Using Amazon S3 event notifications and batch operations

**SPL-DD-300-STS3IB-1 - Version 1.0.10**

© 2024 Amazon Web Services, Inc. or its affiliates. All rights reserved. This work may not be reproduced or redistributed, in whole or in part, without prior written permission from Amazon Web Services, Inc. Commercial copying, lending, or selling is prohibited. All trademarks are the property of their owners.

Note: Do not include any personal, identifying, or confidential information into the lab environment. Information entered may be visible to others.

Corrections, feedback, or other questions? Contact us at [*AWS Training and Certification*](https://support.aws.amazon.com/#/contacts/aws-training).

OBJECTIVES

After completing this lab, you will know how to:

* Implement Amazon Simple Storage Service (Amazon S3) Batch operations to perform large-scale operations on Amazon S3 objects
* Configure Amazon S3 event notifications to automate event-driven workloads

PREREQUISITES

This lab follows the **Managing Amazon Simple Storage Service (Amazon S3)** digital course. This free training is available in the [AWS Learning Library](https://www.aws.training/LearningLibrary).

DURATION

This lab requires 60 minutes to complete.

**Start lab**

1. To launch the lab, at the top of the page, choose **Start lab**.

**Caution:** You must wait for the provisioned AWS services to be ready before you can continue.

1. To open the lab, choose **Open Console**.

You are automatically signed in to the AWS Management Console in a new web browser tab.

**WARNING:** **Do not change the Region unless instructed.**

COMMON SIGN-IN ERRORS

**Error: You must first sign out**



If you see the message, **You must first log out before logging into a different AWS account:**

* Choose the **click here** link.
* Close your **Amazon Web Services Sign In** web browser tab and return to your initial lab page.
* Choose **Open Console** again.

**Error: Choosing Start Lab has no effect**

In some cases, certain pop-up or script blocker web browser extensions might prevent the **Start Lab** button from working as intended. If you experience an issue starting the lab:

* Add the lab domain name to your pop-up or script blocker’s allow list or turn it off.
* Refresh the page and try again.

ICON KEY

Various icons are used throughout this lab to call attention to certain aspects of the guide. The following list explains the purpose of each icon:

* Specifies the command you must run.
* Verifies the output of a command or edited file.
* Specifies important hints, tips, guidance, or advice.
* Specifies where to find more information.
* Calls attention to information of special interest or importance. Failure to read the note does not result in physical harm to the equipment or data, but could result in the need to repeat certain steps.
* Draws special attention to actions that are irreversible and could potentially impact the failure of a command or process. Includes warnings about configurations that cannot be changed after they are made.
* Suggests a moment to pause to consider how you might apply a concept in your own environment or to initiate a conversation about the topic at hand.

LAB OVERVIEW

This lab demonstrates how to manage your Amazon S3 storage using Amazon S3 event notifications and S3 batch operations. You learn how to use Amazon S3 Batch Operations to set object tags at scale. You also explore how to architect your applications to handle Amazon S3 events by using Amazon S3 event notifications and AWS Lambda.

LAB SCENARIO

You work for a company that specializes in image editing and processing. Your team uses Amazon S3 object tagging to identify pictures from completed customer orders. You have a requirement to update the tags for a large batch of images pertaining to an order you recently finalized. You want to leverage Amazon S3 batch operations to assign tags to this large batch of images.

Additionally, most of your customer requests involve resizing images to fit within the design constraints of their mobile applications. You want to leverage Amazon S3 event notifications and AWS Lambda to automate the image resizing tasks.

**Task 1: Create an S3 Batch Operations job**

Amazon S3 Batch Operations allow you to perform large-scale batch operations on your Amazon S3 objects. You can use this feature to either copy objects, set object tags, access control lists, initiate object restores from Amazon Glacier, or invoke a Lambda function.

You can reference an Amazon S3 Inventory report to identify the Amazon S3 objects for processing in a batch job. Alternatively, you can reference an Amazon S3 bucket and its objects that require processing by listing them in a CSV-formatted manifest file.

In this task, you create a batch operations job to add tags to your Amazon S3 objects. In this lab, you will use a CSV file to reference the objects that require processing, as the Amazon S3 Inventory reports can take up to 48 hours to become available. You also request a completion report for all the tasks that your job completed for further analysis.

 For more information, refer to *Amazon S3 Batch Operations* and *Amazon S3 Inventory reports* in the **Additional resources** section.

1. If you have not already done so, follow the steps in the [Start Lab](https://labs.skillbuilder.aws/sa/lab/arn%3Aaws%3Alearningcontent%3Aus-east-1%3A470679935125%3Ablueprintversion%2FSPL-DD-300-STS3IB-1%3A1.0.10-9cb8a54c/en-US#StartLab) section to log into the AWS Management Console.
2. At the top of the page, in the unified search bar, search for and choose

S3

.

1. On the Amazon S3 **Buckets** page, choose the link for the bucket name that starts with **images**.

 Do **not** choose the bucket name that starts with images and **ends with resized**. You use that bucket for another task.

 The bucket should contain four image files.

1. Choose the link for **image1.png** to display its properties.
2. On the **Properties** tab, scroll down to the **Tags** section and confirm that there are no tags associated with the image.

In the next few tasks, you add tags to these images using S3 Batch Operations.

1. At the left of the page, in the **Amazon S3** navigation pane, choose **Batch Operations**.
2. Choose **Create job**
3. On the **Choose Region and manifest** page:

* For **AWS Region**, verify it matches the value of **AwsRegion** listed to the left of these instructions.
* In the **Manifest** section, for **Manifest format**, select **CSV**.
* For **Manifest object**, choose **Browse S3**

The **Manifest object** window opens.

1. In the **Manifest object** window, choose the link for the bucket name that starts with **assets**.
2. Select the **manifest.csv** file.

 The **manifest.csv** file contains inventory information about the objects in the **images** bucket that includes the name of the bucket and the name of each file, similar to the following table:

|  |  |
| --- | --- |
| images-82834469 | image1.png |
| images-82834469 | image2.png |
| images-82834469 | image3.png |
| images-82834469 | image4.png |

1. Choose **Choose path**
2. At the bottom right-hand corner of the page, choose **Next**
3. On the **Choose operation** page:

* For **Operation type**, select **Replace all object tags**.

A new section titled **Replace all object tags** appears at the bottom of the page.

1. In the **Replace all object tags** section:

* For **Key**, enter

phototype

* For **Value**, enter

finished

1. Choose **Next**
2. On the **Configure additional options** page, in the **Additional options** section:

* For **Description**, replace the existing text with

Add phototype:finished tag to all files.

1. In the **Completion report** section:

* For **Path to completion report destination**, choose **Browse S3** and then select the bucket name that starts with **assets**.

1. Choose **Choose path**
2. In the **Permissions** section:

* Select **Choose from existing IAM roles**.
* For **IAM role**, select **S3BatchPutRole**.

 Amazon S3 must have permissions to perform S3 Batch Operations on your behalf. The required permissions are granted through an AWS Identity and Access Management (IAM) role. An IAM role named **S3BatchPutRole** that contains the appropriate permissions for this lab was created during the lab build process. To learn more about the permissions required for S3 Batch Operations, refer to *Granting permissions for Amazon S3 Batch Operations* in the **Additional resources** section.

The following is an example of the permissions contained in the IAM role you selected, though the bucket names are slightly different:

{

"Version": "2012-10-17",

"Statement": [

{

"Action": [

"s3:PutObjectTagging",

"s3:PutObjectVersionTagging"

],

"Resource": [

"arn:aws:s3:::images-82834469/\*"

],

"Effect": "Allow"

},

{

"Action": [

"s3:GetObject",

"s3:GetObjectVersion",

"s3:GetBucketLocation"

],

"Resource": [

"arn:aws:s3:::assets-82834469/\*"

],

"Effect": "Allow"

},

{

"Action": [

"s3:PutObject",

"s3:GetBucketLocation"

],

"Resource": [

"arn:aws:s3:::assets-82834469/\*"

],

"Effect": "Allow"

}

]

}

 The policy grants the following permissions:

* Add tags and version tags to objects in the **images** bucket.
* Get (download) objects, object versions, and bucket locations, and put (upload) objects in the **assets** bucket.

1. At the bottom right-hand corner of the page, choose **Next**
2. On the **Review** page, review the details of the job. At the bottom right-hand corner of the page, choose **Create job**
3. On the **Batch Operations** page, in the **Jobs** section, locate the job you just created.

Wait for the status of the job to change to **Awaiting your confirmation to run**.

 You may need to choose  refresh to update the current status.

 Congratulations! You have successfully created an S3 Batch Operations job to replace the tags on the objects in the bucket!

**Task 2: Run an S3 Batch Operations job and verify job completion**

In this task, you review the batch operations job details you created in Task 1 and run the job. Next, you review the job completion report to confirm a successful job execution.

1. Choose the link for the **Job ID** of the job you just created

 The **Job ID** looks similar to **2df06764-0ca8-4e4c-8168-ebdb4f8ccb2e**.

1. At the top right-hand corner of the page, choose **Run job**
2. On the **Run job ID** page, review the job details. At the bottom right-hand corner of the page, choose **Run job**

On the **Job ID** page, in the **Status** section, the **Status** changes to **Ready**.

1. At the top right-hand corner of the page, choose  refresh until the **Status** changes to **Completed**. The job should complete in approximately one to two minutes.
2. Scroll down the page to the **Completion report** section and choose the **Completion report destination** S3 URL to view the job completion report.

 It may take a minute or two for the completion report to be ready.

1. Choose the link for the folder with the name that starts with **job**.
2. Choose the link for the folder named **results/**.

 You should see one CSV file inside the folder.

1. Select the **.csv** file and then, on the **Actions** drop-down menu, choose **Download** to download the CSV file to your device.
2. Open the CSV file you downloaded and view the details of the file. It contains a list of the objects from the **images** bucket and a **Successful** message for each object, indicating the job completed successfully. It should look similar to the following table:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| images-82834469 | image1.png |  | succeeded | 200 |  | Successful |
| images-82834469 | image2.png |  | succeeded | 200 |  | Successful |
| images-82834469 | image3.png |  | succeeded | 200 |  | Successful |
| images-82834469 | image4.png |  | succeeded | 200 |  | Successful |

1. In the AWS Management Console, in the breadcrumbs at the top of the page, choose **Amazon S3**.
2. On the Amazon S3 **Buckets** page, choose the link for the bucket name that starts with **images**.

 Do **not** choose the bucket name that starts with images and **ends with resized**. You use that bucket for another task.

1. Choose the link for **image1.png** to display its properties.
2. On the **Properties** tab, scroll down to the **Tags** section and confirm that the values you entered when creating the Batch Operations job have been added.
3. Repeat the previous steps to verify that tag has been added for the remaining image files in the bucket.

 Congratulations! You have successfully run an Amazon S3 Batch Operations job to add a tag to all of the objects in a bucket!

**Task 3: Create an AWS Lambda function**

AWS Lambda lets you run code without provisioning or managing servers. A Lambda function is a resource you can invoke to run your code. A function contains code to process the events you pass into the function or that other AWS services pass to the function.

In this task, you create a Lambda function to make a thumbnail of an image.

 To learn more about the code you use in this function, refer to *Tutorial: Using AWS Lambda with Amazon S3* in the **Additional resources** section.

1. In the AWS Management Console, in the breadcrumbs at the top of the page, choose **Amazon S3**.
2. On the Amazon S3 **Buckets** page, choose the link for the bucket name that starts with **assets**.
3. Choose the link for **function.zip** to view its properties. It contains the Lambda deployment package that is referenced from your Lambda function.
4. At the top right-hand corner of the **function.zip** object properties page, choose **Copy S3 URI**

You use the S3 URI when you configure the Lambda function in an upcoming step.

1. At the top of the page, in the unified search bar, search for and choose

Lambda

.

1. On the Lambda **Functions** page, at the top-right hand corner, choose **Create function**

On the **Create function** page:

* Choose **Author from scratch**.
* For **Function name**, enter

ImageResizeFunction

.

* For **Runtime**, select **Node.js 16.x**
* In the **Permissions** section, expand **Change default execution role**.
* For **Execution role**, choose **Use an existing role**. A new field appears.
* For **Existing role**, select **S3LambdaRole**.

 The **S3LambdaRole** IAM role was created during the lab build process. It contains the necessary permissions for Lambda to get objects from and put objects to specific buckets and to write to Amazon CloudWatch Logs for monitoring purposes.

The following is an example of the permissions contained in the IAM role you selected, though the bucket names are slightly different:

{

"Version": "2012-10-17",

"Statement": [

{

"Action": [

"logs:PutLogEvents",

"logs:CreateLogGroup",

"logs:CreateLogStream"

],

"Resource": [

"arn:aws:logs:\*:\*:\*"

],

"Effect": "Allow"

},

{

"Action": [

"s3:GetObject"

],

"Resource": [

"arn:aws:s3:::images-82834469/\*"

],

"Effect": "Allow"

},

{

"Action": [

"s3:PutObject"

],

"Resource": [

"arn:aws:s3:::images-82834469-resized/\*"

],

"Effect": "Allow"

}

]

}

 The policy grants the following permissions:

* Create CloudWatch events, log groups, and log streams.
* Get (download) objects from the **images** bucket.
* Put (upload) objects to the **images-###-resized** bucket.

1. At the bottom right-hand corner of the page, choose **Create function**
2. On the **ImageResizeFunction** page, at the top right-hand corner of the **Code source** section, on the **Upload from** drop-down menu, choose **Amazon S3 location**.
3. In the **Upload a file from Amazon S3** window:

* For **Amazon S3 link URL**, paste the S3 URI you copied previously.

1. Choose **Save**

 As the Lambda function is too large to be displayed in the console, you can optionally download the function code to your device to review its contents.

1. Above the **Code source** section, choose the **Configuration** tab.
2. At the top right-hand corner of the **General configuration** section, choose **Edit**
3. On the **Edit basic settings** page:

* For **Memory (MB)**, enter

1280

.

* For **Timeout**, enter

0

 min

30

 sec.

1. Choose **Save**

 Congratulations! You have successfully created a Lambda function using a pre-configured set of code!

**Task 4: Create an Amazon S3 event notification that invokes an AWS Lambda function**

In this task, you create an Amazon S3 event notification to invoke the Lambda function for each new image that you upload to an S3 bucket.

1. At the top of the page, in the unified search bar, search for and choose

S3

.

1. On the Amazon S3 **Buckets** page, choose the link for the bucket name that starts with **images**.

 Do **not** choose the bucket name that starts with images and **ends with resized**. You use that bucket for another task.

1. Choose the **Properties** tab.
2. Scroll down to the **Event notifications** section and then choose **Create event notification**
3. On the **Create event notification** page:

* In the **General configuration** section, for **Event name**, enter

ImagesResizeEvent

.

* In the **Event types**, select **All object create events** to invoke the Lambda function with any of the following object creation actions: Put, Post, Copy, or Multipart upload completed.
* In the **Destination** section, for **Destination**, select **Lambda function**.
* For **Specify Lambda function**, select **Choose from your Lambda functions**.
* For **Lambda function**, select **ImageResizeFunction**.

1. At the bottom right-hand corner of the page, choose **Save changes**

 The code in the Lambda function assumes that the destination bucket name is a combination of the source bucket name followed by the string **-resized**. The destination bucket with the name **images-###-resized** was created as part of the lab build process.

 Congratulations! You have successfully created an Amazon S3 event notification to invoke a Lambda function!

**Task 5: Upload an image to invoke the bucket notification and Lambda function**

In this task, you upload a new image to an S3 bucket to invoke the Amazon S3 event notification. The bucket notification invokes a Lambda function which creates a thumbnail of the image you upload and puts it in another bucket.

You also examine Amazon CloudWatch metrics to confirm a successful Amazon S3 event notification.

TASK 5.1: UPLOAD A NEW IMAGE TO THE BUCKET AND VERIFY THE LAMBDA FUNCTION IS INVOKED SUCCESSFULLY

1. In the AWS Management Console, in the breadcrumbs at the top of the page, choose **Amazon S3**.
2. On the Amazon S3 **Buckets** page, choose the link for the bucket name that starts with **assets**.
3. Select the **image5.png** file and then, on the **Actions** drop-down menu, choose **Download** to download the image file to your device.
4. In the breadcrumbs at the top of the page, choose **Amazon S3**.
5. On the Amazon S3 **Buckets** page, choose the link for the bucket name that starts with **images**.

 Do **not** choose the bucket name that starts with images and **ends with resized**. You use that bucket in an upcoming step.

1. On the **Objects** tab, choose **Upload**
2. On the **Upload** page, at the top right-hand corner of the **Files and folders** section, choose **Add files**
3. Select the **image5.png** file you downloaded previously.
4. Review the file upload information and then, at the bottom right-hand corner of the page, choose **Upload**

At the top of the page, you should see a message stating **Upload succeeded**

1. At the top right-hand corner of the page, choose **Close**
2. In the AWS Management Console, in the breadcrumbs at the top of the page, choose **Amazon S3**.
3. On the Amazon S3 **Buckets** page, choose the link for the bucket name that starts with **images** and ends with **resized**.

For example, images-82834469-resized.

1. Confirm that a thumbnail version of the image you uploaded has been added to the bucket.

 Because you configured the S3 event notification to invoke the Lambda function only when a file is uploaded to the **images** bucket, there should be only one thumbnail sized image file in the **resized** bucket.

TASK 5.2: USE AMAZON CLOUDWATCH METRICS TO VERIFY THE LAMBDA FUNCTION RAN SUCCESSFULLY

1. At the top of the page, in the unified search bar, search for and choose

Lambda

.

1. Choose the link for the **ImageResizeFunction** function.
2. On the **ImageResizeFunction** details page, above the **Code source** section, choose the **Monitor** tab.

 The **Monitor** tab provides Amazon CloudWatch metrics related to the function’s activity.

The data in the resulting graphs should confirm a successful invocation. For example:

* The **Invocations** graph should show a count of one invocation.
* The **Error count and success rate** graph should show a success rate of 100%.

You can optionally choose **View logs in CloudWatch** to review more detailed logs of the function’s activity that the S3 event notification initiated.

 You may need to refresh the page several times for the logs to become available.

 Congratulations! You have successfully used an S3 event notification together with a Lambda function to create a thumbnail-sized image of an image file you uploaded to an S3 bucket!

**Conclusion**

 Congratulations! You now have successfully:

* Implemented S3 Batch operations to perform large-scale operations on Amazon S3 objects.
* Configured Amazon S3 event notifications to automate event-driven workloads.

**Additional resources**

* [Amazon S3 Batch Operations](https://docs.aws.amazon.com/AmazonS3/latest/user-guide/batch-ops.html)
* [Amazon S3 Inventory reports](https://docs.aws.amazon.com/AmazonS3/latest/dev/storage-inventory.html)
* [Granting permissions for Amazon S3 Batch Operations](https://docs.aws.amazon.com/AmazonS3/latest/dev/batch-ops-iam-role-policies.html)
* [Controlling access and labeling jobs using tags](https://docs.aws.amazon.com/AmazonS3/latest/dev/batch-ops-managing-jobs.html#batch-ops-job-tags)
* [Tutorial: Using AWS Lambda with Amazon S3](https://docs.aws.amazon.com/lambda/latest/dg/with-s3-example.html)

**End lab**

Follow these steps to close the console and end your lab.

1. Return to the **AWS Management Console**.
2. At the upper-right corner of the page, choose **AWSLabsUser**, and then choose **Sign out**.
3. Choose **End lab** and then confirm that you want to end your lab.

For more information about AWS Training and Certification, see [*https://aws.amazon.com/training/*](https://aws.amazon.com/training/).

*Your feedback is welcome and appreciated.*  
If you would like to share any feedback, suggestions, or corrections, please provide the details in our [*AWS Training and Certification Contact Form*](https://support.aws.amazon.com/#/contacts/aws-training).