



Department of Computer Science and Engineering (Data Science)

Cloud Computing

Experiment 3: Guided and Challenging lab: Creating a Dynamic Website

Task 1: Creating a security group to access your EFS file system

Security group (sg-04d98514e516e01bd | EFS Mount Target) was created successfully

Details

EC2 > Security Groups > sg-04d98514e516e01bd - EFS Mount Target

sg-04d98514e516e01bd - EFS Mount Target

Actions

Details

Security group name EFS Mount Target	Security group ID sg-04d98514e516e01bd	Description Inbound NFS access from EFS clients	VPC ID vpc-0c29198d105e1b67f
Owner 992382462616	Inbound rules count 1 Permission entry	Outbound rules count 1 Permission entry	

Inbound rules Outbound rules Tags

Inbound rules (1)

Search

Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
-	sg-0632a92a96b0e9...	-	NFS	TCP	2049	sg-09701e95f776cfff...	-

Manage tags Edit inbound rules

Task 2: Creating an EFS file system

Tags optional

Add tags to associate key-value pairs to your resource. [Learn more](#)

Tag key Tag value - optional

Q Name X Q My First EFS File System X Remove tag

Add tag

You can add 49 more tag(s)



Step 1
File system settings

Step 2
Network access

Step 3 - optional
File system policy

Step 4
Review and create

File system settings

General

Name - optional
Name your file system.

File system type
Choose to either store data across multiple Availability Zones or within a single Availability Zone. [Learn more](#)

☒ Regional
Offers the highest levels of availability and durability by storing file system data across multiple Availability Zones within an AWS Region.

☐ One Zone
Provides continuous availability to data within a single Availability Zone within an AWS Region.

Automatic backups
Automatically backup your file system data with AWS backup using recommended settings. Additional pricing applies. [Learn more](#)
☐ Enable automatic backups

⚠️ We recommend that you create a backup policy for your file system

Lifecycle management
Automatically save money as access patterns change by moving files into the Infrequent Access (IA) or Archive storage class. [Learn more](#)

Transition into Infrequent Access (IA)
Transition files to IA based on the time since they were last accessed in Standard storage.

None

Transition into Archive - new
Transition files to Archive based on the time since they were last accessed in Standard storage.

None

Transition into Standard
Transition files back to Standard storage based on when they are first accessed in IA or Archive storage.

None

Valid only when you have enabled lifecycle management to transition files into IA or Archive storage.

Encryption
Choose to enable encryption of your file system's data at rest. Uses the AWS KMS service key (aws/elasticfilesystem) by default. [Learn more](#)
☒ Enable encryption

Amazon EFS > File systems > Create

Step 1
File system settings

Step 2
Network access

Step 3 - optional
File system policy

Step 4
Review and create

Network access

⚠️ We recommend enabling the EFS service-linked role using AWS IAM. Service-linked roles allow you to easily delegate permissions to AWS services and gain additional transparency into when they are used on your behalf. [Learn more](#)

Virtual Private Cloud (VPC) [Learn more](#)
Choose the VPC where you want EC2 instances to connect to your file system.

vpc-0c29198d105e1b67f
Lab VPC

Mount targets
A mount target provides an NFSv4 endpoint at which you can mount an Amazon EFS file system. We recommend creating one mount target per Availability Zone. [Learn more](#)

Availability zone	Subnet ID	IP address	Security groups	
us-east-1a	subnet-02fe75f93c5b2fc65	Automatic	<div>Choose security groups sg-04d98514e516e01bd EFS Mount Target</div>	<div>Remove</div>
us-east-1b	subnet-05b5d1667317e8bb...	Automatic	<div>Choose security groups sg-04d98514e516e01bd EFS Mount Target</div>	<div>Remove</div>

Add mount target

Cancel Previous Next

Introducing Amazon EFS Archive
Amazon Elastic File System (EFS) now offers a new Archive storage class, which is cost-optimized for long-lived data that is accessed only a few times per year or less. To use Archive, choose one of the available "Transition into Archive" options in the Lifecycle Management section when creating or updating your EFS file system. [Learn more about the Archive storage class.](#)

Amazon EFS > File systems > Create

Step 1
File system settings

Step 2
Network access

Step 3 - optional
File system policy

Step 4
Review and create

Review and create

Step 1: File system settings

File system

Field	Value	Is editable?
Name	-	Yes
Performance mode	General Purpose	No
Throughput mode	Elastic	Yes
Encrypted	Yes	No
KMS Key ID	-	No
Lifecycle management	Transition into Infrequent Access (IA): None Transition into Archive: None Transition into Standard: None	Yes
Automatic backups	No	Yes
VPC ID	vpc-0c29198d105e1b67f (Lab VPC)	Yes
Availability Zone	Regional	No

Tags

Edit



Tags

Tag key

Tag value

Name

My First EFS File System

Step 2: Network access

Edit

Mount targets

Availability zone	Subnet	IP address	Security groups
us-east-1a	subnet-02fe75f93c5b2fc65	-	sg-04d98514e516e01bd
us-east-1b	subnet-05b5d1667317e8b23	-	sg-04d98514e516e01bd

Step 3: File system policy

Edit

BWS

Services

Search

[Alt+S]

N. Virginia

voclabs/user2547342=sankatawate30@gmail.com @ 9923-8246-2616

Elastic File System

Success! File system (fs-0ea688f895c624f1c) is available.

View file system

File systems

Access points

AWS Backup

AWS DataSync

AWS Transfer

Documentation

Amazon EFS

File systems

File systems (1)

View details

Delete

Create file system

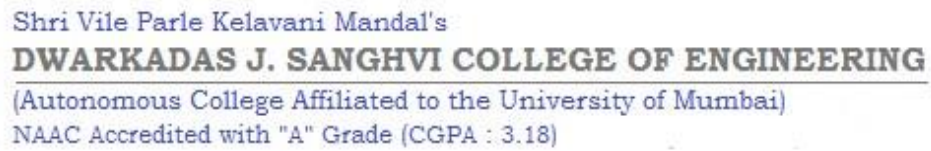
Filter by property values

Name	File system ID	Encrypt	Total size	Size in Standard	Size in IA	Size in Archive	Provisioned Throughput (MiB/s)	File system state	Creation time
My First EFS File System	fs-0ea688f895c624f1c	Encrypt	6.00 KiB	6.00 KiB	0 Bytes	0 Bytes	-	Available	Fri, 23 Feb 2024 16:07:42 GMT

CloudShell

Feedback

© 2024, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie preferences



Task 3: Connecting to your EC2 instance via SSH

Credentials

Cloud Access

AWS CLI:

Show

Cloud Labs

Remaining session time: 01:22:02(83 minutes)

Session started at: 2024-02-23T07:32:43-0800

Session to end at: 2024-02-23T09:32:43-0800

Accumulated lab time: 00:37:00 (37 minutes)

ips -- public:23.20.191.134, private:10.0.1.38

SSH key

Show

Download PEM

Download PPK

AWS SSO

Download URL

SecretKey	u8dHvS8Kq3Bq7n10HVrlS4c282zh7n0DbIn1+/ki
EC2PublicIP	23.20.191.134
AccessKey	AKIA6ODU2VKMJLNG6T4Q

ec2-user@ip-10-0-1-38:~

login as: ec2-user

Authenticating with public key "imported-openssh-key"

#_

Amazon Linux 2

#####

AL2 End of Life is 2025-06-30.

#####

#####

A newer version of Amazon Linux is available!

#####

Amazon Linux 2023, GA and supported until 2028-03-15.

https://aws.amazon.com/linux/amazon-linux-2023/

[ec2-user@ip-10-0-1-38 ~]\$



Task 4: Creating a new directory and mounting the EFS file system

```
ec2-user@ip-10-0-1-38:~  
[ec2-user@ip-10-0-1-38 ~]$ sudo mkdir efs  
[ec2-user@ip-10-0-1-38 ~]$ sudo mount -t nfs4 -o nfsvers=4.1,rsize=1048576,wsiz  
=1048576,hard,timeo=600,retrans=2,noresvport fs-0ea688f895c624f1c.efs.us-east-1.  
amazonaws.com:/ efs  
[ec2-user@ip-10-0-1-38 ~]$ sudo df -hT  
Filesystem                                Type      Size  Used Avail Us  
e Mounted on  
devtmpfs                                 devtmpfs  478M    0  478M  
0% /dev  
tmpfs                                    tmpfs     486M    0  486M  
0% /dev/shm  
tmpfs                                    tmpfs     486M  468K  485M  
1% /run  
tmpfs                                    tmpfs     486M    0  486M  
0% /sys/fs/cgroup  
/dev/xvda1                               xfs       8.0G  2.2G  5.9G  2  
8% /  
tmpfs                                    tmpfs     98M    0   98M  
0% /run/user/0  
tmpfs                                    tmpfs     98M    0   98M  
0% /run/user/1000  
fs-0ea688f895c624f1c.efs.us-east-1.amaz  
onaws.com:/ nfs4      8.0E    0  8.0E  
0% /home/ec2-user/efs  
[ec2-user@ip-10-0-1-38 ~]$
```

Task 5: Examining the performance behavior of your new EFS file system

```
[ec2-user@ip-10-0-1-38 ~]$ sudo fio --name=fio-efs --filesize=10G --filename=./efs/fio-efs-t  
est.img --bs=1M --nrfiles=1 --direct=1 --sync=0 --rw=write --iodepth=200 --ioengine=libaio  
fio-efs: (g=0): rw=write, bs=1M-1M/1M-1M/1M-1M, ioengine=libaio, iodepth=200  
fio-2.14  
Starting 1 process  
fio-efs: Laying out IO file(s) (1 file(s) / 10240MB)  
Jobs: 1 (f=1): [W(1)] [98.8% done] [0KB/11264KB/0KB /s] [0/11/0 iops] [eta 00m:01s]  
fio-efs: (groupid=0, jobs=1): err= 0: pid=10072: Fri Feb 23 16:23:35 2024  
  write: io=10240MB, bw=123955KB/s, iops=121, runt= 84593msec  
    slat (usec): min=61, max=319, avg=99.89, stdev=18.53  
    clat (msec): min=24, max=3320, avg=1651.49, stdev=193.38  
      lat (msec): min=25, max=3320, avg=1651.59, stdev=193.37  
    clat percentiles (msec):  
      | 1.00th=[ 791], 5.00th=[ 1631], 10.00th=[ 1631], 20.00th=[ 1647],  
      | 30.00th=[ 1647], 40.00th=[ 1647], 50.00th=[ 1647], 60.00th=[ 1663],  
      | 70.00th=[ 1663], 80.00th=[ 1663], 90.00th=[ 1680], 95.00th=[ 1680],  
      | 99.00th=[ 2442], 99.50th=[ 2868], 99.90th=[ 3228], 99.95th=[ 3261],  
      | 99.99th=[ 3294]  
    lat (msec) : 50=0.05%, 100=0.12%, 250=0.20%, 500=0.31%, 750=0.29%  
    lat (msec) : 1000=0.29%, 2000=97.21%, >=2000=1.53%  
  cpu          : usr=0.78%, sys=0.54%, ctx=20659, majf=0, minf=11  
  IO depths    : 1=0.1%, 2=0.1%, 4=0.1%, 8=0.1%, 16=0.2%, 32=0.3%, >=64=99.4%  
    submit     : 0=0.0%, 4=100.0%, 8=0.0%, 16=0.0%, 32=0.0%, 64=0.0%, >=64=0.0%  
    complete   : 0=0.0%, 4=100.0%, 8=0.0%, 16=0.0%, 32=0.0%, 64=0.0%, >=64=0.1%  
    issued    : total=r=0/w=10240/d=0, short=r=0/w=0/d=0, drop=r=0/w=0/d=0  
    latency    : target=0, window=0, percentile=100.00%, depth=200  
  
Run status group 0 (all jobs):  
  WRITE: io=10240MB, aggrbw=123955KB/s, minbw=123955KB/s, maxbw=123955KB/s, mint=84593msec, max  
t=84593msec  
[ec2-user@ip-10-0-1-38 ~]$
```



A business request for the café: Preparing an EC2 instance to host a website (Challenge #1)

AWS Academy Cloud Architecting - Module 4 Challenge Lab Questions

View questions in: [English](#)

Question 1: Is the instance in a public subnet?

- ☒ Yes
☐ No

Submit

Question 2: Does the EC2 instance have an IPv4 Public IP address assigned to it?

- ☒ Yes
☐ No

Submit

Question 3: What inbound TCP port numbers are open for this instance?

- ☐ TCP port 80 only, open to the internet
☐ TCP port 22 only, open to the internet
☐ TCP port 80 only, open to a specific range of IP addresses
☒ TCP port 22 only, open to a specific range of IP addresses

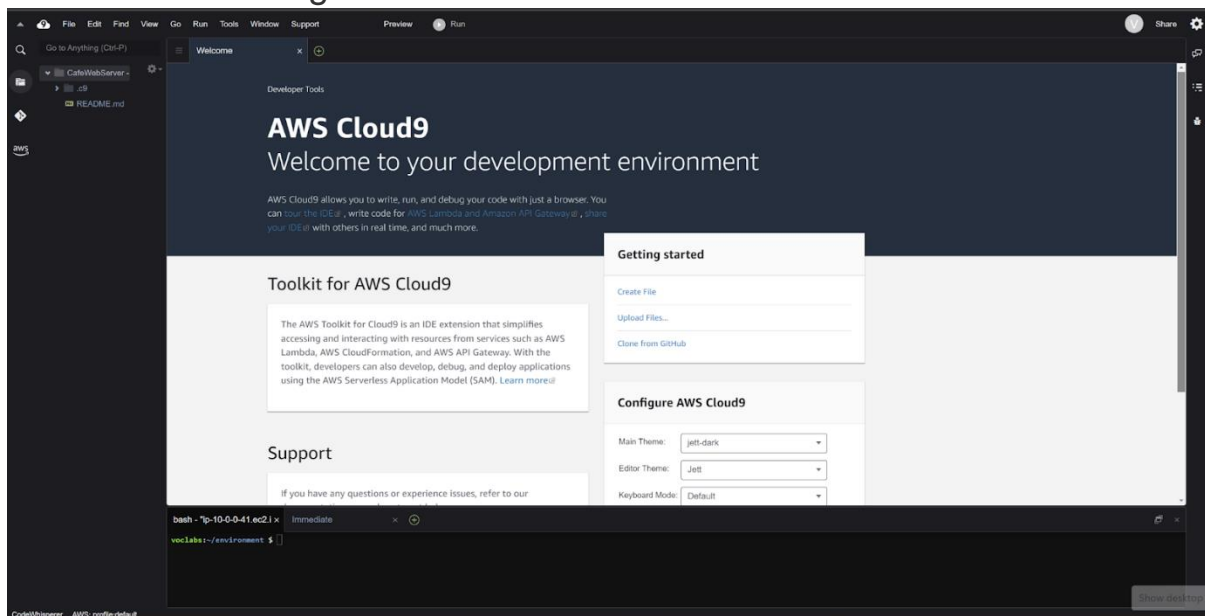
Submit

Question 4: Does the EC2 instance have an AWS Identity and Access Management (IAM) role associated with it?

- ☐ Yes
☒ No

Submit

Task 2: Connecting to the IDE on the EC2 instance





Task 3: Analyzing the LAMP stack environment and confirming that the web server is accessible

```
bash - "ip-10-0-0-41.ec2" x Immediate
voclabs:~/environment $ cat /proc/version
Linux version 5.10.209-198.812.amzn2.x86_64 (mockbuild@ip-10-0-35-124) (gcc10-gcc (GCC) 10.5.0 20230707 (Red Hat 10.5.0-1), GNU ld version 2 (gcc10-gcc (GCC) 10.5.0 20230707 (Red Hat 10.5.0-1), GNU ld version 2.35.2-9.amzn2.0.1) #1 SMP Tue Jan 30 20:59:52 UTC 2024
voclabs:~/environment $ sudo httpd -v
Server version: Apache/2.4.58 ()
Server built:   Oct 26 2023 20:09:34
voclabs:~/environment $ sudo yum -y install httpd php-mbstring
Loaded plugins: extras_suggestions, langpacks, priorities, update-notif
amzn2-core
232 packages excluded due to repository priority protections
Package httpd-2.4.58-1.amzn2.x86_64 already installed and latest version
Resolving Dependencies
--> Running transaction check
--> Package php-mbstring.x86_64 0:8.2.9-1.amzn2 will be installed
--> Processing Dependency: libonig.so.2()(64bit) for package: php-mbstring-8.2.9-1.amzn2.x86_64
--> Running transaction check
--> Package oniguruma.x86_64 0:5.9.6-1.amzn2.0.7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

=====================================================================================================================================
Package Arch Version Repository Size
=====================================================================================================================================
Installing:
php-mbstring.x86_64 8.2.9-1.amzn2 amzn2extra-php8.2 520 k
Installing for dependencies:
oniguruma.x86_64 5.9.6-1.amzn2.0.7 amzn2-core 127 k
Transaction Summary
-----
Install 1 Package (+1 Dependent package)

Total download size: 647 k
Installed size: 2.8 M
Downloading packages:
(1/2): oniguruma-5.9.6-1.amzn2.0.7.x86_64.rpm | 127 kB 00:00
(2/2): php-mbstring-8.2.9-1.amzn2.x86_64.rpm | 520 kB 00:00
-----
Total 3.0 MB/s | 647 kB 00:00

Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
Installing : oniguruma-5.9.6-1.amzn2.0.7.x86_64 1/2
Installing : php-mbstring-8.2.9-1.amzn2.x86_64 2/2
Verifying : php-mbstring-8.2.9-1.amzn2.x86_64 1/2
Verifying : oniguruma-5.9.6-1.amzn2.0.7.x86_64 2/2
```




```
bash - "ip-10-0-0-41.ec2" x Immediate x
Installed:
  php-mbstring.x86_64 0:8.2.9-1.amzn2
Dependency Installed:
  oniguruma.x86_64 0:5.9.6-1.amzn2.0.7
Complete!
voclabs:/environment $ service httpd status
Redirecting to /bin/systemctl status httpd.service
* httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; disabled; vendor preset: disabled)
   Drop-In: /usr/lib/systemd/system/httpd.service.d
           └─php-fpm.conf
   Active: inactive (dead)
   Docs: man:httpd.service(8)
voclabs:/environment $ php --version
PHP 8.2.9 (cli) (built: Aug 24 2023 20:33:12) (NTS)
Copyright (c) The PHP Group
Zend Engine v4.2.9, Copyright (c) Zend Technologies
   with Xdebug v3.2.2, Copyright (c) 2002-2023, by Derick Rethans
voclabs:/environment $ sudo systemctl enable httpd.service
Note: Forwarding request to 'systemctl enable httpd.service'.
Created symlink from /etc/systemd/system/multi-user.target.wants/httpd.service to /usr/lib/systemd/system/httpd.service.
voclabs:/environment $ sudo service httpd start
Redirecting to /bin/systemctl start httpd.service
voclabs:/environment $ sudo service httpd status
Redirecting to /bin/systemctl status httpd.service
* httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; vendor preset: disabled)
   Drop-In: /usr/lib/systemd/system/httpd.service.d
           └─php-fpm.conf
   Active: active (running) since Fri 2024-02-23 17:49:12 UTC; 9s ago
   Main PID: 5525 (httpd)
   Status: "Total requests: 0; Idle/Busy workers 100/0; Requests/sec: 0; Bytes served/sec: 0 B/sec"
   Tasks: 47
   Memory: 13.5M
   CGroup: /system.slice/httpd.service
           └─5525 /usr/sbin/httpd -DFOREGROUND
           └─5541 /usr/sbin/httpd -DFOREGROUND
           └─5542 /usr/sbin/httpd -DFOREGROUND
           └─5543 /usr/sbin/httpd -DFOREGROUND
           └─5544 /usr/sbin/httpd -DFOREGROUND
           └─5545 /usr/sbin/httpd -DFOREGROUND
Feb 23 17:49:11 ip-10-0-0-41.ec2.internal systemd[1]: Starting The ...
Feb 23 17:49:12 ip-10-0-0-41.ec2.internal systemd[1]: Started The A...
Hint: Some lines were ellipsized, use -l to show in full.
voclabs:/environment $ sudo yum install -y mariadb-server
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
232 packages excluded due to repository priority protections
Package mariadb-server-10.5.23-1.amzn2.x86_64 already installed and latest version
Nothing to do.
voclabs:/environment $ sudo mariadb --version
mariadb Ver 15.1 Distrib 10.5.23-MariaDB, for Linux (x86_64) using Editline wrapper
voclabs:/environment $ sudo systemctl enable mariadb
Created symlink from /etc/systemd/system/mysql.service to /usr/lib/systemd/system/mariadb.service.
Created symlink from /etc/systemd/system/mysqld.service to /usr/lib/systemd/system/mariadb.service.
Created symlink from /etc/systemd/system/multi-user.target.wants/mariadb.service to /usr/lib/systemd/system/mariadb.service.
voclabs:/environment $ sudo chkconfig mariadb on
Note: Forwarding request to 'systemctl enable mariadb.service'.
voclabs:/environment $ sudo service mariadb start
Redirecting to /bin/systemctl start mariadb.service
voclabs:/environment $ sudo service mariadb status
Redirecting to /bin/systemctl status mariadb.service
* mariadb.service - MariaDB 10.5 database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; vendor preset: disabled)
   Active: active (running) since Fri 2024-02-23 17:50:34 UTC; 9s ago
   Docs: man:mariadbd(8)
          https://mariadb.com/kb/en/library/systemd/
   Process: 6404 ExecStartPost=/usr/libexec/mariadb-check-upgrade (code=exited, status=0/SUCCESS)
   Process: 6219 ExecStartPre=/usr/libexec/mariadb-prepare-db-dir %n (code=exited, status=0/SUCCESS)
   Process: 6195 ExecStartPre=/usr/libexec/mariadb-check-socket (code=exited, status=0/SUCCESS)
   Main PID: 6351 (mariadbd)
   Status: "Taking your SQL requests now..."
   Tasks: 20
   Memory: 95.9M
   CGroup: /system.slice/mariadb.service
           └─6351 /usr/libexec/mariadbd --basedir=/usr
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:33 ip-10-0-0-41.ec2.internal mariadb-prepare-db-dir[6219]: ...
Feb 23 17:50:34 ip-10-0-0-41.ec2.internal systemd[1]: Started Maria...
Hint: Some lines were ellipsized, use -l to show in full.
voclabs:/environment $
```




Not secure

3.236.195.4



WhatsApp



YouTube



CHATGPT



Gmail



Welcome To Colabo...



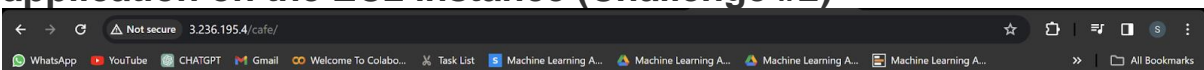
Task List



Machine Learning A...

Hello from the café web server!

New business requirement: Installing a dynamic website application on the EC2 instance (Challenge #2)



Café

[Home](#) [About Us](#) [Contact Us](#) [Menu](#) [Order History](#)



Our café offers an assortment of delicious and delectable pastries and coffees that will put a smile on your face. From cookies to croissants, tarts and cakes, each treat is especially prepared to excite your tastebuds and brighten your day!

Frank bakes a rich variety of cookies. Try them all!



Tea,
Coffee.

Our tarts are always a customer favorite!



Task 5: Testing the web application

Café

HomeMenuOrder History				
Order History				
Order Number: 2	Date: 2024-02-23	Time: 13:31:00	Total Amount: \$3.50	
Item	Price	Quantity	Amount	
Latte	\$3.50	1	\$3.50	
Order Number: 1Date: 2024-02-23Time: 13:29:53Total Amount: \$4.50				
Item	Price	Quantity	Amount	
Croissant	\$1.50	1	\$1.50	
Hot Chocolate	\$3.00	1	\$3.00	

© 2020, Amazon Web Services, Inc. or its Affiliates. All rights reserved.

New business requirement: Creating development and production websites in different AWS Regions (Challenge #3)

aws

Services

Search

[Alt+S]

Oregon

voclabs/user2547342=sanikatawate30@gmail.com @ 7303-3561-9327

Instances (1/2) Info

Find Instance by attribute or tag (case-sensitive)

Any state

Connect

Instance state

Actions

Launch instances

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
<input type="checkbox"/>	ProdCafeServer	i-088ba160703a41b92	Terminated	t2.small	-	View alarms +	us-west-2a	-
<input checked="" type="checkbox"/>	ProdCafeServer	i-05bfab99b116e6cf8	Running	t2.small	2/2 checks passed	View alarms +	us-west-2a	ec2-52-26-90-213.us-w...

Instance: i-05bfab99b116e6cf8 (ProdCafeServer)



Café

Home About Us Contact Us Menu Order History



Our café offers an assortment of delicious and delectable pastries and coffees that will put a smile on your face. From cookies to croissants, tarts and cakes, each treat is especially prepared to excite your tastebuds and brighten your day!

Frank bakes a rich variety of cookies. Try them all!

Tea,
Coffee,

Our tarts are always a customer favorite!

Question 5: When you create an AMI from an instance, will the instance be rebooted?

- ☐ Yes, always
- ☐ No, never
- ☐ You have the option *not* to reboot, but by default it will be rebooted
- ☒ You have the option to reboot, but by default it will *not* be rebooted

Submit

Question 6: In what ways can you modify the root volume properties when you create an AMI from an instance?

- ☐ You cannot change the root volume details.
- ☐ You can edit the size, but nothing else.
- ☒ You can edit the size and 'delete on termination' setting, but not the volume type.
- ☐ You can edit the size and volume type, but not the 'delete on termination' setting.

Submit

Question 7: Can you add more volumes to an AMI that you create from an instance that only has one volume?

- ☒ Yes
- ☐ No

Submit