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Activity - Optimize Utilization

Activity overview

In this activity, you will optimize the AWS resources that are used to run the Café web application. Specifically, you will:

1. Uninstall the decommissioned local database from the Café instance to decrease the instance's storage requirements.
2. Change the instance type to T3 micro to reduce costs.

This diagram illustrates the topology of the Café web application runtime environment *before* and *after* the optimization.

[Before and after resources](#)

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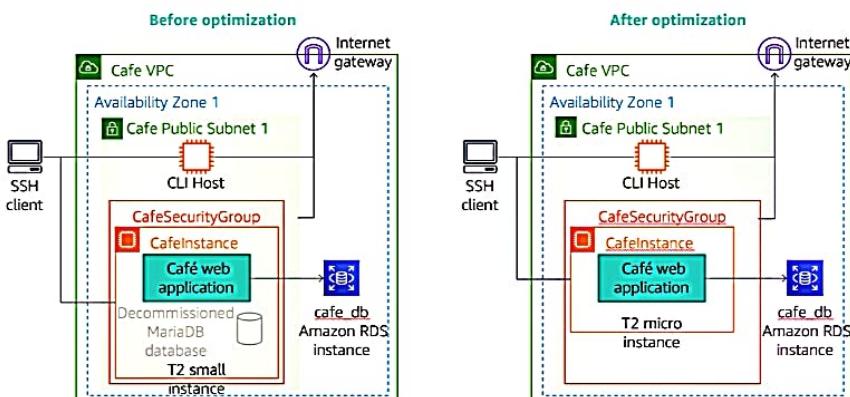
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Before and after resource optimization topology diagrams:



Activity objectives

After completing this activity, you will be able to:

- **Optimize** an Amazon Elastic Compute Cloud (Amazon EC2) instance to reduce costs.
- **Use** the AWS Pricing Calculator to estimate AWS service costs.

Business case

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Business case relevance

**A new business requirement for Café—
Optimize resources to reduce AWS
service costs**



After the migration to Amazon Relational Database Service (Amazon RDS) was completed (an action taken in a prior activity), Sofía identified a number of optimization opportunities that she could implement to reduce AWS service costs. First, she realized that the decommissioned local database could be



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Activity steps

Duration: This activity requires approximately **50 minutes** to complete.

Accessing the AWS Management Console

3. At the top of these instructions, click **Start Lab** to launch your lab.

A Start Lab panel opens displaying the lab status.

4. Wait until you see the message "**Lab status: ready**", then click the **X** to close the Start Lab panel.

5. At the top of these instructions, click **AWS**

This will open the AWS Management Console in a new browser tab. The



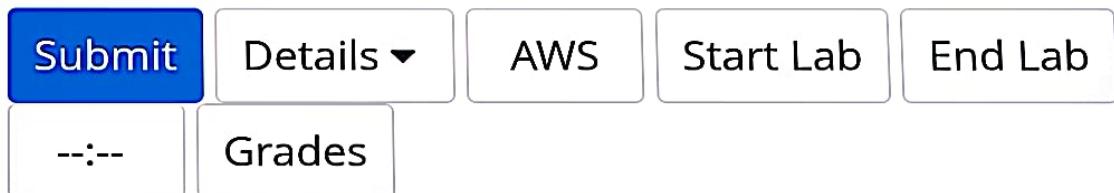
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Task 1: Optimize the website to reduce costs

Because the local database was migrated to Amazon RDS, you can reduce AWS service costs by performing the following actions on the Café EC2 instance:

- Remove the local database from the instance. This action will reduce costs in both CPU and storage utilization.
- Change the instance type from `t3.small` to `t3.micro`. Because the database process no longer runs on the instance, the smaller instance type will be both effective and also cheaper to run.

In this task, you use the AWS Command Line Interface (AWS CLI) to perform these actions. You begin by opening a Secure



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actions. You begin by opening a Secure Shell (SSH) session to the *Café instance* and the *CLI Host*.

Task 1.1: Connect to the Café instance by using SSH

If you are a Windows user, follow the steps described in Task 1.1.1. Otherwise, if you are a macOS or Linux user, follow the steps in Task 1.1.2.

[macOS/Linux users—Click here for login instructions](#)

Task 1.1.1: Windows SSH

● These instructions are specifically for Windows users. If you are using macOS or Linux, [skip to the next section](#).



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[Linux, skip to the next section.](#)

7. Select the **Details** drop-down menu above these instructions you are currently reading, and then select **Show**. A Credentials window will be presented.
8. Select the **Download PPK** button and save the **labsuser.ppk** file.
Typically your browser will save it to the Downloads directory.
9. Make a note of the **PublicIP** address.
10. Then exit the Details panel by selecting the **X**.
11. Download **PuTTY** to SSH into the Amazon EC2 instance. If you do not have PuTTY installed on your computer, [download it here](#).
12. Open **putty.exe**
13. Configure your PuTTY session by following the directions in the following link: [Connect to your Linux](#)



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These instructions are for Mac/Linux users only. If you are a Windows user, [skip ahead to the next task.](#)

15. Read through the three bullet points in this step before you start to complete the actions, because you will not be able see these instructions when the Details panel is open.

- Click on the **Details** drop down menu above these instructions you are currently reading, and then click **Show**. A Credentials window will open.
- Click on the **Download PEM** button and save the **labsuser.pem** file.
- Then exit the Details panel by clicking on the **X**.

16. Open a terminal window, and change directory `cd` to the directory where the labsuser.pem file was

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directory:

```
cd ~/Downloads
```

17. Change the permissions on the key to be read only, by running this command:

```
chmod 400 labsuser.pem
```

18. Return to the AWS Management Console, and in the EC2 service, click on **Instances**. Check the box next to the **CafeInstance** and click on the *Details* tab.

- **NOTE:** The setup for this lab takes a few minutes, because an RDS database instance must first be created before the CafeInstance EC2 instance is created, and RDS instances take a few minutes to create. If you do not yet set the CafeInstance EC2



19. Copy the **IPv4 Public IP** value.
20. Return to the terminal window and run this command (replace <public-ip> with the actual public IP address you copied):

```
ssh -i labsuser.pem ec2-  
user@<public-ip>
```

21. Type `yes` when prompted to allow a first connection to this remote SSH server.

Because you are using a key pair for authentication, you will not be prompted for a password.

Task 1.1.3: Configure the AWS CLI

Before you can run AWS CLI commands on the instance, you must first configure



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Before you can run AWS CLI commands on the instance, you must first configure the AWS CLI environment to define the AWS account credentials, Region name, and output format to use.

22. Discover the region in which the CLI Host instance is running:

```
curl  
http://169.254.169.254/latest  
/dynamic/instance-  
identity/document | grep  
region
```

You will use this region information in a moment.

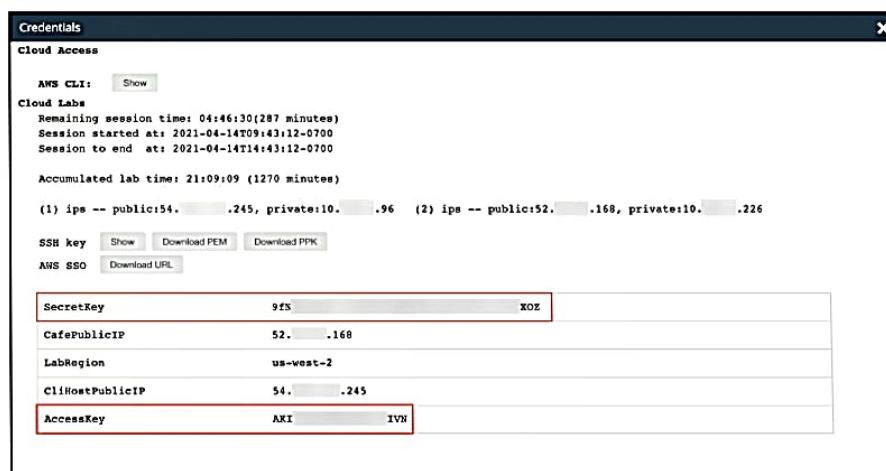
23. Update the AWS CLI software with the credentials.

```
aws configure
```

24. At the prompts, enter the following information:



- **AWS Access Key ID:** Click on the **Details** drop down menu above these instructions, and then click **Show**. Copy the **AccessKey** value and paste it into the terminal window.



- **AWS Secret Access Key:** Copy and paste the **SecretKey** value from the same Credentials screen.
- **Default region name:** Type in the name of the region where your EC2 instances are running, which you just discovered a moment ago. For example, **us-**

east-1 or **e11-west-2**.



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- **Default output format:** json

Leave this terminal window SSH session open. You will return to use it later in the activity.

Task 1.2: Connect to the CLI Host instance by using SSH

Follow the same instructions that you used in Task 1.1 to open an SSH session to a different EC2 instance—the **CLI Host** instance.

Do not close the connection to the CafelInstance, instead, create a connection to the CLI Host in a new window (using putty on Windows or using an additional terminal window on macOS/Linux).

You can find the CLI Host public IP



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Task 1.3: Uninstall MariaDB and resize the instance

25. Stop the local database and uninstall it from the Café instance. In the **SSH window for the CafelInstance**, enter:

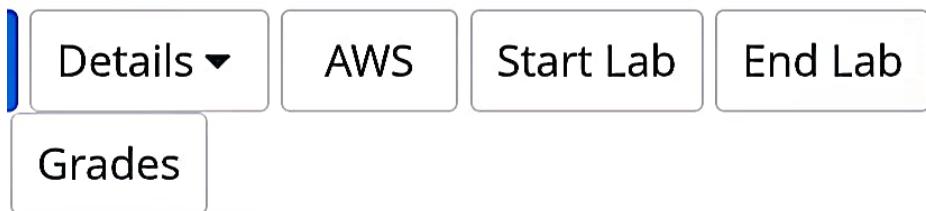
```
sudo systemctl stop mariadb
```

```
sudo yum -y remove mariadb-server
```

If the last command runs successfully, you will see a *Complete!* message in the output.

26. Close the **SSH window for the CafelInstance** because you no longer need it.

27. Determine the **Instance ID** of the CafelInstance. Switch to the **SSH window for the CLI Host instance**



Record the value returned as:

CafeInstance Instance ID: i-nnnnnnnnnn

Stop the Café instance and change its instance type to **t3.micro**. In the **SSH window for the CLI Host instance**, enter:

```
aws ec2 stop-instances --  
instance-ids <CafeInstance  
Instance ID>
```

In the command, substitute



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```
aws ec2 modify-instance-
attribute \
--instance-id <CafeInstance
Instance ID> \
--instance-type "{\"Value\":
\"t3.micro\"}"
```

In the command, substitute
<CafeInstance Instance ID> with the
value that you recorded earlier.

If the command completes
successfully, no output is returned.

30. Start the Café instance. In the **SSH window for the CLI Host instance**, enter:

```
aws ec2 start-instances --
instance-ids <CafeInstance
Instance ID>
```

In the command, substitute
<CafeInstance Instance ID> with the



instance, and wait until the status shows *running*. In the **SSH window for the CLI Host instance**, enter:

```
aws ec2 describe-instances \
--instance-ids <CafeInstance
Instance ID> \
--query
"Reservations[*].Instances[*]
.
[InstanceType, PublicDnsName, P
ublicIpAddress, State.Name]"
```

In the command, substitute *<CafeInstance Instance ID>* with the value that you recorded earlier.

32. The instance might take a few moments to reach the *running* state. Periodically repeat the command until you can confirm that it is running. Also, record the **PublicDnsName** and **PublicIpAddress** values that are returned by the command by using



Downsized CaféInstance Public
DNS Name: ec2-zzz-zzz-zzz-
zzz.eu-west-
2.compute.amazonaws.com
Downsized CaféInstance Public
IP Address: nnn.nnn.nnn.nnn

Information: Because you restarted the instance, Amazon EC2 will assign a different *Public DNS name* and *Public IP address* to the instance than what it had before.

Test the Café website to make sure that it is functional. In a browser window, enter the following URL:

`http://<Downsized
CaféInstance Public DNS
Name>/cafe`

Substitute *<Downsized CaféInstance Public DNS Name>* with the value that you recorded.



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Task 2: Use the AWS Pricing Calculator to estimate AWS service costs

AWS provides a tool that allows you to estimate the monthly costs of the AWS services that you use or are planning to use. In this task, you will use the AWS Pricing Calculator to estimate the cost of running the Café website on AWS before and after EC2 instance optimization. You will then calculate the projected cost savings.

NOTE: The values that you will enter into the AWS Pricing Calculator have been simplified to serve the purposes of this exercise. The intent is to show you the basic use of the calculator and highlight the functions that it provides.

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Task 2.1: Calculate the costs before optimization

First, calculate the costs of running the website in its *before optimization* topology, that is, on a *T3 small* instance with a *decommissioned local database still occupying storage space*.

Specifically, you will use the following service list and configuration to describe the topology components:

- Region: (the region where the CafelInstance EC2 instance is running)
- Amazon EC2 instance:
 - Instance type: **t3.small**
 - Instance class: **On-Demand**
 - Utilization: **100% per month**
 - Operating system: **Linux**
 - Amazon EBS volume: **General Purpose SSD (gp2), 40 GB**
(including 20 GB occupied by +

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local database)

- Amazon RDS instance:
 - Instance class: **db.t3.micro**
 - Engine: **MariaDB**
 - Allocated storage: **20 GB**

35. Open the AWS Pricing Calculator. In a web browser, go to:

<https://calculator.aws>

Click on **Create estimate**.

36. Browse down and choose **Configure** in the **Amazon EC2** service box.

37. In the **Region** menu at the top of the page, select the region where the CafeInstance EC2 instance is running.

For example, choose US East (N. Virginia) if your instances is running in us-east-1.

If you are prompted to confirm the



38. Choose the **Advanced estimate** option.

39. In the *EC2 instance specifications* area, for the Operating system, choose **Linux**

40. In the **Workload** area:

- Choose **Constant usage**.
- For **Number of instances** choose **1**.

41. In the *EC2 instances* area, in the search box, search for and then select the **t3.small** instance type.

42. In the *Pricing strategy* area, set the pricing model to **On-Demand**

43. In the *Amazon Elastic Block Storage (EBS)* area:

- Storage for each EC2 instance: **General Purpose SSD (gp2)**
- Storage amount: **40 GB**
- Snapshot Frequency: **No snapshot storage**



44. SCROLL TO THE BOTTOM AND SELECT **Add**

to my estimate.

Congratulations, you have now estimated the cost of the EC2 instance.

Next, you will add the RDS instance to your price estimate.

45. In the *My Estimate* page, click **Add service**.

46. In the *Select service* page, locate and click **Configure** in the **Amazon RDS for MariaDB** service panel.

47. Configure as follows:

- Region: (choose the same Region you chose for the EC2 instance)
- MariaDB instance specifications:
Standard (single-AZ)
- Instance type: search for and select **db.t3.micro**
- Quantity: **1**
- Pricing model: **On-Demand**



Choose **Add to my estimate**.

The My Estimate page shows a breakdown of the estimated monthly cost of the AWS services that you configured, and it provides a monthly total.

Choose **Save and share**.

If prompted, choose **Agree and continue**.

Choose **Copy the public link** and paste the link into another browser tab.

This is the estimated cost of your *before optimization* topology.

The screenshot shows the AWS Pricing Calculator interface with the 'My Estimate' tab selected. At the top, there are buttons for 'Add service', 'Add group', 'Action', and 'Save and share'. Below this, the 'First 12 months total' is listed as **426.00 USD**. To the right, 'Total upfront' is shown as **0.00 USD** and 'Total monthly' as **\$5.50 USD**. Under the heading 'Services (2)', there is one item listed: 'Amazon EC2' with a 'Region: US East (N. Virginia)'. Below this, there is a section for 'Advance estimate' with detailed information about the operating system, storage, and pricing strategy. At the bottom, there is a note about 'Amazon RDS for MariaDB'.



50. Export the estimate to a comma-separated values (CSV) file by choosing **Action > Export estimate**.
51. In the export dialog window, click **OK** and save the file to your local computer. You can optionally open it to see its contents.
52. Record the total estimated monthly cost (for example, \$35.50) as:

AWS Services Before
Optimization Estimated
Monthly Cost: \$35.50

Task 2.2: Calculate the costs after optimization

Next, you will calculate the costs of running the website *after the Café instance was optimized*. Specifically, you will modify



AWS services that are needed to run the Café website both before and after you optimize the instance, you can estimate the overall projected cost savings as follows:

Before optimization monthly costs:

- Amazon RDS service

\$14.71

- Amazon EC2 service

\$20.89

Total

\$35.60

After optimization monthly costs:

- Amazon EC2 service

\$10.47

- Amazon RDS service

\$14.71

Total

Submit

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publishing, April, 2020, and is for demonstration purposes only. Refer to the AWS website for current pricing by service.

Congratulations! By removing the decommissioned local database and downsizing the Café instance type, you will save more than *\$10 per month* in AWS service costs.

Update from Café



Martha and Frank are very happy that Sofía's initiative resulted in cost savings



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Activity Complete

Congratulations! You have completed the activity.

60. Click **End Lab** at the top of this page and then click **Yes** to confirm that you want to end the lab.

A panel will appear, indicating that "DELETE has been initiated... You may close this message box now."

61. Click the **X** in the top right corner to close the panel.

Additional Resources

For more information about AWS Training and Certification, see <https://aws.amazon.com/training/>.

Your feedback is welcome and appreciated.