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## **Exercise 10**

In this exercise, you will analyze and collect diagnostics information related to your application with AWS X-Ray. With AWS X-Ray, you can understand how your application and its underlying services are performing to identify and troubleshoot the root cause of performance issues. AWS X-Ray traces user requests as they travel through your entire application. It then aggregates the data generated by the individual services and resources that make up your application,

providing you with a trace map of how your application is performing.

**Note:** Make sure to sign in to your AWS account with the AWS IAM user **edXProjectUser** credentials.

To begin, follow the steps below.

## 1. Start the RDS database instance

- In the AWS Console, click **Services**, then click **Relational Database Service** to open the **Amazon RDS dashboard**.
- In the left navigation pane, click **Instances**. From the list of instances, select **edx-photos-db**.
- At the top, click **Instance actions**, and then click **Start**.

## 2. Download and explore the exercise code.

- Type the command below in your AWS Cloud9 terminal to make sure you are in the ~/environment directory of your AWS Cloud9 instance.

```
cd ~/environment
```

- In your AWS Cloud9 environment, download the exercise code by typing the command below in the terminal.

```
wget https://us-west-2-tcdev.s3.amazonaws.com/courses/AWS-100-ADG/v1.1.0/exercises/ex-xray.zip
```

- Unzip the exercise code .zip file by typing the command below in your AWS Cloud9 terminal.

```
unzip ex-xray.zip
```

The contents of the .zip file should be extracted to a folder with a similar name. You can view the folder on the left tree view.

- Open the **exercise-xray/FlaskApp/application.py** file and explore the code. Notice that the AWS X-Ray libraries, such as `aws_xray_sdk.core`, `xray_recorder`, and `XRayMiddleware`, are now being imported in the `application.py` file. AWS X-Ray is configured with `XRayMiddleware` to gather tracing information for different services and report the information back into the AWS cloud.
- Open the **exercise-xray/util.py** file. Notice that there is a **@xray\_recorder.capture()** decorator, which captures the time needed to resize the uploaded photo to a desired size. This information is reported back to the AWS cloud.

### 3. Download and run the AWS X-Ray daemon on your AWS Cloud9 instance.

- Go to the AWS X-Ray daemon documentation link below:  
<https://docs.aws.amazon.com/xray/latest/devguide/xray-daemon.html>
- On the documentation page, scroll down until you see a link to **Linux (executable)-aws-xray-daemon-linux-2.x.zip (sig)**. Right-click the link and copy the link address.
- In your AWS Cloud9 instance terminal, type the command below to go to your home directory.

```
cd ~
```

- Type **wget** and paste the AWS X-Ray daemon hyperlink address that you copied. The command should look like the example below.

wget <https://s3.dualstack.us-east-2.amazonaws.com/aws-xray-assets.us-east-2/xray-daemon/aws-xray-daemon-linux-2.x.zip>

- Unzip the AWS X-Ray daemon by typing the command below. Make sure that the name of the .zip file matches the one in the command below.

```
unzip aws-xray-daemon-linux-2.x.zip
```

- Run the AWS X-Ray daemon by typing the command below.

```
./xray
```

#### 4. Run the exercise code and test the application.

- To run the exercise code, you will need to point the Run Configuration to the correct exercise folder. In the **Python3RunConfiguration** pane at the bottom, in the **Command** text box, type the text shown below and then click **Run**.

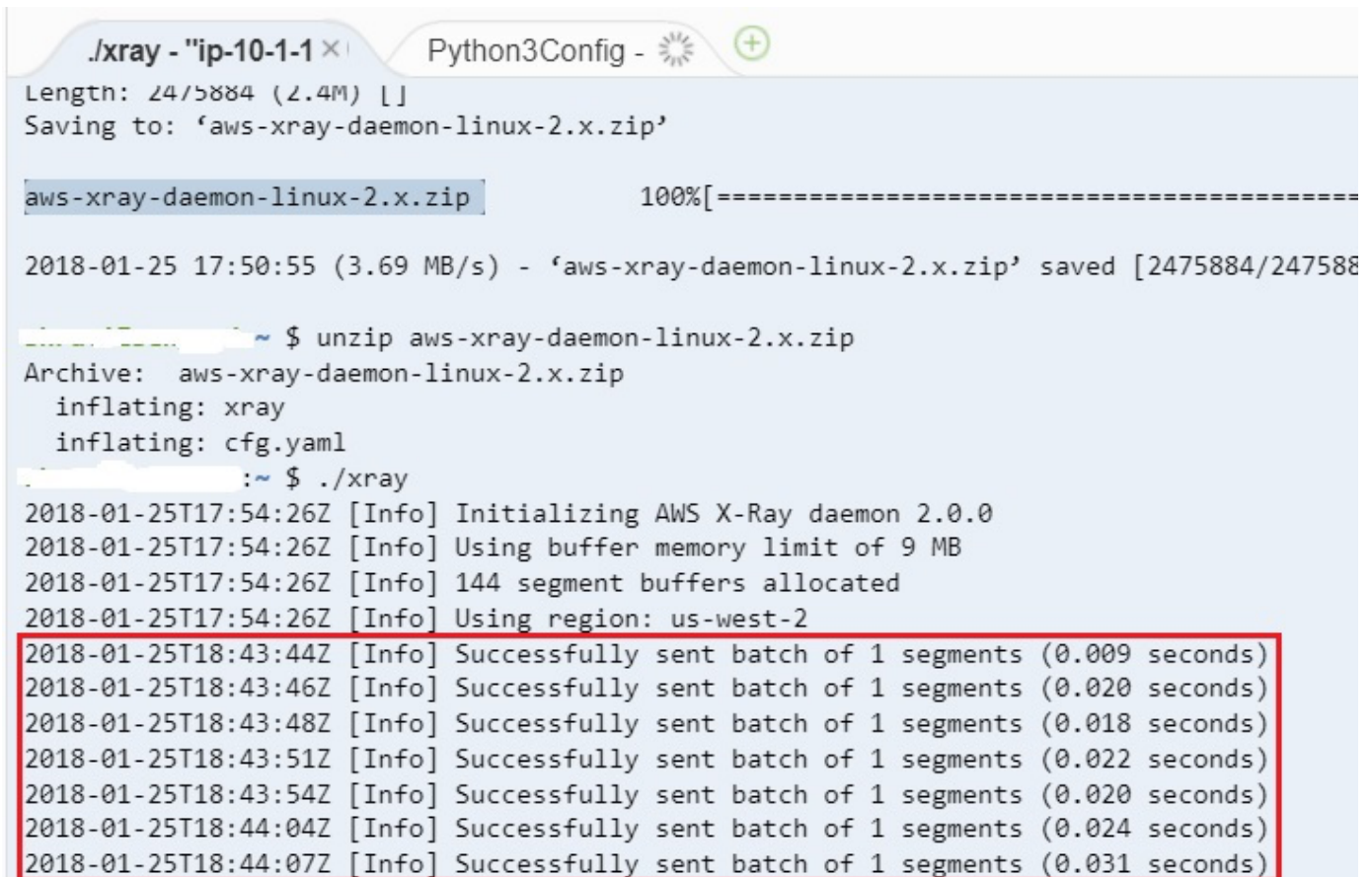
```
exercise-xray/FlaskApp/application.py
```

A message like the one below should appear.

```
Running on http://0.0.0.0:8080/
```

- To test the application, click **Preview -> Preview Running Application** on the top menu bar of the Cloud9 environment.
- Pop out the application in a new window by clicking the **Pop Out** button.
- Log in to the application with your credentials, and upload a photo. Click **My photos** at the top-right corner of the application. You should see your uploaded photo.

- Go to your AWS Cloud9 instance terminal and notice that the AWS X-Ray daemon is sending diagnostics information to your AWS account. You should see information as shown in the screenshot below.



```
. /xray - "ip-10-1-1" Python3Config -
Length: 2475884 (2.4M) []
Saving to: 'aws-xray-daemon-linux-2.x.zip'

aws-xray-daemon-linux-2.x.zip      100%[=====]

2018-01-25 17:50:55 (3.69 MB/s) - 'aws-xray-daemon-linux-2.x.zip' saved [2475884/2475884]

~ $ unzip aws-xray-daemon-linux-2.x.zip
Archive:  aws-xray-daemon-linux-2.x.zip
  inflating: xray
  inflating: cfg.yaml
~ $ ./xray
2018-01-25T17:54:26Z [Info] Initializing AWS X-Ray daemon 2.0.0
2018-01-25T17:54:26Z [Info] Using buffer memory limit of 9 MB
2018-01-25T17:54:26Z [Info] 144 segment buffers allocated
2018-01-25T17:54:26Z [Info] Using region: us-west-2
2018-01-25T18:43:44Z [Info] Successfully sent batch of 1 segments (0.009 seconds)
2018-01-25T18:43:46Z [Info] Successfully sent batch of 1 segments (0.020 seconds)
2018-01-25T18:43:48Z [Info] Successfully sent batch of 1 segments (0.018 seconds)
2018-01-25T18:43:51Z [Info] Successfully sent batch of 1 segments (0.022 seconds)
2018-01-25T18:43:54Z [Info] Successfully sent batch of 1 segments (0.020 seconds)
2018-01-25T18:44:04Z [Info] Successfully sent batch of 1 segments (0.024 seconds)
2018-01-25T18:44:07Z [Info] Successfully sent batch of 1 segments (0.031 seconds)
```

## 5. Explore the diagnostics information collected by AWS X-Ray.

- In the AWS Console, click **Services**, then click **X-Ray** to open the **AWS X-Ray dashboard**.
- If you are using AWS X-Ray for the first time, you may have to click **Get Started** and then click **Cancel** to exit the wizard.
- Click **Service map** in the left navigation menu. The service map has information about AWS services communicating with each other and the processing time each service needs.
- On the left side, click **Traces**. You should see response times and time taken by each component in the application.
- In the **Trace list** at the bottom, click the trace item where the

**Method** column contains **POST**. You should see timing information for all the calls made in your application, as shown in the screenshot below. This particular trace information should be about the POST made to the application to upload a photo. Notice the time needed for Amazon S3, Amazon RDS and Amazon Rekognition to process the photo. You can also see the time needed to resize the image against the `resize_image` label.

AWS X-Ray

Getting started

Service map

Traces

Q 1-5a6a2572-25cb43a4dcdb0e7d7e26eeaa

Traces > Details

Timeline

Raw data

Method	Response	Duration	Age
POST	200	1.0 sec	30.0 min (2018-01-25 18:44:02 U

Name	Res.	Duration	Statu
▼ MyApplication AWS::EC2::Instance			
MyApplication	200	1.0 sec	✓
building.cbokkgxsgj5l.us-west-2.rds.amazonaws	-	1.3 ms	✓
resize_image	-	41.0 ms	✓
S3	200	69.6 ms	✓
rekognition	200	756 ms	✓
building.cbokkgxsgj5l.us-west-2.rds.amazonaws	-	1.6 ms	✓
template_render	-	0.7 ms	✓

With this diagnostics information, you can now find out which component in your application is taking longer to process.

## Optional Challenge 1

AWS X-Ray allows us to add searchable annotations to the trace segment. For more information, see [Recording Annotations with the X-Ray SDK for Python](#).

The code below will pick up the current X-Ray segment from the `xray_recorder`.

```
from aws_xray_sdk.core import xray_recorder
...
document = xray_recorder.current_segment()
```

Inside the homepage route, can you add an annotation to the current segment containing the user's nickname? When this is reported back to AWS Cloud9, you will be able to search traces by username.

## Optional Challenge 2

AWS X-ray will capture and report exceptions. Can you add some code to create an exception - for example, a new route that simply divides a number by zero? Run this new code with X-Ray configured. You will see the stack trace captured and viewable in the X-Ray console.

## 6. Stop the Amazon RDS database instance.

In order to keep your AWS account bill to a minimum, consider stopping the Amazon RDS instance and then starting it again when needed. Follow the steps below to stop the Amazon RDS database instance.

- In the AWS Console, go to the Amazon RDS dashboard.
- In the left navigation pane, click **Instances**. From the list of instances, select **edx-photos-db**.
- At the top, click **Instance actions**, and then click **Stop**. A prompt will appear. Click **Yes, stop now**.

