Parallel & Distributed Processing

AWS SQS/S3 with Java AWS SDK

Setup & Execution

The application is bundled as a maven package. Build the package (after installing dependencies) with `mvn clean package`.

Both the client and worker applications are provided in the same package but they have different main classes and do not have to be run on the same machine.

First configure the S3 Bucket name and the SQS inbox and outbox queues in the *Config.java* file in the src directory inside the project.

Run the worker app using (on an EC2 instance preferably),

```
mvn exec:java -Dexec.mainClass="org.ziya.resizer.WorkerApp"
```

Run the client app (locally) using,

```
mvn exec:java -Dexec.mainClass="org.ziya.resizer.ClientApp"
```

Running The Applications

We can run the applications in either order. We demonstrate both scenarios working. First we launch the client app locally. The logs for this are displayed in Fig 1. We then launch the worker app within the next 10 seconds on an EC2 instance. The polling in the client is setup to perform a scan on the outbox queue every 10s and idle until there is a message on it.

Fig 1. ClientWorker run locally, logging each step, since the

After the first part of the ClientApp runs, it uploads an image to the S3 bucket as seen in Fig 2.
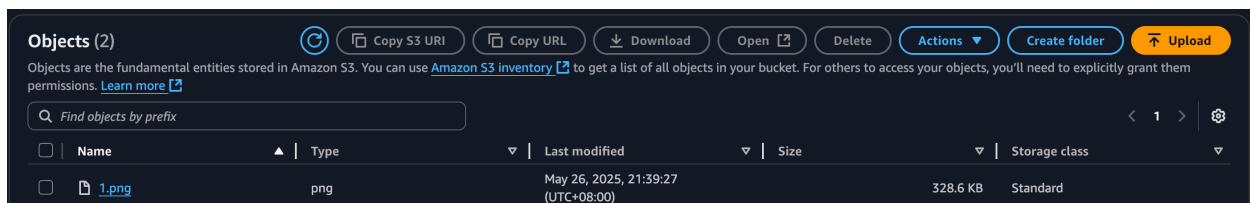

Fig 2. An image uploaded to an S3 bucket by the client app

The worker app then looks in the inbox queue where the client has sent the key for the image in S3, downloads it from the S3 bucket with the given key, resizes it and then sends a message on to the outbox queue, as the logs demonstrate in Fig 3.


```
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< org.ziya.resizer:img_resizer >--------------------
[INFO] Building img_resizer 1.0-SNAPSHOT
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- exec-maven-plugin:3.5.0:java (default-cli) @ img_resizer ---
[INFO] Connection with S3 Client established
[INFO] Connection with SQS Client established
[INFO] Received message: 1.png
[INFO] Message received from SQS inbox
[INFO] Image downloaded from S3 bucket: aziyasimageresizerbucket
[INFO] Image resized successfully: /tmp/output-4558282558414254914.png
[INFO] Processed image uploaded to S3 bucket: aziyasimageresizerbucket
[INFO] Message sent to SQS outbox: https://sqs.ap-southeast-2.amazonaws.com/637423328080/outbox
[INFO] Message deleted from SQS inbox: https://sqs.ap-southeast-2.amazonaws.com/637423328080/inbox
[INFO] WorkerApp completed successfully.
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  4.868 s
[INFO] Finished at: 2025-05-26T13:40:43Z
[INFO] ------------------------------------------------------------------------
```

Fig 3. The logs from the worker app (after launching the client app)

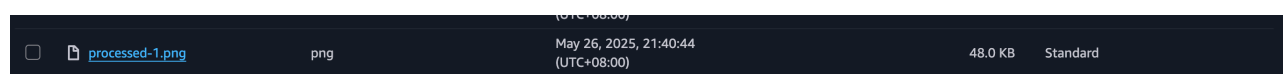The processed image can then be seen in the S3 bucket (see Fig 4).

Fig 4. The processed image in the S3 bucket

The original image and the resized image can be seen below (in Fig 5) for a side-by-side comparison.

Fig 5a. The original image
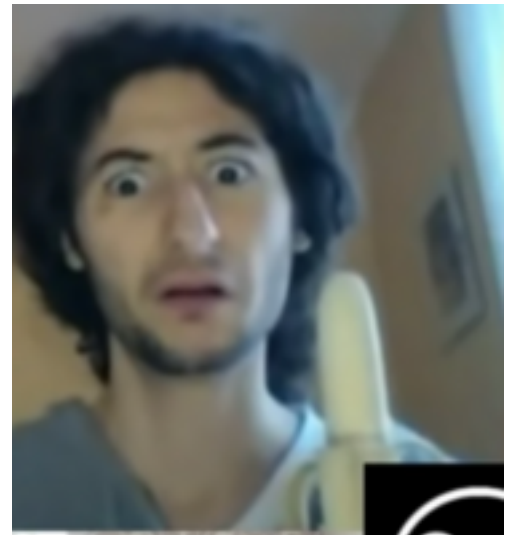
Fig 5b. The resized image after processing

If the worker is launched before the client, we get the same result except the worker now has to wait while its polling. Figures 6 & 7 detail the other scenario.

The structure of the code is as follows,

```
├── pom.xml
└── src
    └── main
        └── java
            └── org
                └── ziya
                    └── resizer
                        ├── ClientApp.java
                        ├── Config.java
                        └── WorkerApp.java

7 directories, 4 files
```

```
ubuntu@ip-172-31-46-84:~/img_resizer$ mvn exec:java -Dexec.mainClass="org.ziya.resizer.WorkerApp"
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< org.ziya.resizer:img_resizer >--------------------
[INFO] Building img_resizer 1.0-SNAPSHOT
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- exec-maven-plugin:3.5.0:java (default-cli) @ img_resizer ---
[INFO] Connection with S3 Client established
[INFO] Connection with SQS Client established
No messages, polling again...
No messages, polling again...
[INFO] Received message: 1.png
[INFO] Message received from SQS inbox
[INFO] Image downloaded from S3 bucket: aziyasimageresizerbucket
[INFO] Image resized successfully: /tmp/output-3372970879699491234.png
[INFO] Processed image uploaded to S3 bucket: aziyasimageresizerbucket
[INFO] Message sent to SQS outbox: https://sqs.ap-southeast-2.amazonaws.com/637423328080/outbox
[INFO] Message deleted from SQS inbox: https://sqs.ap-southeast-2.amazonaws.com/637423328080/inbox
[INFO] WorkerApp completed successfully.
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  27.535 s
[INFO] Finished at: 2025-05-26T13:43:43Z
[INFO] ------------------------------------------------------------------------
```

Fig 6. Worker App launched first, wait on inbox queue

```
[INFO] Scanning for projects...
[INFO]
[INFO] --------------------< org.ziya.resizer:img_resizer >--------------------
[INFO] Building img_resizer 1.0-SNAPSHOT
[INFO] --------------------------------[ jar ]---------------------------------
[INFO]
[INFO] --- exec-maven-plugin:3.5.0:java (default-cli) @ img_resizer ---
[INFO] Connection with S3 Client established
[INFO] Connection with SQS Client established
[INFO] Image uploaded to S3 bucket: aziyasimageresizerbucket
[INFO] Message sent to SQS inbox: https://sqs.ap-southeast-2.amazonaws.com/637423328080/inbox
[INFO] Received message: processed-1.png
[INFO] Message received from SQS outboxbox
[INFO] Processed image downloaded from S3 bucket: aziyasimageresizerbucket
[INFO] Processed image saved to disk
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  5.792 s
[INFO] Finished at: 2025-05-26T13:44:33Z
[INFO] ------------------------------------------------------------------------
```

Fig 7. Client App launched after Worker App