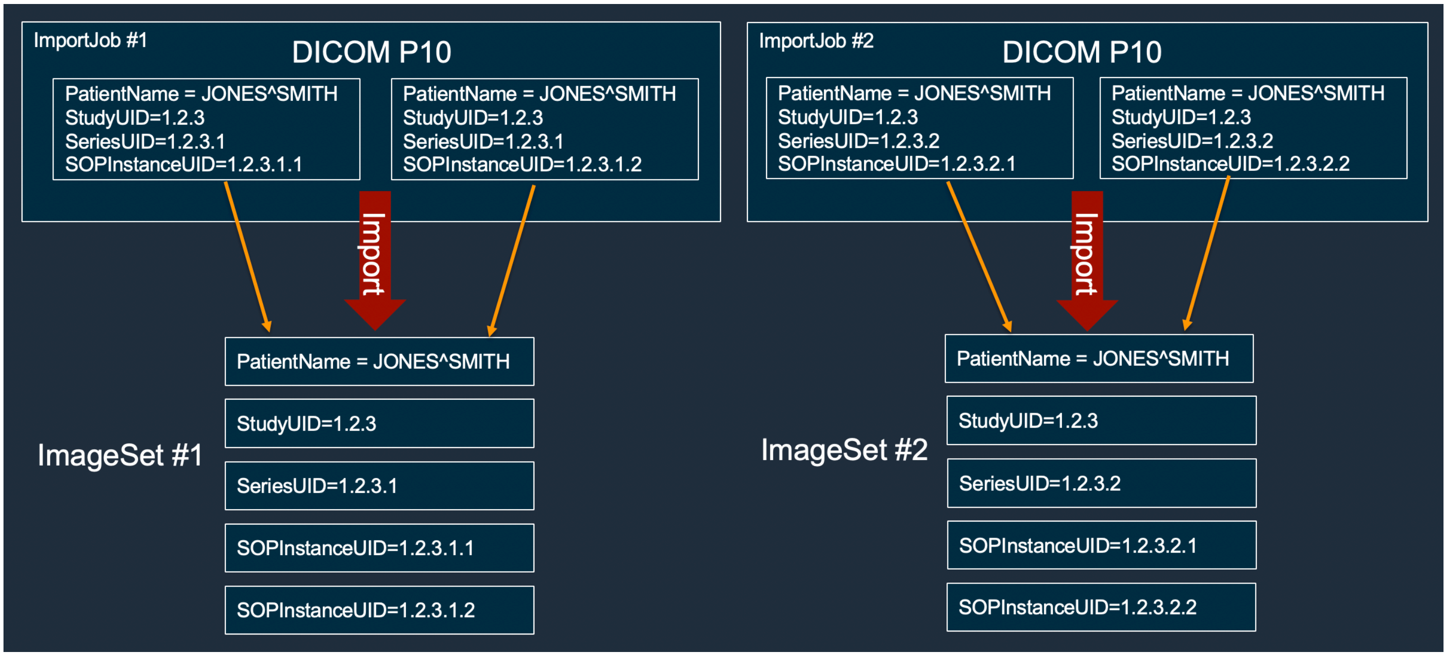


Image set creation example: single import job with two variants

The following example shows a single import job that would fail to merge into a single image set because instances 1 and 3 have different Patient IDs than instances 2 and 4. To resolve this, you can use the `UpdateImageSetMetadata` action to resolve Patient ID conflict with the existing Primary image set. After the conflicts are resolved, you can use the `CopyImageSet` action with the argument `--promoteToPrimary` to add the image set to the Primary image set.

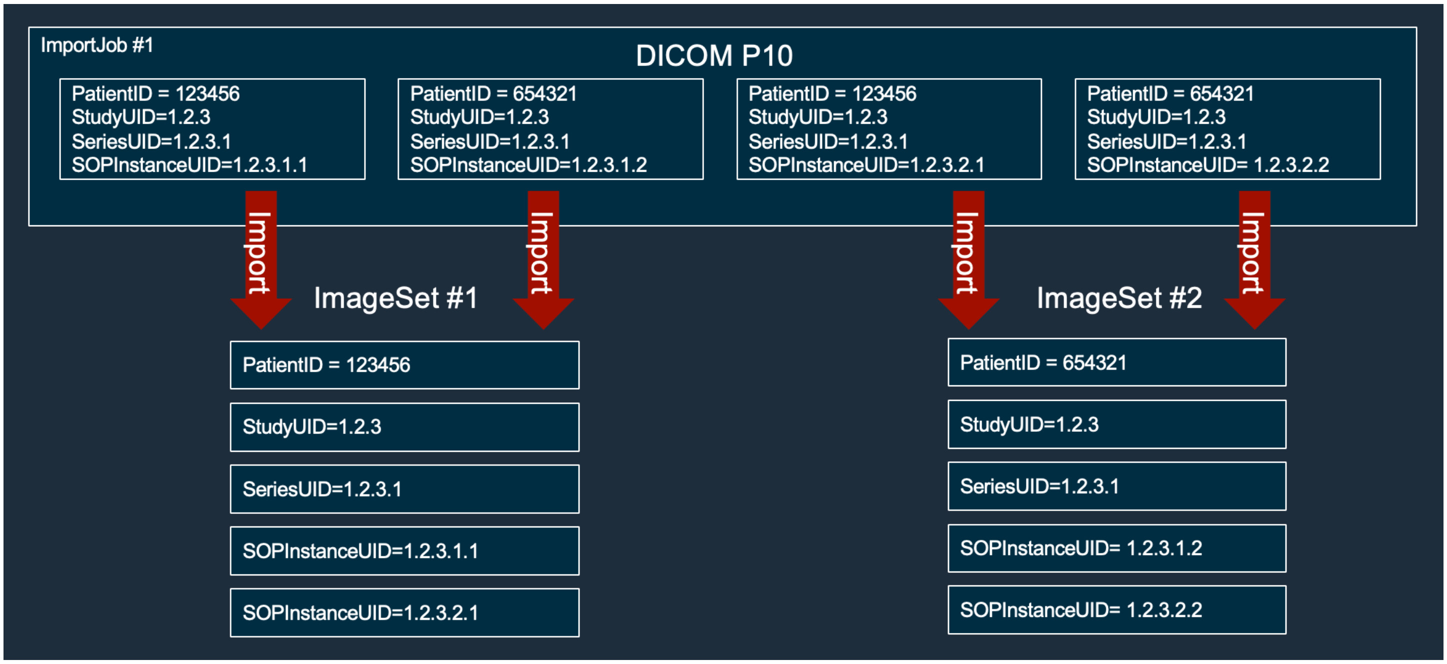
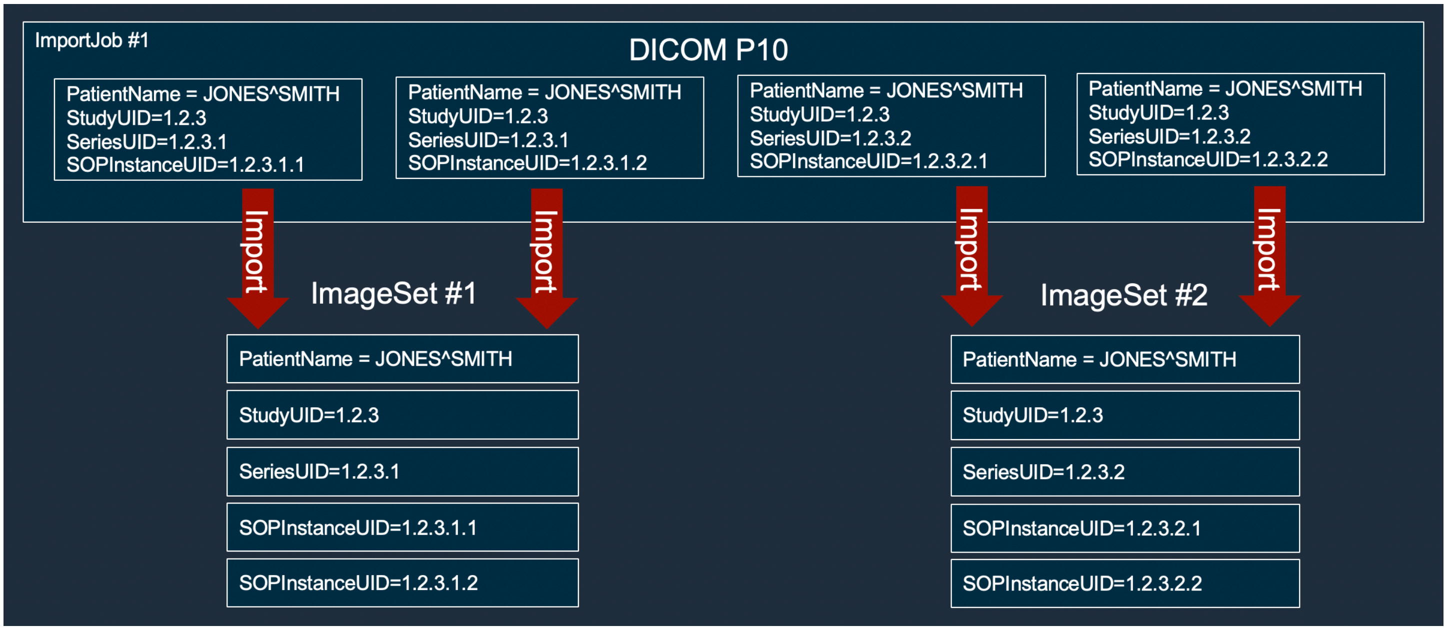


Image set creation example: single import job with optimization

The following example shows a single import job creating two image sets to improve throughput, even though the patient names match.



Searching image sets

Use the `SearchImageSets` action to run search queries against all image sets in an `ACTIVE` HealthImaging data store. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `SearchImageSets` in the *AWS HealthImaging API Reference*.

> **Note**
>
> Keep the following points in mind when searching image sets.
>
> - `SearchImageSets` accepts a single search query parameter and returns a paginated response of all image sets that have the matching criteria. All date range queries must be input as `(lowerBound, upperBound)`.
> - By default, `SearchImageSets` uses the `updatedAt` field for sorting in decreasing order from newest to oldest.

- If you created your data store with a customer-owned AWS KMS key, you must update your AWS KMS key policy before interacting with image sets. For more information, see Creating a customer managed key.

To search image sets

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

Note

The following procedures show how to search image sets using the `Series Instance UID` and `Updated at` property filters.

Series Instance UID

Search image sets using the `Series Instance UID` property filter

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

   The **Data store details** page opens and the **Image sets** tab is selected by default.
3. Choose the property filter menu and select `Series Instance UID`.
4. In the **Enter value to search** field, enter (paste) the Series Instance UID of interest.

   Note

   Series Instance UID values must be identical to those listed in the Registry of DICOM Unique Identifiers (UIDs). Note the requirements include a series of numbers that contain at least one period between them. Periods are not allowed at the beginning or end of Series Instance UIDs. Letters and white space are not allowed, so use caution when copying and pasting UIDs.
5. Choose the **Date range** menu, select a date range for the Series Instance UID, and choose **Apply**.

6. Choose **Search**.

   Series Instance UIDs that fall within the selected date range are returned in Newest order by default.

Updated at

Search image sets using the `Updated at` property filter

1. Open the HealthImaging console [Data stores page](#).
2. Choose a data store.

   The **Data store details** page opens and the **Image sets** tab is selected by default.
3. Choose the property filter menu and choose `Updated at`.
4. Choose the **Date range** menu, select an image set date range, and choose **Apply**.
5. Choose **Search**.

   Image sets that fall within the selected date range are returned in Newest order by default.

AWS CLI and SDKs

C++

SDK for C++

The utility function for searching image sets.

```
//! Routine which searches for image sets based on defined input attributes.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param searchCriteria: A search criteria instance.
  \param imageSetResults: Vector to receive the image set IDs.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
  */
bool AwsDoc::Medical_Imaging::searchImageSets(const Aws::String &dataStoreID,
                                               const
 Aws::MedicalImaging::Model::SearchCriteria &searchCriteria,
                                               Aws::Vector<Aws::String>
 &imageSetResults,
```

```
                                              const
 Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::SearchImageSetsRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetSearchCriteria(searchCriteria);

    Aws::String nextToken; // Used for paginated results.
    bool result = true;
    do {
        if (!nextToken.empty()) {
            request.SetNextToken(nextToken);
        }

        Aws::MedicalImaging::Model::SearchImageSetsOutcome outcome =
 client.SearchImageSets(
                request);
        if (outcome.IsSuccess()) {
            for (auto &imageSetMetadataSummary:
 outcome.GetResult().GetImageSetsMetadataSummaries()) {

 imageSetResults.push_back(imageSetMetadataSummary.GetImageSetId());
            }

            nextToken = outcome.GetResult().GetNextToken();
        }
        else {
            std::cout << "Error: " << outcome.GetError().GetMessage() <<
 std::endl;
            result = false;
        }
    } while (!nextToken.empty());

    return result;
}
```

Use case #1: EQUAL operator.

```
        Aws::Vector<Aws::String> imageIDsForPatientID;
        Aws::MedicalImaging::Model::SearchCriteria searchCriteriaEqualsPatientID;
        Aws::Vector<Aws::MedicalImaging::Model::SearchFilter>
 patientIDSearchFilters = {
```

```
Aws::MedicalImaging::Model::SearchFilter().WithOperator(Aws::MedicalImaging::Model::Oper

.WithValues({Aws::MedicalImaging::Model::SearchByAttributeValue().WithDICOMPatientId(pat
        };

        searchCriteriaEqualsPatientID.SetFilters(patientIDSearchFilters);
        bool result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,

searchCriteriaEqualsPatientID,

imageIDsForPatientID,
                                                               clientConfig);
        if (result) {
            std::cout << imageIDsForPatientID.size() << " image sets found for
the patient with ID '"
            <<  patientID << "'." << std::endl;
            for (auto &imageSetResult : imageIDsForPatientID) {
                std::cout << "  Image set with ID '" << imageSetResult <<
std::endl;
            }
        }
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
        Aws::MedicalImaging::Model::SearchByAttributeValue useCase2StartDate;

useCase2StartDate.SetDICOMStudyDateAndTime(Aws::MedicalImaging::Model::DICOMStudyDateAnd
        .WithDICOMStudyDate("19990101")
        .WithDICOMStudyTime("000000.000"));

        Aws::MedicalImaging::Model::SearchByAttributeValue useCase2EndDate;

useCase2EndDate.SetDICOMStudyDateAndTime(Aws::MedicalImaging::Model::DICOMStudyDateAndTi

.WithDICOMStudyDate(Aws::Utils::DateTime(std::chrono::system_clock::now()).ToLocalTimeSt
%m%d"))
        .WithDICOMStudyTime("000000.000"));

        Aws::MedicalImaging::Model::SearchFilter useCase2SearchFilter;
        useCase2SearchFilter.SetValues({useCase2StartDate, useCase2EndDate});
```

```
useCase2SearchFilter.SetOperator(Aws::MedicalImaging::Model::Operator::BETWEEN);

        Aws::MedicalImaging::Model::SearchCriteria useCase2SearchCriteria;
        useCase2SearchCriteria.SetFilters({useCase2SearchFilter});

        Aws::Vector<Aws::String> usesCase2Results;
        result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,
                                                          useCase2SearchCriteria,
                                                          usesCase2Results,
                                                          clientConfig);
        if (result) {
            std::cout << usesCase2Results.size() << " image sets found for
between 1999/01/01 and present."
                      <<  std::endl;
            for (auto &imageSetResult : usesCase2Results) {
                std::cout << "  Image set with ID '" << imageSetResult <<
std::endl;
            }
        }
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
        Aws::MedicalImaging::Model::SearchByAttributeValue useCase3StartDate;

useCase3StartDate.SetCreatedAt(Aws::Utils::DateTime("20231130T000000000Z",Aws::Utils::Da

        Aws::MedicalImaging::Model::SearchByAttributeValue useCase3EndDate;

useCase3EndDate.SetCreatedAt(Aws::Utils::DateTime(std::chrono::system_clock::now()));

        Aws::MedicalImaging::Model::SearchFilter useCase3SearchFilter;
        useCase3SearchFilter.SetValues({useCase3StartDate, useCase3EndDate});

useCase3SearchFilter.SetOperator(Aws::MedicalImaging::Model::Operator::BETWEEN);

        Aws::MedicalImaging::Model::SearchCriteria useCase3SearchCriteria;
        useCase3SearchCriteria.SetFilters({useCase3SearchFilter});

        Aws::Vector<Aws::String> usesCase3Results;
        result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,
                                                          useCase3SearchCriteria,
```

```
                                                                    usesCase3Results,
                                                                    clientConfig);
       if (result) {
           std::cout << usesCase3Results.size() << " image sets found for
created between 2023/11/30 and present."
                     <<  std::endl;
           for (auto &imageSetResult : usesCase3Results) {
               std::cout << "  Image set with ID '" << imageSetResult <<
std::endl;
           }
       }
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
       Aws::MedicalImaging::Model::SearchByAttributeValue useCase4StartDate;

useCase4StartDate.SetUpdatedAt(Aws::Utils::DateTime("20231130T000000000Z",Aws::Utils::Da

       Aws::MedicalImaging::Model::SearchByAttributeValue useCase4EndDate;

useCase4EndDate.SetUpdatedAt(Aws::Utils::DateTime(std::chrono::system_clock::now()));

       Aws::MedicalImaging::Model::SearchFilter useCase4SearchFilterBetween;
       useCase4SearchFilterBetween.SetValues({useCase4StartDate,
useCase4EndDate});

useCase4SearchFilterBetween.SetOperator(Aws::MedicalImaging::Model::Operator::BETWEEN);

       Aws::MedicalImaging::Model::SearchByAttributeValue seriesInstanceUID;
       seriesInstanceUID.SetDICOMSeriesInstanceUID(dicomSeriesInstanceUID);

       Aws::MedicalImaging::Model::SearchFilter useCase4SearchFilterEqual;
       useCase4SearchFilterEqual.SetValues({seriesInstanceUID});

useCase4SearchFilterEqual.SetOperator(Aws::MedicalImaging::Model::Operator::EQUAL);

       Aws::MedicalImaging::Model::SearchCriteria useCase4SearchCriteria;
       useCase4SearchCriteria.SetFilters({useCase4SearchFilterBetween,
useCase4SearchFilterEqual});

       Aws::MedicalImaging::Model::Sort useCase4Sort;
```

```
useCase4Sort.SetSortField(Aws::MedicalImaging::Model::SortField::updatedAt);
       useCase4Sort.SetSortOrder(Aws::MedicalImaging::Model::SortOrder::ASC);

       useCase4SearchCriteria.SetSort(useCase4Sort);

       Aws::Vector<Aws::String> usesCase4Results;
       result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,
                                                         useCase4SearchCriteria,
                                                         usesCase4Results,
                                                         clientConfig);
       if (result) {
           std::cout << usesCase4Results.size() << " image sets found for EQUAL
operator "
           << "on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort
response\n"
           <<  "in ASC order on updatedAt field." <<  std::endl;
           for (auto &imageSetResult : usesCase4Results) {
               std::cout << "  Image set with ID '" << imageSetResult <<
std::endl;
           }
       }
```

- For API details, see SearchImageSets in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

Example 1: To search image sets with an EQUAL operator

The following `search-image-sets` code example uses the EQUAL operator to search image sets based on a specific value.

```
aws medical-imaging search-image-sets \
```

```
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{"DICOMPatientId" : "SUBJECT08701"}],
        "operator": "EQUAL"
    }]
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
             "DICOMPatientSex": "F",
             "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
             "DICOMPatientBirthDate": "19201120",
             "DICOMStudyDescription": "UNKNOWN",
             "DICOMPatientId": "SUBJECT08701",
             "DICOMPatientName": "Melissa844 Huel628",
             "DICOMNumberOfStudyRelatedInstances": 1,
             "DICOMStudyTime": "140728",
             "DICOMNumberOfStudyRelatedSeries": 1
            },
        "updatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```

Example 2: To search image sets with a BETWEEN operator using DICOMStudyDate and DICOMStudyTime

The following `search-image-sets` code example searches for image sets with DICOM Studies generated between January 1, 1990 (12:00 AM) and January 1, 2023 (12:00 AM).

Note: DICOMStudyTime is optional. If it is not present, 12:00 AM (start of the day) is the time value for the dates provided for filtering.

```
aws medical-imaging search-image-sets \
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{
            "DICOMStudyDateAndTime": {
                "DICOMStudyDate": "19900101",
                "DICOMStudyTime": "000000"
            }
        },
        {
            "DICOMStudyDateAndTime": {
                "DICOMStudyDate": "20230101",
                "DICOMStudyTime": "000000"
            }
        }],
        "operator": "BETWEEN"
    }]
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
            "DICOMPatientSex": "F",
            "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
            "DICOMPatientBirthDate": "19201120",
            "DICOMStudyDescription": "UNKNOWN",
            "DICOMPatientId": "SUBJECT08701",
```

```
            "DICOMPatientName": "Melissa844 Huel628",
            "DICOMNumberOfStudyRelatedInstances": 1,
            "DICOMStudyTime": "140728",
            "DICOMNumberOfStudyRelatedSeries": 1
        },
        "updatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```

Example 3: To search image sets with a BETWEEN operator using createdAt (time studies were previously persisted)

The following `search-image-sets` code example searches for image sets with DICOM Studies persisted in HealthImaging between the time ranges in UTC time zone.

Note: Provide createdAt in example format ("1985-04-12T23:20:50.52Z").

```
aws medical-imaging search-image-sets \
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria  file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{
            "createdAt": "1985-04-12T23:20:50.52Z"
        },
        {
            "createdAt": "2022-04-12T23:20:50.52Z"
        }],
        "operator": "BETWEEN"
    }]
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
```

```
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
            "DICOMPatientSex": "F",
            "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
            "DICOMPatientBirthDate": "19201120",
            "DICOMStudyDescription": "UNKNOWN",
            "DICOMPatientId": "SUBJECT08701",
            "DICOMPatientName": "Melissa844 Huel628",
            "DICOMNumberOfStudyRelatedInstances": 1,
            "DICOMStudyTime": "140728",
            "DICOMNumberOfStudyRelatedSeries": 1
        },
        "lastUpdatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```

Example 4: To search image sets with an EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field

The following `search-image-sets` code example searches for image sets with an EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

Note: Provide updatedAt in example format ("1985-04-12T23:20:50.52Z").

```
aws medical-imaging search-image-sets \
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria  file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{
            "updatedAt": "2024-03-11T15:00:05.074000-07:00"
        }, {
            "updatedAt": "2024-03-11T16:00:05.074000-07:00"
        }],
        "operator": "BETWEEN"
    }, {
```

```
        "values": [{
            "DICOMSeriesInstanceUID": "1.2.840.99999999.84710745.943275268089"
        }],
        "operator": "EQUAL"
    }],
    "sort": {
        "sortField": "updatedAt",
        "sortOrder": "ASC"
    }
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
            "DICOMPatientSex": "F",
            "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
            "DICOMPatientBirthDate": "19201120",
            "DICOMStudyDescription": "UNKNOWN",
            "DICOMPatientId": "SUBJECT08701",
            "DICOMPatientName": "Melissa844 Huel628",
            "DICOMNumberOfStudyRelatedInstances": 1,
            "DICOMStudyTime": "140728",
            "DICOMNumberOfStudyRelatedSeries": 1
        },
        "lastUpdatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```

- For API details, see SearchImageSets in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

The utility function for searching image sets.

```
    public static List<ImageSetsMetadataSummary> searchMedicalImagingImageSets(
            MedicalImagingClient medicalImagingClient,
            String datastoreId, SearchCriteria searchCriteria) {
        try {
            SearchImageSetsRequest datastoreRequest =
SearchImageSetsRequest.builder()
                    .datastoreId(datastoreId)
                    .searchCriteria(searchCriteria)
                    .build();
            SearchImageSetsIterable responses = medicalImagingClient
                    .searchImageSetsPaginator(datastoreRequest);
            List<ImageSetsMetadataSummary> imageSetsMetadataSummaries = new
ArrayList<>();

            responses.stream().forEach(response -> imageSetsMetadataSummaries
                    .addAll(response.imageSetsMetadataSummaries()));

            return imageSetsMetadataSummaries;
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

Use case #1: EQUAL operator.

```
        List<SearchFilter> searchFilters =
Collections.singletonList(SearchFilter.builder()
                .operator(Operator.EQUAL)
                .values(SearchByAttributeValue.builder()
                        .dicomPatientId(patientId)
                        .build())
                .build());

        SearchCriteria searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .build();

        List<ImageSetsMetadataSummary> imageSetsMetadataSummaries =
searchMedicalImagingImageSets(
```

```
                medicalImagingClient,
                datastoreId, searchCriteria);
        if (imageSetsMetadataSummaries != null) {
            System.out.println("The image sets for patient " + patientId + " are:
\n"
                    + imageSetsMetadataSummaries);
            System.out.println();
        }
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
        DateTimeFormatter formatter = DateTimeFormatter.ofPattern("yyyyMMdd");
        searchFilters = Collections.singletonList(SearchFilter.builder()
                .operator(Operator.BETWEEN)
                .values(SearchByAttributeValue.builder()

 .dicomStudyDateAndTime(DICOMStudyDateAndTime.builder()
                                        .dicomStudyDate("19990101")
                                        .dicomStudyTime("000000.000")
                                        .build())
                                .build(),
                        SearchByAttributeValue.builder()

 .dicomStudyDateAndTime(DICOMStudyDateAndTime.builder()
                                        .dicomStudyDate((LocalDate.now()
                                                .format(formatter)))
                                        .dicomStudyTime("000000.000")
                                        .build())
                                .build())
                .build());

        searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .build();

        imageSetsMetadataSummaries =
 searchMedicalImagingImageSets(medicalImagingClient,
                datastoreId, searchCriteria);
        if (imageSetsMetadataSummaries != null) {
            System.out.println(
                    "The image sets searched with BETWEEN operator using
 DICOMStudyDate and DICOMStudyTime are:\n"
```

```
                                +
                                imageSetsMetadataSummaries);
                System.out.println();
            }
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
        searchFilters = Collections.singletonList(SearchFilter.builder()
                .operator(Operator.BETWEEN)
                .values(SearchByAttributeValue.builder()

.createdAt(Instant.parse("1985-04-12T23:20:50.52Z"))
                                .build(),
                        SearchByAttributeValue.builder()
                                .createdAt(Instant.now())
                                .build())
                .build());

        searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .build();
        imageSetsMetadataSummaries =
searchMedicalImagingImageSets(medicalImagingClient,
                datastoreId, searchCriteria);
        if (imageSetsMetadataSummaries != null) {
            System.out.println("The image sets searched with BETWEEN operator
using createdAt are:\n "
                    + imageSetsMetadataSummaries);
            System.out.println();
        }
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
        Instant startDate = Instant.parse("1985-04-12T23:20:50.52Z");
        Instant endDate = Instant.now();

        searchFilters = Arrays.asList(
                SearchFilter.builder()
                        .operator(Operator.EQUAL)
                        .values(SearchByAttributeValue.builder()
```

```
                                .dicomSeriesInstanceUID(seriesInstanceUID)
                                .build())
                        .build(),
                SearchFilter.builder()
                        .operator(Operator.BETWEEN)
                        .values(

SearchByAttributeValue.builder().updatedAt(startDate).build(),

SearchByAttributeValue.builder().updatedAt(endDate).build()
                        ).build());

       Sort sort =
Sort.builder().sortOrder(SortOrder.ASC).sortField(SortField.UPDATED_AT).build();

       searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .sort(sort)
                .build();

       imageSetsMetadataSummaries =
searchMedicalImagingImageSets(medicalImagingClient,
                datastoreId, searchCriteria);
       if (imageSetsMetadataSummaries != null) {
           System.out.println("The image sets searched with EQUAL operator on
DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response\n" +
                   "in ASC order on updatedAt field are:\n "
                   + imageSetsMetadataSummaries);
           System.out.println();
       }
```

- For API details, see SearchImageSets in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

The utility function for searching image sets.

```
import { paginateSearchImageSets } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The data store's ID.
 * @param { import('@aws-sdk/client-medical-imaging').SearchFilter[] } filters -
 The search criteria filters.
 * @param { import('@aws-sdk/client-medical-imaging').Sort } sort - The search
 criteria sort.
 */
export const searchImageSets = async (
  datastoreId = "xxxxxxxx",
  searchCriteria = {},
) => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = {
    datastoreId: datastoreId,
    searchCriteria: searchCriteria,
  };

  const paginator = paginateSearchImageSets(paginatorConfig, commandParams);

  const imageSetsMetadataSummaries = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    imageSetsMetadataSummaries.push(...page.imageSetsMetadataSummaries);
    console.log(page);
  }
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: 'f009ea9c-84ca-4749-b5b6-7164f00a5ada',
  //         extendedRequestId: undefined,
```

```
  //          cfId: undefined,
  //          attempts: 1,
  //          totalRetryDelay: 0
  //      },
  //      imageSetsMetadataSummaries: [
  //          {
  //              DICOMTags: [Object],
  //              createdAt: "2023-09-19T16:59:40.551Z",
  //              imageSetId: '7f75e1b5c0f40eac2b24cf712f485f50',
  //              updatedAt: "2023-09-19T16:59:40.551Z",
  //              version: 1
  //          }]
  // }

  return imageSetsMetadataSummaries;
};
```

Use case #1: EQUAL operator.

```
  const datastoreId = "12345678901234567890123456789012";

  try {
    const searchCriteria = {
      filters: [
        {
          values: [{ DICOMPatientId: "1234567" }],
          operator: "EQUAL",
        },
      ],
    };

    await searchImageSets(datastoreId, searchCriteria);
  } catch (err) {
    console.error(err);
  }
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
  const datastoreId = "12345678901234567890123456789012";

  try {
```

```
    const searchCriteria = {
      filters: [
        {
          values: [
            {
              DICOMStudyDateAndTime: {
                DICOMStudyDate: "19900101",
                DICOMStudyTime: "000000",
              },
            },
            {
              DICOMStudyDateAndTime: {
                DICOMStudyDate: "20230901",
                DICOMStudyTime: "000000",
              },
            },
          ],
          operator: "BETWEEN",
        },
      ],
    };

    await searchImageSets(datastoreId, searchCriteria);
  } catch (err) {
    console.error(err);
  }
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
  const datastoreId = "12345678901234567890123456789012";

  try {
    const searchCriteria = {
      filters: [
        {
          values: [
            { createdAt: new Date("1985-04-12T23:20:50.52Z") },
            { createdAt: new Date() },
          ],
          operator: "BETWEEN",
        },
      ],
```

```
  };

  await searchImageSets(datastoreId, searchCriteria);
} catch (err) {
  console.error(err);
}
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
const datastoreId = "12345678901234567890123456789012";

try {
  const searchCriteria = {
    filters: [
      {
        values: [
          { updatedAt: new Date("1985-04-12T23:20:50.52Z") },
          { updatedAt: new Date() },
        ],
        operator: "BETWEEN",
      },
      {
        values: [
          {
            DICOMSeriesInstanceUID:
              "1.1.123.123456.1.12.1.1234567890.1234.12345678.123",
          },
        ],
        operator: "EQUAL",
      },
    ],
    sort: {
      sortOrder: "ASC",
      sortField: "updatedAt",
    },
  };

  await searchImageSets(datastoreId, searchCriteria);
} catch (err) {
  console.error(err);
}
```

- For API details, see SearchImageSets in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

The utility function for searching image sets.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def search_image_sets(self, datastore_id, search_filter):
        """
        Search for image sets.

        :param datastore_id: The ID of the data store.
        :param search_filter: The search filter.
            For example: {"filters" : [{ "operator": "EQUAL", "values":
 [{"DICOMPatientId": "3524578"}]}]}.
        :return: The list of image sets.
        """
        try:
            paginator =
 self.health_imaging_client.get_paginator("search_image_sets")
            page_iterator = paginator.paginate(
                datastoreId=datastore_id, searchCriteria=search_filter
            )
            metadata_summaries = []
            for page in page_iterator:
                metadata_summaries.extend(page["imageSetsMetadataSummaries"])
        except ClientError as err:
            logger.error(
```

```
                "Couldn't search image sets. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return metadata_summaries
```

Use case #1: EQUAL operator.

```
        search_filter = {
            "filters": [
                {"operator": "EQUAL", "values": [{"DICOMPatientId": patient_id}]}
            ]
        }

        image_sets = self.search_image_sets(data_store_id, search_filter)
        print(f"Image sets found with EQUAL operator\n{image_sets}")
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
        search_filter = {
            "filters": [
                {
                    "operator": "BETWEEN",
                    "values": [
                        {
                            "DICOMStudyDateAndTime": {
                                "DICOMStudyDate": "19900101",
                                "DICOMStudyTime": "000000",
                            }
                        },
                        {
                            "DICOMStudyDateAndTime": {
                                "DICOMStudyDate": "20230101",
                                "DICOMStudyTime": "000000",
                            }
                        },
                    ],
                }
```

```
            ]
        }

        image_sets = self.search_image_sets(data_store_id, search_filter)
        print(
            f"Image sets found with BETWEEN operator using DICOMStudyDate and
 DICOMStudyTime\n{image_sets}"
        )
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
        search_filter = {
            "filters": [
                {
                    "values": [
                        {
                            "createdAt": datetime.datetime(
                                2021, 8, 4, 14, 49, 54, 429000
                            )
                        },
                        {
                            "createdAt": datetime.datetime.now()
                            + datetime.timedelta(days=1)
                        },
                    ],
                    "operator": "BETWEEN",
                }
            ]
        }

        recent_image_sets = self.search_image_sets(data_store_id, search_filter)
        print(
            f"Image sets found with with BETWEEN operator using createdAt
\n{recent_image_sets}"
        )
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
        search_filter = {
            "filters": [
```

```
                {
                    "values": [
                        {
                            "updatedAt": datetime.datetime(
                                2021, 8, 4, 14, 49, 54, 429000
                            )
                        },
                        {
                            "updatedAt": datetime.datetime.now()
                            + datetime.timedelta(days=1)
                        },
                    ],
                    "operator": "BETWEEN",
                },
                {
                    "values": [{"DICOMSeriesInstanceUID": series_instance_uid}],
                    "operator": "EQUAL",
                },
            ],
            "sort": {
                "sortOrder": "ASC",
                "sortField": "updatedAt",
            },
        }

        image_sets = self.search_image_sets(data_store_id, search_filter)
        print(
            "Image sets found with EQUAL operator on DICOMSeriesInstanceUID and
BETWEEN on updatedAt and"
        )
        print(f"sort response in ASC order on updatedAt field\n{image_sets}")
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see SearchImageSets in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    oo_result = lo_mig->searchimagesets(
      iv_datastoreid = iv_datastore_id
      io_searchcriteria = io_search_criteria ).
    DATA(lt_imagesets) = oo_result->get_imagesetsmetadatasums( ).
    DATA(lv_count) = lines( lt_imagesets ).
    MESSAGE |Found { lv_count } image sets.| TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Resource not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see [SearchImageSets](#) in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Example availability

Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Getting image set properties

Use the `GetImageSet` action to return properties for a given image set in HealthImaging. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `GetImageSet` in the *AWS HealthImaging API Reference*.

Note

By default, AWS HealthImaging returns properties for the latest version of an image set. To view properties for an older version of an image set, provide the `versionId` with your request.
Use `GetDICOMInstance`, HealthImaging's representation of a DICOMweb service, to return a DICOM instance binary (`.dcm` file). For more information, see Getting a DICOM instance from HealthImaging.

To get image set properties

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

   The **Data store details** page opens and the **Image sets** tab is selected by default.
3. Choose an image set.

   The **Image set details** page opens and displays image set properties.

AWS CLI and SDKs

CLI

AWS CLI

To get image set properties

The following `get-image-set` code example gets the properties for an image set.

```
aws medical-imaging get-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 18f88ac7870584f58d56256646b4d92b \
    --version-id 1
```

Output:

```
{
    "versionId": "1",
    "imageSetWorkflowStatus": "COPIED",
    "updatedAt": 1680027253.471,
    "imageSetId": "18f88ac7870584f58d56256646b4d92b",
    "imageSetState": "ACTIVE",
    "createdAt": 1679592510.753,
    "datastoreId": "12345678901234567890123456789012"
}
```

- For API details, see GetImageSet in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static GetImageSetResponse getMedicalImageSet(MedicalImagingClient 
 medicalImagingClient,
            String datastoreId,
            String imagesetId,
            String versionId) {
        try {
            GetImageSetRequest.Builder getImageSetRequestBuilder = 
 GetImageSetRequest.builder()
```

```
                    .datastoreId(datastoreId)
                    .imageSetId(imagesetId);

            if (versionId != null) {
                getImageSetRequestBuilder =
 getImageSetRequestBuilder.versionId(versionId);
            }

            return
 medicalImagingClient.getImageSet(getImageSetRequestBuilder.build());
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see GetImageSet in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetImageSetCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imageSetId - The ID of the image set.
 * @param {string} imageSetVersion - The optional version of the image set.
 *
 */
export const getImageSet = async (
  datastoreId = "xxxxxxxxxxxxxxx",
```

```
  imageSetId = "xxxxxxxxxxxxxxx",
  imageSetVersion = "",
) => {
  const params = { datastoreId: datastoreId, imageSetId: imageSetId };
  if (imageSetVersion !== "") {
    params.imageSetVersion = imageSetVersion;
  }
  const response = await medicalImagingClient.send(
    new GetImageSetCommand(params),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '0615c161-410d-4d06-9d8c-6e1241bb0a5a',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     createdAt: 2023-09-22T14:49:26.427Z,
  //     datastoreId: 'xxxxxxxxxxxxxxx',
  //     imageSetArn: 'arn:aws:medical-imaging:us-east-1:xxxxxxxxxx:datastore/
xxxxxxxxxxxxxxxxxxxx/imageset/xxxxxxxxxxxxxxxxxxxx',
  //     imageSetId: 'xxxxxxxxxxxxxxx',
  //     imageSetState: 'ACTIVE',
  //     imageSetWorkflowStatus: 'CREATED',
  //     updatedAt: 2023-09-22T14:49:26.427Z,
  //     versionId: '1'
  // }

  return response;
};
```

- For API details, see GetImageSet in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_image_set(self, datastore_id, image_set_id, version_id=None):
        """
        Get the properties of an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The optional version of the image set.
        :return: The image set properties.
        """
        try:
            if version_id:
                image_set = self.health_imaging_client.get_image_set(
                    imageSetId=image_set_id,
                    datastoreId=datastore_id,
                    versionId=version_id,
                )
            else:
                image_set = self.health_imaging_client.get_image_set(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
        except ClientError as err:
            logger.error(
                "Couldn't get image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return image_set
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetImageSet in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '12345678901234567890123456789012'
        " iv_image_set_id = '12345678901234567890123456789012'
        " iv_version_id = '1' (optional)
        IF iv_version_id IS NOT INITIAL.
          oo_result = lo_mig->getimageset(
            iv_datastoreid = iv_datastore_id
            iv_imagesetid = iv_image_set_id
            iv_versionid = iv_version_id ).
        ELSE.
          oo_result = lo_mig->getimageset(
            iv_datastoreid = iv_datastore_id
            iv_imagesetid = iv_image_set_id ).
        ENDIF.
        DATA(lv_state) = oo_result->get_imagesetstate( ).
        MESSAGE |Image set retrieved with state: { lv_state }.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
```

```
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see GetImageSet in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Getting image set metadata

Use the `GetImageSetMetadata` action to retrieve metadata for a given image set in HealthImaging. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `GetImageSetMetadata` in the *AWS HealthImaging API Reference*.

> **Note**
>
> By default, HealthImaging returns metadata attributes for the latest version of an image set. To view metadata for an older version of an image set, provide the `versionId` with your request.
> Image set metadata is compressed with `gzip` and returned as a JSON object. Therefore, you must decompress the JSON object prior to viewing the normalized metadata. For more information, see Metadata normalization.
> If a large image set metadata is still processing after import, a 409 `ConflictException` may be returned. Retry the request after a few seconds once processing completes.

Use `GetDICOMInstanceMetadata`, HealthImaging's representation of a DICOMweb service, to return DICOM instance metadata (`.json` file). For more information, see Getting DICOM instance metadata from HealthImaging.

To get image set metadata

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

   The **Data store details** page opens and the **Image sets** tab is selected by default.
3. Choose an image set.

   The **Image set details** page opens and the image set metadata displays under the **Image set metadata viewer** section.

AWS CLI and SDKs

C++

SDK for C++

Utility function to get image set metadata.

```
//! Routine which gets a HealthImaging image set's metadata.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param imageSetID: The HealthImaging image set ID.
  \param versionID: The HealthImaging image set version ID, ignored if empty.
  \param outputFilePath: The path where the metadata will be stored as gzipped
 json.
  \param clientConfig: Aws client configuration.
  \\return bool: Function succeeded.
*/
bool AwsDoc::Medical_Imaging::getImageSetMetadata(const Aws::String &dataStoreID,
                                                   const Aws::String &imageSetID,
                                                   const Aws::String &versionID,
```

```
                                                     const Aws::String
 &outputFilePath,
                                                     const
 Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::Model::GetImageSetMetadataRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetImageSetId(imageSetID);
    if (!versionID.empty()) {
        request.SetVersionId(versionID);
    }
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::GetImageSetMetadataOutcome outcome =
 client.GetImageSetMetadata(
            request);
    if (outcome.IsSuccess()) {
        std::ofstream file(outputFilePath, std::ios::binary);
        auto &metadata = outcome.GetResult().GetImageSetMetadataBlob();
        file << metadata.rdbuf();
    }
    else {
        std::cerr << "Failed to get image set metadata: "
                  << outcome.GetError().GetMessage() << std::endl;
    }

    return outcome.IsSuccess();
}
```

Get image set metadata without version.

```
        if (AwsDoc::Medical_Imaging::getImageSetMetadata(dataStoreID, imageSetID,
 "", outputFilePath, clientConfig))
        {
            std::cout << "Successfully retrieved image set metadata." <<
 std::endl;
            std::cout << "Metadata stored in: " << outputFilePath << std::endl;
        }
```

Get image set metadata with version.

```
        if (AwsDoc::Medical_Imaging::getImageSetMetadata(dataStoreID, imageSetID,
 versionID, outputFilePath, clientConfig))
```

```
        {
            std::cout << "Successfully retrieved image set metadata." <<
 std::endl;
            std::cout << "Metadata stored in: " << outputFilePath << std::endl;
        }
```

- For API details, see GetImageSetMetadata in *AWS SDK for C++ API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

Example 1: To get image set metadata without version

The following `get-image-set-metadata` code example gets metadata for an image set without specifying a version.

Note: `outfile` is a required parameter

```
aws medical-imaging get-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    studymetadata.json.gz
```

The returned metadata is compressed with gzip and stored in the studymetadata.json.gz file. To view the contents of the returned JSON object, you must first decompress it.

Output:

```
{
    "contentType": "application/json",
    "contentEncoding": "gzip"
}
```

Example 2: To get image set metadata with version

The following `get-image-set-metadata` code example gets metadata for an image set with a specified version.

Note: `outfile` is a required parameter

```
aws medical-imaging get-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --version-id 1 \
    studymetadata.json.gz
```

The returned metadata is compressed with gzip and stored in the studymetadata.json.gz file. To view the contents of the returned JSON object, you must first decompress it.

Output:

```
{
    "contentType": "application/json",
    "contentEncoding": "gzip"
}
```

- For API details, see GetImageSetMetadata in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void getMedicalImageSetMetadata(MedicalImagingClient
 medicalImagingClient,
            String destinationPath,
            String datastoreId,
            String imagesetId,
            String versionId) {

        try {
            GetImageSetMetadataRequest.Builder getImageSetMetadataRequestBuilder
 = GetImageSetMetadataRequest.builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imagesetId);
```

```
            if (versionId != null) {
                getImageSetMetadataRequestBuilder =
 getImageSetMetadataRequestBuilder.versionId(versionId);
            }


 medicalImagingClient.getImageSetMetadata(getImageSetMetadataRequestBuilder.build(),
                    FileSystems.getDefault().getPath(destinationPath));

            System.out.println("Metadata downloaded to " + destinationPath);
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see GetImageSetMetadata in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

Utility function to get image set metadata.

```
import { GetImageSetMetadataCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";
import { writeFileSync } from "node:fs";

/**
 * @param {string} metadataFileName - The name of the file for the gzipped
 metadata.
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imagesetId - The ID of the image set.
 * @param {string} versionID - The optional version ID of the image set.
 */
```

```
export const getImageSetMetadata = async (
  metadataFileName = "metadata.json.gzip",
  datastoreId = "xxxxxxxxxxxxxx",
  imagesetId = "xxxxxxxxxxxxxx",
  versionID = "",
) => {
  const params = { datastoreId: datastoreId, imageSetId: imagesetId };

  if (versionID) {
    params.versionID = versionID;
  }

  const response = await medicalImagingClient.send(
    new GetImageSetMetadataCommand(params),
  );
  const buffer = await response.imageSetMetadataBlob.transformToByteArray();
  writeFileSync(metadataFileName, buffer);

  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '5219b274-30ff-4986-8cab-48753de3a599',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     contentType: 'application/json',
  //     contentEncoding: 'gzip',
  //     imageSetMetadataBlob: <ref *1> IncomingMessage {}
  // }

  return response;
};
```

Get image set metadata without version.

```
  try {
    await getImageSetMetadata(
      "metadata.json.gzip",
```

```
      "12345678901234567890123456789012",
      "12345678901234567890123456789012",
    );
  } catch (err) {
    console.log("Error", err);
  }
```

Get image set metadata with version.

```
  try {
    await getImageSetMetadata(
      "metadata2.json.gzip",
      "12345678901234567890123456789012",
      "12345678901234567890123456789012",
      "1",
    );
  } catch (err) {
    console.log("Error", err);
  }
```

- For API details, see GetImageSetMetadata in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

Utility function to get image set metadata.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client
```

```
    def get_image_set_metadata(
        self, metadata_file, datastore_id, image_set_id, version_id=None
    ):
        """
        Get the metadata of an image set.

        :param metadata_file: The file to store the JSON gzipped metadata.
        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The version of the image set.
        """
        try:
            if version_id:
                image_set_metadata = 
self.health_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id,
                    datastoreId=datastore_id,
                    versionId=version_id,
                )
            else:

                image_set_metadata = 
self.health_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
            print(image_set_metadata)
            with open(metadata_file, "wb") as f:
                for chunk in 
image_set_metadata["imageSetMetadataBlob"].iter_chunks():
                    if chunk:
                        f.write(chunk)

        except ClientError as err:
            logger.error(
                "Couldn't get image metadata. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

Get image set metadata without version.

```
                image_set_metadata =
self.health_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
```

Get image set metadata with version.

```
                image_set_metadata =
self.health_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id,
                    datastoreId=datastore_id,
                    versionId=version_id,
                )
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetImageSetMetadata in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        " iv_version_id = '1' (optional)
        IF iv_version_id IS NOT INITIAL.
```

```
        oo_result = lo_mig->getimagesetmetadata(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id
          iv_versionid = iv_version_id ).
      ELSE.
        oo_result = lo_mig->getimagesetmetadata(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id ).
      ENDIF.
      DATA(lv_metadata_blob) = oo_result->get_imagesetmetadatablob( ).
      MESSAGE 'Image set metadata retrieved.' TYPE 'I'.
    CATCH /aws1/cx_migaccessdeniedex.
      MESSAGE 'Access denied.' TYPE 'I'.
    CATCH /aws1/cx_migconflictexception.
      MESSAGE 'Conflict error.' TYPE 'I'.
    CATCH /aws1/cx_miginternalserverex.
      MESSAGE 'Internal server error.' TYPE 'I'.
    CATCH /aws1/cx_migresourcenotfoundex.
      MESSAGE 'Image set not found.' TYPE 'I'.
    CATCH /aws1/cx_migthrottlingex.
      MESSAGE 'Request throttled.' TYPE 'I'.
    CATCH /aws1/cx_migvalidationex.
      MESSAGE 'Validation error.' TYPE 'I'.
  ENDTRY.
```

- For API details, see GetImageSetMetadata in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Transfer Syntax Metadata

When importing DICOM data, HealthImaging keeps the original value for the transfer syntax attribute in the image set metadata. The transfer syntax of the original DICOM data imported is stored as `TransferSyntaxUID`. HealthImaging uses `StoredTransferSyntaxUID` to indicate the format used to encode image frame data in the data store: `1.2.840.10008.1.2.4.202` for HTJ2K enabled data stores (default) and `1.2.840.10008.1.2.4.90` for JPEG 2000 Lossless enabled data stores.

Getting image set pixel data

An image frame is the pixel data that exists within an image set to make up a 2D medical image. Use the `GetImageFrame` action to retrieve an HTJ2K-encoded or native JPEG 2000 lossless image frame for a given image set in HealthImaging. The following menus provide code examples for the AWS CLI and AWS SDKs. For more information, see `GetImageFrame` in the *AWS HealthImaging API Reference*.

Note

Keep the following points in mind when using the `GetImageFrame` action:

- During import, HealthImaging retains encoding for some transfer syntaxes, and transcodes others to HTJ2K lossless (default) or JPEG 2000 Lossless. The `GetImageFrame` action returns the image frame in the stored transfer syntax of the instance. No transcoding is performed during retrieval to ensure minimal retrieval latency. Image frames may need to be decoded prior to viewing in an image viewer, depending on the transfer syntax. For more information, see Supported transfer syntaxes and Image frame decoding libraries.
- For instances stored in HealthImaging with one or more image frames encoded in the MPEG family of Transfer Syntaxes (which includes MPEG2, MPEG-4 AVC/H.264 and HEVC/H.265) the `GetImageFrame` action will return a video object in the stored transfer syntax.
- The transfer syntax of image frames is specified in the `Content-Type HTTP` header response element. For example, an image frame encoded in HTJ2K will have `Content-Type: image/jph header`. For more information, see `GetImageFrame` in the *AWS HealthImaging API Reference*.
- You can also use `GetDICOMInstanceFrames`, HealthImaging's representation of a DICOMweb service, to retrieve DICOM instance frames (`multipart` request) for

DICOMweb-compatible viewers and applications. For more information, see Getting DICOM instance frames from HealthImaging.

To get image set pixel data

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

Note

Image frames must be accessed and decoded programmatically, as an image viewer is not available in the AWS Management Console.
For more information about decoding and viewing image frames, see Image frame decoding libraries.

AWS CLI and SDKs

C++

SDK for C++

```
//! Routine which downloads an AWS HealthImaging image frame.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param imageSetID: The image set ID.
  \param frameID: The image frame ID.
  \param jphFile: File to store the downloaded frame.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
*/
bool AwsDoc::Medical_Imaging::getImageFrame(const Aws::String &dataStoreID,
                                            const Aws::String &imageSetID,
                                            const Aws::String &frameID,
                                            const Aws::String &jphFile,
                                            const
 Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
```

```
    Aws::MedicalImaging::Model::GetImageFrameRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetImageSetId(imageSetID);

    Aws::MedicalImaging::Model::ImageFrameInformation imageFrameInformation;
    imageFrameInformation.SetImageFrameId(frameID);
    request.SetImageFrameInformation(imageFrameInformation);

    Aws::MedicalImaging::Model::GetImageFrameOutcome outcome =
 client.GetImageFrame(
            request);

    if (outcome.IsSuccess()) {
        std::cout << "Successfully retrieved image frame." << std::endl;
        auto &buffer = outcome.GetResult().GetImageFrameBlob();

        std::ofstream outfile(jphFile, std::ios::binary);
        outfile << buffer.rdbuf();
    }
    else {
        std::cout << "Error retrieving image frame." <<
 outcome.GetError().GetMessage()
                  << std::endl;

    }

    return outcome.IsSuccess();
}
```

- For API details, see GetImageFrame in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To get image set pixel data

The following `get-image-frame` code example gets an image frame.

```
aws medical-imaging get-image-frame \
    --datastore-id "12345678901234567890123456789012" \
    --image-set-id "98765412345612345678907890789012" \
    --image-frame-information imageFrameId=3abf5d5d7ae72f80a0ec81b2c0de3ef4 \
    imageframe.jph
```

Note: This code example does not include output because the GetImageFrame action returns a stream of pixel data to the imageframe.jph file. For information about decoding and viewing image frames, see HTJ2K decoding libraries.

- For API details, see GetImageFrame in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
        public static void getMedicalImageSetFrame(MedicalImagingClient
 medicalImagingClient,
                        String destinationPath,
                        String datastoreId,
                        String imagesetId,
                        String imageFrameId) {

                try {
                        GetImageFrameRequest getImageSetMetadataRequest =
 GetImageFrameRequest.builder()
                                        .datastoreId(datastoreId)
                                        .imageSetId(imagesetId)

 .imageFrameInformation(ImageFrameInformation.builder()

 .imageFrameId(imageFrameId)
                                                        .build())
                                        .build();

 medicalImagingClient.getImageFrame(getImageSetMetadataRequest,

 FileSystems.getDefault().getPath(destinationPath));
```

```
                        System.out.println("Image frame downloaded to " +
 destinationPath);
                } catch (MedicalImagingException e) {
                        System.err.println(e.awsErrorDetails().errorMessage());
                        System.exit(1);
                }
        }
```

- For API details, see GetImageFrame in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetImageFrameCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} imageFrameFileName - The name of the file for the HTJ2K-
encoded image frame.
 * @param {string} datastoreID - The data store's ID.
 * @param {string} imageSetID - The image set's ID.
 * @param {string} imageFrameID - The image frame's ID.
 */
export const getImageFrame = async (
  imageFrameFileName = "image.jph",
  datastoreID = "DATASTORE_ID",
  imageSetID = "IMAGE_SET_ID",
  imageFrameID = "IMAGE_FRAME_ID",
) => {
  const response = await medicalImagingClient.send(
    new GetImageFrameCommand({
      datastoreId: datastoreID,
      imageSetId: imageSetID,
      imageFrameInformation: { imageFrameId: imageFrameID },
```

```
    }),
  );
  const buffer = await response.imageFrameBlob.transformToByteArray();
  writeFileSync(imageFrameFileName, buffer);

  console.log(response);
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: 'e4ab42a5-25a3-4377-873f-374ecf4380e1',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     contentType: 'application/octet-stream',
  //     imageFrameBlob: <ref *1> IncomingMessage {}
  // }
  return response;
};
```

- For API details, see GetImageFrame in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_pixel_data(
        self, file_path_to_write, datastore_id, image_set_id, image_frame_id
    ):
```

```
        """
        Get an image frame's pixel data.

        :param file_path_to_write: The path to write the image frame's HTJ2K
 encoded pixel data.
        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param image_frame_id: The ID of the image frame.
        """
        try:
            image_frame = self.health_imaging_client.get_image_frame(
                datastoreId=datastore_id,
                imageSetId=image_set_id,
                imageFrameInformation={"imageFrameId": image_frame_id},
            )
            with open(file_path_to_write, "wb") as f:
                for chunk in image_frame["imageFrameBlob"].iter_chunks():
                    if chunk:
                        f.write(chunk)
        except ClientError as err:
            logger.error(
                "Couldn't get image frame. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetImageFrame in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    " iv_image_set_id = '1234567890123456789012345678901234567890'
    " iv_image_frame_id = '1234567890123456789012345678901234567890'
    oo_result = lo_mig->getimageframe(
      iv_datastoreid = iv_datastore_id
      iv_imagesetid = iv_image_set_id
      io_imageframeinformation = NEW /aws1/cl_migimageframeinfmtion(
        iv_imageframeid = iv_image_frame_id ) ).
    DATA(lv_frame_blob) = oo_result->get_imageframeblob( ).
    MESSAGE 'Image frame retrieved.' TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Image frame not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see GetImageFrame in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Example availability

Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Modifying image sets with AWS HealthImaging

DICOM import jobs typically require you to modify your image sets for the following reasons:

- Patient safety
- Data consistency
- Reduce storage costs

> **Important**
>
> During import, HealthImaging processes DICOM instance binaries (`.dcm` files) and transforms them into image sets. Use HealthImaging cloud native actions (APIs) to manage data stores and image sets. Use HealthImaging's representation of DICOMweb services to return DICOMweb responses.

HealthImaging provides several cloud native APIs to simplify the image set modification process. The following topics describe how to modify image sets using AWS CLI and AWS SDKs.

Topics

Listing image set versions

Use the `ListImageSetVersions` action to list version history for an image set in HealthImaging. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `ListImageSetVersions` in the *AWS HealthImaging API Reference*.

> **Note**
>
> AWS HealthImaging records every change made to an image set. Updating image set metadata creates a new version in the image set history. For more information, see Updating image set metadata.

To list versions for an image set

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

   The **Data store details** page opens and the **Image sets** tab is selected by default.
3. Choose an image set.

   The **Image set details** page opens.

   The image set **Version** displays under the **Image set details** section.

AWS CLI and SDKs

CLI

AWS CLI

To list image set versions

The following `list-image-set-versions` code example lists the version history for an image set.

```
aws medical-imaging list-image-set-versions \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e
```

Output:

```
{
    "imageSetPropertiesList": [
        {
            "ImageSetWorkflowStatus": "UPDATED",
            "versionId": "4",
            "updatedAt": 1680029436.304,
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "createdAt": 1680027126.436
        },
        {
            "ImageSetWorkflowStatus": "UPDATED",
            "versionId": "3",
            "updatedAt": 1680029163.325,
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "createdAt": 1680027126.436
        },
        {
            "ImageSetWorkflowStatus": "COPY_FAILED",
            "versionId": "2",
            "updatedAt": 1680027455.944,
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "message": "INVALID_REQUEST:  Series of SourceImageSet and
 DestinationImageSet don't match.",
            "createdAt": 1680027126.436
        },
        {
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "versionId": "1",
            "ImageSetWorkflowStatus": "COPIED",
            "createdAt": 1680027126.436
        }
    ]
}
```

- For API details, see ListImageSetVersions in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static List<ImageSetProperties>
listMedicalImageSetVersions(MedicalImagingClient medicalImagingClient,
            String datastoreId,
            String imagesetId) {
        try {
            ListImageSetVersionsRequest getImageSetRequest =
ListImageSetVersionsRequest.builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imagesetId)
                    .build();

            ListImageSetVersionsIterable responses = medicalImagingClient
                    .listImageSetVersionsPaginator(getImageSetRequest);
            List<ImageSetProperties> imageSetProperties = new ArrayList<>();
            responses.stream().forEach(response ->
imageSetProperties.addAll(response.imageSetPropertiesList()));

            return imageSetProperties;
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see ListImageSetVersions in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { paginateListImageSetVersions } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imageSetId - The ID of the image set.
 */
export const listImageSetVersions = async (
  datastoreId = "xxxxxxxxxxxx",
  imageSetId = "xxxxxxxxxxxx",
) => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = { datastoreId, imageSetId };
  const paginator = paginateListImageSetVersions(
    paginatorConfig,
    commandParams,
  );

  const imageSetPropertiesList = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    imageSetPropertiesList.push(...page.imageSetPropertiesList);
    console.log(page);
  }
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '74590b37-a002-4827-83f2-3c590279c742',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     imageSetPropertiesList: [
  //         {
```

```
  //             ImageSetWorkflowStatus: 'CREATED',
  //             createdAt: 2023-09-22T14:49:26.427Z,
  //             imageSetId: 'xxxxxxxxxxxxxxxxxxxxxxx',
  //             imageSetState: 'ACTIVE',
  //             versionId: '1'
  //         }]
  // }
  return imageSetPropertiesList;
};
```

- For API details, see ListImageSetVersions in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_image_set_versions(self, datastore_id, image_set_id):
        """
        List the image set versions.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :return: The list of image set versions.
        """
        try:
            paginator = self.health_imaging_client.get_paginator(
                "list_image_set_versions"
            )
            page_iterator = paginator.paginate(
                imageSetId=image_set_id, datastoreId=datastore_id
```

```
            )
            image_set_properties_list = []
            for page in page_iterator:
                image_set_properties_list.extend(page["imageSetPropertiesList"])
        except ClientError as err:
            logger.error(
                "Couldn't list image set versions. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return image_set_properties_list
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListImageSetVersions in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        oo_result = lo_mig->listimagesetversions(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id ).
        DATA(lt_versions) = oo_result->get_imagesetpropertieslist( ).
        DATA(lv_count) = lines( lt_versions ).
```

```
        MESSAGE |Found { lv_count } image set versions.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see ListImageSetVersions in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Updating image set metadata

Use the `UpdateImageSetMetadata` action to update image set metadata in AWS HealthImaging. You can use this asynchronous process to add, update, and remove image set metadata attributes, which are manifestations of DICOM normalization elements that are created during import. Using the `UpdateImageSetMetadata` action, you can remove individual SOP Instances to keep image sets in sync with external systems and to de-identify image set metadata. For more information, see `UpdateImageSetMetadata` in the *AWS HealthImaging API Reference*.

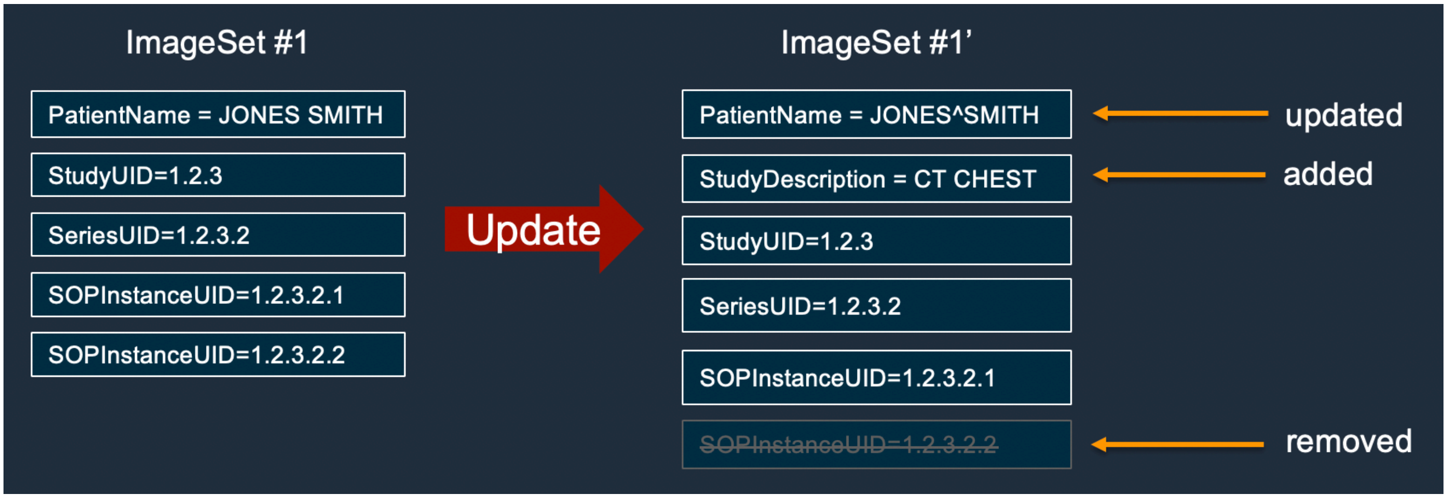
Note

Real-world DICOM imports require updating, adding, and removing attributes from the image set metadata. Keep the following points in mind when updating image set metadata:

- Pass in the `--include-study-image-sets` flag to update all the primary image sets that share the same Study Instance UID as the requested image set. This is an atomic operation, and the versions of all affected image sets will be incremented. Note: the `--include-study-image-sets` flag is not supported with `revertToVersionId` operations, as revert restores a previous version and does not apply attribute changes.
- Updating image set metadata creates a new version in the image set history. For more information, see Listing image set versions. To revert to a previous image set version ID, use the optional `revertToVersionId` parameter.
- Updating image set metadata is an asynchronous process. Therefore, `imageSetState` and `imageSetWorkflowStatus` response elements are available to provide the respective state and status of an image set undergoing update. You cannot perform other write operations on a `LOCKED` image set.
- If the `UpdateImageSetMetadata` action is not successful, call and review the `message` response element to see `common errors.`
- DICOM element constraints are applied to metadata updates. The `force` request parameter allows you to update elements of non-primary image sets in cases where you want to override DICOM metadata constraints.
- The UpdateImageSet will not support --`force` to update StudyInstanceUID, SeriesInstanceUID, and SOPInstanceUID for primary image sets.
- Set the `force` request parameter to force completion of the `UpdateImageSetMetadata` action on non-primary image sets. Setting this parameter allows the following updates to an image set:
  - Updating the `Tag.StudyInstanceUID`, `Tag.SeriesInstanceUID`, `Tag.SOPInstanceUID`, and `Tag.StudyID` attributes
  - Adding, removing, or updating instance level private DICOM data elements
- To remove an instance from an image set, the `--force` parameter must be provided to the `UpdateImageSetMetadata` request.
- The action of promoting an image set to primary will change the image set ID.

- When updating a VR=SQ attribute, the entire sequence attribute will be updated. This API does not support partial sequence attribute updates.

The following diagram represents image set metadata being updated in HealthImaging.



To update image set metadata

Choose a tab based on your access preference to AWS HealthImaging.

AWS CLI and SDKs

CLI

AWS CLI

Example 1: To insert or update an attribute in image set metadata

The following `update-image-set-metadata` example inserts or updates an attribute in image set metadata.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\":1.1,\"Patient\":{\"DICOM\":
{\"PatientName\":\"MX^MX\"}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 2: To remove an attribute from image set metadata

The following `update-image-set-metadata` example removes an attribute from image set metadata.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "removableAttributes": "{\"SchemaVersion\":1.1,\"Study\":{\"DICOM\":
{\"StudyDescription\":\"CHEST\"}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 3: To remove an instance from image set metadata

The following `update-image-set-metadata` example removes an instance from image set metadata.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates file://metadata-updates.json \
    --force
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "removableAttributes": "{\"SchemaVersion\": 1.1,\"Study\": {\"Series
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"Instances\":
 {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
```

```
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 4: To revert an image set to a previous version

The following `update-image-set-metadata` example shows how to revert an image set to a prior version. CopyImageSet and UpdateImageSetMetadata actions create new versions of image sets.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
    --latest-version-id 3 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates '{"revertToVersionId": "1"}'
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "latestVersionId": "4",
    "imageSetState": "LOCKED",
    "imageSetWorkflowStatus": "UPDATING",
    "createdAt": 1680027126.436,
    "updatedAt": 1680042257.908
}
```

Example 5: To add a private DICOM data element to an instance

The following `update-image-set-metadata` example shows how to add a private element to a specified instance within an image set. The DICOM standard permits private data elements for communication of information that cannot be contained in standard data elements. You can create, update, and delete private data elements with the UpdateImageSetMetadata action.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
    --latest-version-id 1 \
```

```
    --cli-binary-format raw-in-base64-out \
    --force \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\": 1.1,\"Study\": {\"Series
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"Instances
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"DICOM\":
 {\"001910F9\": \"97\"},\"DICOMVRs\": {\"001910F9\": \"DS\"}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 6: To update a private DICOM data element to an instance

The following `update-image-set-metadata` example shows how to update the value of a private data element belonging to an instance within an image set.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --force \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\": 1.1,\"Study\": {\"Series
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"Instances
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"DICOM\":
 {\"00091001\": \"GE_GENESIS_DD\"}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 7: To update a SOPInstanceUID with the force parameter

The following `update-image-set-metadata` example shows how to update a SOPInstanceUID, using the force parameter to override the DICOM metadata constraints.

```
aws medical-imaging update-image-set-metadata \
        --datastore-id 12345678901234567890123456789012 \
        --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
        --latest-version-id 1 \
        --cli-binary-format raw-in-base64-out \
        --force \
        --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\":1.1,\"Study\":{\"Series
\":{\"1.3.6.1.4.1.5962.99.1.3633258862.2104868982.1369432891697.3656.0\":
{\"Instances\":
{\"1.3.6.1.4.1.5962.99.1.3633258862.2104868982.1369432891697.3659.0\":{\"DICOM\":
```

```
{\"SOPInstanceUID\":
\"1.3.6.1.4.1.5962.99.1.3633258862.2104868982.1369432891697.3659.9\"}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

- For API details, see UpdateImageSetMetadata in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    /**
     * Update the metadata of an AWS HealthImaging image set.
     *
     * @param medicalImagingClient - The AWS HealthImaging client object.
     * @param datastoreId          - The datastore ID.
     * @param imageSetId           - The image set ID.
     * @param versionId            - The version ID.
     * @param metadataUpdates      - A MetadataUpdates object containing the
 updates.
     * @param force                - The force flag.
     * @throws MedicalImagingException - Base exception for all service
 exceptions thrown by AWS HealthImaging.
     */
    public static void updateMedicalImageSetMetadata(MedicalImagingClient
 medicalImagingClient,
                                                     String datastoreId,
                                                     String imageSetId,
                                                     String versionId,
```

```
                                                                   MetadataUpdates
metadataUpdates,
                                                                   boolean force) {
        try {
            UpdateImageSetMetadataRequest updateImageSetMetadataRequest =
UpdateImageSetMetadataRequest
                    .builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imageSetId)
                    .latestVersionId(versionId)
                    .updateImageSetMetadataUpdates(metadataUpdates)
                    .force(force)
                    .build();

            UpdateImageSetMetadataResponse response =
medicalImagingClient.updateImageSetMetadata(updateImageSetMetadataRequest);

            System.out.println("The image set metadata was updated" + response);
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            throw e;
        }
    }
```

Use case #1: Insert or update an attribute.

```
                final String insertAttributes = """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "DICOM": {
                              "StudyDescription": "CT CHEST"
                            }
                          }
                        }
                        """;
                MetadataUpdates metadataInsertUpdates = MetadataUpdates.builder()
                        .dicomUpdates(DICOMUpdates.builder()
                                .updatableAttributes(SdkBytes.fromByteBuffer(
                                        ByteBuffer.wrap(insertAttributes

.getBytes(StandardCharsets.UTF_8))))
```

```
                                .build())
                        .build();

                updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
imagesetId,
                        versionid, metadataInsertUpdates, force);
```

Use case #2: Remove an attribute.

```
                final String removeAttributes = """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "DICOM": {
                              "StudyDescription": "CT CHEST"
                            }
                          }
                        }
                        """;
                MetadataUpdates metadataRemoveUpdates = MetadataUpdates.builder()
                        .dicomUpdates(DICOMUpdates.builder()
                                .removableAttributes(SdkBytes.fromByteBuffer(
                                        ByteBuffer.wrap(removeAttributes

.getBytes(StandardCharsets.UTF_8))))
                                .build())
                        .build();

                updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
imagesetId,
                        versionid, metadataRemoveUpdates, force);
```

Use case #3: Remove an instance.

```
                final String removeInstance = """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "Series": {

"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {
```

```
                                "Instances": {

"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {}
                                }
                            }
                        }
                    }
                }
                """;
        MetadataUpdates metadataRemoveUpdates = MetadataUpdates.builder()
                .dicomUpdates(DICOMUpdates.builder()
                        .removableAttributes(SdkBytes.fromByteBuffer(
                                ByteBuffer.wrap(removeInstance

.getBytes(StandardCharsets.UTF_8))))
                        .build())
                .build();

        updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
imagesetId,
                versionid, metadataRemoveUpdates, force);
```

Use case #4: Revert to a previous version.

```
        // In this case, revert to previous version.
        String revertVersionId =
Integer.toString(Integer.parseInt(versionid) - 1);
        MetadataUpdates metadataRemoveUpdates = MetadataUpdates.builder()
                .revertToVersionId(revertVersionId)
                .build();
        updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
imagesetId,
                versionid, metadataRemoveUpdates, force);
```

- For API details, see UpdateImageSetMetadata in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { UpdateImageSetMetadataCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the HealthImaging data store.
 * @param {string} imageSetId - The ID of the HealthImaging image set.
 * @param {string} latestVersionId - The ID of the HealthImaging image set
 version.
 * @param {{}} updateMetadata - The metadata to update.
 * @param {boolean} force - Force the update.
 */
export const updateImageSetMetadata = async (
  datastoreId = "xxxxxxxxxx",
  imageSetId = "xxxxxxxxxx",
  latestVersionId = "1",
  updateMetadata = "{}",
  force = false,
) => {
  try {
    const response = await medicalImagingClient.send(
      new UpdateImageSetMetadataCommand({
        datastoreId: datastoreId,
        imageSetId: imageSetId,
        latestVersionId: latestVersionId,
        updateImageSetMetadataUpdates: updateMetadata,
        force: force,
      }),
    );
    console.log(response);
    // {
    //     '$metadata': {
    //     httpStatusCode: 200,
    //         requestId: '7966e869-e311-4bff-92ec-56a61d3003ea',
    //         extendedRequestId: undefined,
    //         cfId: undefined,
    //         attempts: 1,
    //         totalRetryDelay: 0
    // },
    //     createdAt: 2023-09-22T14:49:26.427Z,
    //     datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
```

```
    //     imageSetId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
    //     imageSetState: 'LOCKED',
    //     imageSetWorkflowStatus: 'UPDATING',
    //     latestVersionId: '4',
    //     updatedAt: 2023-09-27T19:41:43.494Z
    // }
    return response;
  } catch (err) {
    console.error(err);
  }
};
```

Use case #1: Insert or update an attribute and force the update.

```
    const insertAttributes = JSON.stringify({
      SchemaVersion: 1.1,
      Study: {
        DICOM: {
          StudyDescription: "CT CHEST",
        },
      },
    });

    const updateMetadata = {
      DICOMUpdates: {
        updatableAttributes: new TextEncoder().encode(insertAttributes),
      },
    };

    await updateImageSetMetadata(
      datastoreID,
      imageSetID,
      versionID,
      updateMetadata,
      true,
    );
```

Use case #2: Remove an attribute.

```
    // Attribute key and value must match the existing attribute.
    const remove_attribute = JSON.stringify({
```

```
    SchemaVersion: 1.1,
    Study: {
      DICOM: {
        StudyDescription: "CT CHEST",
      },
    },
  });

  const updateMetadata = {
    DICOMUpdates: {
      removableAttributes: new TextEncoder().encode(remove_attribute),
    },
  };

  await updateImageSetMetadata(
    datastoreID,
    imageSetID,
    versionID,
    updateMetadata,
  );
```

Use case #3: Remove an instance.

```
  const remove_instance = JSON.stringify({
    SchemaVersion: 1.1,
    Study: {
      Series: {
        "1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {
          Instances: {
            "1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {},
          },
        },
      },
    },
  });

  const updateMetadata = {
    DICOMUpdates: {
      removableAttributes: new TextEncoder().encode(remove_instance),
    },
  };
```

```
    await updateImageSetMetadata(
      datastoreID,
      imageSetID,
      versionID,
      updateMetadata,
    );
```

Use case #4: Revert to an earlier version.

```
    const updateMetadata = {
      revertToVersionId: "1",
    };

    await updateImageSetMetadata(
      datastoreID,
      imageSetID,
      versionID,
      updateMetadata,
    );
```

- For API details, see UpdateImageSetMetadata in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def update_image_set_metadata(
        self, datastore_id, image_set_id, version_id, metadata, force=False
    ):
```

```
        """
        Update the metadata of an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The ID of the image set version.
        :param metadata: The image set metadata as a dictionary.
            For example {"DICOMUpdates": {"updatableAttributes":
            "{\"SchemaVersion\":1.1,\"Patient\":{\"DICOM\":{\"PatientName\":
\"Garcia^Gloria\"}}}"}}
        :param: force: Force the update.
        :return: The updated image set metadata.
        """
        try:
            updated_metadata =
 self.health_imaging_client.update_image_set_metadata(
                imageSetId=image_set_id,
                datastoreId=datastore_id,
                latestVersionId=version_id,
                updateImageSetMetadataUpdates=metadata,
                force=force,
            )
        except ClientError as err:
            logger.error(
                "Couldn't update image set metadata. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return updated_metadata
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

Use case #1: Insert or update an attribute.

```
            attributes = """{
```

```
                    "SchemaVersion": 1.1,
                    "Study": {
                        "DICOM": {
                            "StudyDescription": "CT CHEST"
                        }
                    }
                }"""
            metadata = {"DICOMUpdates": {"updatableAttributes": attributes}}

            self.update_image_set_metadata(
                data_store_id, image_set_id, version_id, metadata, force
            )
```

Use case #2: Remove an attribute.

```
            # Attribute key and value must match the existing attribute.
            attributes = """{
                    "SchemaVersion": 1.1,
                    "Study": {
                        "DICOM": {
                            "StudyDescription": "CT CHEST"
                        }
                    }
                }"""
            metadata = {"DICOMUpdates": {"removableAttributes": attributes}}

            self.update_image_set_metadata(
                data_store_id, image_set_id, version_id, metadata, force
            )
```

Use case #3: Remove an instance.

```
            attributes = """{
                    "SchemaVersion": 1.1,
                    "Study": {
                        "Series": {

 "1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {
                                "Instances": {

 "1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {}
```

```
                                }
                            }
                        }
                    }
                }"""
            metadata = {"DICOMUpdates": {"removableAttributes": attributes}}

            self.update_image_set_metadata(
                data_store_id, image_set_id, version_id, metadata, force
            )
```

Use case #4: Revert to an earlier version.

```
            metadata = {"revertToVersionId": "1"}

            self.update_image_set_metadata(
                data_store_id, image_set_id, version_id, metadata, force
            )
```

- For API details, see UpdateImageSetMetadata in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        " iv_latest_version_id = '1'
        " iv_force = abap_false
```

```
        oo_result = lo_mig->updateimagesetmetadata(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id
          iv_latestversionid = iv_latest_version_id
          io_updateimagesetmetupdates = io_metadata_updates
          iv_force = iv_force ).
        DATA(lv_new_version) = oo_result->get_latestversionid( ).
        MESSAGE |Image set metadata updated to version: { lv_new_version }.| TYPE
'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migservicequotaexcdex.
        MESSAGE 'Service quota exceeded.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see UpdateImageSetMetadata in *AWS SDK for SAP ABAP API reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Example availability

Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

You can move SOP Instances between image sets, resolve metadata element conflicts, and add or remove instances from the primary image sets using the `CopyImageSet`, `UpdateImageSetMetadata`, and `DeleteImageSet` APIs.

You can remove an image set from the primary collection with the `DeleteImageSet` action.

To update the metadata of a primary image set

1. Use the CopyImageSet action to create a non-primary image set that is a copy of the primary image set you want to modify. Let's say this returns `103785414bc2c89330f7ce51bbd13f7a` as the non-primary image set ID.

```
          aws medical-imaging copy-image-set --datastore-id
          a8d19e7875e1532d9b5652f6b25e12c9 --source-image-set-id
          0778b83b36eced0b76752bfe32192fb7 --copy-image-set-information
          '{"sourceImageSet": {"latestVersionId": "1" }}' --region us-west-2
```

2. Use the UpdateImageSetMetadata action to make changes on the non-primary image set (`103785414bc2c89330f7ce51bbd13f7a`). For example, changing the PatientID.

```
aws medical-imaging update-image-set-metadata \
    --region us-west-2 \
    --datastore-id a8d19e7875e1532d9b5652f6b25e12c9 \
    --image-set-id 103785414bc2c89330f7ce51bbd13f7a \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates '{
    "DICOMUpdates": {
      "updatableAttributes": "{\"SchemaVersion\":1.1,\"Patient\":
      {\"DICOM\":{\"PatientID\":\"1234\"}}}"
    }
  }'
```

3. Delete the primary image set that you are modifying.

```
aws medical-imaging delete-image-set --datastore-
          id a8d19e7875e1532d9b5652f6b25e12c9 --image-set-
          id 0778b83b36eced0b76752bfe32192fb7
```

4. Use the CopyImageSet action with the argument `--promoteToPrimary` to add the updated image set to the primary collection.

```
aws medical-imaging copy-image-set --datastore-
        id a8d19e7875e1532d9b5652f6b25e12c9 --source-image-set-
        id 103785414bc2c89330f7ce51bbd13f7a --copy-image-set-information
        '{"sourceImageSet": {"latestVersionId": "2" }}' --region us-west-2 --
        promote-to-primary
```

5. Delete the non-primary image set.

```
aws medical-imaging delete-image-set --datastore-
        id a8d19e7875e1532d9b5652f6b25e12c9 --image-set-
        id 103785414bc2c89330f7ce51bbd13f7a
```

To make a non-primary image set primary

1. Use the UpdateImageSetMetadata action to resolve conflicts with existing Primary image sets.

```
aws medical-imaging update-image-set-metadata \
    --region us-west-2 \
    --datastore-id a8d19e7875e1532d9b5652f6b25e12c9 \
    --image-set-id 103785414bc2c89330f7ce51bbd13f7a \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates '{
    "DICOMUpdates": {
      "updatableAttributes": "{\"SchemaVersion\":1.1,\"Patient\":{\"DICOM\":
      {\"PatientID\":\"1234\"}}}"
    }
  }'
```

2. When the conflicts are resolved, use the CopyImageSet action with the argument `--promoteToPrimary` to add the image set to the primary image set collection.

```
aws medical-imaging copy-image-set --datastore-
        id a8d19e7875e1532d9b5652f6b25e12c9 --source-image-set-
        id 103785414bc2c89330f7ce51bbd13f7a --copy-image-set-information
        '{"sourceImageSet": {"latestVersionId": "2" }}' --region us-west-2 --
        promote-to-primary
```

3. After confirming that the CopyImageSet action was successful, delete the source non-primary image set.

```
aws medical-imaging delete-image-set --datastore-
        id a8d19e7875e1532d9b5652f6b25e12c9 --image-set-
        id 103785414bc2c89330f7ce51bbd13f7a
```

Copying an image set

Use the `CopyImageSet` action to copy an image set in HealthImaging. You use this asynchronous process to copy the contents of an image set into a new or existing image set. You can copy into a *new* image set to split an image set, as well as to create a separate copy. You can also copy into an *existing* image set to merge two image sets together. For more information, see `CopyImageSet` in the *AWS HealthImaging API Reference*.

Note

Keep the following points in mind when using the `CopyImageSet` action:

- The `CopyImageSet` action will create a new image set, or a new version of the `destinationImageSet`. For more information, see Listing image set versions.
- Copy is an asynchronous process. Therefore, the state (`imageSetState`) and status (`imageSetWorkflowStatus`) response elements are available to let you know what operation is happening on a locked image set. Other write operations cannot be performed on a locked image set.
- `CopyImageSet` requires SOP Instance UIDs be unique within an image set.
- You can copy subsets of SOP Instances using `copiableAttributes`. This allows you to pick one or more SOP Instances from the `sourceImageSet` to copy to the `destinationImageSet`.
- If the `CopyImageSet` action is not successful, call `GetImageSet` and review the `message` property. For more information, see Getting image set properties.
- Real-world DICOM imports can result in multiple image sets per DICOM Series. The `CopyImageSet` action requires `sourceImageSet` and `destinationImageSet` to have consistent metadata, unless the optional `force` parameter is supplied.
- Set the `force` parameter to force the operation, even if there are inconsistent metadata elements between the `sourceImageSet` and `destinationImageSet`.

In these cases, the Patient, Study, and Series metadata remains unchanged in the `destinationImageSet`.

To copy an image set

Choose a tab based on your access preference to AWS HealthImaging.

AWS CLI and SDKs

CLI

AWS CLI

Example 1: To copy an image set without a destination.

The following `copy-image-set` example makes a duplicate copy of an image set without a destination.

```
aws medical-imaging copy-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --source-image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --copy-image-set-information '{"sourceImageSet": {"latestVersionId": "1" } }'
```

Output:

```
{
    "destinationImageSetProperties": {
        "latestVersionId": "2",
        "imageSetWorkflowStatus": "COPYING",
        "updatedAt": 1680042357.432,
        "imageSetId": "b9a06fef182a5f992842f77f8e0868e5",
        "imageSetState": "LOCKED",
        "createdAt": 1680042357.432
    },
    "sourceImageSetProperties": {
        "latestVersionId": "1",
        "imageSetWorkflowStatus": "COPYING_WITH_READ_ONLY_ACCESS",
        "updatedAt": 1680042357.432,
        "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
        "imageSetState": "LOCKED",
```

```
        "createdAt": 1680027126.436
    },
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 2: To copy an image set with a destination.

The following `copy-image-set` example makes a duplicate copy of an image set with a destination.

```
aws medical-imaging copy-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --source-image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --copy-image-set-information '{"sourceImageSet": {"latestVersionId": "1" },
 "destinationImageSet": { "imageSetId": "b9a06fef182a5f992842f77f8e0868e5",
 "latestVersionId": "1"} }'
```

Output:

```
{
    "destinationImageSetProperties": {
        "latestVersionId": "2",
        "imageSetWorkflowStatus": "COPYING",
        "updatedAt": 1680042505.135,
        "imageSetId": "b9a06fef182a5f992842f77f8e0868e5",
        "imageSetState": "LOCKED",
        "createdAt": 1680042357.432
    },
    "sourceImageSetProperties": {
        "latestVersionId": "1",
        "imageSetWorkflowStatus": "COPYING_WITH_READ_ONLY_ACCESS",
        "updatedAt": 1680042505.135,
        "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
        "imageSetState": "LOCKED",
        "createdAt": 1680027126.436
    },
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 3: To copy a subset of instances from a source image set to a destination image set.

The following `copy-image-set` example copies one DICOM instance from the source image set to the destination image set. The force parameter is provided to override inconsistencies in the Patient, Study, and Series level attributes.

```
aws medical-imaging copy-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --source-image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --copy-image-set-information '{"sourceImageSet":
 {"latestVersionId": "1","DICOMCopies": {"copiableAttributes":
 "{\"SchemaVersion\":\"1.1\",\"Study\":{\"Series\":
{\"1.3.6.1.4.1.5962.99.1.3673257865.2104868982.1369432891697.3666.0\":
{\"Instances\":
{\"1.3.6.1.4.1.5962.99.1.3673257865.2104868982.1369432891697.3669.0\":
{}}}}}}"}},"destinationImageSet": {"imageSetId":
 "b9eb50d8ee682eb9fcf4acbf92f62bb7","latestVersionId": "1"}}' \
    --force
```

Output:

```
{
    "destinationImageSetProperties": {
        "latestVersionId": "2",
        "imageSetWorkflowStatus": "COPYING",
        "updatedAt": 1680042505.135,
        "imageSetId": "b9eb50d8ee682eb9fcf4acbf92f62bb7",
        "imageSetState": "LOCKED",
        "createdAt": 1680042357.432
    },
    "sourceImageSetProperties": {
        "latestVersionId": "1",
        "imageSetWorkflowStatus": "COPYING_WITH_READ_ONLY_ACCESS",
        "updatedAt": 1680042505.135,
        "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
        "imageSetState": "LOCKED",
        "createdAt": 1680027126.436
    },
    "datastoreId": "12345678901234567890123456789012"
}
```

- For API details, see CopyImageSet in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    /**
     * Copy an AWS HealthImaging image set.
     *
     * @param medicalImagingClient  - The AWS HealthImaging client object.
     * @param datastoreId           - The datastore ID.
     * @param imageSetId            - The image set ID.
     * @param latestVersionId       - The version ID.
     * @param destinationImageSetId - The optional destination image set ID,
 ignored if null.
     * @param destinationVersionId  - The optional destination version ID,
 ignored if null.
     * @param force                 - The force flag.
     * @param subsets               - The optional subsets to copy, ignored if
 null.
     * @return                      - The image set ID of the copy.
     * @throws MedicalImagingException - Base exception for all service
 exceptions thrown by AWS HealthImaging.
     */
    public static String copyMedicalImageSet(MedicalImagingClient
 medicalImagingClient,
                                             String datastoreId,
                                             String imageSetId,
                                             String latestVersionId,
                                             String destinationImageSetId,
                                             String destinationVersionId,
                                             boolean force,
                                             Vector<String> subsets) {

        try {
            CopySourceImageSetInformation.Builder copySourceImageSetInformation =
 CopySourceImageSetInformation.builder()
                    .latestVersionId(latestVersionId);

            // Optionally copy a subset of image instances.
            if (subsets != null) {
                String subsetInstanceToCopy =
 getCopiableAttributesJSON(imageSetId, subsets);

 copySourceImageSetInformation.dicomCopies(MetadataCopies.builder()
```

```
                        .copiableAttributes(subsetInstanceToCopy)
                        .build());
            }

            CopyImageSetInformation.Builder copyImageSetBuilder =
CopyImageSetInformation.builder()
                    .sourceImageSet(copySourceImageSetInformation.build());

            // Optionally designate a destination image set.
            if (destinationImageSetId != null) {
                copyImageSetBuilder =
copyImageSetBuilder.destinationImageSet(CopyDestinationImageSet.builder()
                        .imageSetId(destinationImageSetId)
                        .latestVersionId(destinationVersionId)
                        .build());
            }

            CopyImageSetRequest copyImageSetRequest =
CopyImageSetRequest.builder()
                    .datastoreId(datastoreId)
                    .sourceImageSetId(imageSetId)
                    .copyImageSetInformation(copyImageSetBuilder.build())
                    .force(force)
                    .build();

            CopyImageSetResponse response =
medicalImagingClient.copyImageSet(copyImageSetRequest);

            return response.destinationImageSetProperties().imageSetId();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            throw e;
        }
    }
```

Utility function to create copiable attributes.

```
    /**
     * Create a JSON string of copiable image instances.
     *
     * @param imageSetId - The image set ID.
```

```
     * @param subsets    - The subsets to copy.
     * @return A JSON string of copiable image instances.
     */
    private static String getCopiableAttributesJSON(String imageSetId,
 Vector<String> subsets) {
        StringBuilder subsetInstanceToCopy = new StringBuilder(
                """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "Series": {
                                "
                                 """
        );

        subsetInstanceToCopy.append(imageSetId);

        subsetInstanceToCopy.append(
                """
                                ": {
                                "Instances": {
                        """
        );

        for (String subset : subsets) {
            subsetInstanceToCopy.append('"' + subset + "\": {},");
        }
        subsetInstanceToCopy.deleteCharAt(subsetInstanceToCopy.length() - 1);
        subsetInstanceToCopy.append("""
                         }
                       }
                    }
                  }
                }
                """);
        return subsetInstanceToCopy.toString();
    }
```

- For API details, see CopyImageSet in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

Utility function to copy an image set.

```
import { CopyImageSetCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imageSetId - The source image set ID.
 * @param {string} sourceVersionId - The source version ID.
 * @param {string} destinationImageSetId - The optional ID of the destination
 image set.
 * @param {string} destinationVersionId - The optional version ID of the
 destination image set.
 * @param {boolean} force - Force the copy action.
 * @param {[string]} copySubsets - A subset of instance IDs to copy.
 */
export const copyImageSet = async (
  datastoreId = "xxxxxxxxxxx",
  imageSetId = "xxxxxxxxxxxx",
  sourceVersionId = "1",
  destinationImageSetId = "",
  destinationVersionId = "",
  force = false,
  copySubsets = [],
) => {
  try {
    const params = {
      datastoreId: datastoreId,
      sourceImageSetId: imageSetId,
      copyImageSetInformation: {
        sourceImageSet: { latestVersionId: sourceVersionId },
      },
      force: force,
```

```
    };
    if (destinationImageSetId !== "" && destinationVersionId !== "") {
      params.copyImageSetInformation.destinationImageSet = {
        imageSetId: destinationImageSetId,
        latestVersionId: destinationVersionId,
      };
    }

    if (copySubsets.length > 0) {
      let copySubsetsJson;
      copySubsetsJson = {
        SchemaVersion: 1.1,
        Study: {
          Series: {
            imageSetId: {
              Instances: {},
            },
          },
        },
      };

      for (let i = 0; i < copySubsets.length; i++) {
        copySubsetsJson.Study.Series.imageSetId.Instances[copySubsets[i]] = {};
      }

      params.copyImageSetInformation.dicomCopies = copySubsetsJson;
    }

    const response = await medicalImagingClient.send(
      new CopyImageSetCommand(params),
    );
    console.log(response);
    // {
    //     '$metadata': {
    //         httpStatusCode: 200,
    //         requestId: 'd9b219ce-cc48-4a44-a5b2-c5c3068f1ee8',
    //         extendedRequestId: undefined,
    //         cfId: undefined,
    //         attempts: 1,
    //         totalRetryDelay: 0
    //      },
    //       datastoreId: 'xxxxxxxxxxxxxx',
    //       destinationImageSetProperties: {
    //             createdAt: 2023-09-27T19:46:21.824Z,
```

```
    //              imageSetArn: 'arn:aws:medical-imaging:us-
east-1:xxxxxxxxxxx:datastore/xxxxxxxxxxxxx/imageset/xxxxxxxxxxxxxxxxxxx',
    //              imageSetId: 'xxxxxxxxxxxxxxx',
    //              imageSetState: 'LOCKED',
    //              imageSetWorkflowStatus: 'COPYING',
    //              latestVersionId: '1',
    //              updatedAt: 2023-09-27T19:46:21.824Z
    //        },
    //        sourceImageSetProperties: {
    //              createdAt: 2023-09-22T14:49:26.427Z,
    //              imageSetArn: 'arn:aws:medical-imaging:us-
east-1:xxxxxxxxxxx:datastore/xxxxxxxxxxxxx/imageset/xxxxxxxxxxxxxxxx',
    //              imageSetId: 'xxxxxxxxxxxxxxxx',
    //              imageSetState: 'LOCKED',
    //              imageSetWorkflowStatus: 'COPYING_WITH_READ_ONLY_ACCESS',
    //              latestVersionId: '4',
    //              updatedAt: 2023-09-27T19:46:21.824Z
    //       }
    // }
    return response;
  } catch (err) {
    console.error(err);
  }
};
```

Copy an image set without a destination.

```
  await copyImageSet(
    "12345678901234567890123456789012",
    "12345678901234567890123456789012",
    "1",
  );
```

Copy an image set with a destination.

```
  await copyImageSet(
    "12345678901234567890123456789012",
    "12345678901234567890123456789012",
    "1",
```

```
    "12345678901234567890123456789012",
    "1",
    false,
  );
```

Copy a subset of an image set with a destination and force the copy.

```
  await copyImageSet(
    "12345678901234567890123456789012",
    "12345678901234567890123456789012",
    "1",
    "12345678901234567890123456789012",
    "1",
    true,
    ["12345678901234567890123456789012", "11223344556677889900112233445566"],
  );
```

- For API details, see CopyImageSet in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

Utility function to copy an image set.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def copy_image_set(
```

```
        self,
        datastore_id,
        image_set_id,
        version_id,
        destination_image_set_id=None,
        destination_version_id=None,
        force=False,
        subsets=[],
    ):
        """
        Copy an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The ID of the image set version.
        :param destination_image_set_id: The ID of the optional destination image
 set.
        :param destination_version_id: The ID of the optional destination image
 set version.
        :param force: Force the copy.
        :param subsets: The optional subsets to copy. For example:
 ["12345678901234567890123456789012"].
        :return: The copied image set ID.
        """
        try:
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }
            if destination_image_set_id and destination_version_id:
                copy_image_set_information["destinationImageSet"] = {
                    "imageSetId": destination_image_set_id,
                    "latestVersionId": destination_version_id,
                }
            if len(subsets) > 0:
                copySubsetsJson = {
                    "SchemaVersion": "1.1",
                    "Study": {"Series": {"imageSetId": {"Instances": {}}}},
                }

                for subset in subsets:
                    copySubsetsJson["Study"]["Series"]["imageSetId"]["Instances"]
[
                        subset
                    ] = {}
```

```
                copy_image_set_information["sourceImageSet"]["DICOMCopies"] = {
                    "copiableAttributes": json.dumps(copySubsetsJson)
                }
            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
        except ClientError as err:
            logger.error(
                "Couldn't copy image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return copy_results["destinationImageSetProperties"]["imageSetId"]
```

Copy an image set without a destination.

```
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }

            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
```

Copy an image set with a destination.

```
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }

            if destination_image_set_id and destination_version_id:
```

```
                copy_image_set_information["destinationImageSet"] = {
                    "imageSetId": destination_image_set_id,
                    "latestVersionId": destination_version_id,
                }

            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
```

Copy a subset of an image set.

```
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }

            if len(subsets) > 0:
                copySubsetsJson = {
                    "SchemaVersion": "1.1",
                    "Study": {"Series": {"imageSetId": {"Instances": {}}}},
                }

                for subset in subsets:
                    copySubsetsJson["Study"]["Series"]["imageSetId"]["Instances"]
[
                        subset
                    ] = {}

                copy_image_set_information["sourceImageSet"]["DICOMCopies"] = {
                    "copiableAttributes": json.dumps(copySubsetsJson)
                }

            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see CopyImageSet in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    " iv_source_image_set_id = '1234567890123456789012345678901234567890'
    " iv_source_version_id = '1'
    " iv_destination_image_set_id =
'1234567890123456789012345678901234567890' (optional)
    " iv_destination_version_id = '1' (optional)
    " iv_force = abap_false
    DATA(lo_source_info) = NEW /aws1/cl_migcpsrcimagesetinf00(
      iv_latestversionid = iv_source_version_id ).
    DATA(lo_copy_info) = NEW /aws1/cl_migcpimagesetinfmtion(
      io_sourceimageset = lo_source_info ).
    IF iv_destination_image_set_id IS NOT INITIAL AND
       iv_destination_version_id IS NOT INITIAL.
      DATA(lo_dest_info) = NEW /aws1/cl_migcopydstimageset(
        iv_imagesetid = iv_destination_image_set_id
        iv_latestversionid = iv_destination_version_id ).
      lo_copy_info = NEW /aws1/cl_migcpimagesetinfmtion(
        io_sourceimageset = lo_source_info
        io_destinationimageset = lo_dest_info ).
    ENDIF.
    oo_result = lo_mig->copyimageset(
      iv_datastoreid = iv_datastore_id
      iv_sourceimagesetid = iv_source_image_set_id
```

```
            io_copyimagesetinformation = lo_copy_info
            iv_force = iv_force ).
          DATA(lo_dest_props) = oo_result->get_dstimagesetproperties( ).
          DATA(lv_new_id) = lo_dest_props->get_imagesetid( ).
          MESSAGE |Image set copied with new ID: { lv_new_id }.| TYPE 'I'.
        CATCH /aws1/cx_migaccessdeniedex.
          MESSAGE 'Access denied.' TYPE 'I'.
        CATCH /aws1/cx_migconflictexception.
          MESSAGE 'Conflict error.' TYPE 'I'.
        CATCH /aws1/cx_miginternalserverex.
          MESSAGE 'Internal server error.' TYPE 'I'.
        CATCH /aws1/cx_migresourcenotfoundex.
          MESSAGE 'Image set not found.' TYPE 'I'.
        CATCH /aws1/cx_migservicequotaexcdex.
          MESSAGE 'Service quota exceeded.' TYPE 'I'.
        CATCH /aws1/cx_migthrottlingex.
          MESSAGE 'Request throttled.' TYPE 'I'.
        CATCH /aws1/cx_migvalidationex.
          MESSAGE 'Validation error.' TYPE 'I'.
      ENDTRY.
```

- For API details, see CopyImageSet in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Deleting an image set

Use the `DeleteImageSet` action to delete an image set in HealthImaging. The following menus provide a procedure for the AWS Management Console and code examples for the AWS CLI and AWS SDKs. For more information, see `DeleteImageSet` in the *AWS HealthImaging API Reference*.

To delete an image set

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console [Data stores page](#).
2. Choose a data store.

   The **Data store details** page opens and the **Image sets** tab is selected by default.
3. Choose an image set and choose **Delete**.

   The **Delete image set** modal opens.
4. Provide the ID of the image set and choose **Delete image set**.

AWS CLI and SDKs

C++

SDK for C++

```
//! Routine which deletes an AWS HealthImaging image set.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param imageSetID: The image set ID.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
  */
bool AwsDoc::Medical_Imaging::deleteImageSet(
        const Aws::String &dataStoreID, const Aws::String &imageSetID,
        const Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::DeleteImageSetRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetImageSetId(imageSetID);
    Aws::MedicalImaging::Model::DeleteImageSetOutcome outcome =
 client.DeleteImageSet(
            request);
    if (outcome.IsSuccess()) {
        std::cout << "Successfully deleted image set " << imageSetID
                  << " from data store " << dataStoreID << std::endl;
```

```
    }
    else {
        std::cerr << "Error deleting image set " << imageSetID << " from data
 store "
                  << dataStoreID << ": " <<
                  outcome.GetError().GetMessage() << std::endl;
    }

    return outcome.IsSuccess();
}
```

- For API details, see DeleteImageSet in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To delete an image set

The following `delete-image-set` code example deletes an image set.

```
aws medical-imaging delete-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e
```

Output:

```
{
    "imageSetWorkflowStatus": "DELETING",
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
    "datastoreId": "12345678901234567890123456789012"
}
```

- For API details, see DeleteImageSet in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void deleteMedicalImageSet(MedicalImagingClient
 medicalImagingClient,
             String datastoreId,
             String imagesetId) {
         try {
             DeleteImageSetRequest deleteImageSetRequest =
 DeleteImageSetRequest.builder()
                     .datastoreId(datastoreId)
                     .imageSetId(imagesetId)
                     .build();

             medicalImagingClient.deleteImageSet(deleteImageSetRequest);

             System.out.println("The image set was deleted.");
         } catch (MedicalImagingException e) {
             System.err.println(e.awsErrorDetails().errorMessage());
             System.exit(1);
         }
     }
```

- For API details, see DeleteImageSet in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { DeleteImageSetCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The data store ID.
```

```
 * @param {string} imageSetId - The image set ID.
 */
export const deleteImageSet = async (
  datastoreId = "xxxxxxxxxxxxxxxx",
  imageSetId = "xxxxxxxxxxxxxxxx",
) => {
  const response = await medicalImagingClient.send(
    new DeleteImageSetCommand({
      datastoreId: datastoreId,
      imageSetId: imageSetId,
    }),
  );
  console.log(response);
  // {
  //    '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '6267bbd2-eaa5-4a50-8ee8-8fddf535cf73',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     datastoreId: 'xxxxxxxxxxxxxxxx',
  //     imageSetId: 'xxxxxxxxxxxxxxx',
  //     imageSetState: 'LOCKED',
  //     imageSetWorkflowStatus: 'DELETING'
  // }
  return response;
};
```

- For API details, see DeleteImageSet in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def delete_image_set(self, datastore_id, image_set_id):
        """
        Delete an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :return: The delete results.
        """
        try:
            delete_results = self.health_imaging_client.delete_image_set(
                imageSetId=image_set_id, datastoreId=datastore_id
            )
        except ClientError as err:
            logger.error(
                "Couldn't delete image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return delete_results
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see DeleteImageSet in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    " iv_image_set_id = '1234567890123456789012345678901234567890'
    oo_result = lo_mig->deleteimageset(
      iv_datastoreid = iv_datastore_id
      iv_imagesetid = iv_image_set_id ).
    MESSAGE 'Image set deleted.' TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Image set not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see DeleteImageSet in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Tagging resources with AWS HealthImaging

You can assign metadata to HealthImaging resources (data stores and image sets) in the form of tags. Each tag is a label consisting of a user-defined key and value. Tags help you manage, identify, organize, search for, and filter resources.

> **Important**
>
> Do not store protected health information (PHI), personally identifiable information (PII), or other confidential or sensitive information in tags. Tags are not intended to be used for private or sensitive data.

The following topics describe how to use HealthImaging tagging operations using the AWS Management Console, AWS CLI, and AWS SDKs. For more information, see Tagging your AWS resources in the *AWS General Reference Guide*.

Topics

Tagging a resource

Use the `TagResource` action to tag data stores and image sets in AWS HealthImaging. The following code examples describe how to use the `TagResource` action with the AWS Management Console, AWS CLI, and AWS SDKs. For more information, see Tagging your AWS resources in the *AWS General Reference Guide*.

To tag a resource

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

The **Data store details** page opens.

3. Choose the **Details** tab.
4. Under the **Tags** section, choose **Manage tags**.

   The **Manage tags** page opens.
5. Choose **Add new tag**.
6. Enter a **Key** and **Value** (optional).
7. Choose **Save changes**.

AWS CLI and SDKs

CLI

AWS CLI

Example 1: To tag a data store

The following `tag-resource` code examples tags a data store.

```
aws medical-imaging tag-resource \
  --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012" \
  --tags '{"Deployment":"Development"}'
```

This command produces no output.

Example 2: To tag an image set

The following `tag-resource` code examples tags an image set.

```
aws medical-imaging tag-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/18f88ac7870584f58d56256646b4d92b" \
    --tags '{"Deployment":"Development"}'
```

This command produces no output.

- For API details, see TagResource in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void tagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Map<String, String> tags) {
        try {
            TagResourceRequest tagResourceRequest = TagResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .tags(tags)
                    .build();

            medicalImagingClient.tagResource(tagResourceRequest);

            System.out.println("Tags have been added to the resource.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see TagResource in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { TagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
```

```
 * @param {Record<string,string>} tags - The tags to add to the resource as JSON.
 *                      - For example: {"Deployment" : "Development"}
 */
export const tagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tags = {},
) => {
  const response = await medicalImagingClient.send(
    new TagResourceCommand({ resourceArn: resourceArn, tags: tags }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //    }
  // }

  return response;
};
```

- For API details, see TagResource in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client
```

```
    def tag_resource(self, resource_arn, tags):
        """
        Tag a resource.

        :param resource_arn: The ARN of the resource.
        :param tags: The tags to apply.
        """
        try:
            self.health_imaging_client.tag_resource(resourceArn=resource_arn,
 tags=tags)
        except ClientError as err:
            logger.error(
                "Couldn't tag resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see TagResource in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
```

```
        " iv_resource_arn = 'arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012'
        lo_mig->tagresource(
          iv_resourcearn = iv_resource_arn
          it_tags = it_tags ).
        MESSAGE 'Resource tagged successfully.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see TagResource in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Listing tags for a resource

Use the `ListTagsForResource` action to list tags for data stores and image sets in AWS HealthImaging. The following code examples describe how to use the `ListTagsForResource` action with the AWS Management Console, AWS CLI, and AWS SDKs. For more information, see Tagging your AWS resources in the *AWS General Reference Guide*.

To list tags for a resource

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console [Data stores page](#).
2. Choose a data store.

   The **Data store details** page opens.
3. Choose the **Details** tab.

   Under the **Tags** section, all data store tags are listed.

AWS CLI and SDKs

CLI

AWS CLI

Example 1: To list resource tags for a data store

The following `list-tags-for-resource` code example lists tags for a data store.

```
aws medical-imaging list-tags-for-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012"
```

Output:

```
{
    "tags":{
        "Deployment":"Development"
    }
}
```

Example 2: To list resource tags for an image set

The following `list-tags-for-resource` code example lists tags for an image set.

```
aws medical-imaging list-tags-for-resource \
```

```
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/18f88ac7870584f58d56256646b4d92b"
```

Output:

```
{
    "tags":{
        "Deployment":"Development"
    }
}
```

- For API details, see ListTagsForResource in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static ListTagsForResourceResponse
 listMedicalImagingResourceTags(MedicalImagingClient medicalImagingClient,
            String resourceArn) {
        try {
            ListTagsForResourceRequest listTagsForResourceRequest =
 ListTagsForResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .build();

            return
 medicalImagingClient.listTagsForResource(listTagsForResourceRequest);
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see ListTagsForResource in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

JavaScript

SDK for JavaScript (v3)

```
import { ListTagsForResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 */
export const listTagsForResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:abc:datastore/def/imageset/
ghi",
) => {
  const response = await medicalImagingClient.send(
    new ListTagsForResourceCommand({ resourceArn: resourceArn }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '008fc6d3-abec-4870-a155-20fa3631e645',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     tags: { Deployment: 'Development' }
  // }

  return response;
};
```

- For API details, see [ListTagsForResource](https://docs.aws.amazon.com/AWSJavaScriptSDK/v3/latest/client/medical-imaging/command/ListTagsForResourceCommand) in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_tags_for_resource(self, resource_arn):
        """
        List the tags for a resource.

        :param resource_arn: The ARN of the resource.
        :return: The list of tags.
        """
        try:
            tags = self.health_imaging_client.list_tags_for_resource(
                resourceArn=resource_arn
            )
        except ClientError as err:
            logger.error(
                "Couldn't list tags for resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return tags["tags"]
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListTagsForResource in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_resource_arn = 'arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012'
        oo_result = lo_mig->listtagsforresource( iv_resourcearn =
 iv_resource_arn ).
        DATA(lt_tags) = oo_result->get_tags( ).
        DATA(lv_count) = lines( lt_tags ).
        MESSAGE |Found { lv_count } tags for resource.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see ListTagsForResource in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Untagging a resource

Use the `UntagResource` action to untag data stores and image sets in AWS HealthImaging. The following code examples describe how to use the `UntagResource` action with the AWS Management Console, AWS CLI, and AWS SDKs. For more information, see Tagging your AWS resources in the *AWS General Reference Guide*.

To untag a resource

Choose a menu based on your access preference to AWS HealthImaging.

AWS Console

1. Open the HealthImaging console Data stores page.
2. Choose a data store.

   The **Data store details** page opens.
3. Choose the **Details** tab.
4. Under the **Tags** section, choose **Manage tags**.

   The **Manage tags** page opens.
5. Choose **Remove** next to the tag you want to remove.
6. Choose **Save changes**.

AWS CLI and SDKs

CLI

AWS CLI

Example 1: To untag a data store

The following `untag-resource` code example untags a data store.

```
aws medical-imaging untag-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012" \
    --tag-keys '["Deployment"]'
```

This command produces no output.

Example 2: To untag an image set

The following `untag-resource` code example untags an image set.

```
aws medical-imaging untag-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/18f88ac7870584f58d56256646b4d92b" \
    --tag-keys '["Deployment"]'
```

This command produces no output.

- For API details, see UntagResource in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void untagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Collection<String> tagKeys) {
        try {
            UntagResourceRequest untagResourceRequest =
 UntagResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .tagKeys(tagKeys)
                    .build();

            medicalImagingClient.untagResource(untagResourceRequest);

            System.out.println("Tags have been removed from the resource.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
```

```
            System.exit(1);
        }
    }
```

- For API details, see UntagResource in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { UntagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 * @param {string[]} tagKeys - The keys of the tags to remove.
 */
export const untagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tagKeys = [],
) => {
  const response = await medicalImagingClient.send(
    new UntagResourceCommand({ resourceArn: resourceArn, tagKeys: tagKeys }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
```

```
  //    }
  // }

  return response;
};
```

- For API details, see UntagResource in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def untag_resource(self, resource_arn, tag_keys):
        """
        Untag a resource.

        :param resource_arn: The ARN of the resource.
        :param tag_keys: The tag keys to remove.
        """
        try:
            self.health_imaging_client.untag_resource(
                resourceArn=resource_arn, tagKeys=tag_keys
            )
        except ClientError as err:
            logger.error(
                "Couldn't untag resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see UntagResource in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_resource_arn = 'arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012'
    lo_mig->untagresource(
      iv_resourcearn = iv_resource_arn
      it_tagkeys = it_tag_keys ).
    MESSAGE 'Resource untagged successfully.' TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Resource not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see UntagResource in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

> **Example availability**
>
> Can't find what you need? Request a code example using the **Provide feedback** link on the right sidebar of this page.

Code examples for HealthImaging using AWS SDKs

The following code examples show how to use HealthImaging with an AWS software development kit (SDK).

Actions are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Scenarios are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Code examples

Basic examples for HealthImaging using AWS SDKs

The following code examples show how to use the basics of AWS HealthImaging with AWS SDKs.

Examples

- [Use UntagResource with an AWS SDK or CLI]
- [Use UpdateImageSetMetadata with an AWS SDK or CLI]

Hello HealthImaging

The following code examples show how to get started using HealthImaging.

C++

SDK for C++

Code for the CMakeLists.txt CMake file.

```
# Set the minimum required version of CMake for this project.
cmake_minimum_required(VERSION 3.13)

# Set the AWS service components used by this project.
set(SERVICE_COMPONENTS medical-imaging)

# Set this project's name.
project("hello_health-imaging")

# Set the C++ standard to use to build this target.
# At least C++ 11 is required for the AWS SDK for C++.
set(CMAKE_CXX_STANDARD 11)

# Use the MSVC variable to determine if this is a Windows build.
set(WINDOWS_BUILD ${MSVC})

if (WINDOWS_BUILD) # Set the location where CMake can find the installed
 libraries for the AWS SDK.
    string(REPLACE ";" "/aws-cpp-sdk-all;" SYSTEM_MODULE_PATH
 "${CMAKE_SYSTEM_PREFIX_PATH}/aws-cpp-sdk-all")
    list(APPEND CMAKE_PREFIX_PATH ${SYSTEM_MODULE_PATH})
endif ()

# Find the AWS SDK for C++ package.
find_package(AWSSDK REQUIRED COMPONENTS ${SERVICE_COMPONENTS})

if (WINDOWS_BUILD AND AWSSDK_INSTALL_AS_SHARED_LIBS)
    # Copy relevant AWS SDK for C++ libraries into the current binary directory
 for running and debugging.
```

```
    # set(BIN_SUB_DIR "/Debug") # If you are building from the command line, you
 may need to uncomment this
    # and set the proper subdirectory to the executable location.

    AWSSDK_CPY_DYN_LIBS(SERVICE_COMPONENTS ""
 ${CMAKE_CURRENT_BINARY_DIR}${BIN_SUB_DIR})
endif ()

add_executable(${PROJECT_NAME}
        hello_health_imaging.cpp)

target_link_libraries(${PROJECT_NAME}
        ${AWSSDK_LINK_LIBRARIES})
```

Code for the hello_health_imaging.cpp source file.

```
#include <aws/core/Aws.h>
#include <aws/medical-imaging/MedicalImagingClient.h>
#include <aws/medical-imaging/model/ListDatastoresRequest.h>

#include <iostream>

/*
 *  A "Hello HealthImaging" starter application which initializes an AWS
 HealthImaging (HealthImaging) client
 *  and lists the HealthImaging data stores in the current account.
 *
 *  main function
 *
 *  Usage: 'hello_health-imaging'
 *
 */
#include <aws/core/auth/AWSCredentialsProviderChain.h>
#include <aws/core/platform/Environment.h>

int main(int argc, char **argv) {
    (void) argc;
    (void) argv;
    Aws::SDKOptions options;
    //   Optional: change the log level for debugging.
    //   options.loggingOptions.logLevel = Aws::Utils::Logging::LogLevel::Debug;
```

```
    Aws::InitAPI(options); // Should only be called once.
    {
        Aws::Client::ClientConfiguration clientConfig;
        // Optional: Set to the AWS Region (overrides config file).
        // clientConfig.region = "us-east-1";

        Aws::MedicalImaging::MedicalImagingClient
medicalImagingClient(clientConfig);
        Aws::MedicalImaging::Model::ListDatastoresRequest listDatastoresRequest;

        Aws::Vector<Aws::MedicalImaging::Model::DatastoreSummary>
allDataStoreSummaries;
        Aws::String nextToken; // Used for paginated results.
        do {
            if (!nextToken.empty()) {
                listDatastoresRequest.SetNextToken(nextToken);
            }
            Aws::MedicalImaging::Model::ListDatastoresOutcome
listDatastoresOutcome =
                    medicalImagingClient.ListDatastores(listDatastoresRequest);
            if (listDatastoresOutcome.IsSuccess()) {
                const Aws::Vector<Aws::MedicalImaging::Model::DatastoreSummary>
&dataStoreSummaries =

listDatastoresOutcome.GetResult().GetDatastoreSummaries();
                allDataStoreSummaries.insert(allDataStoreSummaries.cend(),
                                             dataStoreSummaries.cbegin(),
                                             dataStoreSummaries.cend());
                nextToken = listDatastoresOutcome.GetResult().GetNextToken();
            }
            else {
                std::cerr << "ListDatastores error: "
                          << listDatastoresOutcome.GetError().GetMessage() <<
std::endl;
                break;
            }
        } while (!nextToken.empty());

        std::cout << allDataStoreSummaries.size() << " HealthImaging data "
                  << ((allDataStoreSummaries.size() == 1) ?
                      "store was retrieved." : "stores were retrieved.") <<
std::endl;
```

```
        for (auto const &dataStoreSummary: allDataStoreSummaries) {
            std::cout << "  Datastore: " << dataStoreSummary.GetDatastoreName()
                      << std::endl;
            std::cout << "  Datastore ID: " << dataStoreSummary.GetDatastoreId()
                      << std::endl;
        }
    }

    Aws::ShutdownAPI(options); // Should only be called once.
    return 0;
}
```

- For API details, see ListDatastores in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import {
  ListDatastoresCommand,
  MedicalImagingClient,
} from "@aws-sdk/client-medical-imaging";

// When no region or credentials are provided, the SDK will use the
// region and credentials from the local AWS config.
const client = new MedicalImagingClient({});

export const helloMedicalImaging = async () => {
  const command = new ListDatastoresCommand({});

  const { datastoreSummaries } = await client.send(command);
  console.log("Datastores: ");
  console.log(datastoreSummaries.map((item) => item.datastoreName).join("\n"));
  return datastoreSummaries;
};
```

- For API details, see ListDatastores in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
import logging
import boto3
from botocore.exceptions import ClientError

logger = logging.getLogger(__name__)


def hello_medical_imaging(medical_imaging_client):
    """
    Use the AWS SDK for Python (Boto3) to create an AWS HealthImaging
    client and list the data stores in your account.
    This example uses the default settings specified in your shared credentials
    and config files.

    :param medical_imaging_client: A Boto3 AWS HealthImaging Client object.
    """
    print("Hello, Amazon Health Imaging! Let's list some of your data stores:\n")
    try:
        paginator = medical_imaging_client.get_paginator("list_datastores")
        page_iterator = paginator.paginate()
        datastore_summaries = []
        for page in page_iterator:
            datastore_summaries.extend(page["datastoreSummaries"])
        print("\tData Stores:")
        for ds in datastore_summaries:
            print(f"\t\tDatastore: {ds['datastoreName']} ID {ds['datastoreId']}")
    except ClientError as err:
        logger.error(
```

```
            "Couldn't list data stores. Here's why: %s: %s",
            err.response["Error"]["Code"],
            err.response["Error"]["Message"],
        )
        raise


if __name__ == "__main__":
    hello_medical_imaging(boto3.client("medical-imaging"))
```

- For API details, see ListDatastores in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Actions for HealthImaging using AWS SDKs

The following code examples demonstrate how to perform individual HealthImaging actions with AWS SDKs. Each example includes a link to GitHub, where you can find instructions for setting up and running the code.

These excerpts call the HealthImaging API and are code excerpts from larger programs that must be run in context. You can see actions in context in Scenarios for HealthImaging using AWS SDKs.

The following examples include only the most commonly used actions. For a complete list, see the AWS HealthImaging API Reference.

Examples

- Use CopyImageSet with an AWS SDK or CLI
- Use CreateDatastore with an AWS SDK or CLI
- Use DeleteDatastore with an AWS SDK or CLI
- Use DeleteImageSet with an AWS SDK or CLI

Use `CopyImageSet` with an AWS SDK or CLI

The following code examples show how to use `CopyImageSet`.

CLI

AWS CLI

Example 1: To copy an image set without a destination.

The following `copy-image-set` example makes a duplicate copy of an image set without a destination.

```
aws medical-imaging copy-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --source-image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --copy-image-set-information '{"sourceImageSet": {"latestVersionId": "1" } }'
```

Output:

```
{
    "destinationImageSetProperties": {
```

```
        "latestVersionId": "2",
        "imageSetWorkflowStatus": "COPYING",
        "updatedAt": 1680042357.432,
        "imageSetId": "b9a06fef182a5f992842f77f8e0868e5",
        "imageSetState": "LOCKED",
        "createdAt": 1680042357.432
    },
    "sourceImageSetProperties": {
        "latestVersionId": "1",
        "imageSetWorkflowStatus": "COPYING_WITH_READ_ONLY_ACCESS",
        "updatedAt": 1680042357.432,
        "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
        "imageSetState": "LOCKED",
        "createdAt": 1680027126.436
    },
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 2: To copy an image set with a destination.

The following `copy-image-set` example makes a duplicate copy of an image set with a destination.

```
aws medical-imaging copy-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --source-image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --copy-image-set-information '{"sourceImageSet": {"latestVersionId": "1" },
 "destinationImageSet": { "imageSetId": "b9a06fef182a5f992842f77f8e0868e5",
 "latestVersionId": "1"} }'
```

Output:

```
{
    "destinationImageSetProperties": {
        "latestVersionId": "2",
        "imageSetWorkflowStatus": "COPYING",
        "updatedAt": 1680042505.135,
        "imageSetId": "b9a06fef182a5f992842f77f8e0868e5",
        "imageSetState": "LOCKED",
        "createdAt": 1680042357.432
    },
    "sourceImageSetProperties": {
        "latestVersionId": "1",
```

```
        "imageSetWorkflowStatus": "COPYING_WITH_READ_ONLY_ACCESS",
        "updatedAt": 1680042505.135,
        "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
        "imageSetState": "LOCKED",
        "createdAt": 1680027126.436
    },
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 3: To copy a subset of instances from a source image set to a destination image set.

The following `copy-image-set` example copies one DICOM instance from the source image set to the destination image set. The force parameter is provided to override inconsistencies in the Patient, Study, and Series level attributes.

```
aws medical-imaging copy-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --source-image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --copy-image-set-information '{"sourceImageSet":
 {"latestVersionId": "1","DICOMCopies": {"copiableAttributes":
 "{\"SchemaVersion\":\"1.1\",\"Study\":{\"Series\":
{\"1.3.6.1.4.1.5962.99.1.3673257865.2104868982.1369432891697.3666.0\":
{\"Instances\":
{\"1.3.6.1.4.1.5962.99.1.3673257865.2104868982.1369432891697.3669.0\":
{}}}}}}"}},"destinationImageSet": {"imageSetId":
 "b9eb50d8ee682eb9fcf4acbf92f62bb7","latestVersionId": "1"}}' \
    --force
```

Output:

```
{
    "destinationImageSetProperties": {
        "latestVersionId": "2",
        "imageSetWorkflowStatus": "COPYING",
        "updatedAt": 1680042505.135,
        "imageSetId": "b9eb50d8ee682eb9fcf4acbf92f62bb7",
        "imageSetState": "LOCKED",
        "createdAt": 1680042357.432
    },
    "sourceImageSetProperties": {
        "latestVersionId": "1",
```

```
        "imageSetWorkflowStatus": "COPYING_WITH_READ_ONLY_ACCESS",
        "updatedAt": 1680042505.135,
        "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
        "imageSetState": "LOCKED",
        "createdAt": 1680027126.436
    },
    "datastoreId": "12345678901234567890123456789012"
}
```

- For API details, see [CopyImageSet](#) in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    /**
     * Copy an AWS HealthImaging image set.
     *
     * @param medicalImagingClient  - The AWS HealthImaging client object.
     * @param datastoreId           - The datastore ID.
     * @param imageSetId            - The image set ID.
     * @param latestVersionId       - The version ID.
     * @param destinationImageSetId - The optional destination image set ID,
 ignored if null.
     * @param destinationVersionId  - The optional destination version ID,
 ignored if null.
     * @param force                 - The force flag.
     * @param subsets               - The optional subsets to copy, ignored if
 null.
     * @return                      - The image set ID of the copy.
     * @throws MedicalImagingException - Base exception for all service
 exceptions thrown by AWS HealthImaging.
     */
    public static String copyMedicalImageSet(MedicalImagingClient
 medicalImagingClient,
                                             String datastoreId,
                                             String imageSetId,
                                             String latestVersionId,
                                             String destinationImageSetId,
                                             String destinationVersionId,
                                             boolean force,
```

```
                                                  Vector<String> subsets) {

        try {
            CopySourceImageSetInformation.Builder copySourceImageSetInformation =
CopySourceImageSetInformation.builder()
                    .latestVersionId(latestVersionId);

            // Optionally copy a subset of image instances.
            if (subsets != null) {
                String subsetInstanceToCopy =
getCopiableAttributesJSON(imageSetId, subsets);

copySourceImageSetInformation.dicomCopies(MetadataCopies.builder()
                        .copiableAttributes(subsetInstanceToCopy)
                        .build());
            }

            CopyImageSetInformation.Builder copyImageSetBuilder =
CopyImageSetInformation.builder()
                    .sourceImageSet(copySourceImageSetInformation.build());

            // Optionally designate a destination image set.
            if (destinationImageSetId != null) {
                copyImageSetBuilder =
copyImageSetBuilder.destinationImageSet(CopyDestinationImageSet.builder()
                        .imageSetId(destinationImageSetId)
                        .latestVersionId(destinationVersionId)
                        .build());
            }

            CopyImageSetRequest copyImageSetRequest =
CopyImageSetRequest.builder()
                    .datastoreId(datastoreId)
                    .sourceImageSetId(imageSetId)
                    .copyImageSetInformation(copyImageSetBuilder.build())
                    .force(force)
                    .build();

            CopyImageSetResponse response =
medicalImagingClient.copyImageSet(copyImageSetRequest);

            return response.destinationImageSetProperties().imageSetId();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
```

```
            throw e;
        }
    }
```

Utility function to create copiable attributes.

```
    /**
     * Create a JSON string of copiable image instances.
     *
     * @param imageSetId - The image set ID.
     * @param subsets    - The subsets to copy.
     * @return A JSON string of copiable image instances.
     */
    private static String getCopiableAttributesJSON(String imageSetId,
 Vector<String> subsets) {
        StringBuilder subsetInstanceToCopy = new StringBuilder(
                """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "Series": {
                                "
                                 """
        );

        subsetInstanceToCopy.append(imageSetId);

        subsetInstanceToCopy.append(
                """
                                ": {
                                "Instances": {
                        """
        );

        for (String subset : subsets) {
            subsetInstanceToCopy.append('"' + subset + "\": {},");
        }
        subsetInstanceToCopy.deleteCharAt(subsetInstanceToCopy.length() - 1);
        subsetInstanceToCopy.append("""
                         }
                       }
```

```
                }
              }
            }
            """);
        return subsetInstanceToCopy.toString();
    }
```

- For API details, see [CopyImageSet](#) in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

JavaScript

SDK for JavaScript (v3)

Utility function to copy an image set.

```
import { CopyImageSetCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imageSetId - The source image set ID.
 * @param {string} sourceVersionId - The source version ID.
 * @param {string} destinationImageSetId - The optional ID of the destination
 image set.
 * @param {string} destinationVersionId - The optional version ID of the
 destination image set.
 * @param {boolean} force - Force the copy action.
 * @param {[string]} copySubsets - A subset of instance IDs to copy.
 */
export const copyImageSet = async (
  datastoreId = "xxxxxxxxxxx",
  imageSetId = "xxxxxxxxxxxx",
  sourceVersionId = "1",
  destinationImageSetId = "",
  destinationVersionId = "",
  force = false,
```

```
  copySubsets = [],
) => {
  try {
    const params = {
      datastoreId: datastoreId,
      sourceImageSetId: imageSetId,
      copyImageSetInformation: {
        sourceImageSet: { latestVersionId: sourceVersionId },
      },
      force: force,
    };
    if (destinationImageSetId !== "" && destinationVersionId !== "") {
      params.copyImageSetInformation.destinationImageSet = {
        imageSetId: destinationImageSetId,
        latestVersionId: destinationVersionId,
      };
    }

    if (copySubsets.length > 0) {
      let copySubsetsJson;
      copySubsetsJson = {
        SchemaVersion: 1.1,
        Study: {
          Series: {
            imageSetId: {
              Instances: {},
            },
          },
        },
      };

      for (let i = 0; i < copySubsets.length; i++) {
        copySubsetsJson.Study.Series.imageSetId.Instances[copySubsets[i]] = {};
      }

      params.copyImageSetInformation.dicomCopies = copySubsetsJson;
    }

    const response = await medicalImagingClient.send(
      new CopyImageSetCommand(params),
    );
    console.log(response);
    // {
    //     '$metadata': {
```

```
    //          httpStatusCode: 200,
    //          requestId: 'd9b219ce-cc48-4a44-a5b2-c5c3068f1ee8',
    //          extendedRequestId: undefined,
    //          cfId: undefined,
    //          attempts: 1,
    //          totalRetryDelay: 0
    //      },
    //       datastoreId: 'xxxxxxxxxxxxxx',
    //       destinationImageSetProperties: {
    //             createdAt: 2023-09-27T19:46:21.824Z,
    //             imageSetArn: 'arn:aws:medical-imaging:us-
east-1:xxxxxxxxxxx:datastore/xxxxxxxxxxxxx/imageset/xxxxxxxxxxxxxxxxxxx',
    //             imageSetId: 'xxxxxxxxxxxxxxx',
    //             imageSetState: 'LOCKED',
    //             imageSetWorkflowStatus: 'COPYING',
    //             latestVersionId: '1',
    //             updatedAt: 2023-09-27T19:46:21.824Z
    //       },
    //       sourceImageSetProperties: {
    //             createdAt: 2023-09-22T14:49:26.427Z,
    //             imageSetArn: 'arn:aws:medical-imaging:us-
east-1:xxxxxxxxxxx:datastore/xxxxxxxxxxxxx/imageset/xxxxxxxxxxxxxxxx',
    //             imageSetId: 'xxxxxxxxxxxxxxxx',
    //             imageSetState: 'LOCKED',
    //             imageSetWorkflowStatus: 'COPYING_WITH_READ_ONLY_ACCESS',
    //             latestVersionId: '4',
    //             updatedAt: 2023-09-27T19:46:21.824Z
    //      }
    // }
    return response;
  } catch (err) {
    console.error(err);
  }
};
```

Copy an image set without a destination.

```
  await copyImageSet(
    "12345678901234567890123456789012",
    "12345678901234567890123456789012",
    "1",
```

```
);
```

Copy an image set with a destination.

```
await copyImageSet(
  "12345678901234567890123456789012",
  "12345678901234567890123456789012",
  "1",
  "12345678901234567890123456789012",
  "1",
  false,
);
```

Copy a subset of an image set with a destination and force the copy.

```
await copyImageSet(
  "12345678901234567890123456789012",
  "12345678901234567890123456789012",
  "1",
  "12345678901234567890123456789012",
  "1",
  true,
  ["12345678901234567890123456789012", "11223344556677889900112233445566"],
);
```

- For API details, see CopyImageSet in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

Utility function to copy an image set.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def copy_image_set(
        self,
        datastore_id,
        image_set_id,
        version_id,
        destination_image_set_id=None,
        destination_version_id=None,
        force=False,
        subsets=[],
    ):
        """
        Copy an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The ID of the image set version.
        :param destination_image_set_id: The ID of the optional destination image
 set.
        :param destination_version_id: The ID of the optional destination image
 set version.
        :param force: Force the copy.
        :param subsets: The optional subsets to copy. For example:
 ["12345678901234567890123456789012"].
        :return: The copied image set ID.
        """
        try:
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }
            if destination_image_set_id and destination_version_id:
                copy_image_set_information["destinationImageSet"] = {
                    "imageSetId": destination_image_set_id,
                    "latestVersionId": destination_version_id,
```

```
                }
            if len(subsets) > 0:
                copySubsetsJson = {
                    "SchemaVersion": "1.1",
                    "Study": {"Series": {"imageSetId": {"Instances": {}}}},
                }

                for subset in subsets:
                    copySubsetsJson["Study"]["Series"]["imageSetId"]["Instances"]
[
                        subset
                    ] = {}

                copy_image_set_information["sourceImageSet"]["DICOMCopies"] = {
                    "copiableAttributes": json.dumps(copySubsetsJson)
                }
            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
        except ClientError as err:
            logger.error(
                "Couldn't copy image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return copy_results["destinationImageSetProperties"]["imageSetId"]
```

Copy an image set without a destination.

```
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }

            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
```

```
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
```

Copy an image set with a destination.

```
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }

            if destination_image_set_id and destination_version_id:
                copy_image_set_information["destinationImageSet"] = {
                    "imageSetId": destination_image_set_id,
                    "latestVersionId": destination_version_id,
                }

            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
```

Copy a subset of an image set.

```
            copy_image_set_information = {
                "sourceImageSet": {"latestVersionId": version_id}
            }

            if len(subsets) > 0:
                copySubsetsJson = {
                    "SchemaVersion": "1.1",
                    "Study": {"Series": {"imageSetId": {"Instances": {}}}},
                }

                for subset in subsets:
                    copySubsetsJson["Study"]["Series"]["imageSetId"]["Instances"]
[
                        subset
                    ] = {}
```

```
                copy_image_set_information["sourceImageSet"]["DICOMCopies"] = {
                    "copiableAttributes": json.dumps(copySubsetsJson)
                }

            copy_results = self.health_imaging_client.copy_image_set(
                datastoreId=datastore_id,
                sourceImageSetId=image_set_id,
                copyImageSetInformation=copy_image_set_information,
                force=force,
            )
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see [CopyImageSet](#) in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_source_image_set_id = '1234567890123456789012345678901234567890'
        " iv_source_version_id = '1'
        " iv_destination_image_set_id =
 '1234567890123456789012345678901234567890' (optional)
        " iv_destination_version_id = '1' (optional)
        " iv_force = abap_false
        DATA(lo_source_info) = NEW /aws1/cl_migcpsrcimagesetinf00(
          iv_latestversionid = iv_source_version_id ).
        DATA(lo_copy_info) = NEW /aws1/cl_migcpimagesetinfmtion(
          io_sourceimageset = lo_source_info ).
```

```
    IF iv_destination_image_set_id IS NOT INITIAL AND
       iv_destination_version_id IS NOT INITIAL.
      DATA(lo_dest_info) = NEW /aws1/cl_migcopydstimageset(
        iv_imagesetid = iv_destination_image_set_id
        iv_latestversionid = iv_destination_version_id ).
      lo_copy_info = NEW /aws1/cl_migcpimagesetinfmtion(
        io_sourceimageset = lo_source_info
        io_destinationimageset = lo_dest_info ).
    ENDIF.
    oo_result = lo_mig->copyimageset(
      iv_datastoreid = iv_datastore_id
      iv_sourceimagesetid = iv_source_image_set_id
      io_copyimagesetinformation = lo_copy_info
      iv_force = iv_force ).
    DATA(lo_dest_props) = oo_result->get_dstimagesetproperties( ).
    DATA(lv_new_id) = lo_dest_props->get_imagesetid( ).
    MESSAGE |Image set copied with new ID: { lv_new_id }.| TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Image set not found.' TYPE 'I'.
  CATCH /aws1/cx_migservicequotaexcdex.
    MESSAGE 'Service quota exceeded.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see CopyImageSet in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `CreateDatastore` with an AWS SDK or CLI

The following code examples show how to use `CreateDatastore`.

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}

###############################################################################
# function imaging_create_datastore
#
# This function creates an AWS HealthImaging data store for importing DICOM P10
 files.
#
# Parameters:
#       -n data_store_name - The name of the data store.
#
# Returns:
#       The datastore ID.
#    And:
#       0 - If successful.
#       1 - If it fails.
###############################################################################
function imaging_create_datastore() {
  local datastore_name response
  local option OPTARG # Required to use getopts command in a function.

  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_create_datastore"
```

```
    echo "Creates an AWS HealthImaging data store for importing DICOM P10 files."
    echo "  -n data_store_name - The name of the data store."
    echo ""
  }

  # Retrieve the calling parameters.
  while getopts "n:h" option; do
    case "${option}" in
      n) datastore_name="${OPTARG}" ;;
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1

  if [[ -z "$datastore_name" ]]; then
    errecho "ERROR: You must provide a data store name with the -n parameter."
    usage
    return 1
  fi

  response=$(aws medical-imaging create-datastore \
    --datastore-name "$datastore_name" \
    --output text \
    --query 'datastoreId')

  local error_code=${?}

  if [[ $error_code -ne 0 ]]; then
    aws_cli_error_log $error_code
    errecho "ERROR: AWS reports medical-imaging create-datastore operation
failed.$response"
    return 1
  fi

  echo "$response"
```

```
    return 0
}
```

- For API details, see CreateDatastore in *AWS CLI Command Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

Example 1: To create a data store

The following `create-datastore` code example creates a data store with the name `my-datastore`. When you create a datastore without specifying a `--lossless-storage-format`, AWS HealthImaging defaults to HTJ2K (High Throughput JPEG 2000).

```
aws medical-imaging create-datastore \
    --datastore-name "my-datastore"
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "datastoreStatus": "CREATING"
}
```

Example 2: To create a data store with JPEG 2000 Lossless storage format

A data store configured with JPEG 2000 Lossless storage format will transcode and persist lossless image frames in JPEG 2000 format. Image frames can then be retrieved in JPEG 2000 Lossless without transcoding. The following `create-datastore` code example creates a data store configured for JPEG 2000 Lossless storage format with the name `my-datastore`.

```
aws medical-imaging create-datastore \
    --datastore-name "my-datastore" \
    --lossless-storage-format JPEG_2000_LOSSLESS
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "datastoreStatus": "CREATING"
}
```

- For API details, see [CreateDatastore](#) in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static String createMedicalImageDatastore(MedicalImagingClient
 medicalImagingClient,
            String datastoreName) {
        try {
            CreateDatastoreRequest datastoreRequest =
 CreateDatastoreRequest.builder()
                    .datastoreName(datastoreName)
                    .build();
            CreateDatastoreResponse response =
 medicalImagingClient.createDatastore(datastoreRequest);
            return response.datastoreId();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return "";
    }
```

- For API details, see [CreateDatastore](#) in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

JavaScript

SDK for JavaScript (v3)

```
import { CreateDatastoreCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreName - The name of the data store to create.
 */
export const createDatastore = async (datastoreName = "DATASTORE_NAME") => {
  const response = await medicalImagingClient.send(
    new CreateDatastoreCommand({ datastoreName: datastoreName }),
  );
  console.log(response);
  // {
  //   '$metadata': {
  //       httpStatusCode: 200,
  //       requestId: 'a71cd65f-2382-49bf-b682-f9209d8d399b',
  //       extendedRequestId: undefined,
  //       cfId: undefined,
  //       attempts: 1,
  //       totalRetryDelay: 0
  //    },
  //    datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //    datastoreStatus: 'CREATING'
  // }
  return response;
};
```

- For API details, see [CreateDatastore](#) in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def create_datastore(self, name):
        """
        Create a data store.

        :param name: The name of the data store to create.
        :return: The data store ID.
        """
        try:
            data_store =
 self.health_imaging_client.create_datastore(datastoreName=name)
        except ClientError as err:
            logger.error(
                "Couldn't create data store %s. Here's why: %s: %s",
                name,
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return data_store["datastoreId"]
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see CreateDatastore in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_name = 'my-datastore-name'
        oo_result = lo_mig->createdatastore( iv_datastorename =
iv_datastore_name ).
        DATA(lv_datastore_id) = oo_result->get_datastoreid( ).
        MESSAGE 'Data store created.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict. Data store may already exist.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migservicequotaexcdex.
        MESSAGE 'Service quota exceeded.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see CreateDatastore in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see [Using this service with an AWS SDK](). This topic also includes information about getting started and details about previous SDK versions.

Use `DeleteDatastore` with an AWS SDK or CLI

The following code examples show how to use `DeleteDatastore`.

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}

###############################################################################
# function imaging_delete_datastore
#
# This function deletes an AWS HealthImaging data store.
#
# Parameters:
#       -i datastore_id - The ID of the data store.
#
# Returns:
#       0 - If successful.
#       1 - If it fails.
###############################################################################
function imaging_delete_datastore() {
  local datastore_id response
  local option OPTARG # Required to use getopts command in a function.

  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_delete_datastore"
    echo "Deletes an AWS HealthImaging data store."
    echo "  -i datastore_id - The ID of the data store."
    echo ""
```

```
  }

  # Retrieve the calling parameters.
  while getopts "i:h" option; do
    case "${option}" in
      i) datastore_id="${OPTARG}" ;;
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1

  if [[ -z "$datastore_id" ]]; then
    errecho "ERROR: You must provide a data store ID with the -i parameter."
    usage
    return 1
  fi

  response=$(aws medical-imaging delete-datastore \
    --datastore-id "$datastore_id")

  local error_code=${?}

  if [[ $error_code -ne 0 ]]; then
    aws_cli_error_log $error_code
    errecho "ERROR: AWS reports medical-imaging delete-datastore operation
 failed.$response"
    return 1
  fi

  return 0
}
```

- For API details, see DeleteDatastore in *AWS CLI Command Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

CLI

AWS CLI

To delete a data store

The following `delete-datastore` code example deletes a data store.

```
aws medical-imaging delete-datastore \
    --datastore-id "12345678901234567890123456789012"
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "datastoreStatus": "DELETING"
}
```

- For API details, see DeleteDatastore in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void deleteMedicalImagingDatastore(MedicalImagingClient
 medicalImagingClient,
            String datastoreID) {
        try {
            DeleteDatastoreRequest datastoreRequest =
 DeleteDatastoreRequest.builder()
                    .datastoreId(datastoreID)
                    .build();
            medicalImagingClient.deleteDatastore(datastoreRequest);
        } catch (MedicalImagingException e) {
```

```
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see [DeleteDatastore](#) in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

JavaScript

SDK for JavaScript (v3)

```
import { DeleteDatastoreCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store to delete.
 */
export const deleteDatastore = async (datastoreId = "DATASTORE_ID") => {
  const response = await medicalImagingClient.send(
    new DeleteDatastoreCommand({ datastoreId }),
  );
  console.log(response);
  // {
  //   '$metadata': {
  //           httpStatusCode: 200,
  //           requestId: 'f5beb409-678d-48c9-9173-9a001ee1ebb1',
  //           extendedRequestId: undefined,
  //           cfId: undefined,
  //           attempts: 1,
  //           totalRetryDelay: 0
  //       },
  //     datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //     datastoreStatus: 'DELETING'
  // }
```

```
  return response;
};
```

- For API details, see DeleteDatastore in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def delete_datastore(self, datastore_id):
        """
        Delete a data store.

        :param datastore_id: The ID of the data store.
        """
        try:
            self.health_imaging_client.delete_datastore(datastoreId=datastore_id)
        except ClientError as err:
            logger.error(
                "Couldn't delete data store %s. Here's why: %s: %s",
                datastore_id,
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see DeleteDatastore in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    oo_result = lo_mig->deletedatastore( iv_datastoreid = iv_datastore_id ).
    MESSAGE 'Data store deleted.' TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict. Data store may contain resources.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Data store not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see DeleteDatastore in *AWS SDK for SAP ABAP API reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `DeleteImageSet` with an AWS SDK or CLI

The following code examples show how to use `DeleteImageSet`.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code example:

- Get started with image sets and image frames

C++

SDK for C++

```
//! Routine which deletes an AWS HealthImaging image set.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param imageSetID: The image set ID.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
  */
bool AwsDoc::Medical_Imaging::deleteImageSet(
        const Aws::String &dataStoreID, const Aws::String &imageSetID,
        const Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::DeleteImageSetRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetImageSetId(imageSetID);
    Aws::MedicalImaging::Model::DeleteImageSetOutcome outcome =
 client.DeleteImageSet(
            request);
    if (outcome.IsSuccess()) {
```

```
        std::cout << "Successfully deleted image set " << imageSetID
                  << " from data store " << dataStoreID << std::endl;
    }
    else {
        std::cerr << "Error deleting image set " << imageSetID << " from data
 store "
                  << dataStoreID << ": " <<
                  outcome.GetError().GetMessage() << std::endl;
    }

    return outcome.IsSuccess();
}
```

- For API details, see DeleteImageSet in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To delete an image set

The following `delete-image-set` code example deletes an image set.

```
aws medical-imaging delete-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e
```

Output:

```
{
    "imageSetWorkflowStatus": "DELETING",
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
    "datastoreId": "12345678901234567890123456789012"
}
```

- For API details, see DeleteImageSet in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void deleteMedicalImageSet(MedicalImagingClient
medicalImagingClient,
            String datastoreId,
            String imagesetId) {
        try {
            DeleteImageSetRequest deleteImageSetRequest =
DeleteImageSetRequest.builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imagesetId)
                    .build();

            medicalImagingClient.deleteImageSet(deleteImageSetRequest);

            System.out.println("The image set was deleted.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see DeleteImageSet in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { DeleteImageSetCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";
```

```
/**
 * @param {string} datastoreId - The data store ID.
 * @param {string} imageSetId - The image set ID.
 */
export const deleteImageSet = async (
  datastoreId = "xxxxxxxxxxxxxxxx",
  imageSetId = "xxxxxxxxxxxxxxx",
) => {
  const response = await medicalImagingClient.send(
    new DeleteImageSetCommand({
      datastoreId: datastoreId,
      imageSetId: imageSetId,
    }),
  );
  console.log(response);
  // {
  //    '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '6267bbd2-eaa5-4a50-8ee8-8fddf535cf73',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     datastoreId: 'xxxxxxxxxxxxxxxx',
  //     imageSetId: 'xxxxxxxxxxxxxxx',
  //     imageSetState: 'LOCKED',
  //     imageSetWorkflowStatus: 'DELETING'
  // }
  return response;
};
```

- For API details, see DeleteImageSet in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def delete_image_set(self, datastore_id, image_set_id):
        """
        Delete an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :return: The delete results.
        """
        try:
            delete_results = self.health_imaging_client.delete_image_set(
                imageSetId=image_set_id, datastoreId=datastore_id
            )
        except ClientError as err:
            logger.error(
                "Couldn't delete image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return delete_results
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see DeleteImageSet in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        oo_result = lo_mig->deleteimageset(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id ).
        MESSAGE 'Image set deleted.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see [DeleteImageSet](#) in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use GetDICOMImportJob with an AWS SDK or CLI

The following code examples show how to use GetDICOMImportJob.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code example:

- Get started with image sets and image frames

C++

SDK for C++

```
//! Routine which gets a HealthImaging DICOM import job's properties.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param importJobID: The DICOM import job ID
  \param clientConfig: Aws client configuration.
  \return GetDICOMImportJobOutcome: The import job outcome.
*/
Aws::MedicalImaging::Model::GetDICOMImportJobOutcome
AwsDoc::Medical_Imaging::getDICOMImportJob(const Aws::String &dataStoreID,
                                           const Aws::String &importJobID,
                                           const Aws::Client::ClientConfiguration
 &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::GetDICOMImportJobRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetJobId(importJobID);
    Aws::MedicalImaging::Model::GetDICOMImportJobOutcome outcome =
 client.GetDICOMImportJob(
            request);
    if (!outcome.IsSuccess()) {
        std::cerr << "GetDICOMImportJob error: "
                  << outcome.GetError().GetMessage() << std::endl;
    }

    return outcome;
```

```
}
```

- For API details, see GetDICOMImportJob in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To get a dicom import job's properties

The following `get-dicom-import-job` code example gets a dicom import job's properties.

```
aws medical-imaging get-dicom-import-job \
    --datastore-id "12345678901234567890123456789012" \
    --job-id "09876543210987654321098765432109"
```

Output:

```
{
    "jobProperties": {
        "jobId": "09876543210987654321098765432109",
        "jobName": "my-job",
        "jobStatus": "COMPLETED",
        "datastoreId": "12345678901234567890123456789012",
        "dataAccessRoleArn": "arn:aws:iam::123456789012:role/
ImportJobDataAccessRole",
        "endedAt": "2022-08-12T11:29:42.285000+00:00",
        "submittedAt": "2022-08-12T11:28:11.152000+00:00",
        "inputS3Uri": "s3://medical-imaging-dicom-input/dicom_input/",
        "outputS3Uri": "s3://medical-imaging-output/
job_output/12345678901234567890123456789012-
DicomImport-09876543210987654321098765432109/"
    }
}
```

- For API details, see GetDICOMImportJob in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static DICOMImportJobProperties getDicomImportJob(MedicalImagingClient
 medicalImagingClient,
            String datastoreId,
            String jobId) {

        try {
            GetDicomImportJobRequest getDicomImportJobRequest =
 GetDicomImportJobRequest.builder()
                    .datastoreId(datastoreId)
                    .jobId(jobId)
                    .build();
            GetDicomImportJobResponse response =
 medicalImagingClient.getDICOMImportJob(getDicomImportJobRequest);
            return response.jobProperties();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see GetDICOMImportJob in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetDICOMImportJobCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} jobId - The ID of the import job.
 */
export const getDICOMImportJob = async (
  datastoreId = "xxxxxxxxxxxxxxxxxxxx",
  jobId = "xxxxxxxxxxxxxxxxxxxx",
) => {
  const response = await medicalImagingClient.send(
    new GetDICOMImportJobCommand({ datastoreId: datastoreId, jobId: jobId }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: 'a2637936-78ea-44e7-98b8-7a87d95dfaee',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     jobProperties: {
  //         dataAccessRoleArn: 'arn:aws:iam::xxxxxxxxxxxx:role/dicom_import',
  //             datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxx',
  //             endedAt: 2023-09-19T17:29:21.753Z,
  //             inputS3Uri: 's3://healthimaging-source/CTStudy/',
  //             jobId: ''xxxxxxxxxxxxxxxxxxxxxxxxx'',
  //             jobName: 'job_1',
  //             jobStatus: 'COMPLETED',
  //             outputS3Uri: 's3://health-imaging-dest/
ouput_ct/'xxxxxxxxxxxxxxxxxxxxxxxxx'-DicomImport-'xxxxxxxxxxxxxxxxxxxxxxxxx'/',
  //             submittedAt: 2023-09-19T17:27:25.143Z
  //     }
  // }

  return response;
};
```

- For API details, see GetDICOMImportJob in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_dicom_import_job(self, datastore_id, job_id):
        """
        Get the properties of a DICOM import job.

        :param datastore_id: The ID of the data store.
        :param job_id: The ID of the job.
        :return: The job properties.
        """
        try:
            job = self.health_imaging_client.get_dicom_import_job(
                jobId=job_id, datastoreId=datastore_id
            )
        except ClientError as err:
            logger.error(
                "Couldn't get DICOM import job. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return job["jobProperties"]
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetDICOMImportJob in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    " iv_job_id = '12345678901234567890123456789012'
    oo_result = lo_mig->getdicomimportjob(
      iv_datastoreid = iv_datastore_id
      iv_jobid = iv_job_id ).
    DATA(lo_job_props) = oo_result->get_jobproperties( ).
    DATA(lv_job_status) = lo_job_props->get_jobstatus( ).
    MESSAGE |Job status: { lv_job_status }.| TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Job not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see GetDICOMImportJob in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `GetDatastore` with an AWS SDK or CLI

The following code examples show how to use `GetDatastore`.

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}

###############################################################################
# function imaging_get_datastore
#
# Get a data store's properties.
#
# Parameters:
#       -i data_store_id - The ID of the data store.
#
# Returns:
#       [datastore_name, datastore_id, datastore_status, datastore_arn,
 created_at, updated_at]
#    And:
#       0 - If successful.
```

```
#       1 - If it fails.
###############################################################################
function imaging_get_datastore() {
  local datastore_id option OPTARG # Required to use getopts command in a
 function.
  local error_code
  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_get_datastore"
    echo "Gets a data store's properties."
    echo "  -i datastore_id - The ID of the data store."
    echo ""
  }

  # Retrieve the calling parameters.
  while getopts "i:h" option; do
    case "${option}" in
      i) datastore_id="${OPTARG}" ;;
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1

  if [[ -z "$datastore_id" ]]; then
    errecho "ERROR: You must provide a data store ID with the -i parameter."
    usage
    return 1
  fi

  local response

  response=$(
    aws medical-imaging get-datastore \
      --datastore-id "$datastore_id" \
      --output text \
```

```
      --query "[ datastoreProperties.datastoreName,
 datastoreProperties.datastoreId, datastoreProperties.datastoreStatus,
 datastoreProperties.datastoreArn,  datastoreProperties.createdAt,
 datastoreProperties.updatedAt]"
  )
  error_code=${?}

  if [[ $error_code -ne 0 ]]; then
    aws_cli_error_log $error_code
    errecho "ERROR: AWS reports list-datastores operation failed.$response"
    return 1
  fi

  echo "$response"

  return 0
}
```

- For API details, see GetDatastore in *AWS CLI Command Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

Example 1: To get a data store's properties

The following `get-datastore` code example gets a data store's properties.

```
aws medical-imaging get-datastore \
    --datastore-id 12345678901234567890123456789012
```

Output:

```
{
```

```
    "datastoreProperties": {
        "datastoreId": "12345678901234567890123456789012",
        "datastoreName": "TestDatastore123",
        "datastoreStatus": "ACTIVE",
        "losslessStorageFormat": "HTJ2K"
        "datastoreArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012",
        "createdAt": "2022-11-15T23:33:09.643000+00:00",
        "updatedAt": "2022-11-15T23:33:09.643000+00:00"
    }
}
```

Example 2: To get data store's properties configured for JPEG2000

The following `get-datastore` code example gets a data store's properties for a data store configured for JPEG 2000 Lossless storage format.

```
aws medical-imaging get-datastore \
    --datastore-id 12345678901234567890123456789012
```

Output:

```
{
    "datastoreProperties": {
        "datastoreId": "12345678901234567890123456789012",
        "datastoreName": "TestDatastore123",
        "datastoreStatus": "ACTIVE",
        "losslessStorageFormat": "JPEG_2000_LOSSLESS",
        "datastoreArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012",
        "createdAt": "2022-11-15T23:33:09.643000+00:00",
        "updatedAt": "2022-11-15T23:33:09.643000+00:00"
    }
}
```

- For API details, see GetDatastore in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static DatastoreProperties
 getMedicalImageDatastore(MedicalImagingClient medicalImagingClient,
             String datastoreID) {
         try {
             GetDatastoreRequest datastoreRequest = GetDatastoreRequest.builder()
                     .datastoreId(datastoreID)
                     .build();
             GetDatastoreResponse response =
 medicalImagingClient.getDatastore(datastoreRequest);
             return response.datastoreProperties();
         } catch (MedicalImagingException e) {
             System.err.println(e.awsErrorDetails().errorMessage());
             System.exit(1);
         }

         return null;
     }
```

- For API details, see GetDatastore in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetDatastoreCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreID - The ID of the data store.
 */
export const getDatastore = async (datastoreID = "DATASTORE_ID") => {
```

```
  const response = await medicalImagingClient.send(
    new GetDatastoreCommand({ datastoreId: datastoreID }),
  );
  console.log(response);
  // {
  //   '$metadata': {
  //       httpStatusCode: 200,
  //       requestId: '55ea7d2e-222c-4a6a-871e-4f591f40cadb',
  //       extendedRequestId: undefined,
  //       cfId: undefined,
  //       attempts: 1,
  //       totalRetryDelay: 0
  //    },
  //   datastoreProperties: {
  //        createdAt: 2023-08-04T18:50:36.239Z,
  //         datastoreArn: 'arn:aws:medical-imaging:us-
east-1:xxxxxxxxx:datastore/xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //         datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //         datastoreName: 'my_datastore',
  //         datastoreStatus: 'ACTIVE',
  //         updatedAt: 2023-08-04T18:50:36.239Z
  //   }
  // }
  return response.datastoreProperties;
};
```

- For API details, see GetDatastore in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client
```

```
    def get_datastore_properties(self, datastore_id):
        """
        Get the properties of a data store.

        :param datastore_id: The ID of the data store.
        :return: The data store properties.
        """
        try:
            data_store = self.health_imaging_client.get_datastore(
                datastoreId=datastore_id
            )
        except ClientError as err:
            logger.error(
                "Couldn't get data store %s. Here's why: %s: %s",
                id,
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return data_store["datastoreProperties"]
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetDatastore in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    oo_result = lo_mig->getdatastore( iv_datastoreid = iv_datastore_id ).
    DATA(lo_properties) = oo_result->get_datastoreproperties( ).
    DATA(lv_name) = lo_properties->get_datastorename( ).
    DATA(lv_status) = lo_properties->get_datastorestatus( ).
    MESSAGE 'Data store properties retrieved.' TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Data store not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see GetDatastore in *AWS SDK for SAP ABAP API reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `GetImageFrame` with an AWS SDK or CLI

The following code examples show how to use `GetImageFrame`.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code example:

- [Get started with image sets and image frames]

C++

SDK for C++

```
//! Routine which downloads an AWS HealthImaging image frame.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param imageSetID: The image set ID.
  \param frameID: The image frame ID.
  \param jphFile: File to store the downloaded frame.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
*/
bool AwsDoc::Medical_Imaging::getImageFrame(const Aws::String &dataStoreID,
                                            const Aws::String &imageSetID,
                                            const Aws::String &frameID,
                                            const Aws::String &jphFile,
                                            const
 Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);

    Aws::MedicalImaging::Model::GetImageFrameRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetImageSetId(imageSetID);

    Aws::MedicalImaging::Model::ImageFrameInformation imageFrameInformation;
    imageFrameInformation.SetImageFrameId(frameID);
    request.SetImageFrameInformation(imageFrameInformation);

    Aws::MedicalImaging::Model::GetImageFrameOutcome outcome =
 client.GetImageFrame(
            request);

    if (outcome.IsSuccess()) {
        std::cout << "Successfully retrieved image frame." << std::endl;
        auto &buffer = outcome.GetResult().GetImageFrameBlob();

        std::ofstream outfile(jphFile, std::ios::binary);
        outfile << buffer.rdbuf();
    }
    else {
```

```
        std::cout << "Error retrieving image frame." <<
 outcome.GetError().GetMessage()
                  << std::endl;

    }

    return outcome.IsSuccess();
}
```

- For API details, see GetImageFrame in *AWS SDK for C++ API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To get image set pixel data

The following `get-image-frame` code example gets an image frame.

```
aws medical-imaging get-image-frame \
    --datastore-id "12345678901234567890123456789012" \
    --image-set-id "98765412345612345678907890789012" \
    --image-frame-information imageFrameId=3abf5d5d7ae72f80a0ec81b2c0de3ef4 \
    imageframe.jph
```

Note: This code example does not include output because the GetImageFrame action returns a stream of pixel data to the imageframe.jph file. For information about decoding and viewing image frames, see HTJ2K decoding libraries.

- For API details, see GetImageFrame in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
        public static void getMedicalImageSetFrame(MedicalImagingClient
medicalImagingClient,
                        String destinationPath,
                        String datastoreId,
                        String imagesetId,
                        String imageFrameId) {

                try {
                        GetImageFrameRequest getImageSetMetadataRequest =
GetImageFrameRequest.builder()
                                        .datastoreId(datastoreId)
                                        .imageSetId(imagesetId)

.imageFrameInformation(ImageFrameInformation.builder()

.imageFrameId(imageFrameId)
                                                        .build())
                                        .build();

medicalImagingClient.getImageFrame(getImageSetMetadataRequest,

FileSystems.getDefault().getPath(destinationPath));

                        System.out.println("Image frame downloaded to " +
destinationPath);
                } catch (MedicalImagingException e) {
                        System.err.println(e.awsErrorDetails().errorMessage());
                        System.exit(1);
                }
        }
```

- For API details, see GetImageFrame in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetImageFrameCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} imageFrameFileName - The name of the file for the HTJ2K-
encoded image frame.
 * @param {string} datastoreID - The data store's ID.
 * @param {string} imageSetID - The image set's ID.
 * @param {string} imageFrameID - The image frame's ID.
 */
export const getImageFrame = async (
  imageFrameFileName = "image.jph",
  datastoreID = "DATASTORE_ID",
  imageSetID = "IMAGE_SET_ID",
  imageFrameID = "IMAGE_FRAME_ID",
) => {
  const response = await medicalImagingClient.send(
    new GetImageFrameCommand({
      datastoreId: datastoreID,
      imageSetId: imageSetID,
      imageFrameInformation: { imageFrameId: imageFrameID },
    }),
  );
  const buffer = await response.imageFrameBlob.transformToByteArray();
  writeFileSync(imageFrameFileName, buffer);

  console.log(response);
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: 'e4ab42a5-25a3-4377-873f-374ecf4380e1',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     contentType: 'application/octet-stream',
  //     imageFrameBlob: <ref *1> IncomingMessage {}
  // }
  return response;
```

```
};
```

- For API details, see [GetImageFrame](#) in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_pixel_data(
        self, file_path_to_write, datastore_id, image_set_id, image_frame_id
    ):
        """
        Get an image frame's pixel data.

        :param file_path_to_write: The path to write the image frame's HTJ2K
 encoded pixel data.
        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param image_frame_id: The ID of the image frame.
        """
        try:
            image_frame = self.health_imaging_client.get_image_frame(
                datastoreId=datastore_id,
                imageSetId=image_set_id,
                imageFrameInformation={"imageFrameId": image_frame_id},
            )
            with open(file_path_to_write, "wb") as f:
                for chunk in image_frame["imageFrameBlob"].iter_chunks():
                    if chunk:
                        f.write(chunk)
```

```
        except ClientError as err:
            logger.error(
                "Couldn't get image frame. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see [GetImageFrame](#) in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        " iv_image_frame_id = '1234567890123456789012345678901234567890'
        oo_result = lo_mig->getimageframe(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id
          io_imageframeinformation = NEW /aws1/cl_migimageframeinfmtion(
            iv_imageframeid = iv_image_frame_id ) ).
        DATA(lv_frame_blob) = oo_result->get_imageframeblob( ).
        MESSAGE 'Image frame retrieved.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
```

```
      MESSAGE 'Conflict error.' TYPE 'I'.
    CATCH /aws1/cx_miginternalserverex.
      MESSAGE 'Internal server error.' TYPE 'I'.
    CATCH /aws1/cx_migresourcenotfoundex.
      MESSAGE 'Image frame not found.' TYPE 'I'.
    CATCH /aws1/cx_migthrottlingex.
      MESSAGE 'Request throttled.' TYPE 'I'.
    CATCH /aws1/cx_migvalidationex.
      MESSAGE 'Validation error.' TYPE 'I'.
  ENDTRY.
```

- For API details, see GetImageFrame in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `GetImageSet` with an AWS SDK or CLI

The following code examples show how to use `GetImageSet`.

CLI

AWS CLI

To get image set properties

The following `get-image-set` code example gets the properties for an image set.

```
aws medical-imaging get-image-set \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 18f88ac7870584f58d56256646b4d92b \
    --version-id 1
```

Output:

```
{
    "versionId": "1",
    "imageSetWorkflowStatus": "COPIED",
    "updatedAt": 1680027253.471,
    "imageSetId": "18f88ac7870584f58d56256646b4d92b",
    "imageSetState": "ACTIVE",
    "createdAt": 1679592510.753,
    "datastoreId": "12345678901234567890123456789012"
}
```


- For API details, see GetImageSet in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static GetImageSetResponse getMedicalImageSet(MedicalImagingClient
 medicalImagingClient,
            String datastoreId,
            String imagesetId,
            String versionId) {
        try {
            GetImageSetRequest.Builder getImageSetRequestBuilder =
 GetImageSetRequest.builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imagesetId);

            if (versionId != null) {
                getImageSetRequestBuilder =
 getImageSetRequestBuilder.versionId(versionId);
            }

            return
 medicalImagingClient.getImageSet(getImageSetRequestBuilder.build());
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see GetImageSet in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { GetImageSetCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imageSetId - The ID of the image set.
 * @param {string} imageSetVersion - The optional version of the image set.
 *
 */
export const getImageSet = async (
  datastoreId = "xxxxxxxxxxxxxxx",
  imageSetId = "xxxxxxxxxxxxxxx",
  imageSetVersion = "",
) => {
  const params = { datastoreId: datastoreId, imageSetId: imageSetId };
  if (imageSetVersion !== "") {
    params.imageSetVersion = imageSetVersion;
  }
  const response = await medicalImagingClient.send(
    new GetImageSetCommand(params),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '0615c161-410d-4d06-9d8c-6e1241bb0a5a',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
```

```
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     createdAt: 2023-09-22T14:49:26.427Z,
  //     datastoreId: 'xxxxxxxxxxxxxxx',
  //     imageSetArn: 'arn:aws:medical-imaging:us-east-1:xxxxxxxxxx:datastore/
xxxxxxxxxxxxxxxxxxxx/imageset/xxxxxxxxxxxxxxxxxxxx',
  //     imageSetId: 'xxxxxxxxxxxxxxx',
  //     imageSetState: 'ACTIVE',
  //     imageSetWorkflowStatus: 'CREATED',
  //     updatedAt: 2023-09-22T14:49:26.427Z,
  //     versionId: '1'
  // }

  return response;
};
```

- For API details, see GetImageSet in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_image_set(self, datastore_id, image_set_id, version_id=None):
        """
        Get the properties of an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
```

```
        :param version_id: The optional version of the image set.
        :return: The image set properties.
        """
        try:
            if version_id:
                image_set = self.health_imaging_client.get_image_set(
                    imageSetId=image_set_id,
                    datastoreId=datastore_id,
                    versionId=version_id,
                )
            else:
                image_set = self.health_imaging_client.get_image_set(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
        except ClientError as err:
            logger.error(
                "Couldn't get image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return image_set
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetImageSet in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        " iv_version_id = '1' (optional)
        IF iv_version_id IS NOT INITIAL.
          oo_result = lo_mig->getimageset(
            iv_datastoreid = iv_datastore_id
            iv_imagesetid = iv_image_set_id
            iv_versionid = iv_version_id ).
        ELSE.
          oo_result = lo_mig->getimageset(
            iv_datastoreid = iv_datastore_id
            iv_imagesetid = iv_image_set_id ).
        ENDIF.
        DATA(lv_state) = oo_result->get_imagesetstate( ).
        MESSAGE |Image set retrieved with state: { lv_state }.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see GetImageSet in *AWS SDK for SAP ABAP API reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use GetImageSetMetadata with an AWS SDK or CLI

The following code examples show how to use GetImageSetMetadata.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code example:

- Get started with image sets and image frames

C++

SDK for C++

Utility function to get image set metadata.

```
//! Routine which gets a HealthImaging image set's metadata.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param imageSetID: The HealthImaging image set ID.
  \param versionID: The HealthImaging image set version ID, ignored if empty.
  \param outputFilePath: The path where the metadata will be stored as gzipped
 json.
  \param clientConfig: Aws client configuration.
  \\return bool: Function succeeded.
*/
bool AwsDoc::Medical_Imaging::getImageSetMetadata(const Aws::String &dataStoreID,
                                                   const Aws::String &imageSetID,
                                                   const Aws::String &versionID,
                                                   const Aws::String
 &outputFilePath,
                                                   const
 Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::Model::GetImageSetMetadataRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetImageSetId(imageSetID);
    if (!versionID.empty()) {
        request.SetVersionId(versionID);
    }
```

```
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::GetImageSetMetadataOutcome outcome =
 client.GetImageSetMetadata(
            request);
    if (outcome.IsSuccess()) {
        std::ofstream file(outputFilePath, std::ios::binary);
        auto &metadata = outcome.GetResult().GetImageSetMetadataBlob();
        file << metadata.rdbuf();
    }
    else {
        std::cerr << "Failed to get image set metadata: "
                  << outcome.GetError().GetMessage() << std::endl;
    }

    return outcome.IsSuccess();
}
```

Get image set metadata without version.

```
        if (AwsDoc::Medical_Imaging::getImageSetMetadata(dataStoreID, imageSetID,
 "", outputFilePath, clientConfig))
        {
            std::cout << "Successfully retrieved image set metadata." <<
 std::endl;
            std::cout << "Metadata stored in: " << outputFilePath << std::endl;
        }
```

Get image set metadata with version.

```
        if (AwsDoc::Medical_Imaging::getImageSetMetadata(dataStoreID, imageSetID,
 versionID, outputFilePath, clientConfig))
        {
            std::cout << "Successfully retrieved image set metadata." <<
 std::endl;
            std::cout << "Metadata stored in: " << outputFilePath << std::endl;
        }
```

- For API details, see GetImageSetMetadata in *AWS SDK for C++ API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

CLI

AWS CLI

Example 1: To get image set metadata without version

The following `get-image-set-metadata` code example gets metadata for an image set without specifying a version.

Note: `outfile` is a required parameter

```
aws medical-imaging get-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    studymetadata.json.gz
```

The returned metadata is compressed with gzip and stored in the studymetadata.json.gz file. To view the contents of the returned JSON object, you must first decompress it.

Output:

```
{
    "contentType": "application/json",
    "contentEncoding": "gzip"
}
```

Example 2: To get image set metadata with version

The following `get-image-set-metadata` code example gets metadata for an image set with a specified version.

Note: `outfile` is a required parameter

```
aws medical-imaging get-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
```

```
    --version-id 1 \
    studymetadata.json.gz
```

The returned metadata is compressed with gzip and stored in the studymetadata.json.gz file. To view the contents of the returned JSON object, you must first decompress it.

Output:

```
{
    "contentType": "application/json",
    "contentEncoding": "gzip"
}
```

- For API details, see GetImageSetMetadata in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void getMedicalImageSetMetadata(MedicalImagingClient
 medicalImagingClient,
            String destinationPath,
            String datastoreId,
            String imagesetId,
            String versionId) {

        try {
            GetImageSetMetadataRequest.Builder getImageSetMetadataRequestBuilder
 = GetImageSetMetadataRequest.builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imagesetId);

            if (versionId != null) {
                getImageSetMetadataRequestBuilder =
 getImageSetMetadataRequestBuilder.versionId(versionId);
            }


 medicalImagingClient.getImageSetMetadata(getImageSetMetadataRequestBuilder.build(),
                    FileSystems.getDefault().getPath(destinationPath));

            System.out.println("Metadata downloaded to " + destinationPath);
```

```
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see GetImageSetMetadata in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

Utility function to get image set metadata.

```
import { GetImageSetMetadataCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";
import { writeFileSync } from "node:fs";

/**
 * @param {string} metadataFileName - The name of the file for the gzipped
 metadata.
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imagesetId - The ID of the image set.
 * @param {string} versionID - The optional version ID of the image set.
 */
export const getImageSetMetadata = async (
  metadataFileName = "metadata.json.gzip",
  datastoreId = "xxxxxxxxxxxxxx",
  imagesetId = "xxxxxxxxxxxxxx",
  versionID = "",
) => {
  const params = { datastoreId: datastoreId, imageSetId: imagesetId };

  if (versionID) {
    params.versionID = versionID;
  }
```

```
  const response = await medicalImagingClient.send(
    new GetImageSetMetadataCommand(params),
  );
  const buffer = await response.imageSetMetadataBlob.transformToByteArray();
  writeFileSync(metadataFileName, buffer);

  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '5219b274-30ff-4986-8cab-48753de3a599',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     contentType: 'application/json',
  //     contentEncoding: 'gzip',
  //     imageSetMetadataBlob: <ref *1> IncomingMessage {}
  // }

  return response;
};
```

Get image set metadata without version.

```
  try {
    await getImageSetMetadata(
      "metadata.json.gzip",
      "12345678901234567890123456789012",
      "12345678901234567890123456789012",
    );
  } catch (err) {
    console.log("Error", err);
  }
```

Get image set metadata with version.

```
  try {
```

```
    await getImageSetMetadata(
      "metadata2.json.gzip",
      "12345678901234567890123456789012",
      "12345678901234567890123456789012",
      "1",
    );
  } catch (err) {
    console.log("Error", err);
  }
```

- For API details, see GetImageSetMetadata in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

Utility function to get image set metadata.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def get_image_set_metadata(
        self, metadata_file, datastore_id, image_set_id, version_id=None
    ):
        """
        Get the metadata of an image set.

        :param metadata_file: The file to store the JSON gzipped metadata.
        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The version of the image set.
        """
        try:
```

```
            if version_id:
                image_set_metadata = 
self.health_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id,
                    datastoreId=datastore_id,
                    versionId=version_id,
                )
            else:

                image_set_metadata = 
self.health_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
            print(image_set_metadata)
            with open(metadata_file, "wb") as f:
                for chunk in 
image_set_metadata["imageSetMetadataBlob"].iter_chunks():
                    if chunk:
                        f.write(chunk)

        except ClientError as err:
            logger.error(
                "Couldn't get image metadata. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

Get image set metadata without version.

```
                image_set_metadata = 
self.health_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
```

Get image set metadata with version.

```
                image_set_metadata = 
self.health_imaging_client.get_image_set_metadata(
```

```
                imageSetId=image_set_id,
                datastoreId=datastore_id,
                versionId=version_id,
            )
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see GetImageSetMetadata in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    " iv_image_set_id = '1234567890123456789012345678901234567890'
    " iv_version_id = '1' (optional)
    IF iv_version_id IS NOT INITIAL.
      oo_result = lo_mig->getimagesetmetadata(
        iv_datastoreid = iv_datastore_id
        iv_imagesetid = iv_image_set_id
        iv_versionid = iv_version_id ).
    ELSE.
      oo_result = lo_mig->getimagesetmetadata(
        iv_datastoreid = iv_datastore_id
        iv_imagesetid = iv_image_set_id ).
    ENDIF.
    DATA(lv_metadata_blob) = oo_result->get_imagesetmetadatablob( ).
    MESSAGE 'Image set metadata retrieved.' TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
```

```
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see GetImageSetMetadata in *AWS SDK for SAP ABAP API reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `ListDICOMImportJobs` with an AWS SDK or CLI

The following code examples show how to use `ListDICOMImportJobs`.

CLI

AWS CLI

To list dicom import jobs

The following `list-dicom-import-jobs` code example lists dicom import jobs.

```
aws medical-imaging list-dicom-import-jobs \
    --datastore-id "12345678901234567890123456789012"
```

Output:

```
{
    "jobSummaries": [
        {
            "jobId": "09876543210987654321098765432109",
            "jobName": "my-job",
            "jobStatus": "COMPLETED",
            "datastoreId": "12345678901234567890123456789012",
            "dataAccessRoleArn": "arn:aws:iam::123456789012:role/
ImportJobDataAccessRole",
            "endedAt": "2022-08-12T11:21:56.504000+00:00",
            "submittedAt": "2022-08-12T11:20:21.734000+00:00"
        }
    ]
}
```

- For API details, see ListDICOMImportJobs in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static List<DICOMImportJobSummary>
 listDicomImportJobs(MedicalImagingClient medicalImagingClient,
            String datastoreId) {

        try {
            ListDicomImportJobsRequest listDicomImportJobsRequest =
 ListDicomImportJobsRequest.builder()
                    .datastoreId(datastoreId)
                    .build();
            ListDicomImportJobsResponse response =
 medicalImagingClient.listDICOMImportJobs(listDicomImportJobsRequest);
            return response.jobSummaries();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return new ArrayList<>();
    }
```

- For API details, see ListDICOMImportJobs in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { paginateListDICOMImportJobs } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 */
export const listDICOMImportJobs = async (
  datastoreId = "xxxxxxxxxxxxxxxxxx",
) => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = { datastoreId: datastoreId };
  const paginator = paginateListDICOMImportJobs(paginatorConfig, commandParams);

  const jobSummaries = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    jobSummaries.push(...page.jobSummaries);
    console.log(page);
  }
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '3c20c66e-0797-446a-a1d8-91b742fd15a0',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
```

```
  //         totalRetryDelay: 0
  // },
  //     jobSummaries: [
  //         {
  //             dataAccessRoleArn: 'arn:aws:iam::xxxxxxxxxxxx:role/
dicom_import',
  //             datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxx',
  //             endedAt: 2023-09-22T14:49:51.351Z,
  //             jobId: 'xxxxxxxxxxxxxxxxxxxxxxxxx',
  //             jobName: 'test-1',
  //             jobStatus: 'COMPLETED',
  //             submittedAt: 2023-09-22T14:48:45.767Z
  // }
  // ]}

  return jobSummaries;
};
```

- For API details, see ListDICOMImportJobs in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_dicom_import_jobs(self, datastore_id):
        """
        List the DICOM import jobs.

        :param datastore_id: The ID of the data store.
        :return: The list of jobs.
```

```
        """
        try:
            paginator = self.health_imaging_client.get_paginator(
                "list_dicom_import_jobs"
            )
            page_iterator = paginator.paginate(datastoreId=datastore_id)
            job_summaries = []
            for page in page_iterator:
                job_summaries.extend(page["jobSummaries"])
        except ClientError as err:
            logger.error(
                "Couldn't list DICOM import jobs. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return job_summaries
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListDICOMImportJobs in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '12345678901234567890123456789012'
```

```
        oo_result = lo_mig->listdicomimportjobs( iv_datastoreid =
iv_datastore_id ).
        DATA(lt_jobs) = oo_result->get_jobsummaries( ).
        DATA(lv_count) = lines( lt_jobs ).
        MESSAGE |Found { lv_count } DICOM import jobs.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see ListDICOMImportJobs in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `ListDatastores` with an AWS SDK or CLI

The following code examples show how to use `ListDatastores`.

Bash

AWS CLI with Bash script

```
###############################################################################
# function errecho
```

```
#
# This function outputs everything sent to it to STDERR (standard error output).
###############################################################################
function errecho() {
  printf "%s\n" "$*" 1>&2
}

###############################################################################
# function imaging_list_datastores
#
# List the HealthImaging data stores in the account.
#
# Returns:
#       [[datastore_name, datastore_id, datastore_status]]
#    And:
#       0 - If successful.
#       1 - If it fails.
###############################################################################
function imaging_list_datastores() {
  local option OPTARG # Required to use getopts command in a function.
  local error_code
  # bashsupport disable=BP5008
  function usage() {
    echo "function imaging_list_datastores"
    echo "Lists the AWS HealthImaging data stores in the account."
    echo ""
  }

  # Retrieve the calling parameters.
  while getopts "h" option; do
    case "${option}" in
      h)
        usage
        return 0
        ;;
      \?)
        echo "Invalid parameter"
        usage
        return 1
        ;;
    esac
  done
  export OPTIND=1
```

```
    local response
    response=$(aws medical-imaging list-datastores \
      --output text \
      --query "datastoreSummaries[*][datastoreName, datastoreId, datastoreStatus]")
    error_code=${?}

    if [[ $error_code -ne 0 ]]; then
      aws_cli_error_log $error_code
      errecho "ERROR: AWS reports list-datastores operation failed.$response"
      return 1
    fi

    echo "$response"

    return 0
}
```

- For API details, see [ListDatastores](#) in *AWS CLI Command Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

CLI

AWS CLI

To list data stores

The following `list-datastores` code example lists available data stores.

```
aws medical-imaging list-datastores
```

Output:

```
{
    "datastoreSummaries": [
        {
```

```
            "datastoreId": "12345678901234567890123456789012",
            "datastoreName": "TestDatastore123",
            "datastoreStatus": "ACTIVE",
            "datastoreArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012",
            "createdAt": "2022-11-15T23:33:09.643000+00:00",
            "updatedAt": "2022-11-15T23:33:09.643000+00:00"
        }
    ]
}
```

- For API details, see [ListDatastores](#) in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static List<DatastoreSummary>
 listMedicalImagingDatastores(MedicalImagingClient medicalImagingClient) {
        try {
            ListDatastoresRequest datastoreRequest =
 ListDatastoresRequest.builder()
                    .build();
            ListDatastoresIterable responses =
 medicalImagingClient.listDatastoresPaginator(datastoreRequest);
            List<DatastoreSummary> datastoreSummaries = new ArrayList<>();

            responses.stream().forEach(response ->
 datastoreSummaries.addAll(response.datastoreSummaries()));

            return datastoreSummaries;
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see [ListDatastores](#) in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

JavaScript

SDK for JavaScript (v3)

```
import { paginateListDatastores } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

export const listDatastores = async () => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = {};
  const paginator = paginateListDatastores(paginatorConfig, commandParams);

  /**
   * @type {import("@aws-sdk/client-medical-imaging").DatastoreSummary[]}
   */
  const datastoreSummaries = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    datastoreSummaries.push(...page.datastoreSummaries);
    console.log(page);
  }
  // {
  //   '$metadata': {
  //       httpStatusCode: 200,
  //       requestId: '6aa99231-d9c2-4716-a46e-edb830116fa3',
  //       extendedRequestId: undefined,
  //       cfId: undefined,
  //       attempts: 1,
  //       totalRetryDelay: 0
  //   },
  //   datastoreSummaries: [
```

```
  //     {
  //       createdAt: 2023-08-04T18:49:54.429Z,
  //       datastoreArn: 'arn:aws:medical-imaging:us-east-1:xxxxxxxxx:datastore/
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //       datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //       datastoreName: 'my_datastore',
  //       datastoreStatus: 'ACTIVE',
  //       updatedAt: 2023-08-04T18:49:54.429Z
  //     }
  //     ...
  //   ]
  // }

  return datastoreSummaries;
};
```

- For API details, see ListDatastores in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_datastores(self):
        """
        List the data stores.

        :return: The list of data stores.
        """
        try:
```

```
            paginator =
self.health_imaging_client.get_paginator("list_datastores")
            page_iterator = paginator.paginate()
            datastore_summaries = []
            for page in page_iterator:
                datastore_summaries.extend(page["datastoreSummaries"])
        except ClientError as err:
            logger.error(
                "Couldn't list data stores. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return datastore_summaries
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListDatastores in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        oo_result = lo_mig->listdatastores( ).
        DATA(lt_datastores) = oo_result->get_datastoresummaries( ).
        DATA(lv_count) = lines( lt_datastores ).
        MESSAGE |Found { lv_count } data stores.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
```

```
            MESSAGE 'Access denied.' TYPE 'I'.
          CATCH /aws1/cx_miginternalserverex.
            MESSAGE 'Internal server error.' TYPE 'I'.
          CATCH /aws1/cx_migthrottlingex.
            MESSAGE 'Request throttled.' TYPE 'I'.
          CATCH /aws1/cx_migvalidationex.
            MESSAGE 'Validation error.' TYPE 'I'.
        ENDTRY.
```

- For API details, see ListDatastores in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `ListImageSetVersions` with an AWS SDK or CLI

The following code examples show how to use `ListImageSetVersions`.

CLI

AWS CLI

To list image set versions

The following `list-image-set-versions` code example lists the version history for an image set.

```
aws medical-imaging list-image-set-versions \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e
```

Output:

```
{
    "imageSetPropertiesList": [
        {
            "ImageSetWorkflowStatus": "UPDATED",
            "versionId": "4",
            "updatedAt": 1680029436.304,
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "createdAt": 1680027126.436
        },
        {
            "ImageSetWorkflowStatus": "UPDATED",
            "versionId": "3",
            "updatedAt": 1680029163.325,
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "createdAt": 1680027126.436
        },
        {
            "ImageSetWorkflowStatus": "COPY_FAILED",
            "versionId": "2",
            "updatedAt": 1680027455.944,
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "message": "INVALID_REQUEST:  Series of SourceImageSet and
 DestinationImageSet don't match.",
            "createdAt": 1680027126.436
        },
        {
            "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
            "imageSetState": "ACTIVE",
            "versionId": "1",
            "ImageSetWorkflowStatus": "COPIED",
            "createdAt": 1680027126.436
        }
    ]
}
```

- For API details, see [ListImageSetVersions](#) in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static List<ImageSetProperties>
listMedicalImageSetVersions(MedicalImagingClient medicalImagingClient,
            String datastoreId,
            String imagesetId) {
        try {
            ListImageSetVersionsRequest getImageSetRequest =
ListImageSetVersionsRequest.builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imagesetId)
                    .build();

            ListImageSetVersionsIterable responses = medicalImagingClient
                    .listImageSetVersionsPaginator(getImageSetRequest);
            List<ImageSetProperties> imageSetProperties = new ArrayList<>();
            responses.stream().forEach(response ->
imageSetProperties.addAll(response.imageSetPropertiesList()));

            return imageSetProperties;
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

- For API details, see ListImageSetVersions in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { paginateListImageSetVersions } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} imageSetId - The ID of the image set.
 */
export const listImageSetVersions = async (
  datastoreId = "xxxxxxxxxxxx",
  imageSetId = "xxxxxxxxxxxx",
) => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = { datastoreId, imageSetId };
  const paginator = paginateListImageSetVersions(
    paginatorConfig,
    commandParams,
  );

  const imageSetPropertiesList = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    imageSetPropertiesList.push(...page.imageSetPropertiesList);
    console.log(page);
  }
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '74590b37-a002-4827-83f2-3c590279c742',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     imageSetPropertiesList: [
  //         {
```

```
  //              ImageSetWorkflowStatus: 'CREATED',
  //              createdAt: 2023-09-22T14:49:26.427Z,
  //              imageSetId: 'xxxxxxxxxxxxxxxxxxxxxxx',
  //              imageSetState: 'ACTIVE',
  //              versionId: '1'
  //          }]
  // }
  return imageSetPropertiesList;
};
```

- For API details, see ListImageSetVersions in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_image_set_versions(self, datastore_id, image_set_id):
        """
        List the image set versions.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :return: The list of image set versions.
        """
        try:
            paginator = self.health_imaging_client.get_paginator(
                "list_image_set_versions"
            )
            page_iterator = paginator.paginate(
                imageSetId=image_set_id, datastoreId=datastore_id
```

```
            )
            image_set_properties_list = []
            for page in page_iterator:
                image_set_properties_list.extend(page["imageSetPropertiesList"])
        except ClientError as err:
            logger.error(
                "Couldn't list image set versions. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return image_set_properties_list
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListImageSetVersions in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        oo_result = lo_mig->listimagesetversions(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id ).
        DATA(lt_versions) = oo_result->get_imagesetpropertieslist( ).
        DATA(lv_count) = lines( lt_versions ).
```

```
        MESSAGE |Found { lv_count } image set versions.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see ListImageSetVersions in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `ListTagsForResource` with an AWS SDK or CLI

The following code examples show how to use `ListTagsForResource`.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code examples:

- Tagging a data store
- Tagging an image set

CLI

AWS CLI

Example 1: To list resource tags for a data store

The following `list-tags-for-resource` code example lists tags for a data store.

```
aws medical-imaging list-tags-for-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012"
```

Output:

```
{
    "tags":{
        "Deployment":"Development"
    }
}
```

Example 2: To list resource tags for an image set

The following `list-tags-for-resource` code example lists tags for an image set.

```
aws medical-imaging list-tags-for-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/18f88ac7870584f58d56256646b4d92b"
```

Output:

```
{
    "tags":{
        "Deployment":"Development"
    }
}
```

- For API details, see ListTagsForResource in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static ListTagsForResourceResponse
 listMedicalImagingResourceTags(MedicalImagingClient medicalImagingClient,
             String resourceArn) {
         try {
             ListTagsForResourceRequest listTagsForResourceRequest =
 ListTagsForResourceRequest.builder()
                     .resourceArn(resourceArn)
                     .build();

             return
 medicalImagingClient.listTagsForResource(listTagsForResourceRequest);
         } catch (MedicalImagingException e) {
             System.err.println(e.awsErrorDetails().errorMessage());
             System.exit(1);
         }

         return null;
     }
```

- For API details, see ListTagsForResource in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { ListTagsForResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
```

```
 */
export const listTagsForResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:abc:datastore/def/imageset/
ghi",
) => {
  const response = await medicalImagingClient.send(
    new ListTagsForResourceCommand({ resourceArn: resourceArn }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '008fc6d3-abec-4870-a155-20fa3631e645',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     tags: { Deployment: 'Development' }
  // }

  return response;
};
```

- For API details, see ListTagsForResource in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client
```

```
    def list_tags_for_resource(self, resource_arn):
        """
        List the tags for a resource.

        :param resource_arn: The ARN of the resource.
        :return: The list of tags.
        """
        try:
            tags = self.health_imaging_client.list_tags_for_resource(
                resourceArn=resource_arn
            )
        except ClientError as err:
            logger.error(
                "Couldn't list tags for resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return tags["tags"]
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see ListTagsForResource in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
```

```
        " iv_resource_arn = 'arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012'
        oo_result = lo_mig->listtagsforresource( iv_resourcearn =
 iv_resource_arn ).
        DATA(lt_tags) = oo_result->get_tags( ).
        DATA(lv_count) = lines( lt_tags ).
        MESSAGE |Found { lv_count } tags for resource.| TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see ListTagsForResource in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `SearchImageSets` with an AWS SDK or CLI

The following code examples show how to use `SearchImageSets`.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code example:

- Get started with image sets and image frames

C++

SDK for C++

The utility function for searching image sets.

```
//! Routine which searches for image sets based on defined input attributes.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param searchCriteria: A search criteria instance.
  \param imageSetResults: Vector to receive the image set IDs.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
  */
bool AwsDoc::Medical_Imaging::searchImageSets(const Aws::String &dataStoreID,
                                              const
 Aws::MedicalImaging::Model::SearchCriteria &searchCriteria,
                                              Aws::Vector<Aws::String>
 &imageSetResults,
                                              const
 Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::SearchImageSetsRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetSearchCriteria(searchCriteria);

    Aws::String nextToken; // Used for paginated results.
    bool result = true;
    do {
        if (!nextToken.empty()) {
            request.SetNextToken(nextToken);
        }

        Aws::MedicalImaging::Model::SearchImageSetsOutcome outcome =
 client.SearchImageSets(
                request);
        if (outcome.IsSuccess()) {
            for (auto &imageSetMetadataSummary:
 outcome.GetResult().GetImageSetsMetadataSummaries()) {

 imageSetResults.push_back(imageSetMetadataSummary.GetImageSetId());
            }

            nextToken = outcome.GetResult().GetNextToken();
```

```
        }
        else {
            std::cout << "Error: " << outcome.GetError().GetMessage() <<
 std::endl;
            result = false;
        }
    } while (!nextToken.empty());

    return result;
}
```

Use case #1: EQUAL operator.

```
        Aws::Vector<Aws::String> imageIDsForPatientID;
        Aws::MedicalImaging::Model::SearchCriteria searchCriteriaEqualsPatientID;
        Aws::Vector<Aws::MedicalImaging::Model::SearchFilter>
 patientIDSearchFilters = {

 Aws::MedicalImaging::Model::SearchFilter().WithOperator(Aws::MedicalImaging::Model::Oper

 .WithValues({Aws::MedicalImaging::Model::SearchByAttributeValue().WithDICOMPatientId(pat
        };

        searchCriteriaEqualsPatientID.SetFilters(patientIDSearchFilters);
        bool result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,

 searchCriteriaEqualsPatientID,

 imageIDsForPatientID,
                                                                 clientConfig);
        if (result) {
            std::cout << imageIDsForPatientID.size() << " image sets found for
 the patient with ID '"
            <<  patientID << "'." << std::endl;
            for (auto &imageSetResult : imageIDsForPatientID) {
                std::cout << "  Image set with ID '" << imageSetResult <<
 std::endl;
            }
        }
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
        Aws::MedicalImaging::Model::SearchByAttributeValue useCase2StartDate;

 useCase2StartDate.SetDICOMStudyDateAndTime(Aws::MedicalImaging::Model::DICOMStudyDateAnd
        .WithDICOMStudyDate("19990101")
        .WithDICOMStudyTime("000000.000"));

        Aws::MedicalImaging::Model::SearchByAttributeValue useCase2EndDate;

 useCase2EndDate.SetDICOMStudyDateAndTime(Aws::MedicalImaging::Model::DICOMStudyDateAndTi

 .WithDICOMStudyDate(Aws::Utils::DateTime(std::chrono::system_clock::now()).ToLocalTimeSt
%m%d"))
        .WithDICOMStudyTime("000000.000"));

        Aws::MedicalImaging::Model::SearchFilter useCase2SearchFilter;
        useCase2SearchFilter.SetValues({useCase2StartDate, useCase2EndDate});

 useCase2SearchFilter.SetOperator(Aws::MedicalImaging::Model::Operator::BETWEEN);

        Aws::MedicalImaging::Model::SearchCriteria useCase2SearchCriteria;
        useCase2SearchCriteria.SetFilters({useCase2SearchFilter});

        Aws::Vector<Aws::String> usesCase2Results;
        result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,
                                                          useCase2SearchCriteria,
                                                          usesCase2Results,
                                                          clientConfig);
        if (result) {
            std::cout << usesCase2Results.size() << " image sets found for
 between 1999/01/01 and present."
                      <<  std::endl;
            for (auto &imageSetResult : usesCase2Results) {
                std::cout << "  Image set with ID '" << imageSetResult <<
 std::endl;
            }
        }
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
        Aws::MedicalImaging::Model::SearchByAttributeValue useCase3StartDate;
```

```
useCase3StartDate.SetCreatedAt(Aws::Utils::DateTime("20231130T000000000Z",Aws::Utils::Da

       Aws::MedicalImaging::Model::SearchByAttributeValue useCase3EndDate;

useCase3EndDate.SetCreatedAt(Aws::Utils::DateTime(std::chrono::system_clock::now()));

       Aws::MedicalImaging::Model::SearchFilter useCase3SearchFilter;
       useCase3SearchFilter.SetValues({useCase3StartDate, useCase3EndDate});

useCase3SearchFilter.SetOperator(Aws::MedicalImaging::Model::Operator::BETWEEN);

       Aws::MedicalImaging::Model::SearchCriteria useCase3SearchCriteria;
       useCase3SearchCriteria.SetFilters({useCase3SearchFilter});

       Aws::Vector<Aws::String> usesCase3Results;
       result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,
                                                         useCase3SearchCriteria,
                                                         usesCase3Results,
                                                         clientConfig);
       if (result) {
           std::cout << usesCase3Results.size() << " image sets found for
created between 2023/11/30 and present."
                     <<  std::endl;
           for (auto &imageSetResult : usesCase3Results) {
               std::cout << "  Image set with ID '" << imageSetResult <<
std::endl;
           }
       }
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
       Aws::MedicalImaging::Model::SearchByAttributeValue useCase4StartDate;

useCase4StartDate.SetUpdatedAt(Aws::Utils::DateTime("20231130T000000000Z",Aws::Utils::Da

       Aws::MedicalImaging::Model::SearchByAttributeValue useCase4EndDate;

useCase4EndDate.SetUpdatedAt(Aws::Utils::DateTime(std::chrono::system_clock::now()));

       Aws::MedicalImaging::Model::SearchFilter useCase4SearchFilterBetween;
```

```
        useCase4SearchFilterBetween.SetValues({useCase4StartDate,
useCase4EndDate});

useCase4SearchFilterBetween.SetOperator(Aws::MedicalImaging::Model::Operator::BETWEEN);

        Aws::MedicalImaging::Model::SearchByAttributeValue seriesInstanceUID;
        seriesInstanceUID.SetDICOMSeriesInstanceUID(dicomSeriesInstanceUID);

        Aws::MedicalImaging::Model::SearchFilter useCase4SearchFilterEqual;
        useCase4SearchFilterEqual.SetValues({seriesInstanceUID});

useCase4SearchFilterEqual.SetOperator(Aws::MedicalImaging::Model::Operator::EQUAL);

        Aws::MedicalImaging::Model::SearchCriteria useCase4SearchCriteria;
        useCase4SearchCriteria.SetFilters({useCase4SearchFilterBetween,
useCase4SearchFilterEqual});

        Aws::MedicalImaging::Model::Sort useCase4Sort;

useCase4Sort.SetSortField(Aws::MedicalImaging::Model::SortField::updatedAt);
        useCase4Sort.SetSortOrder(Aws::MedicalImaging::Model::SortOrder::ASC);

        useCase4SearchCriteria.SetSort(useCase4Sort);

        Aws::Vector<Aws::String> usesCase4Results;
        result = AwsDoc::Medical_Imaging::searchImageSets(dataStoreID,
                                                          useCase4SearchCriteria,
                                                          usesCase4Results,
                                                          clientConfig);
        if (result) {
            std::cout << usesCase4Results.size() << " image sets found for EQUAL
operator "
            << "on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort
response\n"
            <<  "in ASC order on updatedAt field." <<  std::endl;
            for (auto &imageSetResult : usesCase4Results) {
                std::cout << "  Image set with ID '" << imageSetResult <<
std::endl;
            }
        }
```

- For API details, see SearchImageSets in *AWS SDK for C++ API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

CLI

AWS CLI

Example 1: To search image sets with an EQUAL operator

The following `search-image-sets` code example uses the EQUAL operator to search image sets based on a specific value.

```
aws medical-imaging search-image-sets \
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{"DICOMPatientId" : "SUBJECT08701"}],
        "operator": "EQUAL"
    }]
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
             "DICOMPatientSex": "F",
             "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
             "DICOMPatientBirthDate": "19201120",
             "DICOMStudyDescription": "UNKNOWN",
```

```
                "DICOMPatientId": "SUBJECT08701",
                "DICOMPatientName": "Melissa844 Huel628",
                "DICOMNumberOfStudyRelatedInstances": 1,
                "DICOMStudyTime": "140728",
                "DICOMNumberOfStudyRelatedSeries": 1
               },
          "updatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```

Example 2: To search image sets with a BETWEEN operator using DICOMStudyDate and DICOMStudyTime

The following `search-image-sets` code example searches for image sets with DICOM Studies generated between January 1, 1990 (12:00 AM) and January 1, 2023 (12:00 AM).

Note: DICOMStudyTime is optional. If it is not present, 12:00 AM (start of the day) is the time value for the dates provided for filtering.

```
aws medical-imaging search-image-sets \
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{
            "DICOMStudyDateAndTime": {
                "DICOMStudyDate": "19900101",
                "DICOMStudyTime": "000000"
            }
        },
        {
            "DICOMStudyDateAndTime": {
                "DICOMStudyDate": "20230101",
                "DICOMStudyTime": "000000"
            }
        }],
        "operator": "BETWEEN"
    }]
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
            "DICOMPatientSex": "F",
            "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
            "DICOMPatientBirthDate": "19201120",
            "DICOMStudyDescription": "UNKNOWN",
            "DICOMPatientId": "SUBJECT08701",
            "DICOMPatientName": "Melissa844 Huel628",
            "DICOMNumberOfStudyRelatedInstances": 1,
            "DICOMStudyTime": "140728",
            "DICOMNumberOfStudyRelatedSeries": 1
        },
        "updatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```

Example 3: To search image sets with a BETWEEN operator using createdAt (time studies were previously persisted)

The following `search-image-sets` code example searches for image sets with DICOM Studies persisted in HealthImaging between the time ranges in UTC time zone.

Note: Provide createdAt in example format ("1985-04-12T23:20:50.52Z").

```
aws medical-imaging search-image-sets \
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria  file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{
            "createdAt": "1985-04-12T23:20:50.52Z"
```

```
        },
        {
            "createdAt": "2022-04-12T23:20:50.52Z"
        }],
        "operator": "BETWEEN"
    }]
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
            "DICOMPatientSex": "F",
            "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
            "DICOMPatientBirthDate": "19201120",
            "DICOMStudyDescription": "UNKNOWN",
            "DICOMPatientId": "SUBJECT08701",
            "DICOMPatientName": "Melissa844 Huel628",
            "DICOMNumberOfStudyRelatedInstances": 1,
            "DICOMStudyTime": "140728",
            "DICOMNumberOfStudyRelatedSeries": 1
        },
        "lastUpdatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```

Example 4: To search image sets with an EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field

The following `search-image-sets` code example searches for image sets with an EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

Note: Provide updatedAt in example format ("1985-04-12T23:20:50.52Z").

```
aws medical-imaging search-image-sets \
```

```
    --datastore-id 12345678901234567890123456789012 \
    --search-criteria  file://search-criteria.json
```

Contents of `search-criteria.json`

```
{
    "filters": [{
        "values": [{
            "updatedAt": "2024-03-11T15:00:05.074000-07:00"
        }, {
            "updatedAt": "2024-03-11T16:00:05.074000-07:00"
        }],
        "operator": "BETWEEN"
    }, {
        "values": [{
            "DICOMSeriesInstanceUID": "1.2.840.99999999.84710745.943275268089"
        }],
        "operator": "EQUAL"
    }],
    "sort": {
        "sortField": "updatedAt",
        "sortOrder": "ASC"
    }
}
```

Output:

```
{
    "imageSetsMetadataSummaries": [{
        "imageSetId": "09876543210987654321098765432109",
        "createdAt": "2022-12-06T21:40:59.429000+00:00",
        "version": 1,
        "DICOMTags": {
            "DICOMStudyId": "2011201407",
            "DICOMStudyDate": "19991122",
            "DICOMPatientSex": "F",
            "DICOMStudyInstanceUID": "1.2.840.99999999.84710745.943275268089",
            "DICOMPatientBirthDate": "19201120",
            "DICOMStudyDescription": "UNKNOWN",
            "DICOMPatientId": "SUBJECT08701",
            "DICOMPatientName": "Melissa844 Huel628",
            "DICOMNumberOfStudyRelatedInstances": 1,
            "DICOMStudyTime": "140728",
```

```
            "DICOMNumberOfStudyRelatedSeries": 1
        },
        "lastUpdatedAt": "2022-12-06T21:40:59.429000+00:00"
    }]
}
```


- For API details, see SearchImageSets in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

The utility function for searching image sets.

```
    public static List<ImageSetsMetadataSummary> searchMedicalImagingImageSets(
            MedicalImagingClient medicalImagingClient,
            String datastoreId, SearchCriteria searchCriteria) {
        try {
            SearchImageSetsRequest datastoreRequest =
 SearchImageSetsRequest.builder()
                    .datastoreId(datastoreId)
                    .searchCriteria(searchCriteria)
                    .build();
            SearchImageSetsIterable responses = medicalImagingClient
                    .searchImageSetsPaginator(datastoreRequest);
            List<ImageSetsMetadataSummary> imageSetsMetadataSummaries = new
 ArrayList<>();

            responses.stream().forEach(response -> imageSetsMetadataSummaries
                    .addAll(response.imageSetsMetadataSummaries()));

            return imageSetsMetadataSummaries;
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

Use case #1: EQUAL operator.

```
        List<SearchFilter> searchFilters =
 Collections.singletonList(SearchFilter.builder()
                .operator(Operator.EQUAL)
                .values(SearchByAttributeValue.builder()
                        .dicomPatientId(patientId)
                        .build())
                .build());

        SearchCriteria searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .build();

        List<ImageSetsMetadataSummary> imageSetsMetadataSummaries =
 searchMedicalImagingImageSets(
                medicalImagingClient,
                datastoreId, searchCriteria);
        if (imageSetsMetadataSummaries != null) {
            System.out.println("The image sets for patient " + patientId + " are:
\n"
                    + imageSetsMetadataSummaries);
            System.out.println();
        }
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
        DateTimeFormatter formatter = DateTimeFormatter.ofPattern("yyyyMMdd");
        searchFilters = Collections.singletonList(SearchFilter.builder()
                .operator(Operator.BETWEEN)
                .values(SearchByAttributeValue.builder()

 .dicomStudyDateAndTime(DICOMStudyDateAndTime.builder()
                                        .dicomStudyDate("19990101")
                                        .dicomStudyTime("000000.000")
                                        .build())
                                .build(),
                        SearchByAttributeValue.builder()

 .dicomStudyDateAndTime(DICOMStudyDateAndTime.builder()
                                        .dicomStudyDate((LocalDate.now()
                                                .format(formatter)))
                                        .dicomStudyTime("000000.000")
                                        .build())
```

```
                                .build())
                .build());

        searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .build();

        imageSetsMetadataSummaries =
searchMedicalImagingImageSets(medicalImagingClient,
                datastoreId, searchCriteria);
        if (imageSetsMetadataSummaries != null) {
            System.out.println(
                    "The image sets searched with BETWEEN operator using
DICOMStudyDate and DICOMStudyTime are:\n"
                            +
                            imageSetsMetadataSummaries);
            System.out.println();
        }
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
        searchFilters = Collections.singletonList(SearchFilter.builder()
                .operator(Operator.BETWEEN)
                .values(SearchByAttributeValue.builder()

.createdAt(Instant.parse("1985-04-12T23:20:50.52Z"))
                                .build(),
                        SearchByAttributeValue.builder()
                                .createdAt(Instant.now())
                                .build())
                .build());

        searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .build();
        imageSetsMetadataSummaries =
searchMedicalImagingImageSets(medicalImagingClient,
                datastoreId, searchCriteria);
        if (imageSetsMetadataSummaries != null) {
            System.out.println("The image sets searched with BETWEEN operator
using createdAt are:\n "
                    + imageSetsMetadataSummaries);
```

```
            System.out.println();
        }
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
        Instant startDate = Instant.parse("1985-04-12T23:20:50.52Z");
        Instant endDate = Instant.now();

        searchFilters = Arrays.asList(
                SearchFilter.builder()
                        .operator(Operator.EQUAL)
                        .values(SearchByAttributeValue.builder()
                                .dicomSeriesInstanceUID(seriesInstanceUID)
                                .build())
                        .build(),
                SearchFilter.builder()
                        .operator(Operator.BETWEEN)
                        .values(

SearchByAttributeValue.builder().updatedAt(startDate).build(),

SearchByAttributeValue.builder().updatedAt(endDate).build()
                        ).build());

        Sort sort =
Sort.builder().sortOrder(SortOrder.ASC).sortField(SortField.UPDATED_AT).build();

        searchCriteria = SearchCriteria.builder()
                .filters(searchFilters)
                .sort(sort)
                .build();

        imageSetsMetadataSummaries =
searchMedicalImagingImageSets(medicalImagingClient,
                datastoreId, searchCriteria);
        if (imageSetsMetadataSummaries != null) {
            System.out.println("The image sets searched with EQUAL operator on
DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response\n" +
                    "in ASC order on updatedAt field are:\n "
                    + imageSetsMetadataSummaries);
            System.out.println();
```

```
        }
```

- For API details, see SearchImageSets in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

The utility function for searching image sets.

```
import { paginateSearchImageSets } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The data store's ID.
 * @param { import('@aws-sdk/client-medical-imaging').SearchFilter[] } filters -
 The search criteria filters.
 * @param { import('@aws-sdk/client-medical-imaging').Sort } sort - The search
 criteria sort.
 */
export const searchImageSets = async (
  datastoreId = "xxxxxxxx",
  searchCriteria = {},
) => {
  const paginatorConfig = {
    client: medicalImagingClient,
    pageSize: 50,
  };

  const commandParams = {
    datastoreId: datastoreId,
    searchCriteria: searchCriteria,
  };

  const paginator = paginateSearchImageSets(paginatorConfig, commandParams);
```

```
  const imageSetsMetadataSummaries = [];
  for await (const page of paginator) {
    // Each page contains a list of `jobSummaries`. The list is truncated if is
 larger than `pageSize`.
    imageSetsMetadataSummaries.push(...page.imageSetsMetadataSummaries);
    console.log(page);
  }
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: 'f009ea9c-84ca-4749-b5b6-7164f00a5ada',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     imageSetsMetadataSummaries: [
  //         {
  //             DICOMTags: [Object],
  //             createdAt: "2023-09-19T16:59:40.551Z",
  //             imageSetId: '7f75e1b5c0f40eac2b24cf712f485f50',
  //             updatedAt: "2023-09-19T16:59:40.551Z",
  //             version: 1
  //         }]
  // }

  return imageSetsMetadataSummaries;
};
```

Use case #1: EQUAL operator.

```
  const datastoreId = "12345678901234567890123456789012";

  try {
    const searchCriteria = {
      filters: [
        {
          values: [{ DICOMPatientId: "1234567" }],
          operator: "EQUAL",
        },
      ],
    };
```

```
  await searchImageSets(datastoreId, searchCriteria);
} catch (err) {
  console.error(err);
}
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
const datastoreId = "12345678901234567890123456789012";

try {
  const searchCriteria = {
    filters: [
      {
        values: [
          {
            DICOMStudyDateAndTime: {
              DICOMStudyDate: "19900101",
              DICOMStudyTime: "000000",
            },
          },
          {
            DICOMStudyDateAndTime: {
              DICOMStudyDate: "20230901",
              DICOMStudyTime: "000000",
            },
          },
        ],
        operator: "BETWEEN",
      },
    ],
  };

  await searchImageSets(datastoreId, searchCriteria);
} catch (err) {
  console.error(err);
}
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
const datastoreId = "12345678901234567890123456789012";
```

```
try {
  const searchCriteria = {
    filters: [
      {
        values: [
          { createdAt: new Date("1985-04-12T23:20:50.52Z") },
          { createdAt: new Date() },
        ],
        operator: "BETWEEN",
      },
    ],
  };

  await searchImageSets(datastoreId, searchCriteria);
} catch (err) {
  console.error(err);
}
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
const datastoreId = "12345678901234567890123456789012";

try {
  const searchCriteria = {
    filters: [
      {
        values: [
          { updatedAt: new Date("1985-04-12T23:20:50.52Z") },
          { updatedAt: new Date() },
        ],
        operator: "BETWEEN",
      },
      {
        values: [
          {
            DICOMSeriesInstanceUID:
              "1.1.123.123456.1.12.1.1234567890.1234.12345678.123",
          },
        ],
        operator: "EQUAL",
```

```
        },
      ],
      sort: {
        sortOrder: "ASC",
        sortField: "updatedAt",
      },
    };

    await searchImageSets(datastoreId, searchCriteria);
  } catch (err) {
    console.error(err);
  }
```

- For API details, see SearchImageSets in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

The utility function for searching image sets.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def search_image_sets(self, datastore_id, search_filter):
        """
        Search for image sets.

        :param datastore_id: The ID of the data store.
        :param search_filter: The search filter.
            For example: {"filters" : [{ "operator": "EQUAL", "values":
 [{"DICOMPatientId": "3524578"}]}]}.
        :return: The list of image sets.
        """
```

```
        try:
            paginator =
self.health_imaging_client.get_paginator("search_image_sets")
            page_iterator = paginator.paginate(
                datastoreId=datastore_id, searchCriteria=search_filter
            )
            metadata_summaries = []
            for page in page_iterator:
                metadata_summaries.extend(page["imageSetsMetadataSummaries"])
        except ClientError as err:
            logger.error(
                "Couldn't search image sets. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return metadata_summaries
```

Use case #1: EQUAL operator.

```
        search_filter = {
            "filters": [
                {"operator": "EQUAL", "values": [{"DICOMPatientId": patient_id}]}
            ]
        }

        image_sets = self.search_image_sets(data_store_id, search_filter)
        print(f"Image sets found with EQUAL operator\n{image_sets}")
```

Use case #2: BETWEEN operator using DICOMStudyDate and DICOMStudyTime.

```
        search_filter = {
            "filters": [
                {
                    "operator": "BETWEEN",
                    "values": [
                        {
                            "DICOMStudyDateAndTime": {
                                "DICOMStudyDate": "19900101",
```

```
                                "DICOMStudyTime": "000000",
                            }
                        },
                        {
                            "DICOMStudyDateAndTime": {
                                "DICOMStudyDate": "20230101",
                                "DICOMStudyTime": "000000",
                            }
                        },
                    ],
                }
            ]
        }

        image_sets = self.search_image_sets(data_store_id, search_filter)
        print(
            f"Image sets found with BETWEEN operator using DICOMStudyDate and
DICOMStudyTime\n{image_sets}"
        )
```

Use case #3: BETWEEN operator using createdAt. Time studies were previously persisted.

```
        search_filter = {
            "filters": [
                {
                    "values": [
                        {
                            "createdAt": datetime.datetime(
                                2021, 8, 4, 14, 49, 54, 429000
                            )
                        },
                        {
                            "createdAt": datetime.datetime.now()
                            + datetime.timedelta(days=1)
                        },
                    ],
                    "operator": "BETWEEN",
                }
            ]
        }

        recent_image_sets = self.search_image_sets(data_store_id, search_filter)
```

```
        print(
            f"Image sets found with with BETWEEN operator using createdAt
\n{recent_image_sets}"
        )
```

Use case #4: EQUAL operator on DICOMSeriesInstanceUID and BETWEEN on updatedAt and sort response in ASC order on updatedAt field.

```
        search_filter = {
            "filters": [
                {
                    "values": [
                        {
                            "updatedAt": datetime.datetime(
                                2021, 8, 4, 14, 49, 54, 429000
                            )
                        },
                        {
                            "updatedAt": datetime.datetime.now()
                            + datetime.timedelta(days=1)
                        },
                    ],
                    "operator": "BETWEEN",
                },
                {
                    "values": [{"DICOMSeriesInstanceUID": series_instance_uid}],
                    "operator": "EQUAL",
                },
            ],
            "sort": {
                "sortOrder": "ASC",
                "sortField": "updatedAt",
            },
        }

        image_sets = self.search_image_sets(data_store_id, search_filter)
        print(
            "Image sets found with EQUAL operator on DICOMSeriesInstanceUID and
 BETWEEN on updatedAt and"
        )
        print(f"sort response in ASC order on updatedAt field\n{image_sets}")
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see SearchImageSets in *AWS SDK for Python (Boto3) API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_datastore_id = '1234567890123456789012345678901234567890'
    oo_result = lo_mig->searchimagesets(
      iv_datastoreid = iv_datastore_id
      io_searchcriteria = io_search_criteria ).
    DATA(lt_imagesets) = oo_result->get_imagesetsmetadatasums( ).
    DATA(lv_count) = lines( lt_imagesets ).
    MESSAGE |Found { lv_count } image sets.| TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Resource not found.' TYPE 'I'.
  CATCH /aws1/cx_migthrottlingex.
    MESSAGE 'Request throttled.' TYPE 'I'.
  CATCH /aws1/cx_migvalidationex.
    MESSAGE 'Validation error.' TYPE 'I'.
ENDTRY.
```

- For API details, see SearchImageSets in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `StartDICOMImportJob` with an AWS SDK or CLI

The following code examples show how to use `StartDICOMImportJob`.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code example:

- Get started with image sets and image frames

C++

SDK for C++

```
//! Routine which starts a HealthImaging import job.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param inputBucketName: The name of the Amazon S3 bucket containing the DICOM
 files.
  \param inputDirectory: The directory in the S3 bucket containing the DICOM
 files.
  \param outputBucketName: The name of the S3 bucket for the output.
  \param outputDirectory: The directory in the S3 bucket to store the output.
  \param roleArn: The ARN of the IAM role with permissions for the import.
  \param importJobId: A string to receive the import job ID.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
  */
bool AwsDoc::Medical_Imaging::startDICOMImportJob(
        const Aws::String &dataStoreID, const Aws::String &inputBucketName,
        const Aws::String &inputDirectory, const Aws::String &outputBucketName,
        const Aws::String &outputDirectory, const Aws::String &roleArn,
```

```
        Aws::String &importJobId,
        const Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient medicalImagingClient(clientConfig);
    Aws::String inputURI = "s3://" + inputBucketName + "/" + inputDirectory +
 "/";
    Aws::String outputURI = "s3://" + outputBucketName + "/" + outputDirectory +
 "/";
    Aws::MedicalImaging::Model::StartDICOMImportJobRequest
 startDICOMImportJobRequest;
    startDICOMImportJobRequest.SetDatastoreId(dataStoreID);
    startDICOMImportJobRequest.SetDataAccessRoleArn(roleArn);
    startDICOMImportJobRequest.SetInputS3Uri(inputURI);
    startDICOMImportJobRequest.SetOutputS3Uri(outputURI);

    Aws::MedicalImaging::Model::StartDICOMImportJobOutcome
 startDICOMImportJobOutcome = medicalImagingClient.StartDICOMImportJob(
            startDICOMImportJobRequest);

    if (startDICOMImportJobOutcome.IsSuccess()) {
        importJobId = startDICOMImportJobOutcome.GetResult().GetJobId();
    }
    else {
        std::cerr << "Failed to start DICOM import job because "
                  << startDICOMImportJobOutcome.GetError().GetMessage() <<
 std::endl;
    }

    return startDICOMImportJobOutcome.IsSuccess();
}
```

- For API details, see StartDICOMImportJob in *AWS SDK for C++ API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

CLI

AWS CLI

To start a dicom import job

The following `start-dicom-import-job` code example starts a dicom import job.

```
aws medical-imaging start-dicom-import-job \
    --job-name "my-job" \
    --datastore-id "12345678901234567890123456789012" \
    --input-s3-uri "s3://medical-imaging-dicom-input/dicom_input/" \
    --output-s3-uri "s3://medical-imaging-output/job_output/" \
    --data-access-role-arn "arn:aws:iam::123456789012:role/
ImportJobDataAccessRole"
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "jobId": "09876543210987654321098765432109",
    "jobStatus": "SUBMITTED",
    "submittedAt": "2022-08-12T11:28:11.152000+00:00"
}
```

- For API details, see StartDICOMImportJob in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static String startDicomImportJob(MedicalImagingClient
 medicalImagingClient,
            String jobName,
            String datastoreId,
            String dataAccessRoleArn,
            String inputS3Uri,
            String outputS3Uri) {

        try {
            StartDicomImportJobRequest startDicomImportJobRequest =
 StartDicomImportJobRequest.builder()
```

```
                    .jobName(jobName)
                    .datastoreId(datastoreId)
                    .dataAccessRoleArn(dataAccessRoleArn)
                    .inputS3Uri(inputS3Uri)
                    .outputS3Uri(outputS3Uri)
                    .build();
            StartDicomImportJobResponse response =
 medicalImagingClient.startDICOMImportJob(startDicomImportJobRequest);
            return response.jobId();
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return "";
    }
```

- For API details, see StartDICOMImportJob in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { StartDICOMImportJobCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} jobName - The name of the import job.
 * @param {string} datastoreId - The ID of the data store.
 * @param {string} dataAccessRoleArn - The Amazon Resource Name (ARN) of the role
 that grants permission.
 * @param {string} inputS3Uri - The URI of the S3 bucket containing the input
 files.
 * @param {string} outputS3Uri - The URI of the S3 bucket where the output files
 are stored.
```

```
 */
export const startDicomImportJob = async (
  jobName = "test-1",
  datastoreId = "12345678901234567890123456789012",
  dataAccessRoleArn = "arn:aws:iam::xxxxxxxxxxxx:role/ImportJobDataAccessRole",
  inputS3Uri = "s3://medical-imaging-dicom-input/dicom_input/",
  outputS3Uri = "s3://medical-imaging-output/job_output/",
) => {
  const response = await medicalImagingClient.send(
    new StartDICOMImportJobCommand({
      jobName: jobName,
      datastoreId: datastoreId,
      dataAccessRoleArn: dataAccessRoleArn,
      inputS3Uri: inputS3Uri,
      outputS3Uri: outputS3Uri,
    }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //     httpStatusCode: 200,
  //         requestId: '6e81d191-d46b-4e48-a08a-cdcc7e11eb79',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  // },
  //     datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //     jobId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
  //     jobStatus: 'SUBMITTED',
  //     submittedAt: 2023-09-22T14:48:45.767Z
  // }
  return response;
};
```

- For API details, see StartDICOMImportJob in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def start_dicom_import_job(
        self, job_name, datastore_id, role_arn, input_s3_uri, output_s3_uri
    ):
        """
        Start a DICOM import job.

        :param job_name: The name of the job.
        :param datastore_id: The ID of the data store.
        :param role_arn: The Amazon Resource Name (ARN) of the role to use for
 the job.
        :param input_s3_uri: The S3 bucket input prefix path containing the DICOM
 files.
        :param output_s3_uri: The S3 bucket output prefix path for the result.
        :return: The job ID.
        """
        try:
            job = self.health_imaging_client.start_dicom_import_job(
                jobName=job_name,
                datastoreId=datastore_id,
                dataAccessRoleArn=role_arn,
                inputS3Uri=input_s3_uri,
                outputS3Uri=output_s3_uri,
            )
        except ClientError as err:
            logger.error(
                "Couldn't start DICOM import job. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return job["jobId"]
```

The following code instantiates the MedicalImagingWrapper object.

```
client = boto3.client("medical-imaging")
medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see StartDICOMImportJob in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
TRY.
    " iv_job_name = 'import-job-1'
    " iv_datastore_id = '12345678901234567890123456789012'
    " iv_role_arn = 'arn:aws:iam::123456789012:role/ImportJobRole'
    " iv_input_s3_uri = 's3://my-bucket/input/'
    " iv_output_s3_uri = 's3://my-bucket/output/'
    oo_result = lo_mig->startdicomimportjob(
      iv_jobname = iv_job_name
      iv_datastoreid = iv_datastore_id
      iv_dataaccessrolearn = iv_role_arn
      iv_inputs3uri = iv_input_s3_uri
      iv_outputs3uri = iv_output_s3_uri ).
    DATA(lv_job_id) = oo_result->get_jobid( ).
    MESSAGE |DICOM import job started with ID: { lv_job_id }.| TYPE 'I'.
  CATCH /aws1/cx_migaccessdeniedex.
    MESSAGE 'Access denied.' TYPE 'I'.
  CATCH /aws1/cx_migconflictexception.
    MESSAGE 'Conflict error.' TYPE 'I'.
  CATCH /aws1/cx_miginternalserverex.
    MESSAGE 'Internal server error.' TYPE 'I'.
  CATCH /aws1/cx_migresourcenotfoundex.
    MESSAGE 'Resource not found.' TYPE 'I'.
  CATCH /aws1/cx_migservicequotaexcdex.
    MESSAGE 'Service quota exceeded.' TYPE 'I'.
```

```
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see StartDICOMImportJob in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `TagResource` with an AWS SDK or CLI

The following code examples show how to use `TagResource`.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code examples:

- Tagging a data store
- Tagging an image set

CLI

AWS CLI

Example 1: To tag a data store

The following `tag-resource` code examples tags a data store.

```
aws medical-imaging tag-resource \
  --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012" \
```

```
--tags '{"Deployment":"Development"}'
```

This command produces no output.

Example 2: To tag an image set

The following `tag-resource` code examples tags an image set.

```
aws medical-imaging tag-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/18f88ac7870584f58d56256646b4d92b" \
    --tags '{"Deployment":"Development"}'
```

This command produces no output.

- For API details, see TagResource in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void tagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Map<String, String> tags) {
        try {
            TagResourceRequest tagResourceRequest = TagResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .tags(tags)
                    .build();

            medicalImagingClient.tagResource(tagResourceRequest);

            System.out.println("Tags have been added to the resource.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see [TagResource](#) in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

JavaScript

SDK for JavaScript (v3)

```
import { TagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 * @param {Record<string,string>} tags - The tags to add to the resource as JSON.
 *                     - For example: {"Deployment" : "Development"}
 */
export const tagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tags = {},
) => {
  const response = await medicalImagingClient.send(
    new TagResourceCommand({ resourceArn: resourceArn, tags: tags }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //    }
  // }

  return response;
};
```

- For API details, see TagResource in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def tag_resource(self, resource_arn, tags):
        """
        Tag a resource.

        :param resource_arn: The ARN of the resource.
        :param tags: The tags to apply.
        """
        try:
            self.health_imaging_client.tag_resource(resourceArn=resource_arn,
 tags=tags)
        except ClientError as err:
            logger.error(
                "Couldn't tag resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
```

```
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see [TagResource](#) in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_resource_arn = 'arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012'
        lo_mig->tagresource(
          iv_resourcearn = iv_resource_arn
          it_tags = it_tags ).
        MESSAGE 'Resource tagged successfully.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see [TagResource](#) in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `UntagResource` with an AWS SDK or CLI

The following code examples show how to use `UntagResource`.

Action examples are code excerpts from larger programs and must be run in context. You can see this action in context in the following code examples:

- Tagging a data store
- Tagging an image set

CLI

AWS CLI

Example 1: To untag a data store

The following `untag-resource` code example untags a data store.

```
aws medical-imaging untag-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012" \
    --tag-keys '["Deployment"]'
```

This command produces no output.

Example 2: To untag an image set

The following `untag-resource` code example untags an image set.

```
aws medical-imaging untag-resource \
    --resource-arn "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/18f88ac7870584f58d56256646b4d92b" \
    --tag-keys '["Deployment"]'
```

This command produces no output.

- For API details, see UntagResource in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    public static void untagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Collection<String> tagKeys) {
        try {
            UntagResourceRequest untagResourceRequest =
 UntagResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .tagKeys(tagKeys)
                    .build();

            medicalImagingClient.untagResource(untagResourceRequest);

            System.out.println("Tags have been removed from the resource.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see UntagResource in *AWS SDK for Java 2.x API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

```
import { UntagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";
```

```
/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 * @param {string[]} tagKeys - The keys of the tags to remove.
 */
export const untagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tagKeys = [],
) => {
  const response = await medicalImagingClient.send(
    new UntagResourceCommand({ resourceArn: resourceArn, tagKeys: tagKeys }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //    }
  // }

  return response;
};
```

- For API details, see UntagResource in *AWS SDK for JavaScript API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def untag_resource(self, resource_arn, tag_keys):
        """
        Untag a resource.

        :param resource_arn: The ARN of the resource.
        :param tag_keys: The tag keys to remove.
        """
        try:
            self.health_imaging_client.untag_resource(
                resourceArn=resource_arn, tagKeys=tag_keys
            )
        except ClientError as err:
            logger.error(
                "Couldn't untag resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see UntagResource in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_resource_arn = 'arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012'
        lo_mig->untagresource(
          iv_resourcearn = iv_resource_arn
          it_tagkeys = it_tag_keys ).
        MESSAGE 'Resource untagged successfully.' TYPE 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Resource not found.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see UntagResource in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Use `UpdateImageSetMetadata` with an AWS SDK or CLI

The following code examples show how to use `UpdateImageSetMetadata`.

CLI

AWS CLI

Example 1: To insert or update an attribute in image set metadata

The following `update-image-set-metadata` example inserts or updates an attribute in image set metadata.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\":1.1,\"Patient\":{\"DICOM\":
{\"PatientName\":\"MX^MX\"}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 2: To remove an attribute from image set metadata

The following `update-image-set-metadata` example removes an attribute from image set metadata.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "removableAttributes": "{\"SchemaVersion\":1.1,\"Study\":{\"DICOM\":
{\"StudyDescription\":\"CHEST\"}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 3: To remove an instance from image set metadata

The following `update-image-set-metadata` example removes an instance from image set metadata.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id ea92b0d8838c72a3f25d00d13616f87e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates file://metadata-updates.json \
    --force
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "removableAttributes": "{\"SchemaVersion\": 1.1,\"Study\": {\"Series
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"Instances\":
 {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "ea92b0d8838c72a3f25d00d13616f87e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 4: To revert an image set to a previous version

The following `update-image-set-metadata` example shows how to revert an image set to a prior version. CopyImageSet and UpdateImageSetMetadata actions create new versions of image sets.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
    --latest-version-id 3 \
    --cli-binary-format raw-in-base64-out \
    --update-image-set-metadata-updates '{"revertToVersionId": "1"}'
```

Output:

```
{
    "datastoreId": "12345678901234567890123456789012",
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "latestVersionId": "4",
    "imageSetState": "LOCKED",
```

```
    "imageSetWorkflowStatus": "UPDATING",
    "createdAt": 1680027126.436,
    "updatedAt": 1680042257.908
}
```

Example 5: To add a private DICOM data element to an instance

The following `update-image-set-metadata` example shows how to add a private element to a specified instance within an image set. The DICOM standard permits private data elements for communication of information that cannot be contained in standard data elements. You can create, update, and delete private data elements with the UpdateImageSetMetadata action.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --force \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\": 1.1,\"Study\": {\"Series
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"Instances
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"DICOM\":
 {\"001910F9\": \"97\"},\"DICOMVRs\": {\"001910F9\": \"DS\"}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
```

```
}
```

Example 6: To update a private DICOM data element to an instance

The following `update-image-set-metadata` example shows how to update the value of a private data element belonging to an instance within an image set.

```
aws medical-imaging update-image-set-metadata \
    --datastore-id 12345678901234567890123456789012 \
    --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
    --latest-version-id 1 \
    --cli-binary-format raw-in-base64-out \
    --force \
    --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\": 1.1,\"Study\": {\"Series
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"Instances
\": {\"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1\": {\"DICOM\":
 {\"00091001\": \"GE_GENESIS_DD\"}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

Example 7: To update a SOPInstanceUID with the force parameter

The following `update-image-set-metadata` example shows how to update a SOPInstanceUID, using the force parameter to override the DICOM metadata constraints.

```
aws medical-imaging update-image-set-metadata \
        --datastore-id 12345678901234567890123456789012 \
        --image-set-id 53d5fdb05ca4d46ac7ca64b06545c66e \
        --latest-version-id 1 \
        --cli-binary-format raw-in-base64-out \
        --force \
        --update-image-set-metadata-updates file://metadata-updates.json
```

Contents of `metadata-updates.json`

```
{
    "DICOMUpdates": {
        "updatableAttributes": "{\"SchemaVersion\":1.1,\"Study\":{\"Series
\":{\"1.3.6.1.4.1.5962.99.1.3633258862.2104868982.1369432891697.3656.0\":
{\"Instances\":
{\"1.3.6.1.4.1.5962.99.1.3633258862.2104868982.1369432891697.3659.0\":{\"DICOM\":
{\"SOPInstanceUID\":
\"1.3.6.1.4.1.5962.99.1.3633258862.2104868982.1369432891697.3659.9\"}}}}}}}"
    }
}
```

Output:

```
{
    "latestVersionId": "2",
    "imageSetWorkflowStatus": "UPDATING",
    "updatedAt": 1680042257.908,
    "imageSetId": "53d5fdb05ca4d46ac7ca64b06545c66e",
    "imageSetState": "LOCKED",
    "createdAt": 1680027126.436,
    "datastoreId": "12345678901234567890123456789012"
}
```

- For API details, see UpdateImageSetMetadata in *AWS CLI Command Reference*.

Java

SDK for Java 2.x

```
    /**
```

```
     * Update the metadata of an AWS HealthImaging image set.
     *
     * @param medicalImagingClient - The AWS HealthImaging client object.
     * @param datastoreId          - The datastore ID.
     * @param imageSetId           - The image set ID.
     * @param versionId            - The version ID.
     * @param metadataUpdates      - A MetadataUpdates object containing the
 updates.
     * @param force                - The force flag.
     * @throws MedicalImagingException - Base exception for all service
 exceptions thrown by AWS HealthImaging.
     */
    public static void updateMedicalImageSetMetadata(MedicalImagingClient
 medicalImagingClient,
                                                     String datastoreId,
                                                     String imageSetId,
                                                     String versionId,
                                                     MetadataUpdates
 metadataUpdates,
                                                     boolean force) {
        try {
            UpdateImageSetMetadataRequest updateImageSetMetadataRequest =
 UpdateImageSetMetadataRequest
                    .builder()
                    .datastoreId(datastoreId)
                    .imageSetId(imageSetId)
                    .latestVersionId(versionId)
                    .updateImageSetMetadataUpdates(metadataUpdates)
                    .force(force)
                    .build();

            UpdateImageSetMetadataResponse response =
 medicalImagingClient.updateImageSetMetadata(updateImageSetMetadataRequest);

            System.out.println("The image set metadata was updated" + response);
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            throw e;
        }
    }
```

Use case #1: Insert or update an attribute.

```
                final String insertAttributes = """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "DICOM": {
                              "StudyDescription": "CT CHEST"
                            }
                          }
                        }
                        """;
                MetadataUpdates metadataInsertUpdates = MetadataUpdates.builder()
                        .dicomUpdates(DICOMUpdates.builder()
                                .updatableAttributes(SdkBytes.fromByteBuffer(
                                        ByteBuffer.wrap(insertAttributes

.getBytes(StandardCharsets.UTF_8))))
                                .build())
                        .build();

                updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
imagesetId,
                        versionid, metadataInsertUpdates, force);
```

Use case #2: Remove an attribute.

```
                final String removeAttributes = """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "DICOM": {
                              "StudyDescription": "CT CHEST"
                            }
                          }
                        }
                        """;
                MetadataUpdates metadataRemoveUpdates = MetadataUpdates.builder()
                        .dicomUpdates(DICOMUpdates.builder()
                                .removableAttributes(SdkBytes.fromByteBuffer(
                                        ByteBuffer.wrap(removeAttributes

.getBytes(StandardCharsets.UTF_8))))
                                .build())
```

```
                        .build();

                updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
imagesetId,
                        versionid, metadataRemoveUpdates, force);
```

Use case #3: Remove an instance.

```
                final String removeInstance = """
                        {
                          "SchemaVersion": 1.1,
                          "Study": {
                            "Series": {

"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {
                                "Instances": {

"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {}
                                }
                              }
                            }
                          }
                        }
                        """;
                MetadataUpdates metadataRemoveUpdates = MetadataUpdates.builder()
                        .dicomUpdates(DICOMUpdates.builder()
                                .removableAttributes(SdkBytes.fromByteBuffer(
                                        ByteBuffer.wrap(removeInstance

.getBytes(StandardCharsets.UTF_8))))
                                .build())
                        .build();

                updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
imagesetId,
                        versionid, metadataRemoveUpdates, force);
```

Use case #4: Revert to a previous version.

```
                // In this case, revert to previous version.
```

```
                String revertVersionId =
 Integer.toString(Integer.parseInt(versionid) - 1);
                MetadataUpdates metadataRemoveUpdates = MetadataUpdates.builder()
                        .revertToVersionId(revertVersionId)
                        .build();
                updateMedicalImageSetMetadata(medicalImagingClient, datastoreId,
 imagesetId,
                        versionid, metadataRemoveUpdates, force);
```

- For API details, see [UpdateImageSetMetadata]() in *AWS SDK for Java 2.x API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository]().

JavaScript

SDK for JavaScript (v3)

```
import { UpdateImageSetMetadataCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} datastoreId - The ID of the HealthImaging data store.
 * @param {string} imageSetId - The ID of the HealthImaging image set.
 * @param {string} latestVersionId - The ID of the HealthImaging image set
 version.
 * @param {{}} updateMetadata - The metadata to update.
 * @param {boolean} force - Force the update.
 */
export const updateImageSetMetadata = async (
  datastoreId = "xxxxxxxxxx",
  imageSetId = "xxxxxxxxxx",
  latestVersionId = "1",
  updateMetadata = "{}",
  force = false,
) => {
  try {
    const response = await medicalImagingClient.send(
```

```
      new UpdateImageSetMetadataCommand({
        datastoreId: datastoreId,
        imageSetId: imageSetId,
        latestVersionId: latestVersionId,
        updateImageSetMetadataUpdates: updateMetadata,
        force: force,
      }),
    );
    console.log(response);
    // {
    //     '$metadata': {
    //     httpStatusCode: 200,
    //         requestId: '7966e869-e311-4bff-92ec-56a61d3003ea',
    //         extendedRequestId: undefined,
    //         cfId: undefined,
    //         attempts: 1,
    //         totalRetryDelay: 0
    // },
    //     createdAt: 2023-09-22T14:49:26.427Z,
    //     datastoreId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
    //     imageSetId: 'xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx',
    //     imageSetState: 'LOCKED',
    //     imageSetWorkflowStatus: 'UPDATING',
    //     latestVersionId: '4',
    //     updatedAt: 2023-09-27T19:41:43.494Z
    // }
    return response;
  } catch (err) {
    console.error(err);
  }
};
```

Use case #1: Insert or update an attribute and force the update.

```
    const insertAttributes = JSON.stringify({
      SchemaVersion: 1.1,
      Study: {
        DICOM: {
          StudyDescription: "CT CHEST",
        },
      },
    });
```

```
const updateMetadata = {
  DICOMUpdates: {
    updatableAttributes: new TextEncoder().encode(insertAttributes),
  },
};

await updateImageSetMetadata(
  datastoreID,
  imageSetID,
  versionID,
  updateMetadata,
  true,
);
```

Use case #2: Remove an attribute.

```
// Attribute key and value must match the existing attribute.
const remove_attribute = JSON.stringify({
  SchemaVersion: 1.1,
  Study: {
    DICOM: {
      StudyDescription: "CT CHEST",
    },
  },
});

const updateMetadata = {
  DICOMUpdates: {
    removableAttributes: new TextEncoder().encode(remove_attribute),
  },
};

await updateImageSetMetadata(
  datastoreID,
  imageSetID,
  versionID,
  updateMetadata,
);
```

Use case #3: Remove an instance.

```
    const remove_instance = JSON.stringify({
      SchemaVersion: 1.1,
      Study: {
        Series: {
          "1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {
            Instances: {
              "1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {},
            },
          },
        },
      },
    });

    const updateMetadata = {
      DICOMUpdates: {
        removableAttributes: new TextEncoder().encode(remove_instance),
      },
    };

    await updateImageSetMetadata(
      datastoreID,
      imageSetID,
      versionID,
      updateMetadata,
    );
```

Use case #4: Revert to an earlier version.

```
    const updateMetadata = {
      revertToVersionId: "1",
    };

    await updateImageSetMetadata(
      datastoreID,
      imageSetID,
      versionID,
      updateMetadata,
    );
```

- For API details, see UpdateImageSetMetadata in *AWS SDK for JavaScript API Reference*.

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

Python

SDK for Python (Boto3)

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def update_image_set_metadata(
        self, datastore_id, image_set_id, version_id, metadata, force=False
    ):
        """
        Update the metadata of an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The ID of the image set version.
        :param metadata: The image set metadata as a dictionary.
            For example {"DICOMUpdates": {"updatableAttributes":
            "{\"SchemaVersion\":1.1,\"Patient\":{\"DICOM\":{\"PatientName\":
\"Garcia^Gloria\"}}}"}}
        :param: force: Force the update.
        :return: The updated image set metadata.
        """
        try:
            updated_metadata =
 self.health_imaging_client.update_image_set_metadata(
                imageSetId=image_set_id,
                datastoreId=datastore_id,
                latestVersionId=version_id,
                updateImageSetMetadataUpdates=metadata,
                force=force,
            )
        except ClientError as err:
            logger.error(
```

```
                "Couldn't update image set metadata. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return updated_metadata
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

Use case #1: Insert or update an attribute.

```
            attributes = """{
                    "SchemaVersion": 1.1,
                    "Study": {
                        "DICOM": {
                            "StudyDescription": "CT CHEST"
                        }
                    }
                }"""
            metadata = {"DICOMUpdates": {"updatableAttributes": attributes}}

            self.update_image_set_metadata(
                data_store_id, image_set_id, version_id, metadata, force
            )
```

Use case #2: Remove an attribute.

```
            # Attribute key and value must match the existing attribute.
            attributes = """{
                    "SchemaVersion": 1.1,
                    "Study": {
                        "DICOM": {
                            "StudyDescription": "CT CHEST"
                        }
```

```
                }
            }"""
        metadata = {"DICOMUpdates": {"removableAttributes": attributes}}

        self.update_image_set_metadata(
            data_store_id, image_set_id, version_id, metadata, force
        )
```

Use case #3: Remove an instance.

```
        attributes = """{
                "SchemaVersion": 1.1,
                "Study": {
                    "Series": {

"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {
                            "Instances": {

"1.1.1.1.1.1.12345.123456789012.123.12345678901234.1": {}
                            }
                        }
                    }
                }
            }"""
        metadata = {"DICOMUpdates": {"removableAttributes": attributes}}

        self.update_image_set_metadata(
            data_store_id, image_set_id, version_id, metadata, force
        )
```

Use case #4: Revert to an earlier version.

```
        metadata = {"revertToVersionId": "1"}

        self.update_image_set_metadata(
            data_store_id, image_set_id, version_id, metadata, force
        )
```

- For API details, see UpdateImageSetMetadata in *AWS SDK for Python (Boto3) API Reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

SAP ABAP

SDK for SAP ABAP

```
    TRY.
        " iv_datastore_id = '1234567890123456789012345678901234567890'
        " iv_image_set_id = '1234567890123456789012345678901234567890'
        " iv_latest_version_id = '1'
        " iv_force = abap_false
        oo_result = lo_mig->updateimagesetmetadata(
          iv_datastoreid = iv_datastore_id
          iv_imagesetid = iv_image_set_id
          iv_latestversionid = iv_latest_version_id
          io_updateimagesetmetupdates = io_metadata_updates
          iv_force = iv_force ).
        DATA(lv_new_version) = oo_result->get_latestversionid( ).
        MESSAGE |Image set metadata updated to version: { lv_new_version }.| TYPE
 'I'.
      CATCH /aws1/cx_migaccessdeniedex.
        MESSAGE 'Access denied.' TYPE 'I'.
      CATCH /aws1/cx_migconflictexception.
        MESSAGE 'Conflict error.' TYPE 'I'.
      CATCH /aws1/cx_miginternalserverex.
        MESSAGE 'Internal server error.' TYPE 'I'.
      CATCH /aws1/cx_migresourcenotfoundex.
        MESSAGE 'Image set not found.' TYPE 'I'.
      CATCH /aws1/cx_migservicequotaexcdex.
        MESSAGE 'Service quota exceeded.' TYPE 'I'.
      CATCH /aws1/cx_migthrottlingex.
        MESSAGE 'Request throttled.' TYPE 'I'.
      CATCH /aws1/cx_migvalidationex.
        MESSAGE 'Validation error.' TYPE 'I'.
    ENDTRY.
```

- For API details, see UpdateImageSetMetadata in *AWS SDK for SAP ABAP API reference*.

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Scenarios for HealthImaging using AWS SDKs

The following code examples show you how to implement common scenarios in HealthImaging with AWS SDKs. These scenarios show you how to accomplish specific tasks by calling multiple functions within HealthImaging or combined with other AWS services. Each scenario includes a link to the complete source code, where you can find instructions on how to set up and run the code.

Scenarios target an intermediate level of experience to help you understand service actions in context.

Examples

Get started with HealthImaging image sets and image frames using an AWS SDK

The following code examples show how to import DICOM files and download image frames in HealthImaging.

The implementation is structured as a command-line application.

- Set up resources for a DICOM import.

- Import DICOM files into a data store.
- Retrieve the image set IDs for the import job.
- Retrieve the image frame IDs for the image sets.
- Download, decode and verify the image frames.
- Clean up resources.

C++

SDK for C++

Create an CloudFormation stack with the necessary resources.

```
    Aws::String inputBucketName;
    Aws::String outputBucketName;
    Aws::String dataStoreId;
    Aws::String roleArn;
    Aws::String stackName;

    if (askYesNoQuestion(
            "Would you like to let this workflow create the resources for you?
(y/n) ")) {
        stackName = askQuestion(
                "Enter a name for the AWS CloudFormation stack to create. ");
        Aws::String dataStoreName = askQuestion(
                "Enter a name for the HealthImaging datastore to create. ");

        Aws::Map<Aws::String, Aws::String> outputs = createCloudFormationStack(
                stackName,
                dataStoreName,
                clientConfiguration);

        if (!retrieveOutputs(outputs, dataStoreId, inputBucketName,
outputBucketName,
                             roleArn)) {
            return false;
        }

        std::cout << "The following resources have been created." << std::endl;
        std::cout << "A HealthImaging datastore with ID: " << dataStoreId << "."
                  << std::endl;
```

```
        std::cout << "An Amazon S3 input bucket named: " << inputBucketName <<
"."
                  << std::endl;
        std::cout << "An Amazon S3 output bucket named: " << outputBucketName <<
"."
                  << std::endl;
        std::cout << "An IAM role with the ARN: " << roleArn << "." << std::endl;
        askQuestion("Enter return to continue.", alwaysTrueTest);
    }
    else {
        std::cout << "You have chosen to use preexisting resources:" <<
std::endl;
        dataStoreId = askQuestion(
                "Enter the data store ID of the HealthImaging datastore you wish
to use: ");
        inputBucketName = askQuestion(
                "Enter the name of the S3 input bucket you wish to use: ");
        outputBucketName = askQuestion(
                "Enter the name of the S3 output bucket you wish to use: ");
        roleArn = askQuestion(
                "Enter the ARN for the IAM role with the proper permissions to
import a DICOM series: ");
    }
```

Copy DICOM files to the Amazon S3 import bucket.

```
    std::cout
            << "This workflow uses DICOM files from the National Cancer Institute
Imaging Data\n"
            << "Commons (IDC) Collections." << std::endl;
    std::cout << "Here is the link to their website." << std::endl;
    std::cout << "https://registry.opendata.aws/nci-imaging-data-commons/" <<
std::endl;
    std::cout << "We will use DICOM files stored in an S3 bucket managed by the
IDC."
              << std::endl;
    std::cout
            << "First one of the DICOM folders in the IDC collection must be
copied to your\n"
               "input S3 bucket."
            << std::endl;
    std::cout << "You have the choice of one of the following "
```

```
            << IDC_ImageChoices.size() << " folders to copy." << std::endl;

    int index = 1;
    for (auto &idcChoice: IDC_ImageChoices) {
        std::cout << index << " - " << idcChoice.mDescription << std::endl;
        index++;
    }
    int choice = askQuestionForIntRange("Choose DICOM files to import: ", 1, 4);

    Aws::String fromDirectory = IDC_ImageChoices[choice - 1].mDirectory;
    Aws::String inputDirectory = "input";

    std::cout << "The files in the directory '" << fromDirectory << "' in the
 bucket '"
            << IDC_S3_BucketName << "' will be copied " << std::endl;
    std::cout << "to the folder '" << inputDirectory << "/" << fromDirectory
            << "' in the bucket '" << inputBucketName << "'." << std::endl;
    askQuestion("Enter return to start the copy.", alwaysTrueTest);

    if (!AwsDoc::Medical_Imaging::copySeriesBetweenBuckets(
            IDC_S3_BucketName,
            fromDirectory,
            inputBucketName,
            inputDirectory, clientConfiguration)) {
        std::cerr << "This workflow will exit because of an error." << std::endl;
        cleanup(stackName, dataStoreId, clientConfiguration);
        return false;
    }
```

Import the DICOM files to the Amazon S3 data store.

```
bool AwsDoc::Medical_Imaging::startDicomImport(const Aws::String &dataStoreID,
                                               const Aws::String
 &inputBucketName,
                                               const Aws::String &inputDirectory,
                                               const Aws::String
 &outputBucketName,
                                               const Aws::String
 &outputDirectory,
                                               const Aws::String &roleArn,
                                               Aws::String &importJobId,
```

```
                                                    const
 Aws::Client::ClientConfiguration &clientConfiguration) {
    bool result = false;
    if (startDICOMImportJob(dataStoreID, inputBucketName, inputDirectory,
                            outputBucketName, outputDirectory, roleArn,
 importJobId,
                            clientConfiguration)) {
        std::cout << "DICOM import job started with job ID " << importJobId <<
 "."
                  << std::endl;
        result = waitImportJobCompleted(dataStoreID, importJobId,
 clientConfiguration);
        if (result) {
            std::cout << "DICOM import job completed." << std::endl;

        }
    }

    return result;
}

//! Routine which starts a HealthImaging import job.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param inputBucketName: The name of the Amazon S3 bucket containing the DICOM
 files.
  \param inputDirectory: The directory in the S3 bucket containing the DICOM
 files.
  \param outputBucketName: The name of the S3 bucket for the output.
  \param outputDirectory: The directory in the S3 bucket to store the output.
  \param roleArn: The ARN of the IAM role with permissions for the import.
  \param importJobId: A string to receive the import job ID.
  \param clientConfig: Aws client configuration.
  \return bool: Function succeeded.
  */
bool AwsDoc::Medical_Imaging::startDICOMImportJob(
        const Aws::String &dataStoreID, const Aws::String &inputBucketName,
        const Aws::String &inputDirectory, const Aws::String &outputBucketName,
        const Aws::String &outputDirectory, const Aws::String &roleArn,
        Aws::String &importJobId,
        const Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient medicalImagingClient(clientConfig);
    Aws::String inputURI = "s3://" + inputBucketName + "/" + inputDirectory +
 "/";
```

```
    Aws::String outputURI = "s3://" + outputBucketName + "/" + outputDirectory +
 "/";
    Aws::MedicalImaging::Model::StartDICOMImportJobRequest
 startDICOMImportJobRequest;
    startDICOMImportJobRequest.SetDatastoreId(dataStoreID);
    startDICOMImportJobRequest.SetDataAccessRoleArn(roleArn);
    startDICOMImportJobRequest.SetInputS3Uri(inputURI);
    startDICOMImportJobRequest.SetOutputS3Uri(outputURI);

    Aws::MedicalImaging::Model::StartDICOMImportJobOutcome
 startDICOMImportJobOutcome = medicalImagingClient.StartDICOMImportJob(
            startDICOMImportJobRequest);

    if (startDICOMImportJobOutcome.IsSuccess()) {
        importJobId = startDICOMImportJobOutcome.GetResult().GetJobId();
    }
    else {
        std::cerr << "Failed to start DICOM import job because "
                  << startDICOMImportJobOutcome.GetError().GetMessage() <<
 std::endl;
    }

    return startDICOMImportJobOutcome.IsSuccess();
}


//! Routine which waits for a DICOM import job to complete.
/*!
 * @param dataStoreID: The HealthImaging data store ID.
 * @param importJobId: The import job ID.
 * @param clientConfiguration : Aws client configuration.
 * @return  bool: Function succeeded.
 */
bool AwsDoc::Medical_Imaging::waitImportJobCompleted(const Aws::String
 &datastoreID,
                                                     const Aws::String
 &importJobId,
                                                     const
 Aws::Client::ClientConfiguration &clientConfiguration) {

    Aws::MedicalImaging::Model::JobStatus jobStatus =
 Aws::MedicalImaging::Model::JobStatus::IN_PROGRESS;
    while (jobStatus == Aws::MedicalImaging::Model::JobStatus::IN_PROGRESS) {
        std::this_thread::sleep_for(std::chrono::seconds(1));
```

```
        Aws::MedicalImaging::Model::GetDICOMImportJobOutcome
 getDicomImportJobOutcome = getDICOMImportJob(
                datastoreID, importJobId,
                clientConfiguration);

        if (getDicomImportJobOutcome.IsSuccess()) {
            jobStatus =
 getDicomImportJobOutcome.GetResult().GetJobProperties().GetJobStatus();

            std::cout << "DICOM import job status: " <<

 Aws::MedicalImaging::Model::JobStatusMapper::GetNameForJobStatus(
                             jobStatus) << std::endl;
        }
        else {
            std::cerr << "Failed to get import job status because "
                      << getDicomImportJobOutcome.GetError().GetMessage() <<
 std::endl;
            return false;
        }
    }

    return jobStatus == Aws::MedicalImaging::Model::JobStatus::COMPLETED;
}

//! Routine which gets a HealthImaging DICOM import job's properties.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param importJobID: The DICOM import job ID
  \param clientConfig: Aws client configuration.
  \return GetDICOMImportJobOutcome: The import job outcome.
*/
Aws::MedicalImaging::Model::GetDICOMImportJobOutcome
AwsDoc::Medical_Imaging::getDICOMImportJob(const Aws::String &dataStoreID,
                                           const Aws::String &importJobID,
                                           const Aws::Client::ClientConfiguration
 &clientConfig) {
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::GetDICOMImportJobRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetJobId(importJobID);
    Aws::MedicalImaging::Model::GetDICOMImportJobOutcome outcome =
 client.GetDICOMImportJob(
```

```
            request);
    if (!outcome.IsSuccess()) {
        std::cerr << "GetDICOMImportJob error: "
                  << outcome.GetError().GetMessage() << std::endl;
    }

    return outcome;
}
```

Get image sets created by the DICOM import job.

```
bool
AwsDoc::Medical_Imaging::getImageSetsForDicomImportJob(const Aws::String
 &datastoreID,
                                                        const Aws::String
 &importJobId,
                                                        Aws::Vector<Aws::String>
 &imageSets,
                                                        const
 Aws::Client::ClientConfiguration &clientConfiguration) {
    Aws::MedicalImaging::Model::GetDICOMImportJobOutcome getDicomImportJobOutcome
 = getDICOMImportJob(
            datastoreID, importJobId, clientConfiguration);
    bool result = false;
    if (getDicomImportJobOutcome.IsSuccess()) {
        auto outputURI =
 getDicomImportJobOutcome.GetResult().GetJobProperties().GetOutputS3Uri();
        Aws::Http::URI uri(outputURI);
        const Aws::String &bucket = uri.GetAuthority();
        Aws::String key = uri.GetPath();

        Aws::S3::S3Client s3Client(clientConfiguration);
        Aws::S3::Model::GetObjectRequest objectRequest;
        objectRequest.SetBucket(bucket);
        objectRequest.SetKey(key + "/" + IMPORT_JOB_MANIFEST_FILE_NAME);

        auto getObjectOutcome = s3Client.GetObject(objectRequest);
        if (getObjectOutcome.IsSuccess()) {
            auto &data = getObjectOutcome.GetResult().GetBody();

            std::stringstream stringStream;
            stringStream << data.rdbuf();
```

```
            try {
                // Use JMESPath to extract the image set IDs.
                // https://jmespath.org/specification.html
                std::string jmesPathExpression =
 "jobSummary.imageSetsSummary[].imageSetId";
                jsoncons::json doc = jsoncons::json::parse(stringStream.str());

                jsoncons::json imageSetsJson = jsoncons::jmespath::search(doc,

 jmesPathExpression);\
                for (auto &imageSet: imageSetsJson.array_range()) {
                    imageSets.push_back(imageSet.as_string());
                }

                result = true;
            }
            catch (const std::exception &e) {
                std::cerr << e.what() << '\n';
            }

        }
        else {
            std::cerr << "Failed to get object because "
                      << getObjectOutcome.GetError().GetMessage() << std::endl;
        }

    }
    else {
        std::cerr << "Failed to get import job status because "
                  << getDicomImportJobOutcome.GetError().GetMessage() <<
 std::endl;
    }

    return result;
}
```

Get image frame information for image sets.

```
bool AwsDoc::Medical_Imaging::getImageFramesForImageSet(const Aws::String
 &dataStoreID,
```

```
                                                          const Aws::String
&imageSetID,
                                                          const Aws::String
&outDirectory,

Aws::Vector<ImageFrameInfo> &imageFrames,
                                                          const
Aws::Client::ClientConfiguration &clientConfiguration) {
   Aws::String fileName = outDirectory + "/" + imageSetID +
"_metadata.json.gzip";
   bool result = false;
   if (getImageSetMetadata(dataStoreID, imageSetID, "", // Empty string for
version ID.
                           fileName, clientConfiguration)) {
       try {
           std::string metadataGZip;
           {
               std::ifstream inFileStream(fileName.c_str(), std::ios::binary);
               if (!inFileStream) {
                   throw std::runtime_error("Failed to open file " + fileName);
               }

               std::stringstream stringStream;
               stringStream << inFileStream.rdbuf();
               metadataGZip = stringStream.str();
           }
           std::string metadataJson = gzip::decompress(metadataGZip.data(),
                                                        metadataGZip.size());
           // Use JMESPath to extract the image set IDs.
           // https://jmespath.org/specification.html
           jsoncons::json doc = jsoncons::json::parse(metadataJson);
           std::string jmesPathExpression = "Study.Series.*.Instances[].*[]";
           jsoncons::json instances = jsoncons::jmespath::search(doc,

jmesPathExpression);
           for (auto &instance: instances.array_range()) {
               jmesPathExpression = "DICOM.RescaleSlope";
               std::string rescaleSlope = jsoncons::jmespath::search(instance,

jmesPathExpression).to_string();
               jmesPathExpression = "DICOM.RescaleIntercept";
               std::string rescaleIntercept =
jsoncons::jmespath::search(instance,
```

```
 jmesPathExpression).to_string();

                jmesPathExpression = "ImageFrames[][]";
                jsoncons::json imageFramesJson =
 jsoncons::jmespath::search(instance,

 jmesPathExpression);

                for (auto &imageFrame: imageFramesJson.array_range()) {
                    ImageFrameInfo imageFrameIDs;
                    imageFrameIDs.mImageSetId = imageSetID;
                    imageFrameIDs.mImageFrameId = imageFrame.find(
                            "ID")->value().as_string();
                    imageFrameIDs.mRescaleIntercept = rescaleIntercept;
                    imageFrameIDs.mRescaleSlope = rescaleSlope;
                    imageFrameIDs.MinPixelValue = imageFrame.find(
                            "MinPixelValue")->value().as_string();
                    imageFrameIDs.MaxPixelValue = imageFrame.find(
                            "MaxPixelValue")->value().as_string();

                    jmesPathExpression =
 "max_by(PixelDataChecksumFromBaseToFullResolution, &Width).Checksum";
                    jsoncons::json checksumJson =
 jsoncons::jmespath::search(imageFrame,

 jmesPathExpression);
                    imageFrameIDs.mFullResolutionChecksum =
 checksumJson.as_integer<uint32_t>();

                    imageFrames.emplace_back(imageFrameIDs);
                }
            }

            result = true;
        }
        catch (const std::exception &e) {
            std::cerr << "getImageFramesForImageSet failed because " << e.what()
                      << std::endl;
        }
    }

    return result;
}
```

```
//! Routine which gets a HealthImaging image set's metadata.
/*!
  \param dataStoreID: The HealthImaging data store ID.
  \param imageSetID: The HealthImaging image set ID.
  \param versionID: The HealthImaging image set version ID, ignored if empty.
  \param outputFilePath: The path where the metadata will be stored as gzipped
 json.
  \param clientConfig: Aws client configuration.
  \\return bool: Function succeeded.
*/
bool AwsDoc::Medical_Imaging::getImageSetMetadata(const Aws::String &dataStoreID,
                                                  const Aws::String &imageSetID,
                                                  const Aws::String &versionID,
                                                  const Aws::String
 &outputFilePath,
                                                  const
 Aws::Client::ClientConfiguration &clientConfig) {
    Aws::MedicalImaging::Model::GetImageSetMetadataRequest request;
    request.SetDatastoreId(dataStoreID);
    request.SetImageSetId(imageSetID);
    if (!versionID.empty()) {
        request.SetVersionId(versionID);
    }
    Aws::MedicalImaging::MedicalImagingClient client(clientConfig);
    Aws::MedicalImaging::Model::GetImageSetMetadataOutcome outcome =
 client.GetImageSetMetadata(
            request);
    if (outcome.IsSuccess()) {
        std::ofstream file(outputFilePath, std::ios::binary);
        auto &metadata = outcome.GetResult().GetImageSetMetadataBlob();
        file << metadata.rdbuf();
    }
    else {
        std::cerr << "Failed to get image set metadata: "
                  << outcome.GetError().GetMessage() << std::endl;
    }

    return outcome.IsSuccess();
}
```

Download, decode and verify image frames.

```
bool AwsDoc::Medical_Imaging::downloadDecodeAndCheckImageFrames(
        const Aws::String &dataStoreID,
        const Aws::Vector<ImageFrameInfo> &imageFrames,
        const Aws::String &outDirectory,
        const Aws::Client::ClientConfiguration &clientConfiguration) {

    Aws::Client::ClientConfiguration clientConfiguration1(clientConfiguration);
    clientConfiguration1.executor =
 Aws::MakeShared<Aws::Utils::Threading::PooledThreadExecutor>(
            "executor", 25);
    Aws::MedicalImaging::MedicalImagingClient medicalImagingClient(
            clientConfiguration1);

    Aws::Utils::Threading::Semaphore semaphore(0, 1);
    std::atomic<size_t> count(imageFrames.size());

    bool result = true;
    for (auto &imageFrame: imageFrames) {
        Aws::MedicalImaging::Model::GetImageFrameRequest getImageFrameRequest;
        getImageFrameRequest.SetDatastoreId(dataStoreID);
        getImageFrameRequest.SetImageSetId(imageFrame.mImageSetId);

        Aws::MedicalImaging::Model::ImageFrameInformation imageFrameInformation;
        imageFrameInformation.SetImageFrameId(imageFrame.mImageFrameId);
        getImageFrameRequest.SetImageFrameInformation(imageFrameInformation);

        auto getImageFrameAsyncLambda = [&semaphore, &result, &count, imageFrame,
 outDirectory](
                const Aws::MedicalImaging::MedicalImagingClient *client,
                const Aws::MedicalImaging::Model::GetImageFrameRequest &request,
                Aws::MedicalImaging::Model::GetImageFrameOutcome outcome,
                const std::shared_ptr<const Aws::Client::AsyncCallerContext>
 &context) {

                if (!handleGetImageFrameResult(outcome, outDirectory,
 imageFrame)) {
                    std::cerr << "Failed to download and convert image frame: "
                              << imageFrame.mImageFrameId << " from image set: "
                              << imageFrame.mImageSetId << std::endl;
                    result = false;
                }

                count--;
```

```
                if (count <= 0) {

                    semaphore.ReleaseAll();
                }
        }; // End of 'getImageFrameAsyncLambda' lambda.

        medicalImagingClient.GetImageFrameAsync(getImageFrameRequest,
                                                getImageFrameAsyncLambda);
    }

    if (count > 0) {
        semaphore.WaitOne();
    }

    if (result) {
        std::cout << imageFrames.size() << " image files were downloaded."
                  << std::endl;
    }

    return result;
}

bool AwsDoc::Medical_Imaging::decodeJPHFileAndValidateWithChecksum(
        const Aws::String &jphFile,
        uint32_t crc32Checksum) {
    opj_image_t *outputImage = jphImageToOpjBitmap(jphFile);
    if (!outputImage) {
        return false;
    }

    bool result = true;
    if (!verifyChecksumForImage(outputImage, crc32Checksum)) {
        std::cerr << "The checksum for the image does not match the expected
 value."
                  << std::endl;
        std::cerr << "File :" << jphFile << std::endl;
        result = false;
    }

    opj_image_destroy(outputImage);

    return result;
}
```

```
opj_image *
AwsDoc::Medical_Imaging::jphImageToOpjBitmap(const Aws::String &jphFile) {
    opj_stream_t *inFileStream = nullptr;
    opj_codec_t *decompressorCodec = nullptr;
    opj_image_t *outputImage = nullptr;
    try {
        std::shared_ptr<opj_dparameters> decodeParameters =
 std::make_shared<opj_dparameters>();
        memset(decodeParameters.get(), 0, sizeof(opj_dparameters));

        opj_set_default_decoder_parameters(decodeParameters.get());

        decodeParameters->decod_format = 1; // JP2 image format.
        decodeParameters->cod_format = 2; // BMP image format.

        std::strncpy(decodeParameters->infile, jphFile.c_str(),
                     OPJ_PATH_LEN);

        inFileStream = opj_stream_create_default_file_stream(
                decodeParameters->infile, true);
        if (!inFileStream) {
            throw std::runtime_error(
                    "Unable to create input file stream for file '" + jphFile +
 "'.");
        }

        decompressorCodec = opj_create_decompress(OPJ_CODEC_JP2);
        if (!decompressorCodec) {
            throw std::runtime_error("Failed to create decompression codec.");
        }

        int decodeMessageLevel = 1;
        if (!setupCodecLogging(decompressorCodec, &decodeMessageLevel)) {
            std::cerr << "Failed to setup codec logging." << std::endl;
        }

        if (!opj_setup_decoder(decompressorCodec, decodeParameters.get())) {
            throw std::runtime_error("Failed to setup decompression codec.");
        }
        if (!opj_codec_set_threads(decompressorCodec, 4)) {
            throw std::runtime_error("Failed to set decompression codec
 threads.");
        }
```

```
        if (!opj_read_header(inFileStream, decompressorCodec, &outputImage)) {
            throw std::runtime_error("Failed to read header.");
        }

        if (!opj_decode(decompressorCodec, inFileStream,
                        outputImage)) {
            throw std::runtime_error("Failed to decode.");
        }

        if (DEBUGGING) {
            std::cout << "image width : " << outputImage->x1 - outputImage->x0
                      << std::endl;
            std::cout << "image height : " << outputImage->y1 - outputImage->y0
                      << std::endl;
            std::cout << "number of channels: " << outputImage->numcomps
                      << std::endl;
            std::cout << "colorspace : " << outputImage->color_space <<
 std::endl;
        }

    } catch (const std::exception &e) {
        std::cerr << e.what() << std::endl;
        if (outputImage) {
            opj_image_destroy(outputImage);
            outputImage = nullptr;
        }
    }
    if (inFileStream) {
        opj_stream_destroy(inFileStream);
    }
    if (decompressorCodec) {
        opj_destroy_codec(decompressorCodec);
    }

    return outputImage;
}

//! Template function which converts a planar image bitmap to an interleaved
 image bitmap and
//! then verifies the checksum of the bitmap.
/*!
 * @param image: The OpenJPEG image struct.
 * @param crc32Checksum: The CRC32 checksum.
 * @return  bool: Function succeeded.
```

```
 */
template<class myType>
bool verifyChecksumForImageForType(opj_image_t *image, uint32_t crc32Checksum) {
    uint32_t width = image->x1 - image->x0;
    uint32_t height = image->y1 - image->y0;
    uint32_t numOfChannels = image->numcomps;

    // Buffer for interleaved bitmap.
    std::vector<myType> buffer(width * height * numOfChannels);

    // Convert planar bitmap to interleaved bitmap.
    for (uint32_t channel = 0; channel < numOfChannels; channel++) {
        for (uint32_t row = 0; row < height; row++) {
            uint32_t fromRowStart = row / image->comps[channel].dy * width /
                                    image->comps[channel].dx;
            uint32_t toIndex = (row * width) * numOfChannels + channel;

            for (uint32_t col = 0; col < width; col++) {
                uint32_t fromIndex = fromRowStart + col / image-
>comps[channel].dx;

                buffer[toIndex] = static_cast<myType>(image-
>comps[channel].data[fromIndex]);

                toIndex += numOfChannels;
            }
        }
    }

    // Verify checksum.
    boost::crc_32_type crc32;
    crc32.process_bytes(reinterpret_cast<char *>(buffer.data()),
                        buffer.size() * sizeof(myType));

    bool result = crc32.checksum() == crc32Checksum;
    if (!result) {
        std::cerr << "verifyChecksumForImage, checksum mismatch, expected - "
                  << crc32Checksum << ", actual - " << crc32.checksum()
                  << std::endl;
    }

    return result;
}
```

```
//! Routine which verifies the checksum of an OpenJPEG image struct.
/*!
 * @param image: The OpenJPEG image struct.
 * @param crc32Checksum: The CRC32 checksum.
 * @return  bool: Function succeeded.
 */
bool AwsDoc::Medical_Imaging::verifyChecksumForImage(opj_image_t *image,
                                                     uint32_t crc32Checksum) {
    uint32_t channels = image->numcomps;
    bool result = false;
    if (0 < channels) {
        // Assume the precision is the same for all channels.
        uint32_t precision = image->comps[0].prec;
        bool signedData = image->comps[0].sgnd;
        uint32_t bytes = (precision + 7) / 8;

        if (signedData) {
            switch (bytes) {
                case 1 :
                    result = verifyChecksumForImageForType<int8_t>(image,

 crc32Checksum);
                    break;
                case 2 :
                    result = verifyChecksumForImageForType<int16_t>(image,

 crc32Checksum);
                    break;
                case 4 :
                    result = verifyChecksumForImageForType<int32_t>(image,

 crc32Checksum);
                    break;
                default:
                    std::cerr
                            << "verifyChecksumForImage, unsupported data type,
 signed bytes - "
                            << bytes << std::endl;
                    break;
            }
        }
        else {
            switch (bytes) {
                case 1 :
```

```
                    result = verifyChecksumForImageForType<uint8_t>(image,

 crc32Checksum);
                    break;
                case 2 :
                    result = verifyChecksumForImageForType<uint16_t>(image,

 crc32Checksum);
                    break;
                case 4 :
                    result = verifyChecksumForImageForType<uint32_t>(image,

 crc32Checksum);
                    break;
                default:
                    std::cerr
                            << "verifyChecksumForImage, unsupported data type,
 unsigned bytes - "
                            << bytes << std::endl;
                    break;
            }
        }

        if (!result) {
            std::cerr << "verifyChecksumForImage, error bytes " << bytes
                      << " signed "
                      << signedData << std::endl;
        }
    }
    else {
        std::cerr << "'verifyChecksumForImage', no channels in the image."
                  << std::endl;
    }
    return result;
}
```

Clean up resources.

```
bool AwsDoc::Medical_Imaging::cleanup(const Aws::String &stackName,
                                      const Aws::String &dataStoreId,
                                      const Aws::Client::ClientConfiguration
 &clientConfiguration) {
```

```
    bool result = true;

    if (!stackName.empty() && askYesNoQuestion(
            "Would you like to delete the stack " + stackName + "? (y/n)")) {
        std::cout << "Deleting the image sets in the stack." << std::endl;
        result &= emptyDatastore(dataStoreId, clientConfiguration);
        printAsterisksLine();
        std::cout << "Deleting the stack." << std::endl;
        result &= deleteStack(stackName, clientConfiguration);
    }
    return result;
}

bool AwsDoc::Medical_Imaging::emptyDatastore(const Aws::String &datastoreID,
                                             const
 Aws::Client::ClientConfiguration &clientConfiguration) {

    Aws::MedicalImaging::Model::SearchCriteria emptyCriteria;
    Aws::Vector<Aws::String> imageSetIDs;
    bool result = false;
    if (searchImageSets(datastoreID, emptyCriteria, imageSetIDs,
                        clientConfiguration)) {
        result = true;
        for (auto &imageSetID: imageSetIDs) {
            result &= deleteImageSet(datastoreID, imageSetID,
 clientConfiguration);
        }
    }

    return result;
}
```

- For API details, see the following topics in *AWS SDK for C++ API Reference*.
  - DeleteImageSet
  - GetDICOMImportJob
  - GetImageFrame
  - GetImageSetMetadata
  - SearchImageSets
  - StartDICOMImportJob

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

JavaScript

SDK for JavaScript (v3)

Orchestrate steps (index.js).

```
import {
  parseScenarioArgs,
  Scenario,
} from "@aws-doc-sdk-examples/lib/scenario/index.js";
import {
  saveState,
  loadState,
} from "@aws-doc-sdk-examples/lib/scenario/steps-common.js";

import {
  createStack,
  deployStack,
  getAccountId,
  getDatastoreName,
  getStackName,
  outputState,
  waitForStackCreation,
} from "./deploy-steps.js";
import {
  doCopy,
  selectDataset,
  copyDataset,
  outputCopiedObjects,
} from "./dataset-steps.js";
import {
  doImport,
  outputImportJobStatus,
  startDICOMImport,
  waitForImportJobCompletion,
} from "./import-steps.js";
```

```
import {
  getManifestFile,
  outputImageSetIds,
  parseManifestFile,
} from "./image-set-steps.js";
import {
  getImageSetMetadata,
  outputImageFrameIds,
} from "./image-frame-steps.js";
import { decodeAndVerifyImages, doVerify } from "./verify-steps.js";
import {
  confirmCleanup,
  deleteImageSets,
  deleteStack,
} from "./clean-up-steps.js";

const context = {};

const scenarios = {
  deploy: new Scenario(
    "Deploy Resources",
    [
      deployStack,
      getStackName,
      getDatastoreName,
      getAccountId,
      createStack,
      waitForStackCreation,
      outputState,
      saveState,
    ],
    context,
  ),
  demo: new Scenario(
    "Run Demo",
    [
      loadState,
      doCopy,
      selectDataset,
      copyDataset,
      outputCopiedObjects,
      doImport,
      startDICOMImport,
      waitForImportJobCompletion,
```

```
      outputImportJobStatus,
      getManifestFile,
      parseManifestFile,
      outputImageSetIds,
      getImageSetMetadata,
      outputImageFrameIds,
      doVerify,
      decodeAndVerifyImages,
      saveState,
    ],
    context,
  ),
  destroy: new Scenario(
    "Clean Up Resources",
    [loadState, confirmCleanup, deleteImageSets, deleteStack],
    context,
  ),
};

// Call function if run directly
import { fileURLToPath } from "node:url";
if (process.argv[1] === fileURLToPath(import.meta.url)) {
  parseScenarioArgs(scenarios, {
    name: "Health Imaging Workflow",
    description:
      "Work with DICOM images using an AWS Health Imaging data store.",
    synopsis:
      "node index.js --scenario <deploy | demo | destroy> [-h|--help] [-y|--yes]
 [-v|--verbose]",
  });
}
```

Deploy resources (deploy-steps.js).

```
import fs from "node:fs/promises";
import path from "node:path";

import {
  CloudFormationClient,
  CreateStackCommand,
  DescribeStacksCommand,
} from "@aws-sdk/client-cloudformation";
```

```
import { STSClient, GetCallerIdentityCommand } from "@aws-sdk/client-sts";

import {
  ScenarioAction,
  ScenarioInput,
  ScenarioOutput,
} from "@aws-doc-sdk-examples/lib/scenario/index.js";
import { retry } from "@aws-doc-sdk-examples/lib/utils/util-timers.js";

const cfnClient = new CloudFormationClient({});
const stsClient = new STSClient({});

const __dirname = path.dirname(new URL(import.meta.url).pathname);
const cfnTemplatePath = path.join(
  __dirname,
  "../../../../../scenarios/features/healthimaging_image_sets/resources/
cfn_template.yaml",
);

export const deployStack = new ScenarioInput(
  "deployStack",
  "Do you want to deploy the CloudFormation stack?",
  { type: "confirm" },
);

export const getStackName = new ScenarioInput(
  "getStackName",
  "Enter a name for the CloudFormation stack:",
  { type: "input", skipWhen: (/** @type {{}} */ state) => !state.deployStack },
);

export const getDatastoreName = new ScenarioInput(
  "getDatastoreName",
  "Enter a name for the HealthImaging datastore:",
  { type: "input", skipWhen: (/** @type {{}} */ state) => !state.deployStack },
);

export const getAccountId = new ScenarioAction(
  "getAccountId",
  async (/** @type {{}} */ state) => {
    const command = new GetCallerIdentityCommand({});
    const response = await stsClient.send(command);
    state.accountId = response.Account;
  },
```

```
  {
    skipWhen: (/** @type {{}} */ state) => !state.deployStack,
  },
);

export const createStack = new ScenarioAction(
  "createStack",
  async (/** @type {{}} */ state) => {
    const stackName = state.getStackName;
    const datastoreName = state.getDatastoreName;
    const accountId = state.accountId;

    const command = new CreateStackCommand({
      StackName: stackName,
      TemplateBody: await fs.readFile(cfnTemplatePath, "utf8"),
      Capabilities: ["CAPABILITY_IAM"],
      Parameters: [
        {
          ParameterKey: "datastoreName",
          ParameterValue: datastoreName,
        },
        {
          ParameterKey: "userAccountID",
          ParameterValue: accountId,
        },
      ],
    });

    const response = await cfnClient.send(command);
    state.stackId = response.StackId;
  },
  { skipWhen: (/** @type {{}} */ state) => !state.deployStack },
);

export const waitForStackCreation = new ScenarioAction(
  "waitForStackCreation",
  async (/** @type {{}} */ state) => {
    const command = new DescribeStacksCommand({
      StackName: state.stackId,
    });

    await retry({ intervalInMs: 10000, maxRetries: 60 }, async () => {
      const response = await cfnClient.send(command);
      const stack = response.Stacks?.find(
```

```
        (s) => s.StackName === state.getStackName,
      );
      if (!stack || stack.StackStatus === "CREATE_IN_PROGRESS") {
        throw new Error("Stack creation is still in progress");
      }
      if (stack.StackStatus === "CREATE_COMPLETE") {
        state.stackOutputs = stack.Outputs?.reduce((acc, output) => {
          acc[output.OutputKey] = output.OutputValue;
          return acc;
        }, {});
      } else {
        throw new Error(
          `Stack creation failed with status: ${stack.StackStatus}`,
        );
      }
    });
  },
  {
    skipWhen: (/** @type {{}} */ state) => !state.deployStack,
  },
);

export const outputState = new ScenarioOutput(
  "outputState",
  (/** @type {{}} */ state) => {
    /**
     * @type {{ stackOutputs: { DatastoreID: string, BucketName: string, RoleArn:
 string }}}
     */
    const { stackOutputs } = state;
    return `Stack creation completed. Output values:
Datastore ID: ${stackOutputs?.DatastoreID}
Bucket Name: ${stackOutputs?.BucketName}
Role ARN: ${stackOutputs?.RoleArn}
    `;
  },
  { skipWhen: (/** @type {{}} */ state) => !state.deployStack },
);
```

Copy DICOM files (dataset-steps.js).

```
import {
```

```
  S3Client,
  CopyObjectCommand,
  ListObjectsV2Command,
} from "@aws-sdk/client-s3";

import {
  ScenarioAction,
  ScenarioInput,
  ScenarioOutput,
} from "@aws-doc-sdk-examples/lib/scenario/index.js";

const s3Client = new S3Client({});

const datasetOptions = [
  {
    name: "CT of chest (2 images)",
    value: "00029d25-fb18-4d42-aaa5-a0897d1ac8f7",
  },
  {
    name: "CT of pelvis (57 images)",
    value: "00025d30-ef8f-4135-a35a-d83eff264fc1",
  },
  {
    name: "MRI of head (192 images)",
    value: "0002d261-8a5d-4e63-8e2e-0cbfac87b904",
  },
  {
    name: "MRI of breast (92 images)",
    value: "0002dd07-0b7f-4a68-a655-44461ca34096",
  },
];

/**
 * @typedef {{ stackOutputs: {
 *   BucketName: string,
 *   DatastoreID: string,
 *   doCopy: boolean
 * }}} State
 */

export const selectDataset = new ScenarioInput(
  "selectDataset",
  (state) => {
    if (!state.doCopy) {
```

```
      process.exit(0);
    }
    return "Select a DICOM dataset to import:";
  },
  {
    type: "select",
    choices: datasetOptions,
  },
);

export const doCopy = new ScenarioInput(
  "doCopy",
  "Do you want to copy images from the public dataset into your bucket?",
  {
    type: "confirm",
  },
);

export const copyDataset = new ScenarioAction(
  "copyDataset",
  async (/** @type { State } */ state) => {
    const inputBucket = state.stackOutputs.BucketName;
    const inputPrefix = "input/";
    const selectedDatasetId = state.selectDataset;

    const sourceBucket = "idc-open-data";
    const sourcePrefix = `${selectedDatasetId}`;

    const listObjectsCommand = new ListObjectsV2Command({
      Bucket: sourceBucket,
      Prefix: sourcePrefix,
    });

    const objects = await s3Client.send(listObjectsCommand);

    const copyPromises = objects.Contents.map((object) => {
      const sourceKey = object.Key;
      const destinationKey = `${inputPrefix}${sourceKey
        .split("/")
        .slice(1)
        .join("/")}`;

      const copyCommand = new CopyObjectCommand({
        Bucket: inputBucket,
```

```
        CopySource: `/${sourceBucket}/${sourceKey}`,
        Key: destinationKey,
      });

      return s3Client.send(copyCommand);
    });

    const results = await Promise.all(copyPromises);
    state.copiedObjects = results.length;
  },
);

export const outputCopiedObjects = new ScenarioOutput(
  "outputCopiedObjects",
  (state) => `${state.copiedObjects} DICOM files were copied.`,
);
```

Start import into datastore (import-steps.js).

```
import {
  MedicalImagingClient,
  StartDICOMImportJobCommand,
  GetDICOMImportJobCommand,
} from "@aws-sdk/client-medical-imaging";

import {
  ScenarioAction,
  ScenarioOutput,
  ScenarioInput,
} from "@aws-doc-sdk-examples/lib/scenario/index.js";
import { retry } from "@aws-doc-sdk-examples/lib/utils/util-timers.js";

/**
 * @typedef {{ stackOutputs: {
 *   BucketName: string,
 *   DatastoreID: string,
 *   RoleArn: string
 * }}} State
 */

export const doImport = new ScenarioInput(
  "doImport",
```

```
    "Do you want to import DICOM images into your datastore?",
    {
      type: "confirm",
      default: true,
    },
  );

  export const startDICOMImport = new ScenarioAction(
    "startDICOMImport",
    async (/** @type {State} */ state) => {
      if (!state.doImport) {
        process.exit(0);
      }
      const medicalImagingClient = new MedicalImagingClient({});
      const inputS3Uri = `s3://${state.stackOutputs.BucketName}/input/`;
      const outputS3Uri = `s3://${state.stackOutputs.BucketName}/output/`;

      const command = new StartDICOMImportJobCommand({
        dataAccessRoleArn: state.stackOutputs.RoleArn,
        datastoreId: state.stackOutputs.DatastoreID,
        inputS3Uri,
        outputS3Uri,
      });

      const response = await medicalImagingClient.send(command);
      state.importJobId = response.jobId;
    },
  );

  export const waitForImportJobCompletion = new ScenarioAction(
    "waitForImportJobCompletion",
    async (/** @type {State} */ state) => {
      const medicalImagingClient = new MedicalImagingClient({});
      const command = new GetDICOMImportJobCommand({
        datastoreId: state.stackOutputs.DatastoreID,
        jobId: state.importJobId,
      });

      await retry({ intervalInMs: 10000, maxRetries: 60 }, async () => {
        const response = await medicalImagingClient.send(command);
        const jobStatus = response.jobProperties?.jobStatus;
        if (!jobStatus || jobStatus === "IN_PROGRESS") {
          throw new Error("Import job is still in progress");
        }
```

```
      if (jobStatus === "COMPLETED") {
        state.importJobOutputS3Uri = response.jobProperties.outputS3Uri;
      } else {
        throw new Error(`Import job failed with status: ${jobStatus}`);
      }
    });
  },
);

export const outputImportJobStatus = new ScenarioOutput(
  "outputImportJobStatus",
  (state) =>
    `DICOM import job completed. Output location: ${state.importJobOutputS3Uri}`,
);
```

Get image set IDs (image-set-steps.js -).

```
import { S3Client, GetObjectCommand } from "@aws-sdk/client-s3";

import {
  ScenarioAction,
  ScenarioOutput,
} from "@aws-doc-sdk-examples/lib/scenario/index.js";

/**
 * @typedef {{ stackOutputs: {
 *   BucketName: string,
 *   DatastoreID: string,
 *   RoleArn: string
 * }, importJobId: string,
 * importJobOutputS3Uri: string,
 * imageSetIds: string[],
 * manifestContent: { jobSummary: { imageSetsSummary: { imageSetId: string }
[] } }
 * }} State
 */

const s3Client = new S3Client({});

export const getManifestFile = new ScenarioAction(
  "getManifestFile",
  async (/** @type {State} */ state) => {
```

```
    const bucket = state.stackOutputs.BucketName;
    const prefix = `output/${state.stackOutputs.DatastoreID}-DicomImport-
${state.importJobId}/`;
    const key = `${prefix}job-output-manifest.json`;

    const command = new GetObjectCommand({
      Bucket: bucket,
      Key: key,
    });

    const response = await s3Client.send(command);
    const manifestContent = await response.Body.transformToString();
    state.manifestContent = JSON.parse(manifestContent);
  },
);

export const parseManifestFile = new ScenarioAction(
  "parseManifestFile",
  (/** @type {State} */ state) => {
    const imageSetIds =
      state.manifestContent.jobSummary.imageSetsSummary.reduce((ids, next) => {
        return Object.assign({}, ids, {
          [next.imageSetId]: next.imageSetId,
        });
      }, {});
    state.imageSetIds = Object.keys(imageSetIds);
  },
);

export const outputImageSetIds = new ScenarioOutput(
  "outputImageSetIds",
  (/** @type {State} */ state) =>
    `The image sets created by this import job are: \n${state.imageSetIds
      .map((id) => `Image set: ${id}`)
      .join("\n")}`,
);
```

Get image frame IDs (image-frame-steps.js).

```
import {
  MedicalImagingClient,
  GetImageSetMetadataCommand,
```

```
} from "@aws-sdk/client-medical-imaging";
import { gunzip } from "node:zlib";
import { promisify } from "node:util";

import {
  ScenarioAction,
  ScenarioOutput,
} from "@aws-doc-sdk-examples/lib/scenario/index.js";

const gunzipAsync = promisify(gunzip);

/**
 * @typedef {Object} DICOMValueRepresentation
 * @property {string} name
 * @property {string} type
 * @property {string} value
 */

/**
 * @typedef {Object} ImageFrameInformation
 * @property {string} ID
 * @property {Array<{ Checksum: number, Height: number, Width: number }>}
 PixelDataChecksumFromBaseToFullResolution
 * @property {number} MinPixelValue
 * @property {number} MaxPixelValue
 * @property {number} FrameSizeInBytes
 */

/**
 * @typedef {Object} DICOMMetadata
 * @property {Object} DICOM
 * @property {DICOMValueRepresentation[]} DICOMVRs
 * @property {ImageFrameInformation[]} ImageFrames
 */

/**
 * @typedef {Object} Series
 * @property {{ [key: string]: DICOMMetadata }} Instances
 */

/**
 * @typedef {Object} Study
 * @property {Object} DICOM
 * @property {Series[]} Series
```

```
 */

/**
 * @typedef {Object} Patient
 * @property {Object} DICOM
 */

/**
 * @typedef {{
 *  SchemaVersion: string,
 *  DatastoreID: string,
 *  ImageSetID: string,
 *  Patient: Patient,
 *  Study: Study
 * }} ImageSetMetadata
 */

/**
 * @typedef {{ stackOutputs: {
 *   BucketName: string,
 *   DatastoreID: string,
 *   RoleArn: string
 * }, imageSetIds: string[] }} State
 */

const medicalImagingClient = new MedicalImagingClient({});

export const getImageSetMetadata = new ScenarioAction(
  "getImageSetMetadata",
  async (/** @type {State} */ state) => {
    const outputMetadata = [];

    for (const imageSetId of state.imageSetIds) {
      const command = new GetImageSetMetadataCommand({
        datastoreId: state.stackOutputs.DatastoreID,
        imageSetId,
      });

      const response = await medicalImagingClient.send(command);
      const compressedMetadataBlob =
        await response.imageSetMetadataBlob.transformToByteArray();
      const decompressedMetadata = await gunzipAsync(compressedMetadataBlob);
      const imageSetMetadata = JSON.parse(decompressedMetadata.toString());
```

```
      outputMetadata.push(imageSetMetadata);
    }

    state.imageSetMetadata = outputMetadata;
  },
);

export const outputImageFrameIds = new ScenarioOutput(
  "outputImageFrameIds",
  (/** @type {State & { imageSetMetadata: ImageSetMetadata[] }} */ state) => {
    let output = "";

    for (const metadata of state.imageSetMetadata) {
      const imageSetId = metadata.ImageSetID;
      /** @type {DICOMMetadata[]} */
      const instances = Object.values(metadata.Study.Series).flatMap(
        (series) => {
          return Object.values(series.Instances);
        },
      );
      const imageFrameIds = instances.flatMap((instance) =>
        instance.ImageFrames.map((frame) => frame.ID),
      );

      output += `Image set ID: ${imageSetId}\nImage frame IDs:\n
${imageFrameIds.join(
        "\n",
      )}\n\n`;
    }

    return output;
  },
);
```

Verify image frames (verify-steps.js). The [AWS HealthImaging Pixel Data Verification](#) library was used for verification.

```
import { spawn } from "node:child_process";

import {
  ScenarioAction,
  ScenarioInput,
```

```
} from "@aws-doc-sdk-examples/lib/scenario/index.js";

/**
 * @typedef {Object} DICOMValueRepresentation
 * @property {string} name
 * @property {string} type
 * @property {string} value
 */

/**
 * @typedef {Object} ImageFrameInformation
 * @property {string} ID
 * @property {Array<{ Checksum: number, Height: number, Width: number }>}
 PixelDataChecksumFromBaseToFullResolution
 * @property {number} MinPixelValue
 * @property {number} MaxPixelValue
 * @property {number} FrameSizeInBytes
 */

/**
 * @typedef {Object} DICOMMetadata
 * @property {Object} DICOM
 * @property {DICOMValueRepresentation[]} DICOMVRs
 * @property {ImageFrameInformation[]} ImageFrames
 */

/**
 * @typedef {Object} Series
 * @property {{ [key: string]: DICOMMetadata }} Instances
 */

/**
 * @typedef {Object} Study
 * @property {Object} DICOM
 * @property {Series[]} Series
 */

/**
 * @typedef {Object} Patient
 * @property {Object} DICOM
 */

/**
 * @typedef {{
```

```
 *  SchemaVersion: string,
 *  DatastoreID: string,
 *  ImageSetID: string,
 *  Patient: Patient,
 *  Study: Study
 * }} ImageSetMetadata
 */

/**
 * @typedef {{ stackOutputs: {
 *   BucketName: string,
 *   DatastoreID: string,
 *   RoleArn: string
 * }, imageSetMetadata: ImageSetMetadata[] }} State
 */

export const doVerify = new ScenarioInput(
  "doVerify",
  "Do you want to verify the imported images?",
  {
    type: "confirm",
    default: true,
  },
);

export const decodeAndVerifyImages = new ScenarioAction(
  "decodeAndVerifyImages",
  async (/** @type {State} */ state) => {
    if (!state.doVerify) {
      process.exit(0);
    }
    const verificationTool = "./pixel-data-verification/index.js";

    for (const metadata of state.imageSetMetadata) {
      const datastoreId = state.stackOutputs.DatastoreID;
      const imageSetId = metadata.ImageSetID;

      for (const [seriesInstanceUid, series] of Object.entries(
        metadata.Study.Series,
      )) {
        for (const [sopInstanceUid, _] of Object.entries(series.Instances)) {
          console.log(
            `Verifying image set ${imageSetId} with series ${seriesInstanceUid}
 and sop ${sopInstanceUid}`,
```

```
          );
          const child = spawn(
            "node",
            [
              verificationTool,
              datastoreId,
              imageSetId,
              seriesInstanceUid,
              sopInstanceUid,
            ],
            { stdio: "inherit" },
          );

          await new Promise((resolve, reject) => {
            child.on("exit", (code) => {
              if (code === 0) {
                resolve();
              } else {
                reject(
                  new Error(
                    `Verification tool exited with code ${code} for image set
 ${imageSetId}`,
                  ),
                );
              }
            });
          });
        }
      }
    }
  },
);
```

Destroy resources (clean-up-steps.js).

```
import {
  CloudFormationClient,
  DeleteStackCommand,
} from "@aws-sdk/client-cloudformation";
import {
  MedicalImagingClient,
  DeleteImageSetCommand,
```

```
} from "@aws-sdk/client-medical-imaging";

import {
  ScenarioAction,
  ScenarioInput,
} from "@aws-doc-sdk-examples/lib/scenario/index.js";

/**
 * @typedef {Object} DICOMValueRepresentation
 * @property {string} name
 * @property {string} type
 * @property {string} value
 */

/**
 * @typedef {Object} ImageFrameInformation
 * @property {string} ID
 * @property {Array<{ Checksum: number, Height: number, Width: number }>}
 PixelDataChecksumFromBaseToFullResolution
 * @property {number} MinPixelValue
 * @property {number} MaxPixelValue
 * @property {number} FrameSizeInBytes
 */

/**
 * @typedef {Object} DICOMMetadata
 * @property {Object} DICOM
 * @property {DICOMValueRepresentation[]} DICOMVRs
 * @property {ImageFrameInformation[]} ImageFrames
 */

/**
 * @typedef {Object} Series
 * @property {{ [key: string]: DICOMMetadata }} Instances
 */

/**
 * @typedef {Object} Study
 * @property {Object} DICOM
 * @property {Series[]} Series
 */

/**
 * @typedef {Object} Patient
```

```
 * @property {Object} DICOM
 */

/**
 * @typedef {{
 *  SchemaVersion: string,
 *  DatastoreID: string,
 *  ImageSetID: string,
 *  Patient: Patient,
 *  Study: Study
 * }} ImageSetMetadata
 */

/**
 * @typedef {{ stackOutputs: {
 *   BucketName: string,
 *   DatastoreID: string,
 *   RoleArn: string
 * }, imageSetMetadata: ImageSetMetadata[] }} State
 */

const cfnClient = new CloudFormationClient({});
const medicalImagingClient = new MedicalImagingClient({});

export const confirmCleanup = new ScenarioInput(
  "confirmCleanup",
  "Do you want to delete the created resources?",
  { type: "confirm" },
);

export const deleteImageSets = new ScenarioAction(
  "deleteImageSets",
  async (/** @type {State} */ state) => {
    const datastoreId = state.stackOutputs.DatastoreID;

    for (const metadata of state.imageSetMetadata) {
      const command = new DeleteImageSetCommand({
        datastoreId,
        imageSetId: metadata.ImageSetID,
      });

      try {
        await medicalImagingClient.send(command);
        console.log(`Successfully deleted image set ${metadata.ImageSetID}`);
```

```
      } catch (e) {
        if (e instanceof Error) {
          if (e.name === "ConflictException") {
            console.log(`Image set ${metadata.ImageSetID} already deleted`);
          }
        }
      }
    }
  },
  {
    skipWhen: (/** @type {{}} */ state) => !state.confirmCleanup,
  },
);

export const deleteStack = new ScenarioAction(
  "deleteStack",
  async (/** @type {State} */ state) => {
    const stackName = state.getStackName;

    const command = new DeleteStackCommand({
      StackName: stackName,
    });

    await cfnClient.send(command);
    console.log(`Stack ${stackName} deletion initiated`);
  },
  {
    skipWhen: (/** @type {{}} */ state) => !state.confirmCleanup,
  },
);
```

- For API details, see the following topics in *AWS SDK for JavaScript API Reference*.
  - DeleteImageSet
  - GetDICOMImportJob
  - GetImageFrame
  - GetImageSetMetadata
  - SearchImageSets
  - StartDICOMImportJob

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

Python

SDK for Python (Boto3)

Create an CloudFormation stack with the necessary resources.

```
    def deploy(self):
        """
        Deploys prerequisite resources used by the scenario. The resources are
        defined in the associated `setup.yaml` AWS CloudFormation script and are
 deployed
        as a CloudFormation stack, so they can be easily managed and destroyed.
        """

        print("\t\tLet's deploy the stack for resource creation.")
        stack_name = q.ask("\t\tEnter a name for the stack: ", q.non_empty)

        data_store_name = q.ask(
            "\t\tEnter a name for the Health Imaging Data Store: ", q.non_empty
        )

        account_id = boto3.client("sts").get_caller_identity()["Account"]

        with open(
            "../../../../scenarios/features/healthimaging_image_sets/resources/
cfn_template.yaml"
        ) as setup_file:
            setup_template = setup_file.read()
        print(f"\t\tCreating {stack_name}.")
        stack = self.cf_resource.create_stack(
            StackName=stack_name,
            TemplateBody=setup_template,
            Capabilities=["CAPABILITY_NAMED_IAM"],
            Parameters=[
                {
                    "ParameterKey": "datastoreName",
                    "ParameterValue": data_store_name,
```

```
                },
                {
                    "ParameterKey": "userAccountID",
                    "ParameterValue": account_id,
                },
            ],
        )
        print("\t\tWaiting for stack to deploy. This typically takes a minute or
 two.")
        waiter = self.cf_resource.meta.client.get_waiter("stack_create_complete")
        waiter.wait(StackName=stack.name)
        stack.load()
        print(f"\t\tStack status: {stack.stack_status}")

        outputs_dictionary = {
            output["OutputKey"]: output["OutputValue"] for output in
 stack.outputs
        }
        self.input_bucket_name = outputs_dictionary["BucketName"]
        self.output_bucket_name = outputs_dictionary["BucketName"]
        self.role_arn = outputs_dictionary["RoleArn"]
        self.data_store_id = outputs_dictionary["DatastoreID"]
        return stack
```

Copy DICOM files to the Amazon S3 import bucket.

```
    def copy_single_object(self, key, source_bucket, target_bucket,
 target_directory):
        """
        Copies a single object from a source to a target bucket.

        :param key: The key of the object to copy.
        :param source_bucket: The source bucket for the copy.
        :param target_bucket: The target bucket for the copy.
        :param target_directory: The target directory for the copy.
        """
        new_key = target_directory + "/" + key
        copy_source = {"Bucket": source_bucket, "Key": key}
        self.s3_client.copy_object(
            CopySource=copy_source, Bucket=target_bucket, Key=new_key
        )
```

```
        print(f"\n\t\tCopying {key}.")

    def copy_images(
        self, source_bucket, source_directory, target_bucket, target_directory
    ):
        """
        Copies the images from the source to the target bucket using multiple
 threads.

        :param source_bucket: The source bucket for the images.
        :param source_directory: Directory within the source bucket.
        :param target_bucket: The target bucket for the images.
        :param target_directory: Directory within the target bucket.
        """

        # Get list of all objects in source bucket.
        list_response = self.s3_client.list_objects_v2(
            Bucket=source_bucket, Prefix=source_directory
        )
        objs = list_response["Contents"]
        keys = [obj["Key"] for obj in objs]

        # Copy the objects in the bucket.
        for key in keys:
            self.copy_single_object(key, source_bucket, target_bucket,
 target_directory)

        print("\t\tDone copying all objects.")
```

Import the DICOM files to the Amazon S3 data store.

```
class MedicalImagingWrapper:
    """Encapsulates AWS HealthImaging functionality."""

    def __init__(self, medical_imaging_client, s3_client):
        """
        :param medical_imaging_client: A Boto3 Amazon MedicalImaging client.
        :param s3_client: A Boto3 S3 client.
        """
```

```
        self.medical_imaging_client = medical_imaging_client
        self.s3_client = s3_client

    @classmethod
    def from_client(cls):
        medical_imaging_client = boto3.client("medical-imaging")
        s3_client = boto3.client("s3")
        return cls(medical_imaging_client, s3_client)


    def start_dicom_import_job(
        self,
        data_store_id,
        input_bucket_name,
        input_directory,
        output_bucket_name,
        output_directory,
        role_arn,
    ):
        """
        Routine which starts a HealthImaging import job.

        :param data_store_id: The HealthImaging data store ID.
        :param input_bucket_name: The name of the Amazon S3 bucket containing the
 DICOM files.
        :param input_directory: The directory in the S3 bucket containing the
 DICOM files.
        :param output_bucket_name: The name of the S3 bucket for the output.
        :param output_directory: The directory in the S3 bucket to store the
 output.
        :param role_arn: The ARN of the IAM role with permissions for the import.
        :return: The job ID of the import.
        """

        input_uri = f"s3://{input_bucket_name}/{input_directory}/"
        output_uri = f"s3://{output_bucket_name}/{output_directory}/"
        try:
            job = self.medical_imaging_client.start_dicom_import_job(
                jobName="examplejob",
                datastoreId=data_store_id,
                dataAccessRoleArn=role_arn,
                inputS3Uri=input_uri,
                outputS3Uri=output_uri,
            )
```

```
        except ClientError as err:
            logger.error(
                "Couldn't start DICOM import job. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return job["jobId"]
```

Get image sets created by the DICOM import job.

```
class MedicalImagingWrapper:
    """Encapsulates AWS HealthImaging functionality."""

    def __init__(self, medical_imaging_client, s3_client):
        """
        :param medical_imaging_client: A Boto3 Amazon MedicalImaging client.
        :param s3_client: A Boto3 S3 client.
        """
        self.medical_imaging_client = medical_imaging_client
        self.s3_client = s3_client

    @classmethod
    def from_client(cls):
        medical_imaging_client = boto3.client("medical-imaging")
        s3_client = boto3.client("s3")
        return cls(medical_imaging_client, s3_client)


    def get_image_sets_for_dicom_import_job(self, datastore_id, import_job_id):
        """
        Retrieves the image sets created for an import job.

        :param datastore_id: The HealthImaging data store ID
        :param import_job_id: The import job ID
        :return: List of image set IDs
        """
```

```
        import_job = self.medical_imaging_client.get_dicom_import_job(
            datastoreId=datastore_id, jobId=import_job_id
        )

        output_uri = import_job["jobProperties"]["outputS3Uri"]

        bucket = output_uri.split("/")[2]
        key = "/".join(output_uri.split("/")[3:])

        # Try to get the manifest.
        retries = 3
        while retries > 0:
            try:
                obj = self.s3_client.get_object(
                    Bucket=bucket, Key=key + "job-output-manifest.json"
                )
                body = obj["Body"]
                break
            except ClientError as error:
                retries = retries - 1
                time.sleep(3)
        try:
            data = json.load(body)
            expression =
 jmespath.compile("jobSummary.imageSetsSummary[].imageSetId")
            image_sets = expression.search(data)
        except json.decoder.JSONDecodeError as error:
            image_sets = import_job["jobProperties"]

        return image_sets


    def get_image_set(self, datastore_id, image_set_id, version_id=None):
        """
        Get the properties of an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The optional version of the image set.
        :return: The image set properties.
        """
        try:
            if version_id:
                image_set = self.medical_imaging_client.get_image_set(
```

```
                    imageSetId=image_set_id,
                    datastoreId=datastore_id,
                    versionId=version_id,
                )
            else:
                image_set = self.medical_imaging_client.get_image_set(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
        except ClientError as err:
            logger.error(
                "Couldn't get image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return image_set
```

Get image frame information for image sets.

```
class MedicalImagingWrapper:
    """Encapsulates AWS HealthImaging functionality."""

    def __init__(self, medical_imaging_client, s3_client):
        """
        :param medical_imaging_client: A Boto3 Amazon MedicalImaging client.
        :param s3_client: A Boto3 S3 client.
        """
        self.medical_imaging_client = medical_imaging_client
        self.s3_client = s3_client

    @classmethod
    def from_client(cls):
        medical_imaging_client = boto3.client("medical-imaging")
        s3_client = boto3.client("s3")
        return cls(medical_imaging_client, s3_client)
```

```
    def get_image_frames_for_image_set(self, datastore_id, image_set_id,
 out_directory):
        """
        Get the image frames for an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param out_directory: The directory to save the file.
        :return: The image frames.
        """
        image_frames = []
        file_name = os.path.join(out_directory,
 f"{image_set_id}_metadata.json.gzip")
        file_name = file_name.replace("/", "\\\\")
        self.get_image_set_metadata(file_name, datastore_id, image_set_id)
        try:
            with gzip.open(file_name, "rb") as f_in:
                doc = json.load(f_in)
            instances = jmespath.search("Study.Series.*.Instances[].*[]", doc)
            for instance in instances:
                rescale_slope = jmespath.search("DICOM.RescaleSlope", instance)
                rescale_intercept = jmespath.search("DICOM.RescaleIntercept",
 instance)
                image_frames_json = jmespath.search("ImageFrames[][]", instance)
                for image_frame in image_frames_json:
                    checksum_json = jmespath.search(
                        "max_by(PixelDataChecksumFromBaseToFullResolution,
 &Width)",
                        image_frame,
                    )
                    image_frame_info = {
                        "imageSetId": image_set_id,
                        "imageFrameId": image_frame["ID"],
                        "rescaleIntercept": rescale_intercept,
                        "rescaleSlope": rescale_slope,
                        "minPixelValue": image_frame["MinPixelValue"],
                        "maxPixelValue": image_frame["MaxPixelValue"],
                        "fullResolutionChecksum": checksum_json["Checksum"],
                    }
                    image_frames.append(image_frame_info)
            return image_frames
        except TypeError:
            return {}
        except ClientError as err:
```

```
            logger.error(
                "Couldn't get image frames for image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        return image_frames


    def get_image_set_metadata(
        self, metadata_file, datastore_id, image_set_id, version_id=None
    ):
        """
        Get the metadata of an image set.

        :param metadata_file: The file to store the JSON gzipped metadata.
        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param version_id: The version of the image set.
        """

        try:
            if version_id:
                image_set_metadata =
self.medical_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id,
                    datastoreId=datastore_id,
                    versionId=version_id,
                )
            else:
                image_set_metadata =
self.medical_imaging_client.get_image_set_metadata(
                    imageSetId=image_set_id, datastoreId=datastore_id
                )
            with open(metadata_file, "wb") as f:
                for chunk in
image_set_metadata["imageSetMetadataBlob"].iter_chunks():
                    if chunk:
                        f.write(chunk)

        except ClientError as err:
            logger.error(
                "Couldn't get image metadata. Here's why: %s: %s",
                err.response["Error"]["Code"],
```

```
                err.response["Error"]["Message"],
            )
            raise
```

Download, decode and verify image frames.

```
class MedicalImagingWrapper:
    """Encapsulates AWS HealthImaging functionality."""

    def __init__(self, medical_imaging_client, s3_client):
        """
        :param medical_imaging_client: A Boto3 Amazon MedicalImaging client.
        :param s3_client: A Boto3 S3 client.
        """
        self.medical_imaging_client = medical_imaging_client
        self.s3_client = s3_client

    @classmethod
    def from_client(cls):
        medical_imaging_client = boto3.client("medical-imaging")
        s3_client = boto3.client("s3")
        return cls(medical_imaging_client, s3_client)


    def get_pixel_data(
        self, file_path_to_write, datastore_id, image_set_id, image_frame_id
    ):
        """
        Get an image frame's pixel data.

        :param file_path_to_write: The path to write the image frame's HTJ2K
 encoded pixel data.
        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        :param image_frame_id: The ID of the image frame.
        """
        try:
            image_frame = self.medical_imaging_client.get_image_frame(
                datastoreId=datastore_id,
```

```
                imageSetId=image_set_id,
                imageFrameInformation={"imageFrameId": image_frame_id},
            )
            with open(file_path_to_write, "wb") as f:
                for chunk in image_frame["imageFrameBlob"].iter_chunks():
                    f.write(chunk)
        except ClientError as err:
            logger.error(
                "Couldn't get image frame. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise


    def download_decode_and_check_image_frames(
        self, data_store_id, image_frames, out_directory
    ):
        """
        Downloads image frames, decodes them, and uses the checksum to validate
        the decoded images.

        :param data_store_id: The HealthImaging data store ID.
        :param image_frames: A list of dicts containing image frame information.
        :param out_directory: A directory for the downloaded images.
        :return: True if the function succeeded; otherwise, False.
        """
        total_result = True
        for image_frame in image_frames:
            image_file_path = f"{out_directory}/
image_{image_frame['imageFrameId']}.jph"
            self.get_pixel_data(
                image_file_path,
                data_store_id,
                image_frame["imageSetId"],
                image_frame["imageFrameId"],
            )

            image_array = self.jph_image_to_opj_bitmap(image_file_path)
            crc32_checksum = image_frame["fullResolutionChecksum"]
            # Verify checksum.
            crc32_calculated = zlib.crc32(image_array)
            image_result = crc32_checksum == crc32_calculated
            print(
```

```
                f"\t\tImage checksum verified for {image_frame['imageFrameId']}:
{image_result }"
            )
            total_result = total_result and image_result
        return total_result

    @staticmethod
    def jph_image_to_opj_bitmap(jph_file):
        """
        Decode the image to a bitmap using an OPENJPEG library.
        :param jph_file: The file to decode.
        :return: The decoded bitmap as an array.
        """
        # Use format 2 for the JPH file.
        params = openjpeg.utils.get_parameters(jph_file, 2)
        print(f"\n\t\tImage parameters for {jph_file}: \n\t\t{params}")

        image_array = openjpeg.utils.decode(jph_file, 2)

        return image_array
```

Clean up resources.

```
    def destroy(self, stack):
        """
        Destroys the resources managed by the CloudFormation stack, and the
CloudFormation
        stack itself.

        :param stack: The CloudFormation stack that manages the example
resources.
        """

        print(f"\t\tCleaning up resources and {stack.name}.")
        data_store_id = None
        for oput in stack.outputs:
            if oput["OutputKey"] == "DatastoreID":
                data_store_id = oput["OutputValue"]
        if data_store_id is not None:
            print(f"\t\tDeleting image sets in data store {data_store_id}.")
            image_sets = self.medical_imaging_wrapper.search_image_sets(
```

```
                data_store_id, {}
            )
            image_set_ids = [image_set["imageSetId"] for image_set in image_sets]

            for image_set_id in image_set_ids:
                self.medical_imaging_wrapper.delete_image_set(
                    data_store_id, image_set_id
                )
                print(f"\t\tDeleted image set with id : {image_set_id}")

        print(f"\t\tDeleting {stack.name}.")
        stack.delete()
        print("\t\tWaiting for stack removal. This may take a few minutes.")
        waiter = self.cf_resource.meta.client.get_waiter("stack_delete_complete")
        waiter.wait(StackName=stack.name)
        print("\t\tStack delete complete.")




class MedicalImagingWrapper:
    """Encapsulates AWS HealthImaging functionality."""

    def __init__(self, medical_imaging_client, s3_client):
        """
        :param medical_imaging_client: A Boto3 Amazon MedicalImaging client.
        :param s3_client: A Boto3 S3 client.
        """
        self.medical_imaging_client = medical_imaging_client
        self.s3_client = s3_client

    @classmethod
    def from_client(cls):
        medical_imaging_client = boto3.client("medical-imaging")
        s3_client = boto3.client("s3")
        return cls(medical_imaging_client, s3_client)


    def search_image_sets(self, datastore_id, search_filter):
        """
        Search for image sets.

        :param datastore_id: The ID of the data store.
        :param search_filter: The search filter.
```

```
            For example: {"filters" : [{ "operator": "EQUAL", "values":
[{"DICOMPatientId": "3524578"}]}]}.
        :return: The list of image sets.
        """
        try:
            paginator =
self.medical_imaging_client.get_paginator("search_image_sets")
            page_iterator = paginator.paginate(
                datastoreId=datastore_id, searchCriteria=search_filter
            )
            metadata_summaries = []
            for page in page_iterator:
                metadata_summaries.extend(page["imageSetsMetadataSummaries"])
        except ClientError as err:
            logger.error(
                "Couldn't search image sets. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return metadata_summaries


    def delete_image_set(self, datastore_id, image_set_id):
        """
        Delete an image set.

        :param datastore_id: The ID of the data store.
        :param image_set_id: The ID of the image set.
        """
        try:
            delete_results = self.medical_imaging_client.delete_image_set(
                imageSetId=image_set_id, datastoreId=datastore_id
            )
        except ClientError as err:
            logger.error(
                "Couldn't delete image set. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

- For API details, see the following topics in *AWS SDK for Python (Boto3) API Reference*.
  - DeleteImageSet
  - GetDICOMImportJob
  - GetImageFrame
  - GetImageSetMetadata
  - SearchImageSets
  - StartDICOMImportJob

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Tagging a HealthImaging data store using an AWS SDK

The following code examples show how to tag a HealthImaging data store.

Java

SDK for Java 2.x

To tag a data store.

```
                final String datastoreArn = "arn:aws:medical-imaging:us-east-1:123456789012:datastore/12345678901234567890123456789012";

                TagResource.tagMedicalImagingResource(medicalImagingClient, datastoreArn,
                                ImmutableMap.of("Deployment", "Development"));
```

The utility function for tagging a resource.

```
    public static void tagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Map<String, String> tags) {
        try {
            TagResourceRequest tagResourceRequest = TagResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .tags(tags)
                    .build();

            medicalImagingClient.tagResource(tagResourceRequest);

            System.out.println("Tags have been added to the resource.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

To list tags for a data store.

```
                final String datastoreArn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012";

                ListTagsForResourceResponse result =
 ListTagsForResource.listMedicalImagingResourceTags(
                                medicalImagingClient,
                                datastoreArn);
                if (result != null) {
                        System.out.println("Tags for resource: " +
 result.tags());
                }
```

The utility function for listing a resource's tags.

```
    public static ListTagsForResourceResponse
 listMedicalImagingResourceTags(MedicalImagingClient medicalImagingClient,
            String resourceArn) {
        try {
```

```
            ListTagsForResourceRequest listTagsForResourceRequest =
 ListTagsForResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .build();

            return
 medicalImagingClient.listTagsForResource(listTagsForResourceRequest);
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

To untag a data store.

```
                final String datastoreArn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012";

                UntagResource.untagMedicalImagingResource(medicalImagingClient,
 datastoreArn,
                                Collections.singletonList("Deployment"));
```

The utility function for untagging a resource.

```
    public static void untagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Collection<String> tagKeys) {
        try {
            UntagResourceRequest untagResourceRequest =
 UntagResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .tagKeys(tagKeys)
                    .build();

            medicalImagingClient.untagResource(untagResourceRequest);

            System.out.println("Tags have been removed from the resource.");
        } catch (MedicalImagingException e) {
```

```
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see the following topics in *AWS SDK for Java 2.x API Reference*.
  - ListTagsForResource
  - TagResource
  - UntagResource

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

To tag a data store.

```
  try {
    const datastoreArn =
      "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012";
    const tags = {
      Deployment: "Development",
    };
    await tagResource(datastoreArn, tags);
  } catch (e) {
    console.log(e);
  }
```

The utility function for tagging a resource.

```
import { TagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";
```

```
/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 * @param {Record<string,string>} tags - The tags to add to the resource as JSON.
 *                     - For example: {"Deployment" : "Development"}
 */
export const tagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tags = {},
) => {
  const response = await medicalImagingClient.send(
    new TagResourceCommand({ resourceArn: resourceArn, tags: tags }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //    }
  // }

  return response;
};
```

To list tags for a data store.

```
  try {
    const datastoreArn =
      "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012";
    const { tags } = await listTagsForResource(datastoreArn);
    console.log(tags);
  } catch (e) {
    console.log(e);
  }
```

The utility function for listing a resource's tags.

```
import { ListTagsForResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 */
export const listTagsForResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:abc:datastore/def/imageset/
ghi",
) => {
  const response = await medicalImagingClient.send(
    new ListTagsForResourceCommand({ resourceArn: resourceArn }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '008fc6d3-abec-4870-a155-20fa3631e645',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     tags: { Deployment: 'Development' }
  // }

  return response;
};
```

To untag a data store.

```
  try {
    const datastoreArn =
      "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012";
    const keys = ["Deployment"];
    await untagResource(datastoreArn, keys);
  } catch (e) {
    console.log(e);
```

```
}
```

The utility function for untagging a resource.

```
import { UntagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 * @param {string[]} tagKeys - The keys of the tags to remove.
 */
export const untagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tagKeys = [],
) => {
  const response = await medicalImagingClient.send(
    new UntagResourceCommand({ resourceArn: resourceArn, tagKeys: tagKeys }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //    }
  // }

  return response;
};
```

- For API details, see the following topics in *AWS SDK for JavaScript API Reference*.
  - ListTagsForResource
  - TagResource
  - UntagResource

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

Python

SDK for Python (Boto3)

To tag a data store.

```
    a_data_store_arn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012"

    medical_imaging_wrapper.tag_resource(data_store_arn, {"Deployment":
 "Development"})
```

The utility function for tagging a resource.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def tag_resource(self, resource_arn, tags):
        """
        Tag a resource.

        :param resource_arn: The ARN of the resource.
        :param tags: The tags to apply.
        """
        try:
            self.health_imaging_client.tag_resource(resourceArn=resource_arn,
 tags=tags)
        except ClientError as err:
            logger.error(
                "Couldn't tag resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
```

```
            raise
```

To list tags for a data store.

```
    a_data_store_arn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012"

    medical_imaging_wrapper.list_tags_for_resource(data_store_arn)
```

The utility function for listing a resource's tags.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_tags_for_resource(self, resource_arn):
        """
        List the tags for a resource.

        :param resource_arn: The ARN of the resource.
        :return: The list of tags.
        """
        try:
            tags = self.health_imaging_client.list_tags_for_resource(
                resourceArn=resource_arn
            )
        except ClientError as err:
            logger.error(
                "Couldn't list tags for resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
        else:
            return tags["tags"]
```

To untag a data store.

```
    a_data_store_arn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012"

    medical_imaging_wrapper.untag_resource(data_store_arn, ["Deployment"])
```

The utility function for untagging a resource.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def untag_resource(self, resource_arn, tag_keys):
        """
        Untag a resource.

        :param resource_arn: The ARN of the resource.
        :param tag_keys: The tag keys to remove.
        """
        try:
            self.health_imaging_client.untag_resource(
                resourceArn=resource_arn, tagKeys=tag_keys
            )
        except ClientError as err:
            logger.error(
                "Couldn't untag resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see the following topics in *AWS SDK for Python (Boto3) API Reference*.

- ListTagsForResource
- TagResource
- UntagResource

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Tagging a HealthImaging image set using an AWS SDK

The following code examples show how to tag a HealthImaging image set.

Java

SDK for Java 2.x

To tag an image set.

```
                final String imageSetArn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/12345678901234567890123456789012";

                TagResource.tagMedicalImagingResource(medicalImagingClient,
 imageSetArn,
                                ImmutableMap.of("Deployment", "Development"));
```

The utility function for tagging a resource.

```
    public static void tagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Map<String, String> tags) {
        try {
            TagResourceRequest tagResourceRequest = TagResourceRequest.builder()
```

```
                    .resourceArn(resourceArn)
                    .tags(tags)
                    .build();

            medicalImagingClient.tagResource(tagResourceRequest);

            System.out.println("Tags have been added to the resource.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

To list tags for an image set.

```
                final String imageSetArn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/12345678901234567890123456789012";

                ListTagsForResourceResponse result =
 ListTagsForResource.listMedicalImagingResourceTags(
                                medicalImagingClient,
                                imageSetArn);
                if (result != null) {
                        System.out.println("Tags for resource: " +
 result.tags());
                }
```

The utility function for listing a resource's tags.

```
    public static ListTagsForResourceResponse
 listMedicalImagingResourceTags(MedicalImagingClient medicalImagingClient,
            String resourceArn) {
        try {
            ListTagsForResourceRequest listTagsForResourceRequest =
 ListTagsForResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .build();

            return
 medicalImagingClient.listTagsForResource(listTagsForResourceRequest);
```

```
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }

        return null;
    }
```

To untag an image set.

```
                final String imageSetArn = "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/12345678901234567890123456789012";

                UntagResource.untagMedicalImagingResource(medicalImagingClient,
 imageSetArn,
                                Collections.singletonList("Deployment"));
```

The utility function for untagging a resource.

```
    public static void untagMedicalImagingResource(MedicalImagingClient
 medicalImagingClient,
            String resourceArn,
            Collection<String> tagKeys) {
        try {
            UntagResourceRequest untagResourceRequest =
 UntagResourceRequest.builder()
                    .resourceArn(resourceArn)
                    .tagKeys(tagKeys)
                    .build();

            medicalImagingClient.untagResource(untagResourceRequest);

            System.out.println("Tags have been removed from the resource.");
        } catch (MedicalImagingException e) {
            System.err.println(e.awsErrorDetails().errorMessage());
            System.exit(1);
        }
    }
```

- For API details, see the following topics in *AWS SDK for Java 2.x API Reference*.
  - ListTagsForResource
  - TagResource
  - UntagResource

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

JavaScript

SDK for JavaScript (v3)

To tag an image set.

```
  try {
    const imagesetArn =
      "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/12345678901234567890123456789012";
    const tags = {
      Deployment: "Development",
    };
    await tagResource(imagesetArn, tags);
  } catch (e) {
    console.log(e);
  }
```

The utility function for tagging a resource.

```
import { TagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 * @param {Record<string,string>} tags - The tags to add to the resource as JSON.
```

```
 *                     - For example: {"Deployment" : "Development"}
 */
export const tagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tags = {},
) => {
  const response = await medicalImagingClient.send(
    new TagResourceCommand({ resourceArn: resourceArn, tags: tags }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //    }
  // }

  return response;
};
```

To list tags for an image set.

```
  try {
    const imagesetArn =
      "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/12345678901234567890123456789012";
    const { tags } = await listTagsForResource(imagesetArn);
    console.log(tags);
  } catch (e) {
    console.log(e);
  }
```

The utility function for listing a resource's tags.

```
import { ListTagsForResourceCommand } from "@aws-sdk/client-medical-imaging";
```

```
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 */
export const listTagsForResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:abc:datastore/def/imageset/
ghi",
) => {
  const response = await medicalImagingClient.send(
    new ListTagsForResourceCommand({ resourceArn: resourceArn }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //         httpStatusCode: 200,
  //         requestId: '008fc6d3-abec-4870-a155-20fa3631e645',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //     },
  //     tags: { Deployment: 'Development' }
  // }

  return response;
};
```

To untag an image set.

```
  try {
    const imagesetArn =
      "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/
imageset/12345678901234567890123456789012";
    const keys = ["Deployment"];
    await untagResource(imagesetArn, keys);
  } catch (e) {
    console.log(e);
  }
```

The utility function for untagging a resource.

```
import { UntagResourceCommand } from "@aws-sdk/client-medical-imaging";
import { medicalImagingClient } from "../libs/medicalImagingClient.js";

/**
 * @param {string} resourceArn - The Amazon Resource Name (ARN) for the data
 store or image set.
 * @param {string[]} tagKeys - The keys of the tags to remove.
 */
export const untagResource = async (
  resourceArn = "arn:aws:medical-imaging:us-east-1:xxxxxx:datastore/xxxxx/
imageset/xxx",
  tagKeys = [],
) => {
  const response = await medicalImagingClient.send(
    new UntagResourceCommand({ resourceArn: resourceArn, tagKeys: tagKeys }),
  );
  console.log(response);
  // {
  //     '$metadata': {
  //        httpStatusCode: 204,
  //         requestId: '8a6de9a3-ec8e-47ef-8643-473518b19d45',
  //         extendedRequestId: undefined,
  //         cfId: undefined,
  //         attempts: 1,
  //         totalRetryDelay: 0
  //    }
  // }

  return response;
};
```

- For API details, see the following topics in *AWS SDK for JavaScript API Reference*.
  - ListTagsForResource
  - TagResource
  - UntagResource

Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](https://github.com/awsdocs/aws-doc-sdk-examples).

Python

SDK for Python (Boto3)

To tag an image set.

```
    an_image_set_arn = (
        "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/"
        "imageset/12345678901234567890123456789012"
    )

    medical_imaging_wrapper.tag_resource(image_set_arn, {"Deployment":
 "Development"})
```

The utility function for tagging a resource.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def tag_resource(self, resource_arn, tags):
        """
        Tag a resource.

        :param resource_arn: The ARN of the resource.
        :param tags: The tags to apply.
        """
        try:
            self.health_imaging_client.tag_resource(resourceArn=resource_arn,
 tags=tags)
        except ClientError as err:
            logger.error(
                "Couldn't tag resource. Here's why: %s: %s",
```

```
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

To list tags for an image set.

```
    an_image_set_arn = (
        "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/"
        "imageset/12345678901234567890123456789012"
    )

    medical_imaging_wrapper.list_tags_for_resource(image_set_arn)
```

The utility function for listing a resource's tags.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def list_tags_for_resource(self, resource_arn):
        """
        List the tags for a resource.

        :param resource_arn: The ARN of the resource.
        :return: The list of tags.
        """
        try:
            tags = self.health_imaging_client.list_tags_for_resource(
                resourceArn=resource_arn
            )
        except ClientError as err:
            logger.error(
                "Couldn't list tags for resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

```
        else:
            return tags["tags"]
```

To untag an image set.

```
    an_image_set_arn = (
        "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/12345678901234567890123456789012/"
        "imageset/12345678901234567890123456789012"
    )

    medical_imaging_wrapper.untag_resource(image_set_arn, ["Deployment"])
```

The utility function for untagging a resource.

```
class MedicalImagingWrapper:
    def __init__(self, health_imaging_client):
        self.health_imaging_client = health_imaging_client


    def untag_resource(self, resource_arn, tag_keys):
        """
        Untag a resource.

        :param resource_arn: The ARN of the resource.
        :param tag_keys: The tag keys to remove.
        """
        try:
            self.health_imaging_client.untag_resource(
                resourceArn=resource_arn, tagKeys=tag_keys
            )
        except ClientError as err:
            logger.error(
                "Couldn't untag resource. Here's why: %s: %s",
                err.response["Error"]["Code"],
                err.response["Error"]["Message"],
            )
            raise
```

The following code instantiates the MedicalImagingWrapper object.

```
    client = boto3.client("medical-imaging")
    medical_imaging_wrapper = MedicalImagingWrapper(client)
```

- For API details, see the following topics in *AWS SDK for Python (Boto3) API Reference*.
  - ListTagsForResource
  - TagResource
  - UntagResource

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

For a complete list of AWS SDK developer guides and code examples, see Using this service with an AWS SDK. This topic also includes information about getting started and details about previous SDK versions.

Monitoring AWS HealthImaging

Monitoring and logging are important parts of maintaining the security, reliability, availability, and performance of AWS HealthImaging. AWS provides the following logging and monitoring tools to watch HealthImaging, report when something is wrong, and take automatic actions when appropriate:

- *AWS CloudTrail* captures API calls and related events made by or on behalf of your AWS account and delivers the log files to an Amazon S3 bucket that you specify. You can identify which users and accounts called AWS, the source IP address from which the calls were made, and when the calls occurred. For more information, see the AWS CloudTrail User Guide.
- *Amazon CloudWatch* monitors your AWS resources and the applications you run on AWS in real time. You can collect and track metrics, create customized dashboards, and set alarms that notify you or take actions when a specified metric reaches a threshold that you specify. For example, you can have CloudWatch track CPU usage or other metrics of your Amazon EC2 instances and automatically launch new instances when needed. For more information, see the Amazon CloudWatch User Guide.
- *Amazon EventBridge* is a serverless event bus service that makes it easy to connect your applications with data from a variety of sources. EventBridge delivers a stream of real-time data from your own applications, Software-as-a-Service (SaaS) applications, and AWS services and routes that data to targets such as Lambda. This enables you to monitor events that happen in services, and build event-driven architectures. For more information, see the Amazon EventBridge User Guide.

Topics

Using AWS CloudTrail with HealthImaging

AWS HealthImaging is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in HealthImaging. CloudTrail captures all API calls for HealthImaging as events. The calls captured include calls from the HealthImaging console and code calls to the HealthImaging API operations. If you create a trail, you can turn on continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for HealthImaging. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in **Event history**. Using the information collected by CloudTrail, you can determine the request that was made to HealthImaging, the IP address from which the request was made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, see the AWS CloudTrail User Guide.

Creating a trail

CloudTrail is turned on for your AWS account when you create the account. When activity occurs in HealthImaging, that activity is recorded in a CloudTrail event along with other AWS service events in **Event history**. You can view, search, and download recent events in your AWS account. For more information, see Viewing events with CloudTrail Event history.

> **Note**
>
> To view CloudTrail event history for AWS HealthImaging in the AWS Management Console, go to the **Lookup attributes** menu, select **Event source**, and choose `medical-imaging.amazonaws.com`.

For an ongoing record of events in your AWS account, including events for HealthImaging, create a trail. A *trail* enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all AWS Regions. The trail logs events from all Regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see the following:

- Overview for creating a trail
- CloudTrail supported services and integrations
- Configuring Amazon SNS notifications for CloudTrail
- Receiving CloudTrail log files from multiple regions and Receiving CloudTrail log files from multiple accounts

> **Note**
>
> AWS HealthImaging supports two types of CloudTrail events — **management events** and **data events**. Management events are the general events that every AWS service generates, including HealthImaging. By default, logging is applied to management events for every HealthImaging API call that has it enabled. Data events are billable and generally reserved for APIs that have high transactions per second (tps), so you can opt out of having CloudTrail logs for cost purposes.
>
> With HealthImaging, all native API actions listed in the *AWS HealthImaging API Reference* are classified as management events with the exception of `GetImageFrame`. The `GetImageFrame` action is onboarded with CloudTrail as a data event and therefore must be enabled. For more information, see Logging data events in the *AWS CloudTrail User Guide*.
>
> DICOMweb WADO-RS API actions are classified as data events in CloudTrail, therefore, you must opt-in to them. For more information, see Retrieving DICOM data from HealthImaging and Logging data events in the *AWS CloudTrail User Guide*.

Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or AWS Identity and Access Management (IAM) user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.
- Whether the request was made by another AWS service.

For more information, see the CloudTrail `userIdentity` element.

Understanding log entries

A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files aren't an ordered stack trace of the public API calls, so they don't appear in any specific order.

The following example shows a CloudTrail log entry for HealthImaging that demonstrates the `GetDICOMImportJob` action.


```
{
    "eventVersion": "1.08",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "XXXXXXXXXXXXXXXXXXXXX:ce6d90ba-5fba-4456-a7bc-f9bc877597c3",
        "arn": "arn:aws:sts::123456789012:assumed-role/TestAccessRole/
ce6d90ba-5fba-4456-a7bc-f9bc877597c3"
        "accountId": "123456789012",
        "accessKeyId": "XXXXXXXXXXXXXXXXXXXX",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "XXXXXXXXXXXXXXXXXXXXX",
                "arn": "arn:aws:iam::123456789012:role/TestAccessRole",
                "accountId": "123456789012",
                "userName": "TestAccessRole"
            },
            "webIdFederationData": {},
            "attributes": {
                "creationDate": "2022-10-28T15:52:42Z",
                "mfaAuthenticated": "false"
            }
        }
    },
    "eventTime": "2022-10-28T16:02:30Z",
    "eventSource": "medical-imaging.amazonaws.com",
    "eventName": "GetDICOMImportJob",
    "awsRegion": "us-east-1",
    "sourceIPAddress": "192.0.2.0",
    "userAgent": "aws-sdk-java/2.18.1 Linux/5.4.209-129.367.amzn2int.x86_64 OpenJDK_64-
Bit_Server_VM/11.0.17+9-LTS Java/11.0.17 vendor/Amazon.com_Inc. md/internal io/sync
 http/Apache cfg/retry-mode/standard",
    "requestParameters": {
        "jobId": "5d08d05d6aab2a27922d6260926077d4",
        "datastoreId": "12345678901234567890123456789012"
    },
    "responseElements": null,
    "requestID": "922f5304-b39f-4034-9d2e-f062de092a44",
    "eventID": "26307f73-07f4-4276-b379-d362aa303b22",
    "readOnly": true,
```

```
    "eventType": "AwsApiCall",
    "managementEvent": true,
    "recipientAccountId": "824333766656",
    "eventCategory": "Management"
}
```

Using Amazon CloudWatch with HealthImaging

You can monitor AWS HealthImaging using CloudWatch, which collects raw data and processes it into readable, near real-time metrics. These statistics are kept for 15 months, so you can use that historical information and gain a better perspective on how your web application or service is performing. You can also set alarms that watch for certain thresholds, and send notifications or take actions when those thresholds are met. For more information, see the Amazon CloudWatch User Guide.

HealthImaging publishes the following types of metrics to CloudWatch, in the `AWS/HealthImaging` namespace:

- **API metrics** - Call counts for HealthImaging API operations
- **HealthImaging metrics** - Data store and account-level resource usage

> **Note**
>
> - Metrics are reported for most HealthImaging APIs.
> - HealthImaging metrics are only available for data stores created after February 9, 2026, or by filing a support Case.

AWS HealthImaging API Metrics

The following tables list the metrics and dimensions for HealthImaging. Each is presented as a frequency count for a user-specified data range.

Metric

Metrics	Description
`CallCount`	The number of calls to APIs. This can be reported either for the account or a specified data store. Units: Count Valid Statistics: Sum, Count Dimensions: Operation, data store ID, data store type

You can get metrics for HealthImaging with the AWS Management Console, the AWS CLI, or the CloudWatch API. You can use the CloudWatch API through one of the Amazon AWS Software Development Kits (SDKs) or the CloudWatch API tools. The HealthImaging console displays graphs based on the raw data from the CloudWatch API.

You must have the appropriate CloudWatch permissions to monitor HealthImaging with CloudWatch. For more information, see [Identity and access management for CloudWatch] in the *CloudWatch User Guide*.

AWS HealthImaging Metrics

The `AWS/HealthImaging` namespace includes the following metrics at the account and data store levels.

Account-Level Metrics

Account-level metrics provide aggregated visibility across all data stores in your account.

Account-Level Metrics

Metric	Description
`DataStoreCount`	The number of data stores with active status. Units: Count

Metric	Description
	Valid statistics: Sum, Average
`ImageSetCount`	The total number of image sets across all data stores. Units: Count Valid statistics: Sum, Average
`StorageBytes`	The amount of data in bytes stored across all data stores in the following storage tiers: • Frequent Access (`FrequentAccessStorage`) • Archive Instant Access (`ArchiveInstantAccessStorage`) This value is calculated by summing the size of all image sets in all data stores. Valid storage-tier filters (See the [`StorageTier`] dimension): • `FrequentAccessStorage` • `ArchiveInstantAccessStorage` • `AllStorage` Units: Bytes Valid statistics: Sum, Average

Data Store-Level Metrics

Data store-level metrics provide detailed visibility into individual data store.

Data Store-Level Metrics

Metric	Description
`TotalImageSetCount`	The total number of image sets in the data store. Units: Count Valid statistics: Sum, Average
`PrimaryImageSetCount`	The number of primary image sets in the datastore. Units: Count Valid statistics: Sum, Average
`SmallImageSetCount`	The number of image sets less than 5MB in the datastore. Units: Count Valid statistics: Sum, Average
`StorageBytes`	The amount of data in bytes stored across all data stores in the following storage tiers: • Frequent Access (`FrequentAccessStorage`) • Archive Instant Access (`ArchiveInstantAccessStorage`) This value is calculated by summing the size of all image sets in the data store. Valid storage-tier filters (See the [`StorageTier`] dimension): • FrequentAccessStorage

Metric	Description
	• ArchiveInstantAccessStorage • AllStorage Units: Bytes Valid statistics: Sum, Average
`DICOMStudyCount`	The number of DICOM studies in the datastore . Units: Count Valid statistics: Sum, Average
`DICOMSeriesCount`	The number of DICOM series in the datastore. Units: Count Valid statistics: Sum, Average
`DICOMInstanceCount`	The number of DICOM instances in the datastore. Units: Count Valid statistics: Sum, Average
`StructuredStorageBytes`	The amount of structured storage in bytes indexed by the data store. Units: Bytes Valid statistics: Sum, Average

HealthImaging Dimensions in CloudWatch

The following dimensions are used to filter HealthImaging metrics.

Dimensions

Dimension	Description
`AccountId`	This dimension filters the data for the identifie d AWS account.
`DatastoreId`	This dimension filters the data for the identifie d data store only.
`StorageTier`	This dimension filters the data by the following storage tiers: • `FrequentAccessStorage` – The number of bytes used for image sets in Frequent Access storage. • `ArchiveInstantAccessStorage` – The number of bytes used for image sets in Archive Instant Access storage. • `AllStorage` – The total number of bytes across all storage tiers.

Accessing HealthImaging Metrics

You can access HealthImaging metrics using:

- **AWS Management Console** - View metrics in the CloudWatch console
- **AWS CLI** - Use CloudWatch CLI commands
- **CloudWatch API** - Access through AWS SDKs or CloudWatch API tools

You must have the appropriate permissions to monitor HealthImaging with CloudWatch. For more information, see Identity and access management for CloudWatch in the *CloudWatch User Guide*.

Setting Up HealthImaging Metrics

To receive HealthImaging metrics in your CloudWatch account, you need to create a service-linked role that allows HealthImaging to publish metrics on your behalf. See Using service-linked roles for HealthImaging for details on how to create a service-linked role.

Viewing HealthImaging Metrics

To view metrics (CloudWatch console)

1. Sign in to the AWS Management Console and open the CloudWatch console.
2. Choose **Metrics**, choose **All Metrics**, and then choose **`AWS/HealthImaging`**.
3. Choose the dimension:
   - **By Account Id** - View account-level metrics
   - **By Datastore Id** - View data store-level metrics
4. Choose a metric name, then choose **Add to graph**.
5. Choose a value for the date range, and the metric count will be displayed.

Creating an alarm using CloudWatch

A CloudWatch alarm watches a single metric over a specified time period, and performs one or more actions: sending a notification to an Amazon Simple Notification Service (Amazon SNS) topic or Auto Scaling policy. The action or actions are based on the value of the metric relative to a given threshold over a number of time periods that you specify. CloudWatch can also send you an Amazon SNS message when the alarm changes state.

CloudWatch alarms invoke actions only when the state changes and has persisted for the period you specify. For more information, see Using CloudWatch alarms.

Using Amazon EventBridge with HealthImaging

Amazon EventBridge is a serverless service that uses events to connect application components together, making it easier for you to build scalable event-driven applications. The basis of EventBridge is to create rules that route events to targets. AWS HealthImaging provides durable delivery of state changes to EventBridge. For more information, see What is Amazon EventBridge? in the *Amazon EventBridge User Guide*.

Topics

HealthImaging events sent to EventBridge

The following table lists all HealthImaging events sent to EventBridge for processing.

HealthImaging event type	State
Data store events	
Data Store Creating	CREATING
Data Store Creation Failed	CREATE_FAILED
Data Store Created	ACTIVE
Data Store Deleting	DELETING
Data Store Deleted	DELETED
For more information, see datastoreStatus in the *AWS HealthImaging API Reference.*	
Import job events	
Import Job Submitted	SUBMITTED
Import Job In Progress	IN_PROGRESS
Import Job Completed	COMPLETED
Import Job Failed	FAILED
For more information, see jobStatus in the *AWS HealthImaging API Reference.*	
Image set events	
Image Set Created	CREATED

HealthImaging event type	State
Image Set Copying	COPYING
Image Set Copying With Read Only Access	COPYING_WITH_READ_ONLY_ACCESS
Image Set Copied	COPIED
Image Set Copy Failed	COPY_FAILED
Image Set Updating	UPDATING
Image Set Updated	UPDATED
Image Set Update Failed	UPDATE_FAILED
Image Set Deleting	DELETING
Image Set Deleted	DELETED
For more information, see ImageSetWorkflowStatus in the *AWS HealthImaging API Reference.*	

HealthImaging event structure and examples

HealthImaging events are objects with JSON structure that also contain metadata details. You can use the metadata as input to either recreate an event or learn more information. All associated metadata fields are listed in a table under the code examples in the following menus. For more information, see Event structure reference in the *Amazon EventBridge User Guide*.

> **Note**
>
> The `source` attribute for HealthImaging event structures is `aws.medical-imaging`.

Data store events

Data Store Creating

State - CREATING

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Data Store Creating",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "datastoreName": "test",
        "datastoreStatus": "CREATING"
    }
}
```


Data Store Creation Failed

State - CREATE_FAILED


```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Data Store Creation Failed",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "datastoreName": "test",
        "datastoreStatus": "CREATE_FAILED"
    }
}
```


Data Store Created

State - ACTIVE

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Data Store Created",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "datastoreName": "test",
        "datastoreStatus": "ACTIVE"
    }
}
```

Data Store Deleting

State - DELETING

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Data Store Deleting",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "datastoreName": "test",
        "datastoreStatus": "DELETING"
    }
}
```

Data Store Deleted

State - DELETED

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Data Store Deleted",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "datastoreName": "test",
        "datastoreStatus": "DELETED"
    }
}
```

Data store events - metadata descriptions

Name	Type	Description
version	string	The EventBridge event schema version.
id	string	The Version 4 UUID generated for every event.
detail-type	string	The type of event that is being sent.
source	string	Identifies the service that generated the event.
account	string	The 12-digit AWS account ID of the data store owner.
time	string	The time the event occurred.

Name	Type	Description
`region`	string	Identifies the AWS Region of the data store.
`resources`	array (string)	A JSON array that contains the ARN of the data store.
`detail`	object	A JSON object that contains information about the event.
`detail.imagingVersion`	string	The version ID that tracks changes to HealthImaging's event detail schema.
`detail.datastoreId`	string	The data store ID associated with the status change event.
`detail.datastoreName`	string	The data store name.
`detail.datastoreStatus`	string	The current data store status.

Import job events

Import Job Submitted

State - `SUBMITTED`

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Import Job Submitted",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
```

```
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "jobId": "a6a1d220f152e7aab6d8925d995d8b76",
        "jobName": "test_only_1",
        "jobStatus": "SUBMITTED",
        "inputS3Uri": "s3://healthimaging-test-bucket/input/",
        "outputS3Uri": "s3://healthimaging-test-bucket/output/"
    }
}
```

Import Job In Progress

State - IN_PROGRESS

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Import Job In Progress",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "jobId": "a6a1d220f152e7aab6d8925d995d8b76",
        "jobName": "test_only_1",
        "jobStatus": "IN_PROGRESS",
        "inputS3Uri": "s3://healthimaging-test-bucket/input/",
        "outputS3Uri": "s3://healthimaging-test-bucket/output/"
    }
}
```

Import Job Completed

State - COMPLETED

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Import Job Completed",
```

```
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "jobId": "a6a1d220f152e7aab6d8925d995d8b76",
        "jobName": "test_only_1",
        "jobStatus": "COMPLETED",
        "inputS3Uri": "s3://healthimaging-test-bucket/input/",
        "outputS3Uri": "s3://healthimaging-test-bucket/output/"
    }
}
```

Import Job Failed

State - FAILED

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Import Job Failed",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:111122223333:datastore/
bbc4f3cccbae4095a34170fddc19b13d"],
    "detail": {
        "imagingVersion": "1.0",
        "datastoreId" : "bbc4f3cccbae4095a34170fddc19b13d",
        "jobId": "a6a1d220f152e7aab6d8925d995d8b76",
        "jobName": "test_only_1",
        "jobStatus": "FAILED",
        "inputS3Uri": "s3://healthimaging-test-bucket/input/",
        "outputS3Uri": "s3://healthimaging-test-bucket/output/"
    }
}
```

Import job events - metadata descriptions

Name	Type	Description
`version`	string	The EventBridge event schema version.
`id`	string	The Version 4 UUID generated for every event.
`detail-type`	string	The type of event that is being sent.
`source`	string	Identifies the service that generated the event.
`account`	string	The 12-digit AWS account ID of the data store owner.
`time`	string	The time the event occurred.
`region`	string	Identifies the AWS Region of the data store.
`resources`	array (string)	A JSON array that contains the ARN of the data store.
`detail`	object	A JSON object that contains information about the event.
`detail.imagingVersion`	string	The version ID that tracks changes to HealthImaging's event detail schema.
`detail.datastoreId`	string	The data store that generated the status change event.
`detail.jobId`	string	The import job ID associated with the status change event.

Name	Type	Description
`detail.jobName`	string	The import job name.
`detail.jobStatus`	string	The current job status.
`detail.inputS3Uri`	string	The input prefix path for the S3 bucket that contains the DICOM files to be imported.
`detail.outputS3Uri`	string	The output prefix of the S3 bucket where the results of the DICOM import job will be uploaded.

Image set events

Image Set Created

State - CREATED

```
{
   "version": "0",
   "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
   "detail-type": "Image Set Created",
   "source": "aws.medical-imaging",
   "account": "111122223333",
   "time": "2024-03-14T00:01:00Z",
   "region": "us-west-2",
   "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
   "detail": {
      "imagingVersion": "1.0",
      "isPrimary": true,
      "imageSetVersion": "1",
      "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
      "imagesetId": "5b3a711878c34d40e888253319388649",
      "imageSetState": "ACTIVE",
      "imageSetWorkflowStatus": "CREATED"
   }
```

```
}
```

Image Set Copying

State - COPYING


```
{
   "version": "0",
   "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
   "detail-type": "Image Set Copying",
   "source": "aws.medical-imaging",
   "account": "111122223333",
   "time": "2024-03-14T00:01:00Z",
   "region": "us-west-2",
   "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
   "detail": {
      "imagingVersion": "1.0",
      "isPrimary": true,
      "imageSetVersion": "1",
      "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
      "imagesetId": "5b3a711878c34d40e888253319388649",
      "imageSetState": "LOCKED",
      "imageSetWorkflowStatus": "COPYING",
      "sourceImageSetArn": "arn:aws:medical-imaging:us-
west-2:147997158357:datastore/c381ee9b9ef34902a45b476dd7be068b/
imageset/0309de3674fd551fa7ddd2880b21f990"
   }
}
```


Image Set Copying With Read Only Access

State - COPYING_WITH_READ_ONLY_ACCESS


```
{
   "version": "0",
   "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
   "detail-type": "Image Set Copying With Read Only Access",
   "source": "aws.medical-imaging",
   "account": "111122223333",
   "time": "2024-03-14T00:01:00Z",
   "region": "us-west-2",
```

```
    "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
    "detail": {
        "imagingVersion": "1.0",
        "isPrimary": true,
        "imageSetVersion": "1",
        "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
        "imagesetId": "5b3a711878c34d40e888253319388649",
        "imageSetState": "LOCKED",
        "imageSetWorkflowStatus": "COPYING_WITH_READ_ONLY_ACCESS"
    }
}
```

Image Set Copied

State - COPIED

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Image Set Copied",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
    "detail": {
        "imagingVersion": "1.0",
        "isPrimary": true,
        "imageSetVersion": "1",
        "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
        "imagesetId": "5b3a711878c34d40e888253319388649",
        "imageSetState": "ACTIVE",
        "imageSetWorkflowStatus": "COPIED"
    }
}
```

Image Set Copy Failed

State - COPY_FAILED

```
{
```

```
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Image Set Copy Failed",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
    "detail": {
        "imagingVersion": "1.0",
        "isPrimary": true,
        "imageSetVersion": "1",
        "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
        "imagesetId": "5b3a711878c34d40e888253319388649",
        "imageSetState": "ACTIVE",
        "imageSetWorkflowStatus": "COPY_FAILED"
    }
}
```

Image Set Updating

State - UPDATING

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Image Set Updating",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
    "detail": {
        "imagingVersion": "1.0",
        "isPrimary": true,
        "imageSetVersion": "1",
        "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
        "imagesetId": "5b3a711878c34d40e888253319388649",
        "imageSetState": "LOCKED",
        "imageSetWorkflowStatus": "UPDATING"
    }
```

```
}
```

Image Set Updated

State - UPDATED

```
{
   "version": "0",
   "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
   "detail-type": "Image Set Updated",
   "source": "aws.medical-imaging",
   "account": "111122223333",
   "time": "2024-03-14T00:01:00Z",
   "region": "us-west-2",
   "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
   "detail": {
      "imagingVersion": "1.0",
      "isPrimary": true,
      "imageSetVersion": "1",
      "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
      "imagesetId": "5b3a711878c34d40e888253319388649",
      "imageSetState": "ACTIVE",
      "imageSetWorkflowStatus": "UPDATED"
   }
}
```

Image Set Update Failed

State - UPDATE_FAILED

```
{
   "version": "0",
   "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
   "detail-type": "Image Set Update Failed",
   "source": "aws.medical-imaging",
   "account": "111122223333",
   "time": "2024-03-14T00:01:00Z",
   "region": "us-west-2",
   "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
   "detail": {
      "imagingVersion": "1.0",
```

```
        "isPrimary": true,
        "imageSetVersion": "1",
        "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
        "imagesetId": "5b3a711878c34d40e888253319388649",
        "imageSetState": "ACTIVE",
        "imageSetWorkflowStatus": "UPDATE_FAILED"
    }
}
```

Image Set Deleting

State - DELETING

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Image Set Deleting",
    "source": "aws.medical-imaging",
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
    "detail": {
        "imagingVersion": "1.0",
        "isPrimary": true,
        "imageSetVersion": "1",
        "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
        "imagesetId": "5b3a711878c34d40e888253319388649",
        "imageSetState": "LOCKED",
        "imageSetWorkflowStatus": "DELETING"
    }
}
```

Image Set Deleted

State - DELETED

```
{
    "version": "0",
    "id": "7cf0fb1c-8720-4d48-baa3-6eb97b35a10e",
    "detail-type": "Image Set Deleted",
    "source": "aws.medical-imaging",
```

```
    "account": "111122223333",
    "time": "2024-03-14T00:01:00Z",
    "region": "us-west-2",
    "resources": ["arn:aws:medical-imaging:us-west-2:846006145877:datastore/
bbc4f3cccbae4095a34170fddc19b13d/imageset/207284eef860ac01c4b2a8de27a6fc11"],
    "detail": {
        "imagingVersion": "1.0",
        "isPrimary": true,
        "imageSetVersion": "1",
        "datastoreId": "bbc4f3cccbae4095a34170fddc19b13d",
        "imagesetId": "5b3a711878c34d40e888253319388649",
        "imageSetState": "DELETED",
        "imageSetWorkflowStatus": "DELETED"
    }
}
```

Image set events - metadata descriptions

Name	Type	Description
`version`	string	The EventBridge event schema version.
`id`	string	The Version 4 UUID generated for every event.
`detail-type`	string	The type of event that is being sent.
`source`	string	Identifies the service that generated the event.
`account`	string	The 12-digit AWS account ID of the data store owner.
`time`	string	The time the event occurred.
`region`	string	Identifies the AWS Region of the data store.

Name	Type	Description
`resources`	array (string)	A JSON array that contains the ARN of the image set.
`detail`	object	A JSON object that contains information about the event.
`detail.imagingVersion`	string	The version ID that tracks changes to HealthImaging's event detail schema.
`detail.isPrimary`	boolean	Indicates whether the imported data was successfully organized into the managed hierarchy or if there are metadata conflicts that need to be resolved.
`detail.imageSetVersion`	string	The image set version will be incremented when an instance is imported more than once. The latest version will overwrite any older version stored within a primary image set.
`detail.datastoreId`	string	The data store ID that generated the status change event.
`detail.imagesetId`	string	The image set ID associated with the status change event.
`detail.imageSetState`	string	The current image set state.
`detail.imageSetWorkflowStatus`	string	The current image set workflow status.

Security in AWS HealthImaging

Cloud security at AWS is the highest priority. As an AWS customer, you benefit from data centers and network architectures that are built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between AWS and you. The shared responsibility model describes this as security *of* the cloud and security *in* the cloud:

- **Security of the cloud** – AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the AWS Compliance Programs. To learn about the compliance programs that apply to AWS HealthImaging, see AWS Services in Scope by Compliance Program.
- **Security in the cloud** – Your responsibility is determined by the AWS service that you use. You are also responsible for other factors including the sensitivity of your data, your company's requirements, and applicable laws and regulations.

This documentation helps you understand how to apply the shared responsibility model when using HealthImaging. The following topics show you how to configure HealthImaging to meet your security and compliance objectives. You also learn how to use other AWS services that help you to monitor and secure your HealthImaging resources.

Topics

Data protection in AWS HealthImaging

The AWS shared responsibility model applies to data protection in AWS HealthImaging. As described in this model, AWS is responsible for protecting the global infrastructure that runs all of the AWS Cloud. You are responsible for maintaining control over your content that is hosted on this infrastructure. You are also responsible for the security configuration and management tasks for the AWS services that you use. For more information about data privacy, see Data Privacy FAQ. For information about data protection in Europe, see the General Data Protection Regulation (GDPR) Center.

For data protection purposes, we recommend that you protect AWS account credentials and set up individual users with AWS IAM Identity Center or AWS Identity and Access Management (IAM). That way, each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with AWS resources. We require TLS 1.2 and recommend TLS 1.3.
- Set up API and user activity logging with AWS CloudTrail. For information about using CloudTrail trails to capture AWS activities, see Working with CloudTrail trails in the *AWS CloudTrail User Guide*.
- Use AWS encryption solutions, along with all default security controls within AWS services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing sensitive data that is stored in Amazon S3.
- If you require FIPS 140-3 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see Federal Information Processing Standard (FIPS) 140-3.

We strongly recommend that you never put confidential or sensitive information, such as your customers' email addresses, into tags or free-form text fields such as a **Name** field. This includes when you work with HealthImaging or other AWS services using the console, API, AWS CLI, or AWS SDKs. Any data that you enter into tags or free-form text fields used for names may be used for billing or diagnostic logs. If you provide a URL to an external server, we strongly recommend that you do not include credentials information in the URL to validate your request to that server.

Topics

- Data encryption
- Network traffic privacy

Data encryption

With AWS HealthImaging, you can add a layer of security to your data at rest in the cloud, providing scalable and efficient encryption features. These include:

- Data at rest encryption capabilities available in most AWS services
- Flexible key management options, including AWS Key Management Service, with which you can choose whether to have AWS manage the encryption keys or to keep complete control over your own keys.
- AWS owned AWS KMS encryption keys
- Encrypted message queues for the transmission of sensitive data using server-side encryption (SSE) for Amazon SQS

In addition, AWS provides APIs for you to integrate encryption and data protection with any of the services you develop or deploy in an AWS environment.

Encryption at rest

By default, HealthImaging encrypts customer data at rest using a service-owned AWS Key Management Service key. Optionally, you can configure HealthImaging to encrypt data at rest using a symmetric customer-managed AWS KMS key that you create, own, and manage. For more information, see Create a symmetric encryption KMS key in the *AWS Key Management Service Developer Guide*.

Encryption in transit

HealthImaging uses TLS 1.2 to encrypt data in transit through the public endpoint and through backend services.

Key management

AWS KMS keys (KMS keys) are the primary resource in AWS Key Management Service. You can also generate data keys for use outside of AWS KMS.

AWS owned KMS key

HealthImaging uses these keys by default to automatically encrypt potentially sensitive information such as personally identifiable or Private Health Information (PHI) data at rest. AWS owned KMS keys aren't stored in your account. They're part of a collection of KMS keys that AWS owns and manages for use in multiple AWS accounts. AWS services can use AWS owned KMS keys to protect your data. You can't view, manage, use AWS owned KMS keys, or audit their use. However, you don't need to do any work or change any programs to protect the keys that encrypt your data.

You're not charged a monthly fee or a usage fee if you use AWS owned KMS keys, and they don't count against AWS KMS quotas for your account. For more information, see AWS owned keys in the *AWS Key Management Service Developer Guide*.

Customer managed KMS keys

If you want full control over AWS KMS lifecycle and usage, HealthImaging supports the use of a symmetric customer-managed KMS key that you create, own, and manage. Because you have full control of this layer of encryption, you can perform such tasks as:

- Establishing and maintaining key policies, IAM policies, and grants
- Rotating key cryptographic material
- Enabling and disabling key policies
- Adding tags
- Creating key aliases
- Scheduling keys for deletion

You can also use CloudTrail to track the requests that HealthImaging sends to AWS KMS on your behalf. Additional AWS KMS charges apply. For more information, see Customer managed keys in the *AWS Key Management Service Developer Guide*.

Creating a customer managed key

You can create a symmetric customer managed key by using the AWS Management Console or the AWS KMS APIs. For more information, see Creating symmetric encryption KMS keys in the *AWS Key Management Service Developer Guide*.

Key policies control access to your customer managed key. Every customer managed key must have exactly one key policy, which contains statements that determine who can use the key and how they can use it. When you create your customer managed key, you can specify a key policy. For more information, see Managing access to customer managed keys in the *AWS Key Management Service Developer Guide*.

To use your customer managed key with your HealthImaging resources, kms:CreateGrant operations must be permitted in the key policy. This adds a grant to a customer managed key which controls access to a specified KMS key, which gives a user access to the Grant operations HealthImaging requires. For more information, see Grants in AWS KMS in the *AWS Key Management Service Developer Guide*.

To use your customer managed KMS key with your HealthImaging resources, the following API operations must be permitted in the key policy:

- `kms:DescribeKey` provides the customer managed key details needed to validate the key. This is required for all operations.
- `kms:GenerateDataKey` provides access to encrypt resources at rest for all write operations.
- `kms:Decrypt` provides access to read or search operations for encrypted resources.
- `kms:ReEncrypt*` provides access to reencrypt resources.

The following is a policy statement example that allows a user to create and interact with a data store in HealthImaging which is encrypted by that key:

```
{
    "Sid": "Allow access to create data stores and perform CRUD and search in
 HealthImaging",
    "Effect": "Allow",
    "Principal": {
        "Service": [
            "medical-imaging.amazonaws.com"
        ]
    },
    "Action": [
        "kms:Decrypt",
        "kms:GenerateDataKey",
        "kms:GenerateDataKeyWithoutPlaintext"
    ],
    "Resource": "*",
    "Condition": {
        "StringEquals": {
```

```
            "kms:EncryptionContext:kms-arn": "arn:aws:kms:us-east-1:123456789012:key/
bec71d48-3462-4cdd-9514-77a7226e001f",
            "kms:EncryptionContext:aws:medical-imaging:datastoreId": "datastoreId"
        }
    }
}
```

Required IAM permissions for using a customer managed KMS key

When creating a data store with AWS KMS encryption enabled using a customer managed KMS key, there are required permissions for both the key policy and the IAM policy for the user or role creating the HealthImaging data store.

For more information about key policies, see [Enabling IAM policies] in the *AWS Key Management Service Developer Guide*.

The IAM user, IAM role, or AWS account creating your repositories must have permissions for the policy below, plus the necessary permissions for AWS HealthImaging.

JSON

```
{
  "Version":"2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "kms:CreateGrant",
        "kms:GenerateDataKey",
        "kms:RetireGrant",
        "kms:Decrypt",
        "kms:ReEncrypt*"
      ],
      "Resource": "arn:aws:kms:us-east-1:123456789012:key/
bec71d48-3462-4cdd-9514-77a7226e001f"
    }
  ]
}
```

How HealthImaging uses grants in AWS KMS

HealthImaging requires a grant to use your customer managed KMS key. When you create a data store encrypted with a customer managed KMS key, HealthImaging creates a grant on your behalf by sending a CreateGrant request to AWS KMS. Grants in AWS KMS are used to give HealthImaging access to a KMS key in a customer account.

The grants that HealthImaging creates on your behalf should not be revoked or retired. If you revoke or retire the grant that gives HealthImaging permission to use the AWS KMS keys in your account, HealthImaging cannot access this data, encrypt new imaging resources pushed to the data store, or decrypt them when they are pulled. When you revoke or retire a grant for HealthImaging, the change occurs immediately. To revoke access rights, you should delete the data store rather than revoke the grant. When a data store is deleted, HealthImaging retires the grants on your behalf.

Monitoring your encryption keys for HealthImaging

You can use CloudTrail to track the requests that HealthImaging sends to AWS KMS on your behalf when using a customer managed KMS key. The log entries in the CloudTrail log show `medical-imaging.amazonaws.com` in the `userAgent` field to clearly distinguish requests made by HealthImaging.

The following examples are CloudTrail events for `CreateGrant`, `GenerateDataKey`, `Decrypt`, and `DescribeKey` to monitor AWS KMS operations called by HealthImaging to access data encrypted by your customer managed key.

The following shows how to use `CreateGrant` to allow HealthImaging to access a customer provided KMS key, enabling HealthImaging to use that KMS key to encrypt all customer data at rest.

Users are not required to create their own grants. HealthImaging creates a grant on your behalf by sending a `CreateGrant` request to AWS KMS. Grants in AWS KMS are used to give HealthImaging access to a AWS KMS key in a customer account.


```
{
            "KeyId": "arn:aws:kms:us-
east-1:147997158357:key/8e1c34df-5fd2-49fa-8986-4618c9829a8c",
            "GrantId":
 "44e88bc45b769499ce5ec4abd5ecb27eeb3b178a4782452aae65fe885ee5ba20",
            "Name": "MedicalImagingGrantForQIDO_ebff634a-2d16-4046-9238-e3dc4ab54d29",
            "CreationDate": "2025-04-17T20:12:49+00:00",
```

```
            "GranteePrincipal": "AWS Internal",
            "RetiringPrincipal": "medical-imaging.us-east-1.amazonaws.com",
            "IssuingAccount": "medical-imaging.us-east-1.amazonaws.com",
            "Operations": [
                "Decrypt",
                "Encrypt",
                "GenerateDataKey",
                "GenerateDataKeyWithoutPlaintext",
                "ReEncryptFrom",
                "ReEncryptTo",
                "CreateGrant",
                "RetireGrant",
                "DescribeKey"
            ]
        },
        {
            "KeyId": "arn:aws:kms:us-
east-1:147997158357:key/8e1c34df-5fd2-49fa-8986-4618c9829a8c",
            "GrantId":
 "9e5fd5ba7812daf75be4a86efb2b1920d6c0c9c0b19781549556bf2ff98953a1",
            "Name": "2025-04-17T20:12:38",
            "CreationDate": "2025-04-17T20:12:38+00:00",
            "GranteePrincipal": "medical-imaging.us-east-1.amazonaws.com",
            "RetiringPrincipal": "medical-imaging.us-east-1.amazonaws.com",
            "IssuingAccount": "AWS Internal",
            "Operations": [
                "Decrypt",
                "Encrypt",
                "GenerateDataKey",
                "GenerateDataKeyWithoutPlaintext",
                "ReEncryptFrom",
                "ReEncryptTo",
                "CreateGrant",
                "RetireGrant",
                "DescribeKey"
            ]
        },
        {
            "KeyId": "arn:aws:kms:us-
east-1:147997158357:key/8e1c34df-5fd2-49fa-8986-4618c9829a8c",
            "GrantId":
 "ab4a9b919f6ca8eb2bd08ee72475658ee76cfc639f721c9caaa3a148941bcd16",
            "Name": "9d060e5b5d4144a895e9b24901088ca5",
            "CreationDate": "2025-04-17T20:12:39+00:00",
```

```
            "GranteePrincipal": "AWS Internal",
            "RetiringPrincipal": "medical-imaging.us-east-1.amazonaws.com",
            "IssuingAccount": "medical-imaging.us-east-1.amazonaws.com",
            "Operations": [
                "Decrypt",
                "Encrypt",
                "GenerateDataKey",
                "GenerateDataKeyWithoutPlaintext",
                "ReEncryptFrom",
                "ReEncryptTo",
                "DescribeKey"
            ],
            "Constraints": {
                "EncryptionContextSubset": {
                    "kms-arn": "arn:aws:kms:us-
east-1:147997158357:key/8e1c34df-5fd2-49fa-8986-4618c9829a8c"
                }
            }
        }
```

The following examples shows how to use `GenerateDataKey` to ensure the user has necessary permissions to encrypt data before storing it.

```
{
    "eventVersion": "1.08",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "EXAMPLEUSER",
        "arn": "arn:aws:sts::111122223333:assumed-role/Sampleuser01",
        "accountId": "111122223333",
        "accessKeyId": "EXAMPLEKEYID",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "EXAMPLEROLE",
                "arn": "arn:aws:iam::111122223333:role/Sampleuser01",
                "accountId": "111122223333",
                "userName": "Sampleuser01"
            },
            "webIdFederationData": {},
            "attributes": {
                "creationDate": "2021-06-30T21:17:06Z",
                "mfaAuthenticated": "false"
```

```
            }
        },
        "invokedBy": "medical-imaging.amazonaws.com"
    },
    "eventTime": "2021-06-30T21:17:37Z",
    "eventSource": "kms.amazonaws.com",
    "eventName": "GenerateDataKey",
    "awsRegion": "us-east-1",
    "sourceIPAddress": "medical-imaging.amazonaws.com",
    "userAgent": "medical-imaging.amazonaws.com",
    "requestParameters": {
        "keySpec": "AES_256",
        "keyId": "arn:aws:kms:us-east-1:111122223333:key/EXAMPLE_KEY_ARN"
    },
    "responseElements": null,
    "requestID": "EXAMPLE_ID_01",
    "eventID": "EXAMPLE_ID_02",
    "readOnly": true,
    "resources": [
        {
            "accountId": "111122223333",
            "type": "AWS::KMS::Key",
            "ARN": "arn:aws:kms:us-east-1:111122223333:key/EXAMPLE_KEY_ARN"
        }
    ],
    "eventType": "AwsApiCall",
    "managementEvent": true,
    "recipientAccountId": "111122223333",
    "eventCategory": "Management"
}
```

The following example shows how HealthImaging calls the `Decrypt` operation to use the stored encrypted data key to access the encrypted data.

```
{
    "eventVersion": "1.08",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "EXAMPLEUSER",
        "arn": "arn:aws:sts::111122223333:assumed-role/Sampleuser01",
        "accountId": "111122223333",
        "accessKeyId": "EXAMPLEKEYID",
        "sessionContext": {
```

```
            "sessionIssuer": {
                "type": "Role",
                "principalId": "EXAMPLEROLE",
                "arn": "arn:aws:iam::111122223333:role/Sampleuser01",
                "accountId": "111122223333",
                "userName": "Sampleuser01"
            },
            "webIdFederationData": {},
            "attributes": {
                "creationDate": "2021-06-30T21:17:06Z",
                "mfaAuthenticated": "false"
            }
        },
        "invokedBy": "medical-imaging.amazonaws.com"
    },
    "eventTime": "2021-06-30T21:21:59Z",
    "eventSource": "kms.amazonaws.com",
    "eventName": "Decrypt",
    "awsRegion": "us-east-1",
    "sourceIPAddress": "medical-imaging.amazonaws.com",
    "userAgent": "medical-imaging.amazonaws.com",
    "requestParameters": {
        "encryptionAlgorithm": "SYMMETRIC_DEFAULT",
        "keyId": "arn:aws:kms:us-east-1:111122223333:key/EXAMPLE_KEY_ARN"
    },
    "responseElements": null,
    "requestID": "EXAMPLE_ID_01",
    "eventID": "EXAMPLE_ID_02",
    "readOnly": true,
    "resources": [
        {
            "accountId": "111122223333",
            "type": "AWS::KMS::Key",
            "ARN": "arn:aws:kms:us-east-1:111122223333:key/EXAMPLE_KEY_ARN"
        }
    ],
    "eventType": "AwsApiCall",
    "managementEvent": true,
    "recipientAccountId": "111122223333",
    "eventCategory": "Management"
}
```

The following example shows how HealthImaging uses the `DescribeKey` operation to verify if the AWS KMS customer owned AWS KMS key is in a usable state and to help a user troubleshoot if it is not functional.


```
{
    "eventVersion": "1.08",
    "userIdentity": {
        "type": "AssumedRole",
        "principalId": "EXAMPLEUSER",
        "arn": "arn:aws:sts::111122223333:assumed-role/Sampleuser01",
        "accountId": "111122223333",
        "accessKeyId": "EXAMPLEKEYID",
        "sessionContext": {
            "sessionIssuer": {
                "type": "Role",
                "principalId": "EXAMPLEROLE",
                "arn": "arn:aws:iam::111122223333:role/Sampleuser01",
                "accountId": "111122223333",
                "userName": "Sampleuser01"
            },
            "webIdFederationData": {},
            "attributes": {
                "creationDate": "2021-07-01T18:36:14Z",
                "mfaAuthenticated": "false"
            }
        },
        "invokedBy": "medical-imaging.amazonaws.com"
    },
    "eventTime": "2021-07-01T18:36:36Z",
    "eventSource": "kms.amazonaws.com",
    "eventName": "DescribeKey",
    "awsRegion": "us-east-1",
    "sourceIPAddress": "medical-imaging.amazonaws.com",
    "userAgent": "medical-imaging.amazonaws.com",
    "requestParameters": {
        "keyId": "arn:aws:kms:us-east-1:111122223333:key/EXAMPLE_KEY_ARN"
    },
    "responseElements": null,
    "requestID": "EXAMPLE_ID_01",
    "eventID": "EXAMPLE_ID_02",
    "readOnly": true,
    "resources": [
        {
```

```
            "accountId": "111122223333",
            "type": "AWS::KMS::Key",
            "ARN": "arn:aws:kms:us-east-1:111122223333:key/EXAMPLE_KEY_ARN"
        }
    ],
    "eventType": "AwsApiCall",
    "managementEvent": true,
    "recipientAccountId": "111122223333",
    "eventCategory": "Management"
}
```

Learn more

The following resources provide more information about data at rest encryption and are located in the in the *AWS Key Management Service Developer Guide*.

- AWS KMS concepts
- Security best practices for AWS KMS

Network traffic privacy

Traffic is protected both between HealthImaging and on-premises applications and between HealthImaging and Amazon S3. Traffic between HealthImaging and AWS Key Management Service uses HTTPS by default.

- **AWS HealthImaging is a regional service** available in the US East (N. Virginia), US West (Oregon), Europe (Ireland), and Asia Pacific (Sydney) Regions.
- **For traffic between HealthImaging and Amazon S3 buckets**, Transport Layer Security (TLS) encrypts objects in-transit between HealthImaging and Amazon S3, and between HealthImaging and customer applications accessing it, you should allow only encrypted connections over HTTPS (TLS) using the `aws:SecureTransport condition` on Amazon S3 bucket IAM policies. Although HealthImaging currently uses the public endpoint to access data in Amazon S3 buckets, this does not mean that the data traverses the public internet. All traffic between HealthImaging and Amazon S3 is routed over the AWS network and is encrypted using TLS.

Identity and Access Management for AWS HealthImaging

AWS Identity and Access Management (IAM) is an AWS service that helps an administrator securely control access to AWS resources. IAM administrators control who can be *authenticated* (signed in) and *authorized* (have permissions) to use HealthImaging resources. IAM is an AWS service that you can use with no additional charge.

Topics

Audience

How you use AWS Identity and Access Management (IAM) differs based on your role:

- **Service user** - request permissions from your administrator if you cannot access features (see Troubleshooting AWS HealthImaging identity and access)
- **Service administrator** - determine user access and submit permission requests (see How AWS HealthImaging works with IAM)
- **IAM administrator** - write policies to manage access (see Identity-based policy examples for AWS HealthImaging)

Authenticating with identities

Authentication is how you sign in to AWS using your identity credentials. You must be authenticated as the AWS account root user, an IAM user, or by assuming an IAM role.

You can sign in as a federated identity using credentials from an identity source like AWS IAM Identity Center (IAM Identity Center), single sign-on authentication, or Google/Facebook credentials. For more information about signing in, see How to sign in to your AWS account in the *AWS Sign-In User Guide*.

For programmatic access, AWS provides an SDK and CLI to cryptographically sign requests. For more information, see AWS Signature Version 4 for API requests in the *IAM User Guide*.

AWS account root user

When you create an AWS account, you begin with one sign-in identity called the AWS account *root user* that has complete access to all AWS services and resources. We strongly recommend that you don't use the root user for everyday tasks. For tasks that require root user credentials, see Tasks that require root user credentials in the *IAM User Guide*.

Federated identity

As a best practice, require human users to use federation with an identity provider to access AWS services using temporary credentials.

A *federated identity* is a user from your enterprise directory, web identity provider, or Directory Service that accesses AWS services using credentials from an identity source. Federated identities assume roles that provide temporary credentials.

For centralized access management, we recommend AWS IAM Identity Center. For more information, see What is IAM Identity Center? in the *AWS IAM Identity Center User Guide*.

IAM users and groups

An *IAM user* is an identity with specific permissions for a single person or application. We recommend using temporary credentials instead of IAM users with long-term credentials. For more information, see Require human users to use federation with an identity provider to access AWS using temporary credentials in the *IAM User Guide*.

An *IAM group* specifies a collection of IAM users and makes permissions easier to manage for large sets of users. For more information, see Use cases for IAM users in the *IAM User Guide*.

IAM roles

An *IAM role* is an identity with specific permissions that provides temporary credentials. You can assume a role by switching from a user to an IAM role (console) or by calling an AWS CLI or AWS API operation. For more information, see Methods to assume a role in the *IAM User Guide*.

IAM roles are useful for federated user access, temporary IAM user permissions, cross-account access, cross-service access, and applications running on Amazon EC2. For more information, see Cross account resource access in IAM in the *IAM User Guide*.

Managing access using policies

You control access in AWS by creating policies and attaching them to AWS identities or resources. A policy defines permissions when associated with an identity or resource. AWS evaluates these policies when a principal makes a request. Most policies are stored in AWS as JSON documents. For more information about JSON policy documents, see Overview of JSON policies in the *IAM User Guide*.

Using policies, administrators specify who has access to what by defining which **principal** can perform **actions** on what **resources**, and under what **conditions**.

By default, users and roles have no permissions. An IAM administrator creates IAM policies and adds them to roles, which users can then assume. IAM policies define permissions regardless of the method used to perform the operation.

Identity-based policies

Identity-based policies are JSON permissions policy documents that you attach to an identity (user, group, or role). These policies control what actions identities can perform, on which resources, and under what conditions. To learn how to create an identity-based policy, see Define custom IAM permissions with customer managed policies in the *IAM User Guide*.

Identity-based policies can be *inline policies* (embedded directly into a single identity) or *managed policies* (standalone policies attached to multiple identities). To learn how to choose between managed and inline policies, see Choose between managed policies and inline policies in the *IAM User Guide*.

Resource-based policies

Resource-based policies are JSON policy documents that you attach to a resource. Examples include IAM *role trust policies* and Amazon S3 *bucket policies*. In services that support resource-based policies, service administrators can use them to control access to a specific resource. You must specify a principal in a resource-based policy.

Resource-based policies are inline policies that are located in that service. You can't use AWS managed policies from IAM in a resource-based policy.

Other policy types

AWS supports additional policy types that can set the maximum permissions granted by more common policy types:

- **Permissions boundaries** – Set the maximum permissions that an identity-based policy can grant to an IAM entity. For more information, see Permissions boundaries for IAM entities in the *IAM User Guide*.
- **Service control policies (SCPs)** – Specify the maximum permissions for an organization or organizational unit in AWS Organizations. For more information, see Service control policies in the *AWS Organizations User Guide*.
- **Resource control policies (RCPs)** – Set the maximum available permissions for resources in your accounts. For more information, see Resource control policies (RCPs) in the *AWS Organizations User Guide*.
- **Session policies** – Advanced policies passed as a parameter when creating a temporary session for a role or federated user. For more information, see Session policies in the *IAM User Guide*.

Multiple policy types

When multiple types of policies apply to a request, the resulting permissions are more complicated to understand. To learn how AWS determines whether to allow a request when multiple policy types are involved, see Policy evaluation logic in the *IAM User Guide*.

How AWS HealthImaging works with IAM

Before you use IAM to manage access to HealthImaging, learn what IAM features are available to use with HealthImaging.

IAM features you can use with AWS HealthImaging

IAM feature	HealthImaging support
Identity-based policies	Yes
Resource-based policies	No
Policy actions	Yes

IAM feature	HealthImaging support
Policy resources	Yes
Policy condition keys (service-specific)	Yes
ACLs	No
ABAC (tags in policies)	Partial
Temporary credentials	Yes
Principal permissions	Yes
Service roles	Yes
Service-linked roles	Yes

To get a high-level view of how HealthImaging and other AWS services work with most IAM features, see AWS services that work with IAM in the *IAM User Guide*.

Identity-based policies for HealthImaging

Supports identity-based policies: Yes

HealthImaging supports condition statements that specify DICOM Study and Series UIDs, enabling access control scoped to one or more DICOM Study or Series.

Identity-based policies are JSON permissions policy documents that you can attach to an identity, such as an IAM user, group of users, or role. These policies control what actions users and roles can perform, on which resources, and under what conditions. To learn how to create an identity-based policy, see Define custom IAM permissions with customer managed policies in the *IAM User Guide*.

With IAM identity-based policies, you can specify allowed or denied actions and resources as well as the conditions under which actions are allowed or denied. To learn about all of the elements that you can use in a JSON policy, see IAM JSON policy elements reference in the *IAM User Guide*.

Identity-based policy examples for HealthImaging

To view examples of HealthImaging identity-based policies, see Identity-based policy examples for AWS HealthImaging.

Resource-based policies within HealthImaging

Supports resource-based policies: No

Resource-based policies are JSON policy documents that you attach to a resource. Examples of resource-based policies are IAM *role trust policies* and Amazon S3 *bucket policies*. In services that support resource-based policies, service administrators can use them to control access to a specific resource. For the resource where the policy is attached, the policy defines what actions a specified principal can perform on that resource and under what conditions. You must specify a principal in a resource-based policy. Principals can include accounts, users, roles, federated users, or AWS services.

To enable cross-account access, you can specify an entire account or IAM entities in another account as the principal in a resource-based policy. For more information, see Cross account resource access in IAM in the *IAM User Guide*.

Policy actions for HealthImaging

Supports policy actions: Yes

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

The `Action` element of a JSON policy describes the actions that you can use to allow or deny access in a policy. Include actions in a policy to grant permissions to perform the associated operation.

To see a list of HealthImaging actions, see Actions defined by AWS HealthImaging in the *Service Authorization Reference*.

Policy actions in HealthImaging use the following prefix before the action:

```
medical-imaging
```

To specify multiple actions in a single statement, separate them with commas.

```
"Action": [
      "medical-imaging:action1",
```

```
    "medical-imaging:action2"
      ]
```

To view examples of HealthImaging identity-based policies, see Identity-based policy examples for AWS HealthImaging.

Policy resources for HealthImaging

Supports policy resources: Yes

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

The `Resource` JSON policy element specifies the object or objects to which the action applies. As a best practice, specify a resource using its Amazon Resource Name (ARN). For actions that don't support resource-level permissions, use a wildcard (*) to indicate that the statement applies to all resources.

```
"Resource": "*"
```

To see a list of HealthImaging resource types and their ARNs, see Resource types defined by AWS HealthImaging in the *Service Authorization Reference*. To learn with which actions and resources you can use an ARN, see Actions defined by AWS HealthImaging.

To view examples of HealthImaging identity-based policies, see Identity-based policy examples for AWS HealthImaging.

Policy condition keys for HealthImaging

Supports service-specific policy condition keys: Yes

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

The `Condition` element specifies when statements execute based on defined criteria. You can create conditional expressions that use condition operators, such as equals or less than, to match the condition in the policy with values in the request. To see all AWS global condition keys, see AWS global condition context keys in the *IAM User Guide*.

To see a list of HealthImaging condition keys, see [Condition keys for AWS HealthImaging] in the *Service Authorization Reference*. To learn with which actions and resources you can use a condition key, see [Actions defined by AWS HealthImaging].

To view examples of HealthImaging identity-based policies, see Identity-based policy examples for AWS HealthImaging.

ACLs in HealthImaging

Supports ACLs: No

Access control lists (ACLs) control which principals (account members, users, or roles) have permissions to access a resource. ACLs are similar to resource-based policies, although they do not use the JSON policy document format.

RBAC with HealthImaging

Supports RBAC	Yes

The traditional authorization model used in IAM is called role-based access control (RBAC). RBAC defines permissions based on a person's job function, known outside of AWS as a *role*. For more information, see Comparing ABAC to the traditional RBAC model in the *IAM User Guide*.

ABAC with HealthImaging

Supports ABAC (tags in policies): Partial

> **Warning**
>
> ABAC is not enforced via the `SearchImageSets` API action. Anyone who has access to the `SearchImageSets` action can access all metadata for image sets in a data store.

> **Note**
>
> Image sets are a child resource of data stores. To use ABAC, an image set must have the same tag as a data store. For more information, refer to Tagging resources with AWS HealthImaging.

Attribute-based access control (ABAC) is an authorization strategy that defines permissions based on attributes called tags. You can attach tags to IAM entities and AWS resources, then design ABAC policies to allow operations when the principal's tag matches the tag on the resource.

To control access based on tags, you provide tag information in the condition element of a policy using the `aws:ResourceTag/key-name`, `aws:RequestTag/key-name`, or `aws:TagKeys` condition keys.

If a service supports all three condition keys for every resource type, then the value is **Yes** for the service. If a service supports all three condition keys for only some resource types, then the value is **Partial**.

For more information about ABAC, see Define permissions with ABAC authorization in the *IAM User Guide*. To view a tutorial with steps for setting up ABAC, see Use attribute-based access control (ABAC) in the *IAM User Guide*.

Using temporary credentials with HealthImaging

Supports temporary credentials: Yes

Temporary credentials provide short-term access to AWS resources and are automatically created when you use federation or switch roles. AWS recommends that you dynamically generate temporary credentials instead of using long-term access keys. For more information, see Temporary security credentials in IAM and AWS services that work with IAM in the *IAM User Guide*.

Cross-service principal permissions for HealthImaging

Supports forward access sessions (FAS): Yes

When you use an IAM user or role to perform actions in AWS, you are considered a principal. Policies grant permissions to a principal. When you use some services, you might perform an action that then triggers another action in a different service. In this case, you must have permissions to perform both actions. To see whether an action requires additional dependent actions in a policy, see Actions, resources, and condition keys for AWS HealthImaging in the *Service Authorization Reference*.

Service roles for HealthImaging

Supports service roles: Yes

A service role is an IAM role that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see Create a role to delegate permissions to an AWS service in the *IAM User Guide*.

> **Warning**
> Changing the permissions for a service role might break HealthImaging functionality. Edit service roles only when HealthImaging provides guidance to do so.

Service-linked roles for HealthImaging

Supports service-linked roles: Yes

A service-linked role is a type of service role that is linked to an AWS service. The service can assume the role to perform an action on your behalf. Service-linked roles appear in your AWS account and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.

HealthImaging uses service-linked roles to publish CloudWatch metrics to your account. For details about creating or managing service-linked roles, see AWS services that work with IAM.

Identity-based policy examples for AWS HealthImaging

By default, users and roles don't have permission to create or modify HealthImaging resources. To grant users permission to perform actions on the resources that they need, an IAM administrator can create IAM policies.

To learn how to create an IAM identity-based policy by using these example JSON policy documents, see Create IAM policies (console) in the *IAM User Guide*.

For details about actions and resource types defined by Awesome, including the format of the ARNs for each of the resource types, see Actions, Resources, and Condition Keys for AWS Awesome in the *Service Authorization Reference*.

Topics

- Policy best practices
- Using the HealthImaging console

- Allow users to view their own permissions
- Granting permissions based on Study Instance UID and Series Instance UID

Policy best practices

Identity-based policies determine whether someone can create, access, or delete HealthImaging resources in your account. These actions can incur costs for your AWS account. When you create or edit identity-based policies, follow these guidelines and recommendations:

- **Get started with AWS managed policies and move toward least-privilege permissions** – To get started granting permissions to your users and workloads, use the *AWS managed policies* that grant permissions for many common use cases. They are available in your AWS account. We recommend that you reduce permissions further by defining AWS customer managed policies that are specific to your use cases. For more information, see AWS managed policies or AWS managed policies for job functions in the *IAM User Guide*.
- **Apply least-privilege permissions** – When you set permissions with IAM policies, grant only the permissions required to perform a task. You do this by defining the actions that can be taken on specific resources under specific conditions, also known as *least-privilege permissions*. For more information about using IAM to apply permissions, see Policies and permissions in IAM in the *IAM User Guide*.
- **Use conditions in IAM policies to further restrict access** – You can add a condition to your policies to limit access to actions and resources. For example, you can write a policy condition to specify that all requests must be sent using SSL. You can also use conditions to grant access to service actions if they are used through a specific AWS service, such as CloudFormation. For more information, see IAM JSON policy elements: Condition in the *IAM User Guide*.
- **Use IAM Access Analyzer to validate your IAM policies to ensure secure and functional permissions** – IAM Access Analyzer validates new and existing policies so that the policies adhere to the IAM policy language (JSON) and IAM best practices. IAM Access Analyzer provides more than 100 policy checks and actionable recommendations to help you author secure and functional policies. For more information, see Validate policies with IAM Access Analyzer in the *IAM User Guide*.
- **Require multi-factor authentication (MFA)** – If you have a scenario that requires IAM users or a root user in your AWS account, turn on MFA for additional security. To require MFA when API operations are called, add MFA conditions to your policies. For more information, see Secure API access with MFA in the *IAM User Guide*.

For more information about best practices in IAM, see [Security best practices in IAM]() in the *IAM User Guide*.

Using the HealthImaging console

To access the AWS HealthImaging console, you must have a minimum set of permissions. These permissions must allow you to list and view details about the HealthImaging resources in your AWS account. If you create an identity-based policy that is more restrictive than the minimum required permissions, the console won't function as intended for entities (users or roles) with that policy.

You don't need to allow minimum console permissions for users that are making calls only to the AWS CLI or the AWS API. Instead, allow access to only the actions that match the API operation that they're trying to perform.

To ensure that users and roles can still use the HealthImaging console, also attach the HealthImaging `ConsoleAccess` or `ReadOnly` AWS managed policy to the entities. For more information, see [Adding permissions to a user]() in the *IAM User Guide*.

Allow users to view their own permissions

This example shows how you might create a policy that allows IAM users to view the inline and managed policies that are attached to their user identity. This policy includes permissions to complete this action on the console or programmatically using the AWS CLI or AWS API.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "ViewOwnUserInfo",
            "Effect": "Allow",
            "Action": [
                "iam:GetUserPolicy",
                "iam:ListGroupsForUser",
                "iam:ListAttachedUserPolicies",
                "iam:ListUserPolicies",
                "iam:GetUser"
            ],
            "Resource": ["arn:aws:iam::*:user/${aws:username}"]
        },
        {
            "Sid": "NavigateInConsole",
```

```
            "Effect": "Allow",
            "Action": [
                "iam:GetGroupPolicy",
                "iam:GetPolicyVersion",
                "iam:GetPolicy",
                "iam:ListAttachedGroupPolicies",
                "iam:ListGroupPolicies",
                "iam:ListPolicyVersions",
                "iam:ListPolicies",
                "iam:ListUsers"
            ],
            "Resource": "*"
        }
    ]
}
```

Granting permissions based on Study Instance UID and Series Instance UID

HealthImaging DICOMWeb APIs support granting access to image sets based on the Study Instance UID and Series Instance UID. You can define IAM policies that limit access by adding condition statements with the `StudyInstanceUID` and `SeriesInstanceUID` condition context keys.

HealthImaging DICOMWeb APIs that use `StudyInstanceUID` as a required parameter support IAM policies that limit access based on the `StudyInstanceUID` key. Similarly, HealthImaging DICOMWeb APIs that use `SeriesInstanceUID` as a required parameter support policies with the `SeriesInstanceUID` key.

HealthImaging APIs that support IAM policies using `StudyInstanceUID` and `SeriesInstanceUID` context keys

Name	Support for `StudyInstanceUID` condition	Support for `SeriesInstanceUID` condition
`GetDICOMInstance`	Yes	Yes
`GetDICOMInstanceFrames`	Yes	Yes
`GetDICOMInstanceMetadata`	Yes	Yes

Name	Support for StudyInstanceUID condition	Support for SeriesInstanceUID condition
GetDICOMSeriesMetadata	Yes	Yes
GetDICOMBulkdata	Yes	Yes
SearchDICOMSeries	Yes	No
SearchDICOMInstances	Yes	Yes
StoreDICOMStudy	Yes	No

Note

A HealthImaging API that does not support this context key will function as if no context key was specified when invoked with a policy that contains a `StudyInstanceUID` or `SeriesInstanceUID` context key.

Example 1: Granting access based on a StudyInstanceUID

To grant access only to specific DICOM studies, attach a policy to the role that specifies a condition on the `StudyInstanceUID`.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "Statement1",
            "Effect": "Allow",
            "Action": [
                "medical-imaging:SearchDICOMSeries"
            ],
            "Resource": [
                "arn:aws:medical-imaging:us-west-2:account-id:datastore/your-datastore-
id"
            ],
            "Condition": {
```

```
                "StringEquals": {
                    "medical-imaging:StudyInstanceUID": "your study instance UID"
                }
            }
        }
    ]
}
```

When this role is assumed via `sts assume-role`, the caller will only be authorized to access image sets that match the condition specified in the role policy, otherwise the calls will be rejected throwing an `AccessDenied` error. In this case, the caller will be granted access to all image sets having the specified `StudyInstanceUID`.

You can use all IAM string condition operators in your policies, including wildcard matching and multiple matches.

An example policy for wildcard matching:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "Statement1",
            "Effect": "Allow",
            "Action": [
                "medical-imaging:SearchDICOMSeries"
            ],
            "Resource": [
                "arn:aws:medical-imaging:us-west-2:account-id:datastore/your-datastore-
id"
            ],
            "Condition": {
                "StringLike": {
                    "medical-imaging:StudyInstanceUID": "123.456.789*"
                }
            }
        }
    ]
}
```

An example policy for multiple matches:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "Statement1",
            "Effect": "Allow",
            "Action": [
                "medical-imaging:SearchDICOMSeries"
            ],
            "Resource": [
                "arn:aws:medical-imaging:us-west-2:account-id:datastore/your-datastore-
id"
            ],
            "Condition": {
                "StringEquals": {
                    "medical-imaging:StudyInstanceUID": [
                        "123.456.789",
                        "1.2.3.4.5.6"
                    ]
                }
            }
        }
    ]
}
```

Example 2: Granting access based on a SeriesInstanceUID

To grant access only to specific image sets corresponding to a DICOM Series, attach a policy to the role that specifies a condition on the `SeriesInstanceUID`.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "Statement1",
            "Effect": "Allow",
            "Action": [
                "medical-imaging:SearchDICOMInstances"
            ],
            "Resource": [
                "arn:aws:medical-imaging:us-west-2:account-id:datastore/your-datastore-
id"
            ],
```

```
            "Condition": {
                "StringEquals": {
                    "medical-imaging:SeriesInstanceUID": [
                        "123.456.789",
                        "1.2.3.4.5.6"
                    ]
                }
            }
        }
    ]
}
```

Example 3: Granting access based on StudyInstanceUIDs and SeriesInstanceUIDs

To grant access only to image sets of a particular DICOM Study and Series, attach a policy to the role that specifies conditions on both the `StudyInstanceUID` and `SeriesInstanceUID`.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Sid": "Statement1",
            "Effect": "Allow",
            "Action": [
                "medical-imaging:SearchDICOMInstances"
            ],
            "Resource": [
                "arn:aws:medical-imaging:us-west-2:account-id:datastore/your-datastore-
id"
            ],
            "Condition": {
                "StringEquals": {
                    "medical-imaging:StudyInstanceUID": ["123.456.789"],
                    "medical-imaging:SeriesInstanceUID": ["1.2.3.4.5.6"]
                }
            }
        }
    ]
}
```

AWS managed policies for AWS HealthImaging

An AWS managed policy is a standalone policy that is created and administered by AWS. AWS managed policies are designed to provide permissions for many common use cases so that you can start assigning permissions to users, groups, and roles.

Keep in mind that AWS managed policies might not grant least-privilege permissions for your specific use cases because they're available for all AWS customers to use. We recommend that you reduce permissions further by defining customer managed policies that are specific to your use cases.

You cannot change the permissions defined in AWS managed policies. If AWS updates the permissions defined in an AWS managed policy, the update affects all principal identities (users, groups, and roles) that the policy is attached to. AWS is most likely to update an AWS managed policy when a new AWS service is launched or new API operations become available for existing services.

For more information, see AWS managed policies in the *IAM User Guide*.

Topics

AWS managed policy: AWSHealthImagingServiceRolePolicy

This policy is attached to service-linked role `AWSServiceRoleForHealthImaging`. It grants permissions for HealthImaging to manage service operations and publish service metrics.

For more information about this policy, including the JSON policy document, see AWSHealthImagingServiceRolePolicy in the *AWS Managed Policy Reference Guide*.

AWS managed policy: AWSHealthImagingFullAccess

You can attach the `AWSHealthImagingFullAccess` policy to your IAM identities.

This policy grants administrative permission to all HealthImaging actions.

JSON

```
{
    "Version":"2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "medical-imaging:*"
            ],
            "Resource": "*"
        },
        {
            "Effect": "Allow",
            "Action": "iam:PassRole",
            "Resource": "*",
            "Condition": {
                "StringEquals": {
                    "iam:PassedToService": "medical-imaging.amazonaws.com"
            }
        }
        }
    ]
}
```

AWS managed policy: AWSHealthImagingReadOnlyAccess

You can attach the `AWSHealthImagingReadOnlyAccess` policy to your IAM identities.

This policy grants read-only permission to specific AWS HealthImaging actions.

JSON

```
{
    "Version":"2012-10-17",
    "Statement": [{
        "Effect": "Allow",
        "Action": [
            "medical-imaging:GetDICOMImportJob",
            "medical-imaging:GetDatastore",
            "medical-imaging:GetImageFrame",
            "medical-imaging:GetImageSet",
            "medical-imaging:GetImageSetMetadata",
            "medical-imaging:ListDICOMImportJobs",
            "medical-imaging:ListDatastores",
            "medical-imaging:ListImageSetVersions",
            "medical-imaging:ListTagsForResource",
            "medical-imaging:SearchImageSets"
        ],
        "Resource": "*"
    }]
}
```

HealthImaging updates to AWS managed policies

View details about updates to AWS managed policies for HealthImaging since this service began tracking these changes. For automatic alerts about changes to this page, subscribe to the RSS feed on the Releases page.

Change	Description	Date
AWSHealthImagingSe rviceRolePolicy	AWS HealthImaging added a new managed policy for the service-linked role that provides permissions for	February 9, 2026

Change	Description	Date
	HealthImaging to manage service operations and publish service metrics.	
HealthImaging started tracking changes	HealthImaging started tracking changes for its AWS managed policies.	July 19, 2023

Cross-service confused deputy prevention in HealthImaging

The confused deputy problem is a security issue where an entity that doesn't have permission to perform an action can coerce a more-privileged entity to perform the action. In AWS, cross-service impersonation can result in the confused deputy problem. Cross-service impersonation can occur when one service (the *calling service*) calls another service (the *called service*). The calling service can be manipulated to use its permissions to act on another customer's resources in a way it should not otherwise have permission to access. To prevent this, AWS provides tools that help you protect your data for all services with service principals that have been given access to resources in your account.

We recommend using the `aws:SourceArn` and `aws:SourceAccount` global condition context keys in your `ImportJobDataAccessRole` IAM role trust relationship policies to limit the permissions that AWS HealthImaging gives another service to your resource. Use `aws:SourceArn` to associate only one resource with cross-service access. Use `aws:SourceAccount` to let any resource in that account be associated with the cross-service use. If you use both global condition context keys, the `aws:SourceAccount` value and the account referenced in the `aws:SourceArn` value must use the same account ID when used in the same policy statement.

The value of `aws:SourceArn` must be the ARN of the affected data store. If you don't know the full ARN of the data store, or if you are specifying multiple data stores, use the `aws:SourceArn` global context condition key with the * wildcard for the unknown portions of the ARN. For example, you can set `aws:SourceArn` to `arn:aws:medical-imaging:us-west-2:111122223333:datastore/*`.

In the following trust policy example, we use the `aws:SourceArn` and `aws:SourceAccount` condition key to restrict access to the service principal based on the data store's ARN to prevent the confused deputy problem.

JSON

```
{
  "Version":"2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "medical-imaging.amazonaws.com"
      },
      "Action": "sts:AssumeRole",
      "Condition": {
        "ArnLike": {
          "aws:SourceArn": "arn:aws:medical-imaging:us-
east-1:123456789012:datastore/*"
        },
        "StringEquals": {
          "aws:SourceAccount": "123456789012"
        }
      }
    }
  ]
}
```

Using service-linked roles for HealthImaging

AWS HealthImaging uses AWS Identity and Access Management (IAM) service-linked roles that are predefined by the service and include all the permissions that the service requires to call other AWS services on your behalf. For more information, see Service-linked role permissions in the IAM User Guide.

Service-linked role permissions for HealthImaging

HealthImaging uses the service-linked role named `AWSServiceRoleForHealthImaging` to perform operations in your AWS account. You need to create this service-linked role if you want HealthImaging to publish metrics about your data stores to CloudWatch.

The role permissions policy named `AWSHealthImagingServiceRolePolicy` grants permissions for HealthImaging to manage service operations and publish service metrics.

For managed policy updates, see HealthImaging managed policies.

Creating a service-linked role for HealthImaging

Create a service-linked role with the IAM Console

You can create a service-linked role using the IAM Console by Selecting `AWS Service` as the Trusted entity type, and then `HealthImaging` in the Use case drop down menu.

Create a service-linked role with the AWS CLI

In the AWS CLI, run `aws iam create-service-linked-role —aws-service-name medical-imaging.amazonaws.com`

Deleting a service-linked role for HealthImaging

You can delete a service-linked role at any time, but doing so will block HealthImaging from performing actions in your AWS account, such as publishing data store metrics to CloudWatch.

To manually delete the service-linked role using IAM

You can use the IAM console, the AWS CLI, or the AWS API to delete the `AWSServiceRoleForHealthImaging` service-linked role. For more information, see Deleting a service-linked role in the *IAM User Guide*. If you deleted a service-linked role, you can use the role creation process to create a new one.

Troubleshooting AWS HealthImaging identity and access

Use the following information to help you diagnose and fix common issues that you might encounter when working with HealthImaging and IAM.

Topics

- I am not authorized to perform an action in HealthImaging
- I am not authorized to perform iam:PassRole
- I want to allow people outside of my AWS account to access my HealthImaging resources

I am not authorized to perform an action in HealthImaging

If you receive an error that you're not authorized to perform an action, your policies must be updated to allow you to perform the action.

The following example error occurs when the `mateojackson` IAM user tries to use the console to view details about a fictional *`my-example-widget`* resource but doesn't have the fictional `AWS:`*`GetWidget`* permissions.

```
User: arn:aws:iam::123456789012:user/mateojackson is not authorized to perform:
 AWS:GetWidget on resource: my-example-widget
```

In this case, the policy for the `mateojackson` user must be updated to allow access to the *`my-example-widget`* resource by using the `AWS:`*`GetWidget`* action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.

I am not authorized to perform iam:PassRole

If you receive an error that you're not authorized to perform the `iam:PassRole` action, your policies must be updated to allow you to pass a role to HealthImaging.

Some AWS services allow you to pass an existing role to that service instead of creating a new service role or service-linked role. To do this, you must have permissions to pass the role to the service.

The following example error occurs when an IAM user named `marymajor` tries to use the console to perform an action in HealthImaging. However, the action requires the service to have permissions that are granted by a service role. Mary does not have permissions to pass the role to the service.

```
User: arn:aws:iam::123456789012:user/marymajor is not authorized to perform:
 iam:PassRole
```

In this case, Mary's policies must be updated to allow her to perform the `iam:PassRole` action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.

I want to allow people outside of my AWS account to access my HealthImaging resources

You can create a role that users in other accounts or people outside of your organization can use to access your resources. You can specify who is trusted to assume the role. For services that support resource-based policies or access control lists (ACLs), you can use those policies to grant people access to your resources.

To learn more, consult the following:

- To learn whether HealthImaging supports these features, see How AWS HealthImaging works with IAM.
- To learn how to provide access to your resources across AWS accounts that you own, see Providing access to an IAM user in another AWS account that you own in the *IAM User Guide*.
- To learn how to provide access to your resources to third-party AWS accounts, see Providing access to AWS accounts owned by third parties in the *IAM User Guide*.
- To learn how to provide access through identity federation, see Providing access to externally authenticated users (identity federation) in the *IAM User Guide*.
- To learn the difference between using roles and resource-based policies for cross-account access, see Cross account resource access in IAM in the *IAM User Guide*.

Compliance validation for AWS HealthImaging

Third-party auditors assess the security and compliance of AWS HealthImaging as part of multiple AWS compliance programs. For HealthImaging, this includes HIPAA.

For a list of AWS services in scope of specific compliance programs, see AWS Services in Scope by Compliance Program. For general information, see AWS Compliance Programs.

You can download third-party audit reports using AWS Artifact. For more information, see Downloading Reports in AWS Artifact.

Your compliance responsibility when using AWS HealthImaging is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. AWS provides the following resources to help with compliance:

- AWS Partner Solutions – The automated reference deployment guides for Security and Compliance discuss architectural considerations and provide steps for deploying security and compliance-focused baseline environments on AWS.
- Architecting for HIPAA Security and Compliance Whitepaper – This whitepaper describes how companies can use AWS to create HIPAA-compliant applications.

- GxP Systems on AWS – This whitepaper provides information on how AWS approaches GxP-related compliance and security and provides guidance on using AWS services in the context of GxP.
- AWS Compliance Resources – This collection of workbooks and guides might apply to your industry and location.
- Evaluating Resources with Rules – AWS Config assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- AWS Security Hub CSPM – This AWS service provides a comprehensive view of your security state within AWS that helps you check your compliance with security industry standards and best practices.

Infrastructure security in AWS HealthImaging

As a managed service, AWS HealthImaging is protected by the AWS global network security procedures that are described in the Amazon Web Services: Overview of Security Processes whitepaper.

You use AWS published API calls to access HealthImaging through the network. Clients must support Transport Layer Security (TLS) 1.3 or later. Clients must also support cipher suites with perfect forward secrecy (PFS) such as Ephemeral Diffie-Hellman (DHE) or Elliptic Curve Ephemeral Diffie-Hellman (ECDHE). Most modern systems such as Java 7 and later support these modes.

Additionally, requests must be signed using an access key ID and a secret access key that is associated with an IAM principal. You can also use the AWS Security Token Service (AWS STS) to generate temporary security credentials to sign requests.

Creating AWS HealthImaging resources with AWS CloudFormation

AWS HealthImaging is integrated with AWS CloudFormation, a service that helps you to model and set up your AWS resources so that you can spend less time creating and managing your resources and infrastructure. You create a template that describes all the AWS resources that you want and CloudFormation provisions and configures those resources for you.

When you use CloudFormation, you can reuse your template to set up your HealthImaging resources consistently and repeatedly. Describe your resources once, and then provision the same resources over and over in multiple AWS accounts and Regions.

HealthImaging and CloudFormation templates

To provision and configure resources for HealthImaging and related services, you must understand CloudFormation templates. Templates are formatted text files in JSON or YAML. These templates describe the resources that you want to provision in your CloudFormation stacks. If you're unfamiliar with JSON or YAML, you can use CloudFormation Designer to help you get started with CloudFormation templates. For more information, see What is CloudFormation Designer? in the *AWS CloudFormation User Guide*.

AWS HealthImaging supports creating data stores with CloudFormation. For more information, including examples of JSON and YAML templates for provisioning HealthImaging data stores, see the AWS HealthImaging resource type reference in the *AWS CloudFormation User Guide*.

Learn more about CloudFormation

To learn more about CloudFormation, see the following resources:

- AWS CloudFormation
- AWS CloudFormation User Guide
- CloudFormation API Reference
- AWS CloudFormation Command Line Interface User Guide

AWS HealthImaging and interface VPC endpoints (AWS PrivateLink)

You can establish a private connection between your VPC and AWS HealthImaging by creating an *interface VPC endpoint*. Interface endpoints are powered by AWS PrivateLink, a technology that you can use to privately access HealthImaging APIs without an internet gateway, NAT device, VPN connection, or AWS Direct Connect connection. Instances in your VPC don't need public IP addresses to communicate with HealthImaging APIs. Traffic between your VPC and HealthImaging does not leave the Amazon network.

Each interface endpoint is represented by one or more Elastic Network Interfaces in your subnets.

For more information, see Interface VPC endpoints (AWS PrivateLink) in the *Amazon VPC User Guide*.

Topics

Considerations for HealthImaging VPC endpoints

Before you set up an interface VPC endpoint for HealthImaging, make sure that you review Interface endpoint properties and limitations in the *Amazon VPC User Guide*.

HealthImaging supports making calls to all AWS HealthImaging actions from your VPC.

Creating an interface VPC endpoint for HealthImaging

You can create a VPC endpoint for the HealthImaging service using the Amazon VPC console or the AWS Command Line Interface (AWS CLI). For more information, see Creating an interface endpoint in the *Amazon VPC User Guide*.

Create VPC endpoints for HealthImaging using the following service names:

- com.amazonaws.*region*.medical-imaging
- com.amazonaws.*region*.runtime-medical-imaging
- com.amazonaws.*region*.dicom-medical-imaging

> **Note**
>
> Private DNS must be enabled to use PrivateLink.

You can make API requests to HealthImaging using its default DNS name for the Region, for example, `medical-imaging.us-east-1.amazonaws.com`.

For more information, see Accessing a service through an interface endpoint in the *Amazon VPC User Guide*.

Creating a VPC endpoint policy for HealthImaging

You can attach an endpoint policy to your VPC endpoint that controls access to HealthImaging. The policy specifies the following information:

- The principal that can perform actions
- The actions that can be performed
- The resources on which actions can be performed

For more information, see Controlling access to services with VPC endpoints in the *Amazon VPC User Guide*.

Example: VPC endpoint policy for HealthImaging actions

The following is an example of an endpoint policy for HealthImaging. When attached to an endpoint, this policy grants access to HealthImaging actions for all principals on all resources.

API

```
{
   "Statement":[
      {
         "Principal":"*",
         "Effect":"Allow",
         "Action":[
            "medical-imaging:*"
         ],
         "Resource":"*"
      }
   ]
}
```

CLI

```
aws ec2 modify-vpc-endpoint \
    --vpc-endpoint-id vpce-id
    --region us-west-2 \
    --private-dns-enabled \
    --policy-document \
    "{\"Statement\":[{\"Principal\":\"*\",\"Effect\":\"Allow\",\"Action\":
[\"medical-imaging:*\"],\"Resource\":\"*\"}]}"
```

Cross-account import for AWS HealthImaging

With cross-account/cross-region import, you can import data into your HealthImaging data store from Amazon S3 buckets located in other supported Regions. You can import data across AWS accounts, accounts owned by other AWS Organizations, and from open data sources like Imaging Data Commons (IDC) located in the Registry of Open Data on AWS.

HealthImaging cross-account/cross-region import use cases include:

- Medical imaging SaaS products importing DICOM data from customer accounts
- Large organizations populating one HealthImaging data store from many Amazon S3 input buckets
- Researchers securely sharing data across multi-institution clinical studies

To use cross-account import

1. The Amazon S3 input (source) bucket owner must grant the HealthImaging data store owner `s3:ListBucket` and `s3:GetObject` permissions.
2. The HealthImaging data store owner must add the Amazon S3 bucket to their IAM `ImportJobDataAccessRole`. See Create an IAM role for import.
3. The HealthImaging data store owner must provide the `inputOwnerAccountId` for the Amazon S3 input bucket when starting the import job.

> **Note**
>
> By providing the `inputOwnerAccountId`, the data store owner validates the input Amazon S3 bucket belongs to the specified account to maintain compliance with industry standards and mitigate potential security risks.

The following `startDICOMImportJob` code example includes the optional `inputOwnerAccountId` parameter, which can be applied to all AWS CLI and SDK code examples in the Starting an import job section.

Java

```
public static String startDicomImportJob(MedicalImagingClient
 medicalImagingClient,
        String jobName,
        String datastoreId,
        String dataAccessRoleArn,
        String inputS3Uri,
        String outputS3Uri,
        String inputOwnerAccountId) {

    try {
        StartDicomImportJobRequest startDicomImportJobRequest =
 StartDicomImportJobRequest.builder()
                .jobName(jobName)
                .datastoreId(datastoreId)
                .dataAccessRoleArn(dataAccessRoleArn)
                .inputS3Uri(inputS3Uri)
                .outputS3Uri(outputS3Uri)
                .inputOwnerAccountId(inputOwnerAccountId)
                .build();
        StartDicomImportJobResponse response =
 medicalImagingClient.startDICOMImportJob(startDicomImportJobRequest);
        return response.jobId();
    } catch (MedicalImagingException e) {
        System.err.println(e.awsErrorDetails().errorMessage());
        System.exit(1);
    }

    return "";
}
```

Resilience in AWS HealthImaging

The AWS global infrastructure is built around AWS Regions and Availability Zones. AWS Regions provide multiple physically separated and isolated Availability Zones, which are connected with low-latency, high-throughput, and highly redundant networking. With Availability Zones, you can design and operate applications and databases that automatically fail over between zones without interruption. Availability Zones are more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

If you need to replicate your data or applications over greater geographic distances, use AWS Local Regions. An AWS Local Region is a single data center designed to complement an existing AWS Region. Like all AWS Regions, AWS Local Regions are completely isolated from other AWS Regions.

For more information about AWS Regions and Availability Zones, see AWS Global Infrastructure.

AWS HealthImaging reference material

> **Note**
>
> All native HealthImaging API actions and data types are described in the *AWS HealthImaging API Reference*.

Topics

DICOM support for AWS HealthImaging

AWS HealthImaging supports specific DICOM elements and transfer syntaxes. Familiarize yourself with the supported Patient, Study, and Series level DICOM data elements, as HealthImaging metadata keys are based on them. Before you start an import, verify that your medical imaging data is compliant with HealthImaging's supported transfer syntaxes and DICOM element constraints.

> **Note**
>
> AWS HealthImaging does not currently support Binary Segmentation Images or Icon Image Sequence pixel data.

Topics

Supported SOP classes

With AWS HealthImaging, you can import DICOM P10 Service-Object Pair (SOP) instances encoded with any SOP class UID, including retired and private. All private *attributes* are preserved, as well.

Metadata normalization

When you import your DICOM P10 data into AWS HealthImaging, it is transformed into image sets comprised of metadata and image frames (pixel data). During the transformation process, HealthImaging metadata keys are generated based on a specific version of the DICOM standard. HealthImaging currently generates and supports metadata keys based on the DICOM PS3.6 2022b Data Dictionary.

AWS HealthImaging supports the following DICOM data elements at the Patient, Study, and Series levels.

Patient level elements

> **Note**
>
> For a detailed description of each Patient level element, see the Registry of DICOM Data Elements.

AWS HealthImaging supports the following Patient level elements:

```
Patient Module Elements

  (0010,0010) - Patient's Name
  (0010,0020) - Patient ID

Issuer of Patient ID Macro Elements

  (0010,0021) - Issuer of Patient ID
  (0010,0024) - Issuer of Patient ID Qualifiers Sequence
  (0010,0022) - Type of Patient ID
  (0010,0030) - Patient's Birth Date
  (0010,0033) - Patient's Birth Date in Alternative Calendar
  (0010,0034) - Patient's Death Date in Alternative Calendar
  (0010,0035) - Patient's Alternative Calendar Attribute
  (0010,0040) - Patient's Sex
```

```
  (0010,1100) - Referenced Patient Photo Sequence
  (0010,0200) - Quality Control Subject
  (0008,1120) - Referenced Patient Sequence
  (0010,0032) - Patient's Birth Time
  (0010,1002) - Other Patient IDs Sequence
  (0010,1001) - Other Patient Names
  (0010,2160) - Ethnic Group
  (0010,4000) - Patient Comments
  (0010,2201) - Patient Species Description
  (0010,2202) - Patient Species Code Sequence Attribute
  (0010,2292) - Patient Breed Description
  (0010,2293) - Patient Breed Code Sequence
  (0010,2294) - Breed Registration Sequence Attribute
  (0010,0212) - Strain Description
  (0010,0213) - Strain Nomenclature Attribute
  (0010,0219) - Strain Code Sequence
  (0010,0218) - Strain Additional Information Attribute
  (0010,0216) - Strain Stock Sequence
  (0010,0221) - Genetic Modifications Sequence Attribute
  (0010,2297) - Responsible Person
  (0010,2298) - Responsible Person Role Attribute
  (0010,2299) - Responsible Organization
  (0012,0062) - Patient Identity Removed
  (0012,0063) - De-identification Method
  (0012,0064) - De-identification Method Code Sequence

Patient Group Macro Elements

  (0010,0026) - Source Patient Group Identification Sequence
  (0010,0027) - Group of Patients Identification Sequence

Clinical Trial Subject Module

  (0012,0010) - Clinical Trial Sponsor Name
  (0012,0020) - Clinical Trial Protocol ID
  (0012,0021) - Clinical Trial Protocol Name Attribute
  (0012,0030) - Clinical Trial Site ID
  (0012,0031) - Clinical Trial Site Name
  (0012,0040) - Clinical Trial Subject ID
  (0012,0042) - Clinical Trial Subject Reading ID
  (0012,0081) - Clinical Trial Protocol Ethics Committee Name
  (0012,0082) - Clinical Trial Protocol Ethics Committee Approval Number
```

Study level elements

> **Note**
>
> For a detailed description of each Study level element, see the Registry of DICOM Data Elements.

AWS HealthImaging supports the following Study level elements:

```
General Study Module

  (0020,000D) - Study Instance UID
  (0008,0020) - Study Date
  (0008,0030) - Study Time
  (0008,0090) - Referring Physician's Name
  (0008,0096) - Referring Physician Identification Sequence
  (0008,009C) - Consulting Physician's Name
  (0008,009D) - Consulting Physician Identification Sequence
  (0020,0010) - Study ID
  (0008,0050) - Accession Number
  (0008,0051) - Issuer of Accession Number Sequence
  (0008,1030) - Study Description
  (0008,1048) - Physician(s) of Record
  (0008,1049) - Physician(s) of Record Identification Sequence
  (0008,1060) - Name of Physician(s) Reading Study
  (0008,1062) - Physician(s) Reading Study Identification Sequence
  (0032,1033) - Requesting Service
  (0032,1034) - Requesting Service Code Sequence
  (0008,1110) - Referenced Study Sequence
  (0008,1032) - Procedure Code Sequence
  (0040,1012) - Reason For Performed Procedure Code Sequence

Patient Study Module

  (0008,1080) - Admitting Diagnoses Description
  (0008,1084) - Admitting Diagnoses Code Sequence
  (0010,1010) - Patient's Age
  (0010,1020) - Patient's Size
  (0010,1030) - Patient's Weight
  (0010,1022) - Patient's Body Mass Index
  (0010,1023) - Measured AP Dimension
  (0010,1024) - Measured Lateral Dimension
```

```
  (0010,1021) - Patient's Size Code Sequence
  (0010,2000) - Medical Alerts
  (0010,2110) - Allergies
  (0010,21A0) - Smoking Status
  (0010,21C0) - Pregnancy Status
  (0010,21D0) - Last Menstrual Date
  (0038,0500) - Patient State
  (0010,2180) - Occupation
  (0010,21B0) - Additional Patient History
  (0038,0010) - Admission ID
  (0038,0014) - Issuer of Admission ID Sequence
  (0032,1066) - Reason for Visit
  (0032,1067) - Reason for Visit Code Sequence
  (0038,0060) - Service Episode ID
  (0038,0064) - Issuer of Service Episode ID Sequence
  (0038,0062) - Service Episode Description
  (0010,2203) - Patient's Sex Neutered

Clinical Trial Study Module

  (0012,0050) - Clinical Trial Time Point ID
  (0012,0051) - Clinical Trial Time Point Description
  (0012,0052) - Longitudinal Temporal Offset from Event
  (0012,0053) - Longitudinal Temporal Event Type
  (0012,0083) - Consent for Clinical Trial Use Sequence
```

Series level elements

> **Note**
>
> For a detailed description of each Series level element, see the [Registry of DICOM Data Elements](https://dicom.nema.org/medical/dicom/current/output/html/part06.html#chapter_6).

AWS HealthImaging supports the following Series level elements:

```
General Series Module

  (0008,0060) - Modality
  (0020,000E) - Series Instance UID
  (0020,0011) - Series Number
  (0020,0060) - Laterality
  (0008,0021) - Series Date
```

```
  (0008,0031) - Series Time
  (0008,1050) - Performing Physician's Name
  (0008,1052) - Performing Physician Identification Sequence
  (0018,1030) - Protocol Name
  (0008,103E) - Series Description
  (0008,103F) - Series Description Code Sequence
  (0008,1070) - Operators' Name
  (0008,1072) - Operator Identification Sequence
  (0008,1111) - Referenced Performed Procedure Step Sequence
  (0008,1250) - Related Series Sequence
  (0018,0015) - Body Part Examined
  (0018,5100) - Patient Position
  (0028,0108) - Smallest Pixel Value in Series
  (0028,0109) - Largest Pixel Value in Series
  (0040,0275) - Request Attributes Sequence
  (0010,2210) - Anatomical Orientation Type
  (300A,0700) - Treatment Session UID

Clinical Trial Series Module

  (0012,0060) - Clinical Trial Coordinating Center Name
  (0012,0071) - Clinical Trial Series ID
  (0012,0072) - Clinical Trial Series Description

General Equipment Module

  (0008,0070) - Manufacturer
  (0008,0080) - Institution Name
  (0008,0081) - Institution Address
  (0008,1010) - Station Name
  (0008,1040) - Institutional Department Name
  (0008,1041) - Institutional Department Type Code Sequence
  (0008,1090) - Manufacturer's Model Name
  (0018,100B) - Manufacturer's Device Class UID
  (0018,1000) - Device Serial Number
  (0018,1020) - Software Versions
  (0018,1008) - Gantry ID
  (0018,100A) - UDI Sequence
  (0018,1002) - Device UID
  (0018,1050) - Spatial Resolution
  (0018,1200) - Date of Last Calibration
  (0018,1201) - Time of Last Calibration
  (0028,0120) - Pixel Padding Value
```

```
Frame of Reference Module

  (0020,0052) - Frame of Reference UID
  (0020,1040) - Position Reference Indicator
```

Supported transfer syntaxes

AWS HealthImaging supports importing DICOM P10 files with different transfer syntaxes. Some files retain their original transfer syntax encoding during import, while most lossless image frames are transcoded during import. The transcoding behavior depends on your datastore configuration. Data stores use HTJ2K as the storage format by default, but can be configured at creation time to use JPEG 2000 Lossless. The following example shows how HealthImaging records a `StoredTransferSyntaxUID` for each instance within the [metadata](#) returned by [`GetImageSetMetadata`](#).

```
"Instances": {
   "999.999.2.19941105.134500.2.101": {
        "StoredTransferSyntaxUID": "1.2.840.10008.1.2.4.90",
        "ImageFrames": [{ ...
```

> **Note**
>
> Keep these points in mind when viewing the following table:
>
> - A transfer syntax UID entry marked with an asterisk (*) indicates a file is stored in its original encoded format during import. For these files, the `StoredTransferSyntaxUID` located in the instance metadata matches the original transfer syntax.
> - A transfer syntax UID entry marked *without* an asterisk indicates a file is transcoded to HTJ2K lossless during import and stored in HealthImaging. The `StoredTransferSyntaxUID` element of the instance metadata will be set the storage format of High-Throughput JPEG 2000 with RPCL Options Image Compression—Lossless Only (1.2.840.10008.1.2.4.202).
> - If the `StoredTransferSyntaxUID` key does not exist or is set to `null`, you can assume it is encoded to the configured data store storage format.

HealthImaging supported transfer syntaxes

Transfer syntax UID	Transfer syntax name
1.2.840.10008.1.2	Implicit VR Endian: Default Transfer Syntax for DICOM
1.2.840.10008.1.2.1* (binary segmentation retains original encoding, whereas, non-binary segmentation is transcoded to HTJ2K Lossless RPCL)	Explicit VR Little Endian
1.2.840.10008.1.2.1.99	Deflated Explicit VR Little Endian
1.2.840.10008.1.2.2	Explicit VR Big Endian
1.2.840.10008.1.2.4.50*	JPEG Baseline (Process 1): Default Transfer Syntax for Lossy JPEG 8-bit Image Compressi on
1.2.840.10008.1.2.4.51	JPEG Baseline (Processes 2 & 4): Default Transfer Syntax for Lossy JPEG 12-bit Image Compression (Process 4 only)
1.2.840.10008.1.2.4.57	JPEG Lossless Non-Hierarchical (Process 14)
1.2.840.10008.1.2.4.70	JPEG Lossless, Nonhierarchical, First- Order Prediction (Processes 14 [Selection Value 1]): Default Transfer Syntax for Lossless JPEG Image Compression
1.2.840.10008.1.2.4.80	JPEG-LS Lossless Image Compression
1.2.840.10008.1.2.4.81	JPEG-LS Lossy (Near-Lossless) Image Compression
1.2.840.10008.1.2.4.90	JPEG 2000 Image Compression (Lossless Only)
1.2.840.10008.1.2.4.91*	JPEG 2000 Image Compression

Transfer syntax UID	Transfer syntax name
1.2.840.10008.1.2.4.92	JPEG 2000 Part 2 Multicomponent Image Compression (Lossless Only)
1.2.840.10008.1.2.4.93	JPEG 2000 Part 2 Multicomponent Image Compression
1.2.840.10008.1.2.4.112*	JPEG XL
1.2.840.10008.1.2.4.201	High-Throughput JPEG 2000 Image Compressi on (Lossless Only)
1.2.840.10008.1.2.4.202	High-Throughput JPEG 2000 with RPCL Options Image Compression (Lossless Only)
1.2.840.10008.1.2.4.203*	High-Throughput JPEG 2000 Image Compressi on
1.2.840.10008.1.2.5	RLE Lossless
1.2.840.10008.1.2.4.100*, 1.2.840.10008.1.2. 4.100.1*	MPEG2 Main Profile Main Level
1.2.840.10008.1.2.4.101*, 1.2.840.10008.1.2. 4.101.1*	MPEG2 Main Profile at High Level
1.2.840.10008.1.2.4.102*, 1.2.840.10008.1.2. 4.102.1*	MPEG-4 AVC/H.264 High Profile / Level 4.1
1.2.840.10008.1.2.4.103*, 1.2.840.10008.1.2. 4.103.1*	MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1
1.2.840.10008.1.2.4.104*, 1.2.840.10008.1.2. 4.104.1*	MPEG-4 AVC/H.264 High Profile / Level 4.2 for 2D Video
1.2.840.10008.1.2.4.105*, 1.2.840.10008.1.2. 4.105.1*	MPEG-4 AVC/H.264 High Profile / Level 4.2 of the ITU-T H.264 Video

Transfer syntax UID	Transfer syntax name
1.2.840.10008.1.2.4.106*, 1.2.840.10008.1.2.4.106.1*	MPEG-4 AVC/H.264 Stereo High Profile / Level 4.2 of the ITU-T H.264 Video
1.2.840.10008.1.2.4.107*	HEVC/H.265 Main Profile / Level 5.1 Video
1.2.840.10008.1.2.4.108*	HEVC/H.265 Main 10 Profile / Level 5.1

*Retains original transfer syntax encoding during import

DICOM element constraints

When importing your medical imaging data into AWS HealthImaging, max length constraints are applied to the following DICOM elements. To achieve a successful import, ensure that your data does not exceed the max length constraints.

DICOM element constraints during import

DICOM keyword	DICOM tag	Max length
PatientName	(0010,0010)	256
PatientID	(0010,0020)	256
PatientBirthDate	(0010,0030)	18
PatientSex	(0010,0040)	16
StudyInstanceUID	(0020,000D)	256
StudyID	(0020,0010)	256
StudyDescription	(0008,1030)	256
NumberOfStudyRelatedSeries	(0020,1206)	1,000,000
NumberOfStudyRelatedInstances	(0020,1208)	1,000,000
AccessionNumber	(0008,0050)	256

DICOM keyword	DICOM tag	Max length
StudyDate	(0008,0020)	18
StudyTime	(0008,0030)	28
SOPInstanceUID	(0008,0018)	256
SeriesInstanceUID	(0020,000E)	256

DICOM metadata constraints

When you use `UpdateImageSetMetadata` to update HealthImaging metadata attributes, the following DICOM constraints are applied.

- Cannot update or remove private attributes on Patient/Study/Series/Instance level attributes unless the update constraint applies to both `updatableAttributes` and `removableAttributes`
- Cannot update the following AWS HealthImaging generated attributes: `SchemaVersion`, `DatastoreID`, `ImageSetID`, `PixelData`, `Checksum`, `Width`, `Height`, `MinPixelValue`, `MaxPixelValue`, `FrameSizeInBytes`
- Cannot update the following DICOM attributes unless the `force` flag is set: `Tag.PixelData`, `Tag.StudyInstanceUID`, `Tag.SeriesInstanceUID`, `Tag.SOPInstanceUID`, `Tag.StudyID`
- Cannot update attributes with VR type SQ (nested attributes) unless the `force` flag is set
- Cannot update multivalued attributes unless the `force` flag is set
- Cannot update attributes with values that are not compatible with the attribute VR type unless the `force` flag is set
- Cannot update attributes which are not considered valid attributes according to the DICOM standard unless the `force` flag is set
- Cannot update attributes across modules. For example, if a Patient level attribute is given at the Study level in customer payload request, the request can be invalidated.
- Cannot update attributes if the associated attribute module is not present in existing `ImageSetMetadata`. For example, you are not allowed to update attributes for a `seriesInstanceUID` if the Series with `seriesInstanceUID` is not present in existing image set metadata.

AWS HealthImaging reference

This section contains supporting data that is relevant to AWS HealthImaging.

Topics

AWS HealthImaging endpoints and quotas

The following topics contain information about AWS HealthImaging service endpoints and quotas.

Topics

Service endpoints

A service endpoint is a URL that identifies a host and port as the entry point for a web service. Every web service request contains an endpoint. Most AWS services provide endpoints for specific Regions to enable faster connectivity. The following table lists the service endpoints for AWS HealthImaging.

Region Name	Region	Endpoint	Protocol
US East (N. Virginia)	us-east-1	medical-imaging.us-east-1.amazonaws.com	HTTPS
		medical-imaging-fips.us-east-1.amazonaws.com	HTTPS

Region Name	Region	Endpoint	Protocol
US West (Oregon)	us-west-2	medical-imaging.us-west-2.amazonaws.com medical-imaging-fips.us-west-2.amazonaws.com	HTTPS HTTPS
Asia Pacific (Sydney)	ap-southeast-2	medical-imaging.ap-southeast-2.amazonaws.com	HTTPS
Europe (Ireland)	eu-west-1	medical-imaging.eu-west-1.amazonaws.com	HTTPS
Europe (London)	eu-west-2	medical-imaging.eu-west-2.amazonaws.com	HTTPS

If you are using HTTP requests to call AWS HealthImaging actions, you must use different endpoints depending on the actions being called. The following menu lists the available service endpoints for HTTP requests and the actions they support.

Supported API actions for HTTP requests

data store, import, tagging

The following *data store*, *import*, and *tagging* actions are accessible via endpoint:

```
https://medical-imaging.region.amazonaws.com
```

- CreateDatastore
- GetDatastore
- ListDatastores
- DeleteDatastore

- StartDICOMImportJob
- GetDICOMImportJob
- ListDICOMImportJobs
- TagResource
- ListTagsForResource
- UntagResource

image set

The following *image set* actions are accessible via endpoint:

```
https://runtime-medical-imaging.region.amazonaws.com
```

- SearchImageSets
- GetImageSet
- GetImageSetMetadata
- GetImageFrame
- ListImageSetVersions
- UpdateImageSetMetadata
- CopyImageSet
- DeleteImageSet

DICOMweb

HealthImaging offers a representations of DICOMweb Retrieve WADO-RS services. For more information, see Retrieving DICOM data from HealthImaging.

The following DICOMweb services are accessible via endpoint:

```
https://dicom-medical-imaging.region.amazonaws.com
```

- `GetDICOMInstance`
- `GetDICOMInstanceMetadata`
- `GetDICOMInstanceFrames`

Service quotas

Service quotas are defined as the maximum value for your resources, actions, and items in your AWS account.

> **Note**
>
> For adjustable quotas, you can request a quota increase using the Service Quotas console. For more information, see Requesting a quota increase in the *Service Quotas User Guide*.

The following table lists the default quotas for AWS HealthImaging.

Name	Default	Adjustable	Description
Maximum concurrent CopyImageSet requests per data store	Each supported Region: 100	Yes	The maximum concurrent CopyImageSet requests per data store in the current AWS Region
Maximum concurrent DeleteImageSet requests per data store	Each supported Region: 100	Yes	The maximum concurrent DeleteImageSet requests per data store in the current AWS Region

Name	Default	Adjustable	Description
Maximum concurrent UpdateImageSetMetadata requests per data store	Each supported Region: 100	Yes	The maximum concurrent UpdateImageSetMetadata requests per data store in the current AWS Region
Maximum concurrent import jobs per data store	ap-southeast-2: 20 Each of the other supported Regions: 100	Yes	The maximum number of concurrent import jobs per data store in the current AWS Region
Maximum data stores	Each supported Region: 10	Yes	The maximum number of active data stores in the current AWS Region
Maximum number of ImageFrames allowed to be copied per CopyImageSet request	Each supported Region: 1,000	Yes	The maximum number of ImageFrames allowed to be copied per CopyImageSet request in the current AWS Region
Maximum number of files in a DICOM import job	Each supported Region: 5,000	Yes	The maximum number of files in a DICOM import job in the current AWS Region
Maximum number of nested folders in a DICOM import job	Each supported Region: 10,000	No	The maximum number of nested folders in a DICOM import job in the current AWS Region

Name	Default	Adjustable	Description
Maximum payload size limit (in KB) accepted by UpdateImageSetMetadata	Each supported Region: 10 Kilobytes	Yes	The maximum payload size limit (in KB) accepted by UpdateImageSetMetadata in the current AWS Region
Maximum size (in GB) of all files in a DICOM import job	Each supported Region: 10 Gigabytes	No	The maximum size (in GB) of all files in a DICOM import job in the current AWS Region
Maximum size (in GB) of each DICOM P10 file in a DICOM import job	Each supported Region: 4 Gigabytes	No	The maximum size (in GB) of each DICOM P10 file in the DICOM import job in the current AWS Region
Maximum size limit (in MB) on ImageSetMetadata per Import, Copy, and UpdateImageSet	Each supported Region: 50 Megabytes	Yes	The maximum size limit (in MB) on ImageSetMetadata per Import, Copy, and UpdateImageSet in the current AWS Region

AWS HealthImaging throttling limits

Your AWS account has throttling limits that apply to AWS HealthImaging API actions. For all actions, a `ThrottlingException` error is thrown if throttling limits are exceeded. For more information, see the *AWS HealthImaging API Reference*.

> **Note**
>
> Throttling limits are adjustable for all HealthImaging API actions. To request a throttling limit adjustment, contact the AWS Support Center. To create a case, log in to your AWS account and choose **Create case**.

The following table lists throttling limits for both native HealthImaging actions and representations of DICOMweb services.

AWS HealthImaging throttling limits

Action	Throttle rate	Throttle burst
CreateDatastore	0.085 tps	1 tps
GetDatastore	10 tps	20 tps
ListDatastores	5 tps	10 tps
DeleteDatastore	0.085 tps	1 tps
StartDICOMImportJob	1 tps	2 tps
GetDICOMImportJob	25 tps	50 tps
ListDICOMImportJobs	10 tps	20 tps
SearchImageSets	25 tps	50 tps
GetImageSet	25 tps	50 tps
GetImageSetMetadata	50 tps	100 tps
GetImageFrame	1000 tps	2000 tps
ListImageSetVersions	25 tps	50 tps
UpdateImageSetMetadata	0.25 tps	1 tps
CopyImageSet	0.25 tps	1 tps

Action	Throttle rate	Throttle burst
DeleteImageSet	0.25 tps	1 tps
TagResource	10 tps	20 tps
ListTagsForResource	10 tps	20 tps
UntagResource	10 tps	20 tps
GetDICOMInstance*	50 tps	100 tps
GetDICOMInstanceMetadata*	50 tps	100 tps
GetDICOMInstanceFrames*	50 tps	100 tps
GetDICOMSeriesMetadata	50 tps	100 tps

*Representation of a DICOMweb service

AWS HealthImaging pixel data verification

During import, HealthImaging provides built-in pixel data verification by checking the lossless encoding and decoding state of every image. This feature ensures that images decoded using HTJ2K decoding libraries always match the original DICOM P10 images imported into HealthImaging.

- The image onboarding process begins when an import job captures the original pixel quality state of DICOM P10 images before they are imported. A unique immutable Image Frame Resolution Checksum (IFRC) is generated for each image using the CRC32 algorithm. The IFRC checksum value is presented in the `job-output-manifest.json` metadata document. For more information, see Understanding import jobs.
- After the images are imported into a HealthImaging data store and transformed into image sets, the HTJ2K-encoded image frames are immediately decoded and new IFRCs are calculated. HealthImaging then compares the full resolution IFRCs of the original images against the new IFRCs of the imported image frames to verify accuracy.
- A corresponding per-image descriptive error condition is captured in the import job output log (`job-output-manifest.json`) for you to review and verify.

To verify pixel data

1. After importing your medical imaging data, view the per-image set descriptive success (or error condition) captured in the import job output log, `job-output-manifest.json`. For more information, see Understanding import jobs.
2. Image sets are comprised of metadata and image frames (pixel data). Image set metadata contains information about associated image frames. Use the `GetImageSetMetadata` action to get metadata for an image set. For more information, see Getting image set metadata.
3. The `PixelDataChecksumFromBaseToFullResolution` contains the IFRC (checksum) for the full resolution image. For images stored in their original transfer syntax 1.2.840.10008.1.2.4.203, 1.2.840.10008.1.2.4.91, 1.2.840.10008.1.2.4.50, and 1.2.840.10008.1.2.1 (Binary Segmentation only) the checksum is calculated on the original image. For images that are stored in HTJ2K Lossless with RPCL, the checksum is calculated on the decoded full resolution image. For more information, see Supported transfer syntaxes.

   Following is example metadata output for the IFRC that is generated as part of the import job process and recorded to `job-output-manifest.json`.

```
"ImageFrames": [{
"ID": "67890678906789012345123451234512",
"PixelDataChecksumFromBaseToFullResolution": [
{
    "Width": 512,
    "Height": 512,
    "Checksum": 2510355201
}
]
```

   For images stored in their original transfer syntax 1.2.840.10008.1.2.4.203, 1.2.840.10008.1.2.4.91, 1.2.840.10008.1.2.4.50, and 1.2.840.10008.1.2.1 (Binary Segmentation only) the `MinPixelValue` and `MaxPixelValue` will not be available. The `FrameSizeInBytes` indicates the size of the original frame.

```
"PixelDataChecksumFromBaseToFullResolution": [
   {"Width": 512, "Height": 512, "Checksum": 1379921327 }
],
"MinPixelValue": null,
"MaxPixelValue": null,
"FrameSizeInBytes": 429
```

For images stored in HTJ2K Lossless with RPCL, the `FrameSizeInBytes` indicates the size of the decoded image frame.

```
"PixelDataChecksumFromBaseToFullResolution": [
   {"Width": 512, "Height": 512, "Checksum": 1379921327 }
],
"MinPixelValue": 11,
"MaxPixelValue": 11,
"FrameSizeInBytes": 1652
```

4. For instances containing video, HealthImaging performs a lightweight codec validation that verifies the transfer syntax specified in the DICOM metadata matches the video codec.

   HealthImaging computes an IFRC checksum value on the original video object using the CRC32 algorithm. The IFRC checksum value is recorded to the `job-output-manifest.json`, and persisted in the HealthImaging metadata. As with images stored in their original transfer syntax (described above), the `MinPixelValue` and `MaxPixelValue` will not be available. The FrameSizeInBytes indicates the size of the original frame.

5. HealthImaging verify pixel data, access the Pixel data verification procedure on GitHub and follow the instructions in the`README.md` file to independently verify lossless image processing by the various Image frame decoding libraries that are utilized by HealthImaging. After the full image is loaded, you can compute the IFRC for raw input data on your end and compare it with the IFRC value provided in the HealthImaging metadata to verify the pixel data.

HealthImaging Warning Codes

HealthImaging attempts to import all your medical imaging data. If data non-conformances or unrecognized data elements are encountered during imports, HealthImaging will add one of the following warnings to the `warning.ndjson` file. A warning associated with an imported instance will also be searchable via the `SearchDICOMInstances` action with the `WarningReason` element. Instances imported with a warning may have reduced support via HealthImaging APIs, as described below.

HealthImaging Import Warning Codes

Warning Reason (Hexadecimal)	Warning Reason (Decimal)	Warning Type (Enum)	Warning Details	Resulting Behavior
DICOM Standard Warning Reasons				
0xB000	45056	COERCION_OF_DATA_ELEMENTS	The ingestion modified one or more data elements during storage of the instance. See Section 6.6.1.3.	n/a
0xB006	45062	ELEMENTS_DISCARDED	The ingestion discarded some data elements during storage of the instance. See Section 6.6.1.3.	n/a
0xB007	45063	SOP_CLASS_DATA_MISMATCH	The `StoreDICOM` action observed that the Data Set did not match the constraints of the SOP Class during storage of the instance.	n/a
AWS HealthImaging Warning Reasons				
0xB100	45312	TRANSCODING_EXCEPTION	This warning occurs when HealthImaging cannot transcode the instance PixelData to HTJ2K (default storage format), or if the PixelData cannot be transcoded for another reason (i.e. failed	Pixel data may still be retrievable as a single blob if required, passing wildcard "*" as the `transfer-syntax` in Accept header will return it in the stored format.

Warning Reason (Hexadecimal)	Warning Reason (Decimal)	Warning Type (Enum)	Warning Details	Resulting Behavior
			validations, wrong pixel data attributes, etc). In this case, the pixel data will be stored as a blob.	
0xB110	45328	FRAMES_EXTRACTION_FAILURE	This warning occurs when there is an issue parsing individual frames from the PixelData based on the given DICOM metadata.	Pixel data was malformed and cannot be retrieved, use `GetDICOMInstance` to retrieve the entire instance
0xB111	45329	FRAME_NUMBER_MISMATCH	This warning occurs when the "NumberOfFrames" DICOM element does not match the actual number of image "fragments" in the input DICOM file.	Pixel data was malformed and cannot be retrieved, use `GetDICOMInstance` to retrieve the entire instance
0xB112	45330	INVALID_OFFSET_TABLE	This warning occurs when the offset table in the fragments of the input DICOM file do not match up with the actual frame length and could result in malformed frames depending on the severity.	Pixel data was malformed and cannot be retrieved, use `GetDICOMInstance` to retrieve the entire instance

Warning Reason (Hexadecimal)	Warning Reason (Decimal)	Warning Type (Enum)	Warning Details	Resulting Behavior
0xB120	45344	UNSUPPORTED_TRANSFER_SYNTAX	This warning occurs when HealthImaging encounters an unrecognized or unsupported transfer syntax. When this happens, HealthImaging will store the pixel data as a blob.	Pixel data may still be retrievable as a single blob if required, passing wildcard "*" as the `transfer-syntax` in Accept header will return it in the stored format.
0xB201	45570	INVALID_UID_FORMAT	This warning occurs when one or more UID elements violate the DICOM Value Representation (e.g. `1.2.3..4`)	n/a
0xB202	45571	INVALID_DICOM_VALUE_LENGTH	This warning occurs when a DICOM element has a length longer than that supported by the DICOM Value Representation, potentially introducing invalid behaviors for search/retrieve actions.	Some fields may not be parseable and therefore cannot be searched on (i.e. `StudyDate` or `StudyTime`)
0xBFFF	47513	OTHER	This warning occurs when there an uncaught warning that HealthImaging does not capture as a specific warning code.	Pixel data was malformed and cannot be retrieved, use `GetDICOMInstance` to retrieve the entire instance

Image frame decoding libraries for AWS HealthImaging

During import, some transfer syntaxes retain their original encoding, while others are transcoded to High-Throughput JPEG 2000 (HTJ2K) lossless by default or JPEG 2000 Lossless (when configured) depending on your datastore configuration. HTJ2K delivers consistently fast image display and universal access to HTJ2K's advanced features. Because image frames are encoded in either HTJ2K or JPEG 2000 Lossless during import, they must be decoded prior to viewing in an image viewer. For information about determining transfer syntaxes, see Supported transfer syntaxes. For information about determining transfer syntaxes, see Supported transfer syntaxes.

> **Note**
>
> HTJ2K is defined in Part 15 of the JPEG2000 standard (ISO/IEC 15444-15:2019). HTJ2K retains the advanced features of JPEG2000 such as resolution scalability, precincts, tiling, high bit depth, multiple channels, and color space support.

Topics

- Image frame decoding libraries
- Image viewers

Image frame decoding libraries

Depending on your programming language, we recommend the following decoding libraries to decode image frames.

- NVIDIA nvJPEG2000 – Commercial, GPU-accelerated
- Kakadu Software – Commercial, C++ with Java and .NET bindings
- OpenJPH – Open source, C++ and WASM
- OpenJPEG – Open source, C/C++, Java
- openjphpy – Open source, Python
- pylibjpeg-openjpeg – Open source, Python

Image viewers

You can view image frames after you've decoded them. AWS HealthImaging API actions support a variety of open-source image viewers, including:

- Open Health Imaging Foundation (OHIF)
- Cornerstone.js

AWS HealthImaging sample projects

AWS HealthImaging provides the following sample projects on GitHub.

OHIF Viewer integrated to AWS HealthImaging via OIDC

This AWS Cloud Development Kit (AWS CDK) project deploys OHIF viewer on Amazon CloudFront. The viewer is integrated to an Amazon Web Services datastore as DICOMWeb data source, and with Amazon Cognito as the identity provider for authentication via OIDC.

DICOM Ingestion From On-Premises to AWS HealthImaging

An AWS serverless project for deploying an IoT edge solution that receives DICOM files from a DICOM DIMSE source (PACS, VNA, CT scanner) and stores them in a secure Amazon S3 bucket. The solution indexes the DICOM files in a database and queues each DICOM series to be imported in AWS HealthImaging. It is comprised of a component running at the edge that is managed by AWS IoT Greengrass, and a DICOM ingestion pipeline running in AWS Cloud.

Tile Level Marker (TLM) Proxy

An AWS Cloud Development Kit (AWS CDK) project for retrieving image frames from AWS HealthImaging by using tile level markers (TLM), a feature of High-Throughput JPEG 2000 (HTJ2K). This results in faster retrieval times with lower-resolution images. Potential workflows include generating thumbnails and progressive loading of images.

Amazon CloudFront Delivery

An AWS serverless project for creating an Amazon CloudFront distribution with an HTTPS endpoint that caches (by using GET) and delivers image frames from the edge. By default, the endpoint authenticates requests with an Amazon Cognito JSON web token (JWT). Both authentication and request signing is done at the edge using Lambda@Edge. This service is a feature of Amazon CloudFront that lets you run code closer to users of your application, which improves performance and reduces latency. There is no infrastucture to manage.

AWS HealthImaging Viewer UI

An AWS Amplify project for deploying a frontend UI with backend authentication with which you can view image set metadata attributes and image frames (pixel data) stored in AWS HealthImaging using progressive decoding. You can optionally integrate the Tile Level Marker (TLM) Proxy and/or Amazon CloudFront Delivery projects above to load image frames using an alternative method.

AWS HealthImaging DICOMweb Proxy

A Python-based project for enabling DICOMweb WADO-RS and QIDO-RS endpoints on a HealthImaging data store to support web-based medical imaging viewers and other DICOMweb-compatible apps.

> **Note**
>
> This project does not use HealthImaging's representation of DICOMweb APIs described in Using DICOMweb with AWS HealthImaging.

To view additional sample projects, see AWS HealthImaging Samples on GitHub.

Using this service with an AWS SDK

AWS software development kits (SDKs) are available for many popular programming languages. Each SDK provides an API, code examples, and documentation that make it easier for developers to build applications in their preferred language.

SDK documentation	Code examples
AWS SDK for C++	AWS SDK for C++ code examples
AWS CLI	AWS CLI code examples
AWS SDK for Go	AWS SDK for Go code examples
AWS SDK for Java	AWS SDK for Java code examples
AWS SDK for JavaScript	AWS SDK for JavaScript code examples
AWS SDK for Kotlin	AWS SDK for Kotlin code examples

SDK documentation	Code examples
AWS SDK for .NET	AWS SDK for .NET code examples
AWS SDK for PHP	AWS SDK for PHP code examples
AWS Tools for PowerShell	AWS Tools for PowerShell code examples
AWS SDK for Python (Boto3)	AWS SDK for Python (Boto3) code examples
AWS SDK for Ruby	AWS SDK for Ruby code examples
AWS SDK for Rust	AWS SDK for Rust code examples
AWS SDK for SAP ABAP	AWS SDK for SAP ABAP code examples
AWS SDK for Swift	AWS SDK for Swift code examples

Example availability

Can't find what you need? Request a code example by using the **Provide feedback** link at the bottom of this page.

Cost Optimization

HealthImaging is designed to optimize storage costs by automatically moving data to the most cost-effective access tier when access patterns change. As usage patterns change over time, intelligent tiering provides automatic lifecycle management for DICOM data without any operational overhead. HealthImaging has two storage tiers:

- **Frequent Access tier** storage for newly imported or regularly accessed DICOM data.
- **Archive Instant Access tier** storage for DICOM data that has not been accessed recently. Provides reduced storage costs for long-term archival while maintaining millisecond access latencies.

You are billed for the aggregate storage size of all image sets in a data store. Both storage tiers are billed per GB per month, and there is no per image set fee. There are also no retrieval charges for moving data between storage tiers.

> **Note**
>
> Image sets are billed at a minimum size of 5 MB. HealthImaging accepts image sets smaller than 5 MB, but these smaller objects are charged at a 5 MB rate.

How Intelligent Tiering Works

Your data is stored in the Frequent Access tier when new image sets are created. Image sets can be created by importing new data (through Import Jobs or DICOMweb STOW-RS) or by invoking CopyImageSet. HealthImaging automatically moves image sets that have not been accessed for 30 consecutive days to the Archive Instant Access tier, and image sets remain in Archive Instant Access tier until they are accessed again.

The following are actions that constitute access to DICOM data that automatically move image sets from the Archive Instant Access tier back to the Frequent Access tier:

- Invoking GetImageSetMetadata, GetImageFrame, or any DICOMweb WADO-RS action.
- Invoking CopyImageSet or UpdateImageSetMetadata. In the case of Copy operations, only the replicated image sets are tiered up to Frequent Access. In the case of Copy with destination, the destination image set is tiered up.

- Viewing and downloading image set data through the AWS HealthImaging management console.

The above actions both promote image sets to Frequent Access tier and prevent image sets in Frequent Access tier from tiering down to the Archive Instant Access tier for another 30 days. Access to image sets can occur via the AWS Management Console or through programmatic interfaces such as the AWS CLI or AWS SDKs. Other actions **do not** constitute access and therefore will not automatically move objects from the Archive Instant Access tier back to the Frequent Access tier. The following is a sample, not a definitive list, of such actions:

- Actions on data stores (CreateDatastore and GetDatastore)
- List actions (ListDICOMImportJobs, ListImageSetVersions, and ListTagsForResource)
- Search actions (SearchImageSets and DICOMweb QIDO-RS queries)
- Invoking GetImageSet, TagResource, or UntagResource
- Delete operations

Data imported to HealthImaging is charged for a minimum storage duration of 30 days. You can delete your data anytime, but each image deleted prior to 30 days after import will be charged for the remainder of the minimum duration.

Estimating Structured Data Storage

HealthImaging stores some DICOM header information in indexed storage. You are charged for this structured storage consumption independent of the image set storage tier, and these charges are additive. You can estimate structured storage consumption by multiplying the number of DICOM resources in your data stores by the indexed record sizes per resource. The following values are approximate.

DICOM Resource	Indexed Sizes (bytes)
Study	1024
Series	830
Instance	680

AWS HealthImaging releases

The following table shows when features and updates were released for the AWS HealthImaging service and documentation. For more information on a release, see the linked topic.

Change	Description	Date
`includefield` query parameter for QIDO-RS Search APIs	HealthImaging now supports the `includefield` query parameter across all three QIDO-RS Search APIs (`SearchDICOMStudies`, `SearchDICOMSeries`, and `SearchDICOMInstances`). This feature allows you to request additional DICOM attributes beyond the default response set, including standard tags, nested Sequence (SQ) attributes using dotted path notation, and private data elements. You can also specify `includefield=all` to retrieve all available attributes at a given resource level. For more information, see Searching DICOM data.	May 22, 2026
DICOM JSON metadata import for `StartDICOMImportJob`	HealthImaging adds the `importConfiguration` parameter to the `StartDICOMImportJob` action. You can now enhance existing DICOM files with JSON metadata during import	May 20, 2026

	by providing a `DicomMetadataMapping` that maps DICOM files to their corresponding JSON metadata files. For more information, see StartDICOMImportJob.	
Atomic study-level updates for `UpdateImageSetMetadata`	HealthImaging adds the `--include-study-image-sets` flag to the `UpdateImageSetMetadata` action. When set, Patient and Study-level attribute changes made to the specified image set are automatically applied to all other primary image sets that share the same Study Instance UID within the datastore. For more information, see Updating image set metadata.	March 31, 2026
Study-level fine-grained access control	HealthImaging now supports granting permissions for DICOMweb APIs using DICOM Study Instance UIDs and Series Instance UIDs directly in IAM policies. For more information, see Granting permissions based on Study Instance UID and Series Instance UID.	March 19, 2026

Amazon CloudWatch metrics for HealthImaging	HealthImaging publishes additional metrics to CloudWatch in the `AWS/HealthImaging` namespace, including resource usage metrics at both account and data store levels. For more information, see Using Amazon CloudWatch with HealthImaging.	February 12, 2026
Service-linked role for HealthImaging	HealthImaging now supports service-linked roles that allow the service to publish datastore metrics to CloudWatch on your behalf. The `AWSServiceRoleForHealthImaging` role can be created using the IAM console or AWS CLI. For more information, see Using service-linked roles for HealthImaging.	February 9, 2026
AWSHealthImagingServiceRolePolicy managed policy	HealthImaging added a new managed policy `AWSHealthImagingServiceRolePolicy` for the service-linked role that provides permissions to manage service operations and publish service metrics to CloudWatch. For more information, see AWSHealthImagingServiceRolePolicy.	February 9, 2026

JPEG XL support for AWS HealthImaging data stores	HealthImaging supports importing and storing DICOM lossy files in the JPEG XL transfer syntax (1.2.840.10008.1.2.4.112). For more information, see Supported transfer syntaxes.	February 2, 2026
Enhanced DICOM import with warning support for non-conformant data	HealthImaging now imports previously rejected DICOM data by accepting non-conformant files while providing detailed warnings through EventBridge events. Import jobs now generate a WARNING folder containing `warning.ndjson` files with specific warning reason codes for non-conformant data. The update adds searchable WarningReason (0008,1196) DICOM element support and introduces `transfer-syntax=*` parameter for retrieving instances in their stored format when transcoding isn't feasible. See Understanding import jobs and HealthImaging warning codes for more information.	December 8, 2025

JPEG 2000 Lossless support for AWS HealthImaging data stores	AWS HealthImaging now supports native JPEG 2000 Lossless encoding for medical images, allowing you to create datastores that persist and retrieve lossless image frames in JPEG 2000 format without transcoding. This enables lower latency retrieval for applications that require JPEG 2000 Lossless format when you specify `–lossless-storage-format JPEG_2000_LOSSLESS` when creating a data store.	November 25, 2025

QIDO-RS Search Enhancements Design	HealthImaging now supports wildcard searching on key DICOM attributes (Patient Name, Referring Physician Name, Patient ID, Study Description, Modality, and Accession Number) and fuzzy search capabilities for Patient/Referring Physician Names to accommodate incomplete or misspelled terms. The update also expands QIDO-RS API query capabilities to include Patient Birthdate and Study Description searches, enhancing the ability to locate relevant studies and series. See Searching DICOM data in HealthImaging for more information.	September 15, 2025
OpenID Connect (OIDC) authorization for DICOMweb APIs	HealthImaging now supports OpenID Connect (OIDC) bearer-token authorization across all DICOMweb APIs. This adds standards-based OAuth 2.0 interoperability with common viewers and toolkits (e.g., OHIF, SLIM, MONAI) by accepting IdP-issued JWTs in the `Authorization` header. See OIDC authentication for DICOMweb APIs for more information.	September 3, 2025

Support for DICOMweb data imports and DICOMweb Bulkdata	HealthImaging HealthImaging supports storing DICOM P10 files via the DICOMweb STOW-RS protocol. See Importing data for more details. Additionally, HealthImaging supports DICOM Bulkdata to ensure consistent, low latency metadata retrievals. See Getting DICOM bulkdata for more information.	June 30, 2025
Automatic data organization, DICOMweb QIDO-RS search, and DICOMweb WADO-RS enhancements	HealthImaging provides automatic organization of DICOM P10 data on import according to the Patient, Study, and Series level hierarchy of the DICOM standard. For more information see Understanding import jobs. HealthImaging supports rich search, per the DICOMweb QIDO-RS standard. See Searching DICOM data in HealthImaging for more information. HealthImaging supports retrieving the metadata for all DICOM instances in a series via a single API action, as described in Getting DICOM series metadata from HealthImaging.	May 22, 2025

Image set creation uses fewer DICOM elements	HealthImaging decreases the number of elements used when grouping incoming DICOM P10 objects into image sets. For more information, see What is an image set?.	January 27, 2025
Lossy support for StartDICOMImportJob	HealthImaging supports importing and storing DICOM lossy files (1.2.840.10008.1.2.4.203, 1.2.840.10008.1.2.4.91, 1.2.840.10008.1.2.4.50) and binary segmentation files in their original format. For more information, see Supported transfer syntaxes.	November 1, 2024
Lossy support for DICOMweb retrieval APIs	HealthImaging supports retrieving images and instances stored in 1.2.840.10008.1.2.4.203, 1.2.840.10008.1.2.4.91, 1.2.840.10008.1.2.4.50, and 1.2.840.10008.1.2.1 (binary segmentation only) in their original format or in Explicit VR Little Endian (1.2.840.10008.1.2.1). For more information, see Supported transfer syntaxes and Retrieving DICOM data.	November 1, 2024
Faster imports for digital pathology	HealthImaging supports up to 6x faster import jobs for DICOM digital pathology (WSI).	November 1, 2024

Binary segmentation support	HealthImaging supports both ingestion and retrieval of DICOM binary segmentat ion files. For more informati on, see Supported transfer syntaxes.	November 1, 2024
Revert to a previous image set version ID	HealthImaging provides the `revertToVersionId` parameter to revert to a previous image set version ID. For more information, see `revertToVersionId` in the *AWS HealthImaging API Reference*.	July 24, 2024

Force functionality for image set modification	HealthImaging provides the `Overrides` data type with the optional `forced` request parameter. Setting this parameter forces the `UpdateImageSetMetadata` and `CopyImageSet` actions, even if Patient, Study, or Series level metadata are mismatched. For more information, see Overrides in the *AWS HealthImaging API Reference*.
	
	• `UpdateImageSetMetadata` force functionality—HealthImaging introduces the optional `force` request parameter for updating the following attributes:
	  • `Tag.StudyInstanceUID` , `Tag.SeriesInstanceUID` , `Tag.SOPInstanceUID` , and `Tag.StudyID`
	  • Adding, removing, or updating instance level private DICOM data elements
	
	For more information, see UpdateImageSetMetadata in the *AWS HealthImaging API Reference*.
	• `CopyImageSet` force functionality—Heal
		July 24, 2024

	thImaging introduces the optional `force` request parameter for copying image sets. Setting this parameter forces the `CopyImageSet` action, even if Patient, Study, or Series level metadata are mismatched across the `sourceImageSet` and `destinationImageSet`. In these cases, the inconsistent metadata remains unchanged in the `destinationImageSet`. For more information, see CopyImageSet in the *AWS HealthImaging API Reference*.	
Copy subsets of SOP Instances	HealthImaging enhances the `CopyImageSet` action so you can pick one or more SOP Instances from a `sourceImageSet` to copy to a `destinationImageSet`. For more information, see Copying an image set.	July 24, 2024
`GetDICOMInstanceMetadata` for returning DICOM instance metadata	HealthImaging provides the `GetDICOMInstanceMetadata` API to return DICOM Part 10 metadata (`.json` file). For more information, see Getting instance metadata.	July 11, 2024

`GetDICOMInstanceFrames` for returning DICOM instance frames (pixel data)	HealthImaging provides the `GetDICOMInstanceFrames` API to return DICOM Part 10 frames (`multipart` request). For more information, see Getting instance frames.	July 11, 2024

Enhanced support for non-standard DICOM data imports	HealthImaging provides support for data imports that include deviations from the DICOM standard. For more information, see DICOM element constraints.
	
	• The following DICOM data elements can be up to 256 characters in max length:
	  ◦ `Patient's Name (0010,0010)`
	  ◦ `Patient ID (0010,0020)`
	  ◦ `Accession Number (0008,0050)`
	• The following syntax variations are permitted for `Study Instance UID`, `Series Instance UID`, `Treatment Session UID`, `Manufacturer’s Device Class UID`, `Device UID`, and `Acquisition UID` :
	  ◦ The first element of any UID can be zero
	  ◦ UIDs can start with one or more leading zeros
	  ◦ UIDs can be up to 256 characters in length
		June 28, 2024

Event notifications	HealthImaging integrates with Amazon EventBridge to support event-driven applicati ons. For more information, see Using EventBridge.	June 5, 2024
`GetDICOMInstance` for returning DICOM instance data	HealthImaging provides the `GetDICOMInstance` service to return DICOM Part 10 instance data (`.dcm` file). For more information, see Getting an instance.	May 15, 2024
Cross-account import	HealthImaging provides support for data imports from Amazon S3 buckets located in other supported Regions. For more information, see Cross-account import.	May 15, 2024

Search enhancements for image sets	HealthImaging `SearchImageSets` action supports the following search enhancements. For more information, see Searching image sets. • Additional support for searching on `UpdatedAt` and `SeriesInstanceUID` • Search between start time and end time • Sort search results by `Ascending` or `Descending` • DICOM Series parameters are returned in responses	April 3, 2024
Maximum file size for imports increased	HealthImaging supports a 4 GB maximum file size for each DICOM P10 file in an import job. For more information, see Service quotas.	March 6, 2024

Transfer syntaxes for JPEG Lossless and HTJ2K	HealthImaging provides support for the following transfer syntaxes for job imports. For more information, see Supported transfer syntaxes. • 1.2.840.10008.1.2.4.57 — JPEG Lossless Non-Hierarchical (Process 14) • 1.2.840.10008.1.2.4.201 — High-Throughput JPEG 2000 Image Compression (Lossless Only) • 1.2.840.10008.1.2.4.202 — High-Throughput JPEG 2000 with RPCL Options Image Compression (Lossless Only) • 1.2.840.10008.1.2.4.203 — High-Throughput JPEG 2000 Image Compression	February 16, 2024
Tested code examples	HealthImaging documentation provides tested code examples for AWS CLI and AWS SDKs for Python, JavaScript, Java, and C++. For more information, see Code examples.	December 19, 2023
Maximum file number for imports increased	HealthImaging supports up to 5,000 files for a single import job. For more information, see Service quotas.	December 19, 2023

Nested folders for imports	HealthImaging supports up to 10,000 nested folders for a single import job. For more information see Service quotas.	December 1, 2023
Faster imports	HealthImaging provides 20X faster imports in all supported Regions. For more information, see Service endpoints.	December 1, 2023
CloudFormation support	HealthImaging supports infrastructure as code (IaC) for provisioning data stores. For more information, see Creating HealthImaging resources with CloudFormation.	September 21, 2023
General availability	AWS HealthImaging is available to all customers in the US East (N. Virginia), US West (Oregon), Europe (Ireland), and Asia Pacific (Sydney) Regions. For more information, see Service endpoints.	July 26, 2023