ECE1779: Introduction to Cloud Computing

Fall 2020

Week 5

Introduction to AWS

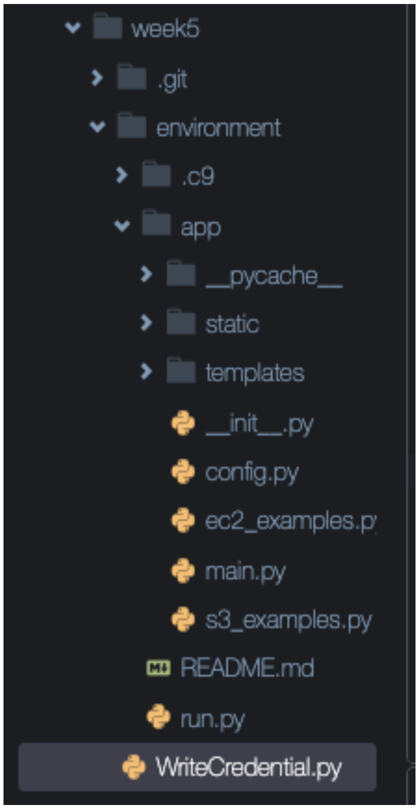
Objective

This tutorial assignment will help you get familiar with boto3, EC2 and S3 bucket. You will also get experience performing operations on EC2 and S3 bucket using boto3.

Run the following command to determine your public ip address:

dig +short myip.opendns.com @resolver1.opendns.com

Week5 tutorial file structure



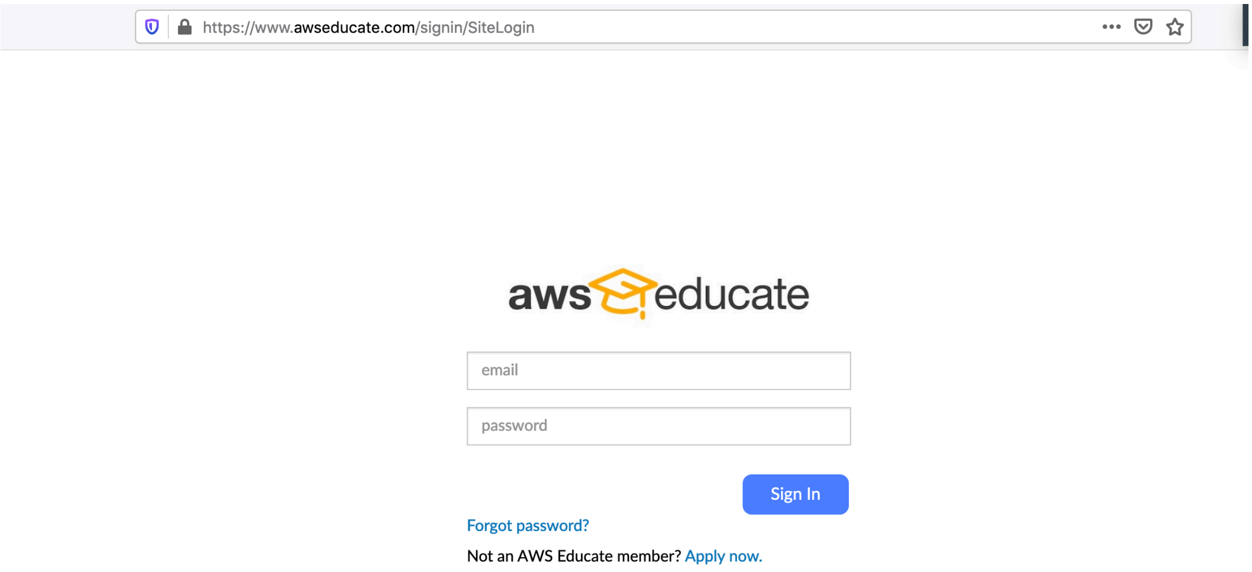
```
week5
  .git
  environment
    .c9
    app
      __pycache__
      static
      templates
      __init__.py
      config.py
      ec2_examples.p
      main.py
      s3_examples.py
    README.md
    run.py
  WriteCredential.py
```

Prelab preparation (Only one student performs this in a breakout room):

1) Update the file ~/.aws/credentials with your AWS credentials. The following video tutorial illustrates the process:

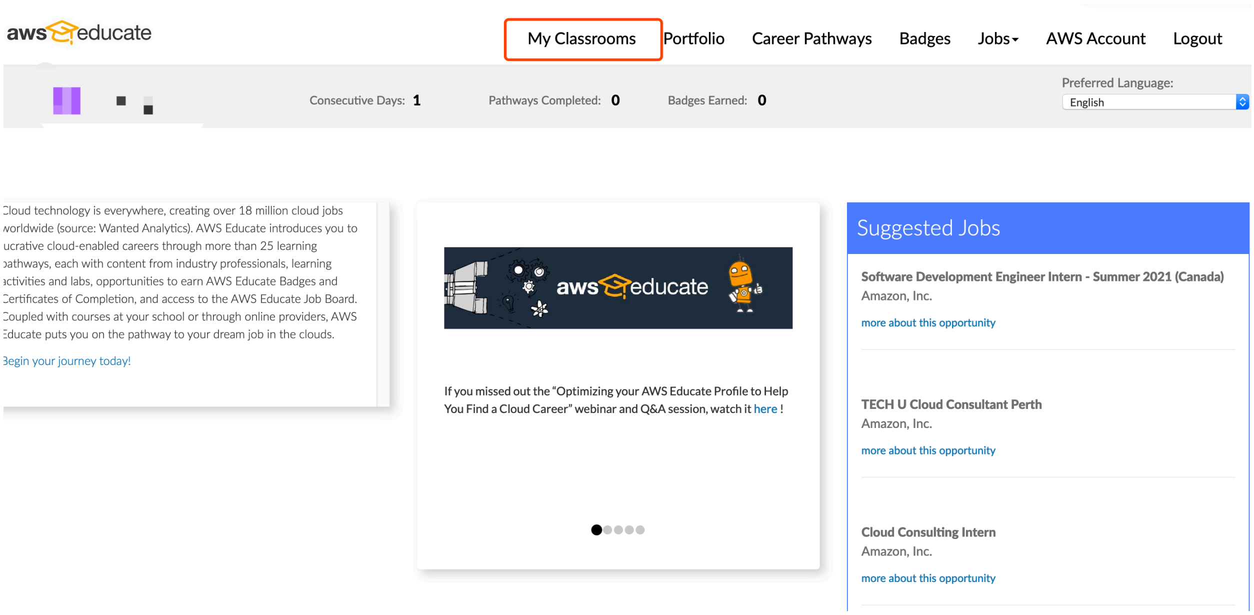
https://utoronto.zoom.us/rec/share/bJGqDzkIQgVKwZzsSyhJQNRt8Cb6UEXmHmCoJnBbEO1ZK5IHHi-0_NEMWnbxch3X._NIUAUHnIuNKfJM6?startTime=1602094724000

Or follow step by step:



https://www.awseducate.com/signin/SiteLogin

Step1: Login with your AWS student account (https://www.awseducate.com/signin/SiteLogin)



[redacted]

Consecutive Days: **1** Pathways Completed: **0** Badges Earned: **0**

Preferred Language: English

Cloud technology is everywhere, creating over 18 million cloud jobs worldwide (source: Wanted Analytics). AWS Educate introduces you to lucrative cloud-enabled careers through more than 25 learning pathways, each with content from industry professionals, learning activities and labs, opportunities to earn AWS Educate Badges and Certificates of Completion, and access to the AWS Educate Job Board. Coupled with courses at your school or through online providers, AWS Educate puts you on the pathway to your dream job in the clouds.

Begin your journey today!

If you missed out the "Optimizing your AWS Educate Profile to Help You Find a Cloud Career" webinar and Q&A session, watch it here !

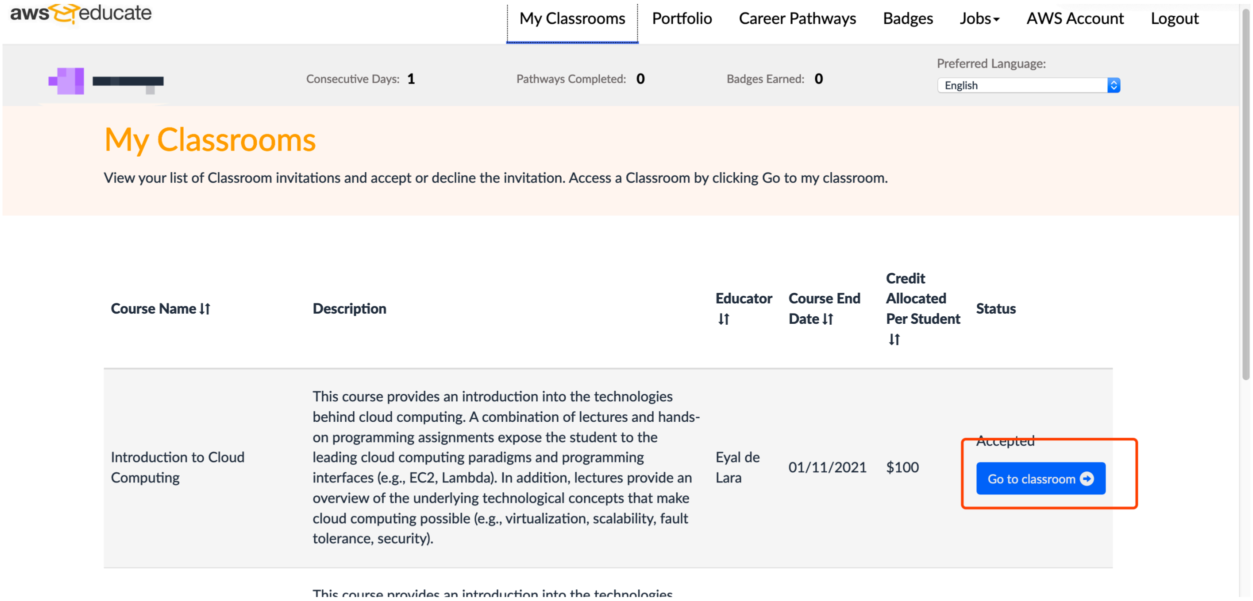
Suggested Jobs

Software Development Engineer Intern - Summer 2021 (Canada)
Amazon, Inc.
more about this opportunity

TECH U Cloud Consultant Perth
Amazon, Inc.
more about this opportunity

Cloud Consulting Intern
Amazon, Inc.
more about this opportunity

Step2: Jump to My Classroom



[redacted]

Consecutive Days: **1** Pathways Completed: **0** Badges Earned: **0**

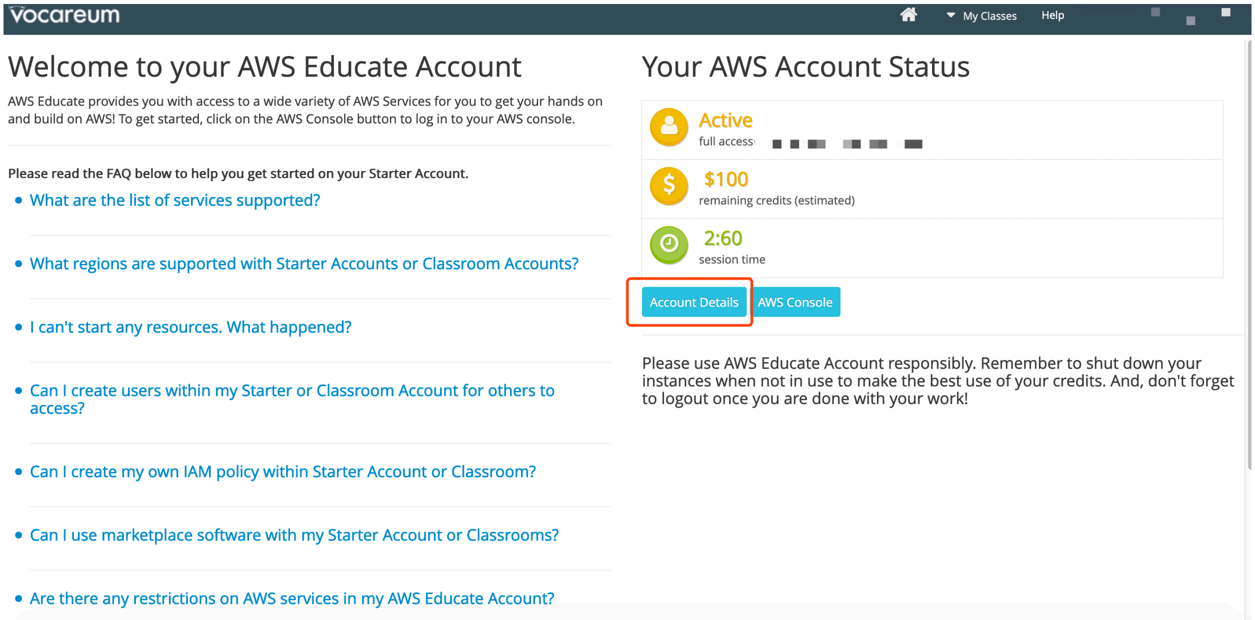
Preferred Language: English

My Classrooms

View your list of Classroom invitations and accept or decline the invitation. Access a Classroom by clicking Go to my classroom.

Course Name ⇅	Description	Educator ⇅	Course End Date ⇅	Credit Allocated Per Student ⇅	Status
Introduction to Cloud Computing	This course provides an introduction into the technologies behind cloud computing. A combination of lectures and hands-on programming assignments expose the student to the leading cloud computing paradigms and programming interfaces (e.g., EC2, Lambda). In addition, lectures provide an overview of the underlying technological concepts that make cloud computing possible (e.g., virtualization, scalability, fault tolerance, security).	Eyal de Lara	01/11/2021	$100	Accepted Go to classroom
	This course provides an introduction into the technologies				

Step3: Click on Go to Classroom



[redacted]

Welcome to your AWS Educate Account

AWS Educate provides you with access to a wide variety of AWS Services for you to get your hands on and build on AWS! To get started, click on the AWS Console button to log in to your AWS console.

Please read the FAQ below to help you get started on your Starter Account.

- What are the list of services supported?
- What regions are supported with Starter Accounts or Classroom Accounts?
- I can't start any resources. What happened?
- Can I create users within my Starter or Classroom Account for others to access?
- Can I create my own IAM policy within Starter Account or Classroom?
- Can I use marketplace software with my Starter Account or Classrooms?
- Are there any restrictions on AWS services in my AWS Educate Account?

Your AWS Account Status

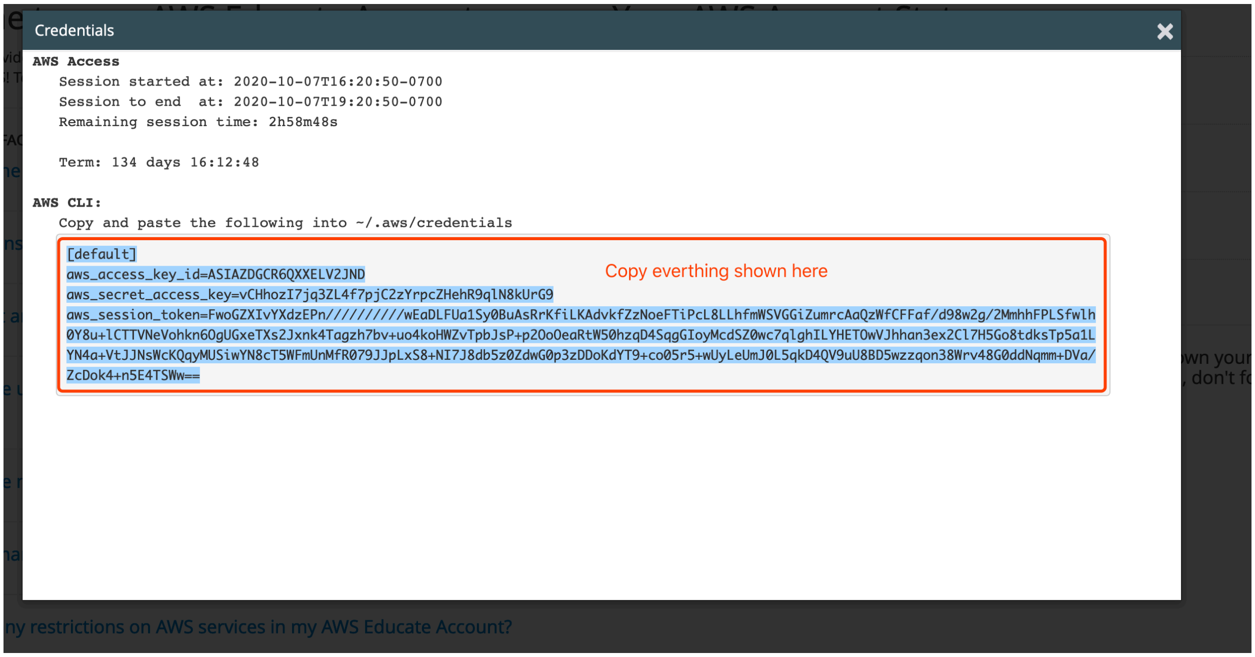
Active
full access [redacted]

$100
remaining credits (estimated)

2:60
session time

Please use AWS Educate Account responsibly. Remember to shut down your instances when not in use to make the best use of your credits. And, don't forget to logout once you are done with your work!

Step4: Check Account Details

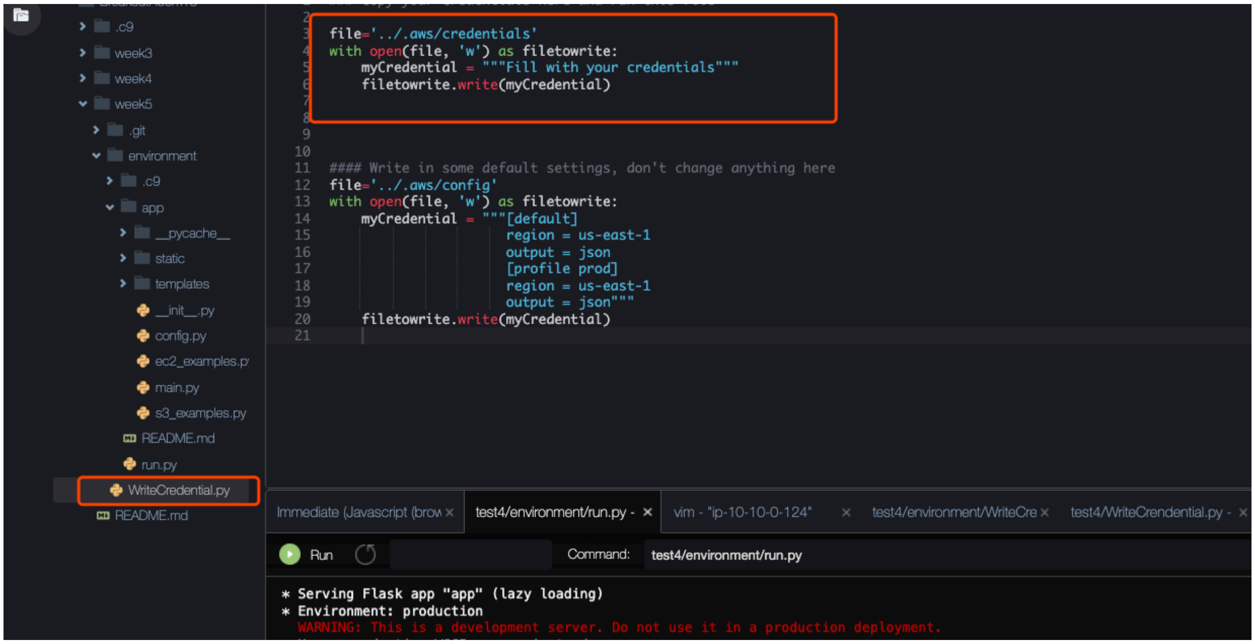


```
AWS Access
   Session started at: 2020-10-07T16:20:50-0700
   Session to end  at: 2020-10-07T19:20:50-0700
   Remaining session time: 2h58m48s

   Term: 134 days 16:12:48

AWS CLI:
   Copy and paste the following into ~/.aws/credentials
```

Copy everthing shown here

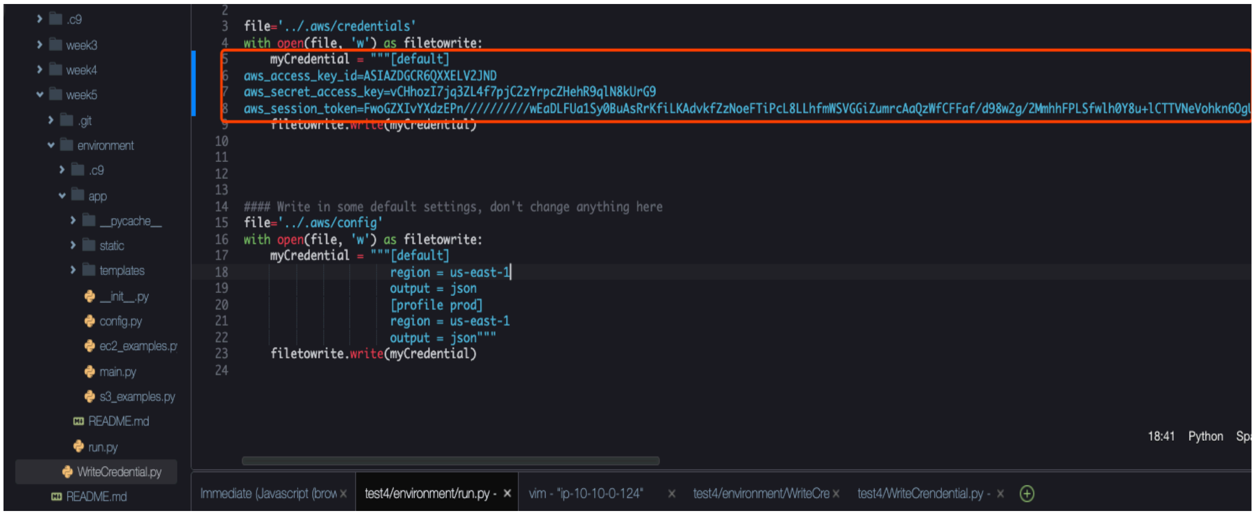
```
[default]
aws_access_key_id=ASIAZDGCR6QXXELV2JND
aws_secret_access_key=vCHhozI7jq3ZL4f7pjC2zYrpcZHehR9qlN8kUrG9
aws_session_token=FwoGZXIvYXdzEPn//////////wEaDLFUa1Sy0BuAsRrKfiLKAdvkfZzNoeFTiPcL8LLhfmWSVGGiZumrcAaQzWfCFFaf/d98w2g/2MmhhFPLSfwlh
0Y8u+lCTTVNeVohkn6OgUGxeTXs2Jxnk4Tagzh7bv+uo4koHWZvTpbJsP+p2OoOeaRtW50hzqD4SqgGIoyMcdSZ0wc7qlghILYHETOwVJhhan3ex2Cl7H5Go8tdksTp5a1L
YN4a+VtJJNsWcKQqyMUSiwYN8cT5WFmUnMfR079JJpLxS8+NI7J8db5z0ZdwG0p3zDDoKdYT9+co05r5+wUyLeUmJ0L5qkD4QV9uU8BD5wzzqon38Wrv48G0ddNqmm+DVa/
ZcDok4+n5E4TSWw==
```

Step5: Copy your credentials



```
file='../.aws/credentials'
with open(file, 'w') as filetowrite:
    myCredential = """Fill with your credentials"""
    filetowrite.write(myCredential)


#### Write in some default settings, don't change anything here
file='../.aws/config'
with open(file, 'w') as filetowrite:
    myCredential = """[default]
                    region = us-east-1
                    output = json
                    [profile prod]
                    region = us-east-1
                    output = json"""
    filetowrite.write(myCredential)
```

```
* Serving Flask app "app" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
```



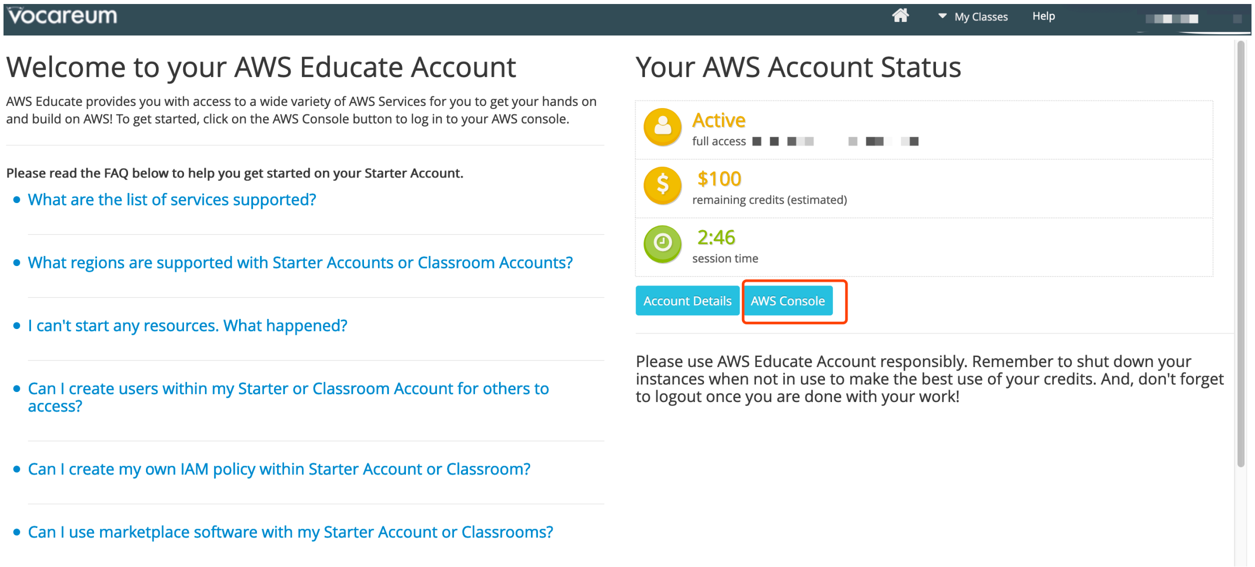
```
file='../.aws/credentials'
with open(file, 'w') as filetowrite:
    myCredential = """[default]
aws_access_key_id=ASIAZDGCR6QXXELV2JND
aws_secret_access_key=vCHhozI7jq3ZL4f7pjC2zYrpcZHehR9qlN8kUrG9
aws_session_token=FwoGZXIvYXdzEPn//////////wEaDLFUa1Sy0BuAsRrKfiLKAdvkfZzNoeFTiPcL8LLhfmWSVGGiZumrcAaQzWfCFFaf/d98w2g/2MmhhFPLSfwlh0Y8u+lCTTVNeVohkn6Ogl
    filetowrite.write(myCredential)



#### Write in some default settings, don't change anything here
file='../.aws/config'
with open(file, 'w') as filetowrite:
    myCredential = """[default]
                    region = us-east-1
                    output = json
                    [profile prod]
                    region = us-east-1
                    output = json"""
    filetowrite.write(myCredential)
```

Step6: Replace with your credentials in *WriteCredential.py* and *run* this file (*WriteCredential.py*)

2) Determine the id of your default network subnet and update the field config.subnet_id. The following video tutorial illustrates the process:

https://utoronto.zoom.us/rec/share/bJGqDzkIQgVKwZzsSyhJQNRt8Cb6UEXmHmCoJnBbEO1ZK5IHHi-0_NEMWnbxch3X._NIUAUHnIuNKfJM6?startTime=1602094872000

Or follow step by step:



[redacted]

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- Can I use marketplace software with my Starter Account or Classrooms?

Your AWS Account Status

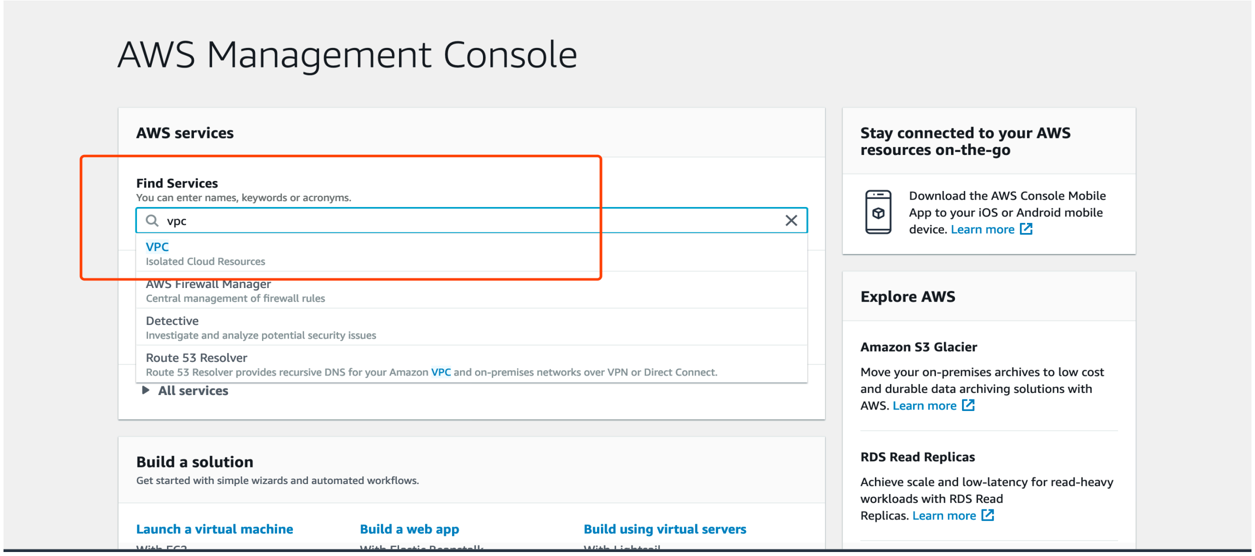
Active
full access [redacted]

$100
remaining credits (estimated)

2:46
session time

Please use AWS Educate Account responsibly. Remember to shut down your instances when not in use to make the best use of your credits. And, don't forget to logout once you are done with your work!

Step1: Go to your AWS Console


AWS Management Console

AWS services

Find Services
You can enter names, keywords or acronyms.

vpc

VPC
Isolated Cloud Resources

AWS Firewall Manager
Central management of firewall rules

Detective
Investigate and analyze potential security issues

Route 53 Resolver
Route 53 Resolver provides recursive DNS for your Amazon VPC and on-premises networks over VPN or Direct Connect.

Build a solution
Get started with simple wizards and automated workflows.

Stay connected to your AWS resources on-the-go

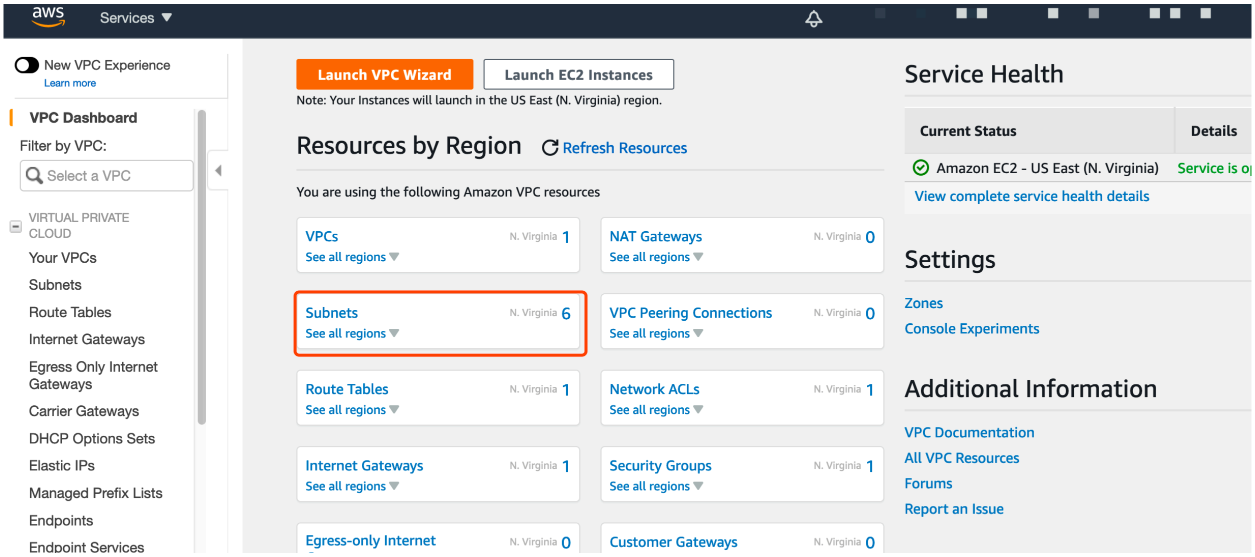
Download the AWS Console Mobile App to your iOS or Android mobile device. Learn more

Explore AWS

Amazon S3 Glacier
Move your on-premises archives to low cost and durable data archiving solutions with AWS. Learn more

RDS Read Replicas
Achieve scale and low-latency for read-heavy workloads with RDS Read Replicas. Learn more

Step2: Jump to VPC



Note: Your Instances will launch in the US East (N. Virginia) region.

Resources by Region

Refresh Resources

You are using the following Amazon VPC resources

VPCs See all regions ▼	N. Virginia 1	NAT Gateways See all regions ▼	N. Virginia 0
Subnets See all regions ▼	N. Virginia 6	VPC Peering Connections See all regions ▼	N. Virginia 0
Route Tables See all regions ▼	N. Virginia 1	Network ACLs See all regions ▼	N. Virginia 1
Internet Gateways See all regions ▼	N. Virginia 1	Security Groups See all regions ▼	N. Virginia 1
Egress-only Internet	N. Virginia 0	Customer Gateways	N. Virginia 0

Service Health

Current Status	Details
✓ Amazon EC2 - US East (N. Virginia)	Service is o

View complete service health details

Settings

Zones

Console Experiments

Additional Information

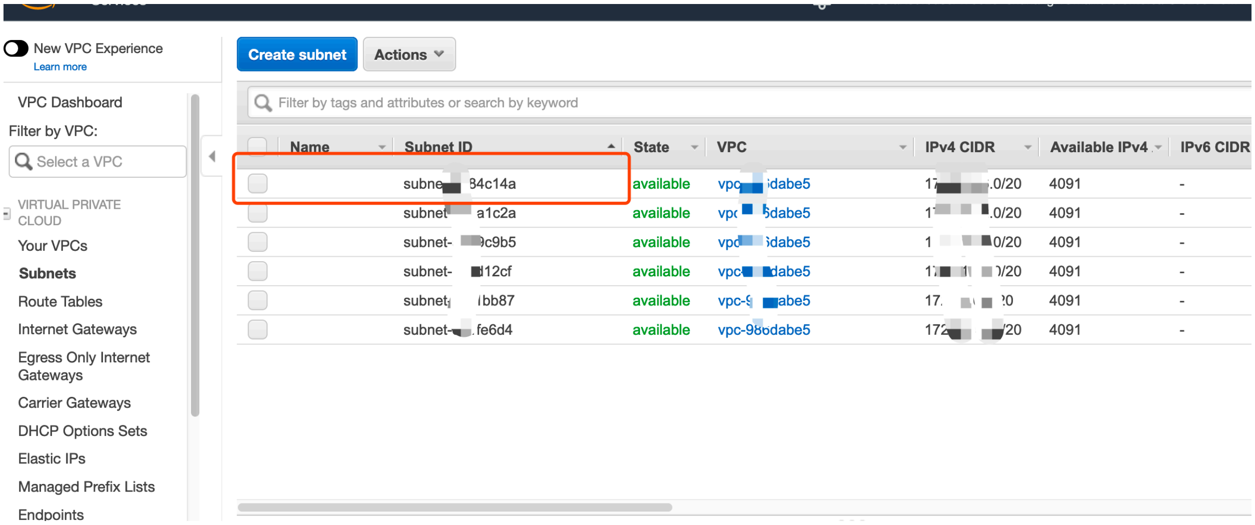
VPC Documentation

All VPC Resources

Forums

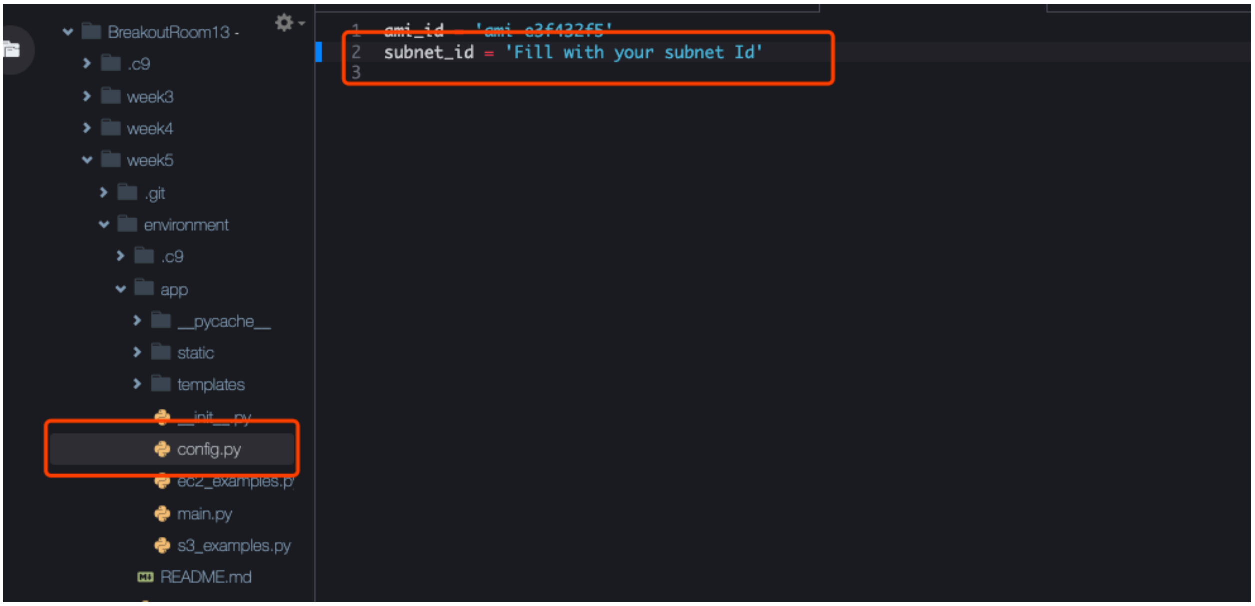
Report an Issue

Step3: Check Subnets



□	Name	Subnet ID	State	VPC	IPv4 CIDR	Available IPv4	IPv6 CIDR
□		subne[redacted]84c14a	available	vpc[redacted]dabe5	17[redacted].0/20	4091	-
□		subnet[redacted]a1c2a	available	vpc[redacted]dabe5	1[redacted].0/20	4091	-
□		subnet-[redacted]9c9b5	available	vpc[redacted]dabe5	1[redacted]0/20	4091	-
□		subnet-[redacted]12cf	available	vpc[redacted]dabe5	17[redacted]/20	4091	-
□		subnet[redacted]bb87	available	vpc-[redacted]abe5	17.[redacted]20	4091	-
□		subnet-[redacted]fe6d4	available	vpc-9[redacted]dabe5	172[redacted]/20	4091	-

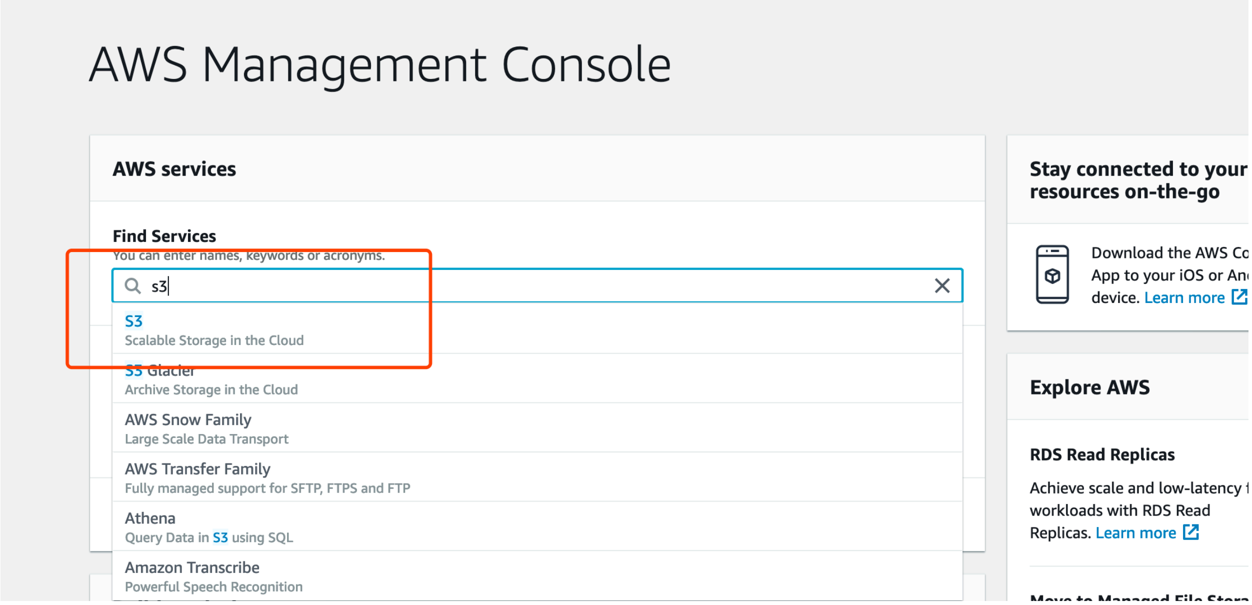
Step4: Copy any available subnet ID



```
ami_id = 'ami-e3f432f5'
subnet_id = 'Fill with your subnet Id'

```

Step5: Replace with your subnet ID

3) Create a new S3 bucket



AWS Management Console

AWS services

Find Services

You can enter names, keywords or acronyms.

s3

S3
Scalable Storage in the Cloud

S3 Glacier
Archive Storage in the Cloud

AWS Snow Family
Large Scale Data Transport

AWS Transfer Family
Fully managed support for SFTP, FTPS and FTP

Athena
Query Data in S3 using SQL

Amazon Transcribe
Powerful Speech Recognition

Stay connected to your resources on-the-go

Download the AWS Co App to your iOS or An device. Learn more

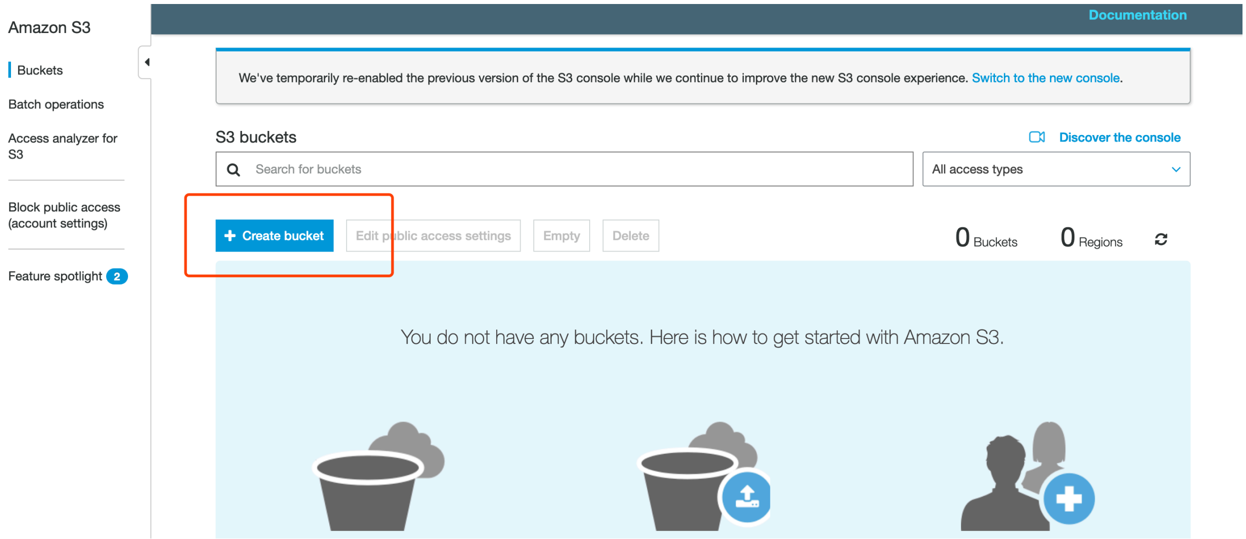
Explore AWS

RDS Read Replicas

Achieve scale and low-latency f workloads with RDS Read Replicas. Learn more

Move to Managed File Stora

Step1: Find S3 service



Amazon S3

- Buckets
- Batch operations
- Access analyzer for S3
- Block public access (account settings)
- Feature spotlight 2

Documentation

We've temporarily re-enabled the previous version of the S3 console while we continue to improve the new S3 console experience. Switch to the new console.

S3 buckets

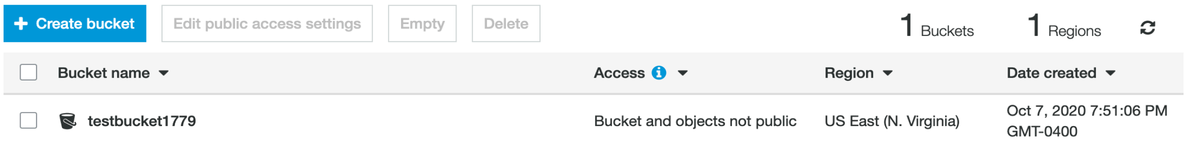
Discover the console

Search for buckets | All access types

0 Buckets 0 Regions

You do not have any buckets. Here is how to get started with Amazon S3.

Step2: Create a bucket, you can keep all *Configure options* or *Set permissions* as default (Only specify your bucket name and click next).



1 Buckets 1 Regions

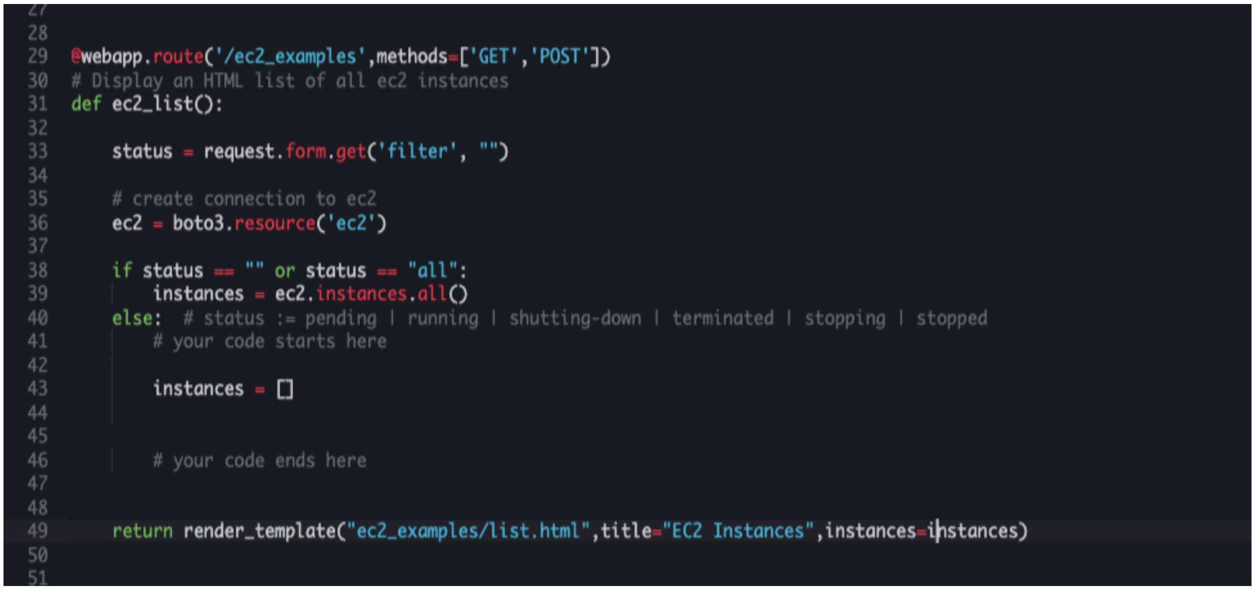
	Bucket name	Access	Region	Date created
□	testbucket1779	Bucket and objects not public	US East (N. Virginia)	Oct 7, 2020 7:51:06 PM GMT-0400

You will find your s3 bucket in the list.

Tutorial Tasks:

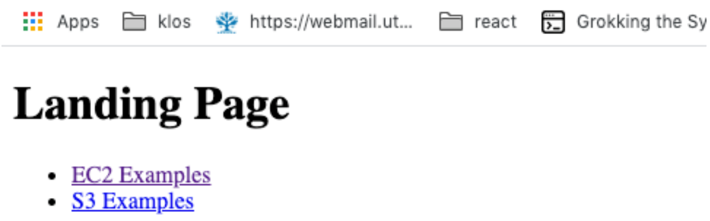
1) Modify the function ec2_list() from *ec2_exmaples.py* so that it displays information only for instances with the selected status.

Documentation for the EC2 filter function is available at:
https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/ec2.html
Search in the above URL for the string "ec2.instances.filter"
The filter function takes a very large number of options. The key that reflects the status of the instance is called "instance-state-name"



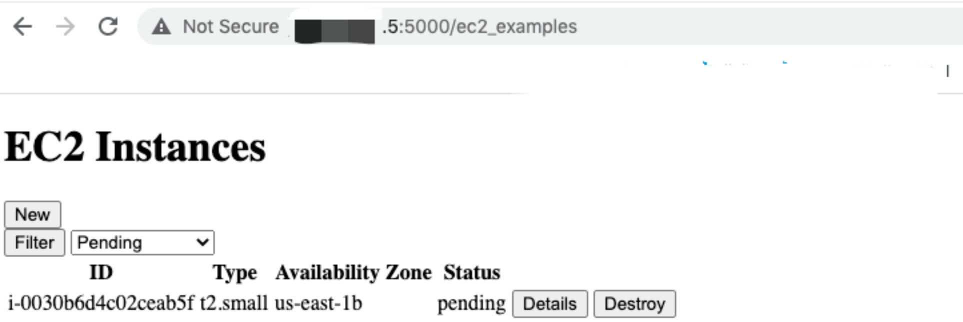
```
@webapp.route('/ec2_examples',methods=['GET','POST'])
# Display an HTML list of all ec2 instances
def ec2_list():

    status = request.form.get('filter', "")

    # create connection to ec2
    ec2 = boto3.resource('ec2')

    if status == "" or status == "all":
        instances = ec2.instances.all()
    else:  # status := pending | running | shutting-down | terminated | stopping | stopped
        # your code starts here

        instances = []


        # your code ends here


    return render_template("ec2_examples/list.html",title="EC2 Instances",instances=instances)
```

Expected view:



Landing Page

- EC2 Examples
- S3 Examples



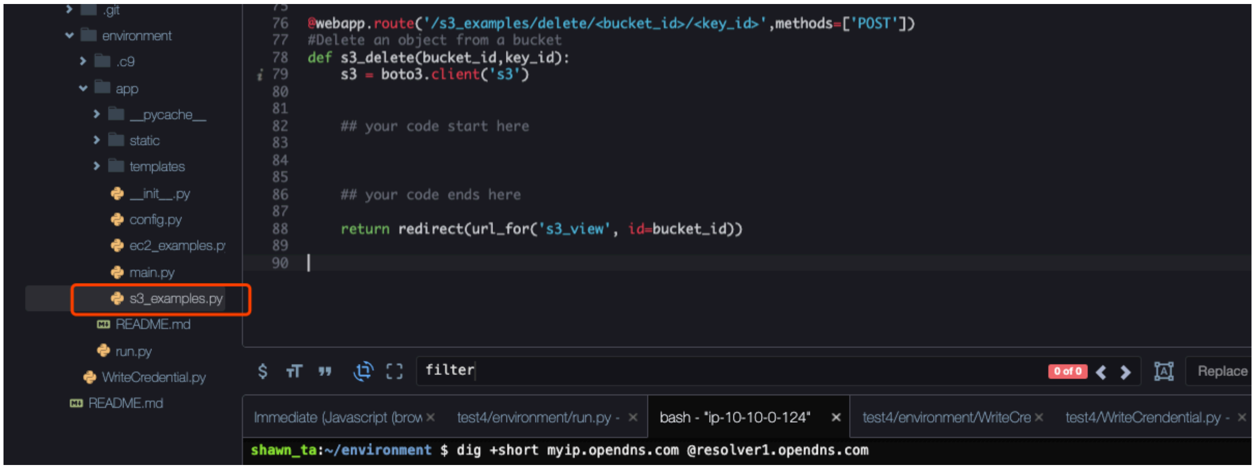
Not Secure [redacted].5:5000/ec2_examples

EC2 Instances

ID	Type	Availability Zone	Status
i-0030b6d4c02ceab5f	t2.small	us-east-1b	pending

2) Finish writing the function delete() from *s3_examples.py* so that you can removes any objects from an S3 bucket.

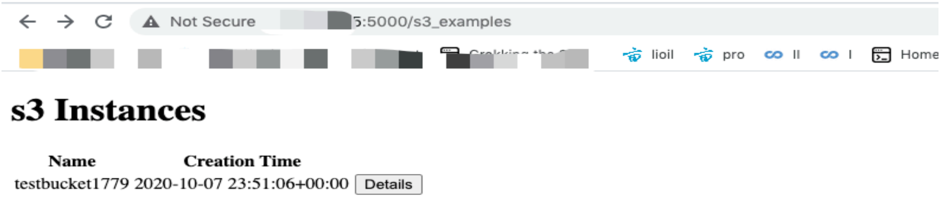
Documentation for the S3 available at:
https://boto3.amazonaws.com/v1/documentation/api/latest/reference/services/s3.html#S3.Client.delete_object
Search in the above URL for the string "client.delete_object"



```python
@webapp.route('/s3_examples/delete/<bucket_id>/<key_id>',methods=['POST'])
#Delete an object from a bucket
def s3_delete(bucket_id,key_id):
    s3 = boto3.client('s3')


    ## your code start here



    ## your code ends here

    return redirect(url_for('s3_view', id=bucket_id))

```

```
shawn_ta:~/environment $ dig +short myip.opendns.com @resolver1.opendns.com
```

Expected view:

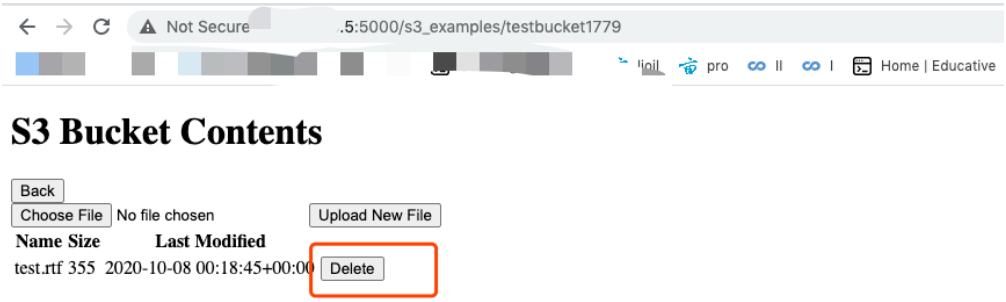


[redacted]5:5000/s3_examples

s3 Instances

Name	Creation Time	
testbucket1779	2020-10-07 23:51:06+00:00	Details

You can upload a file and test with your functionality



[redacted].5:5000/s3_examples/testbucket1779

S3 Bucket Contents

Name	Size	Last Modified	
test.rtf	355	2020-10-08 00:18:45+00:00	Delete