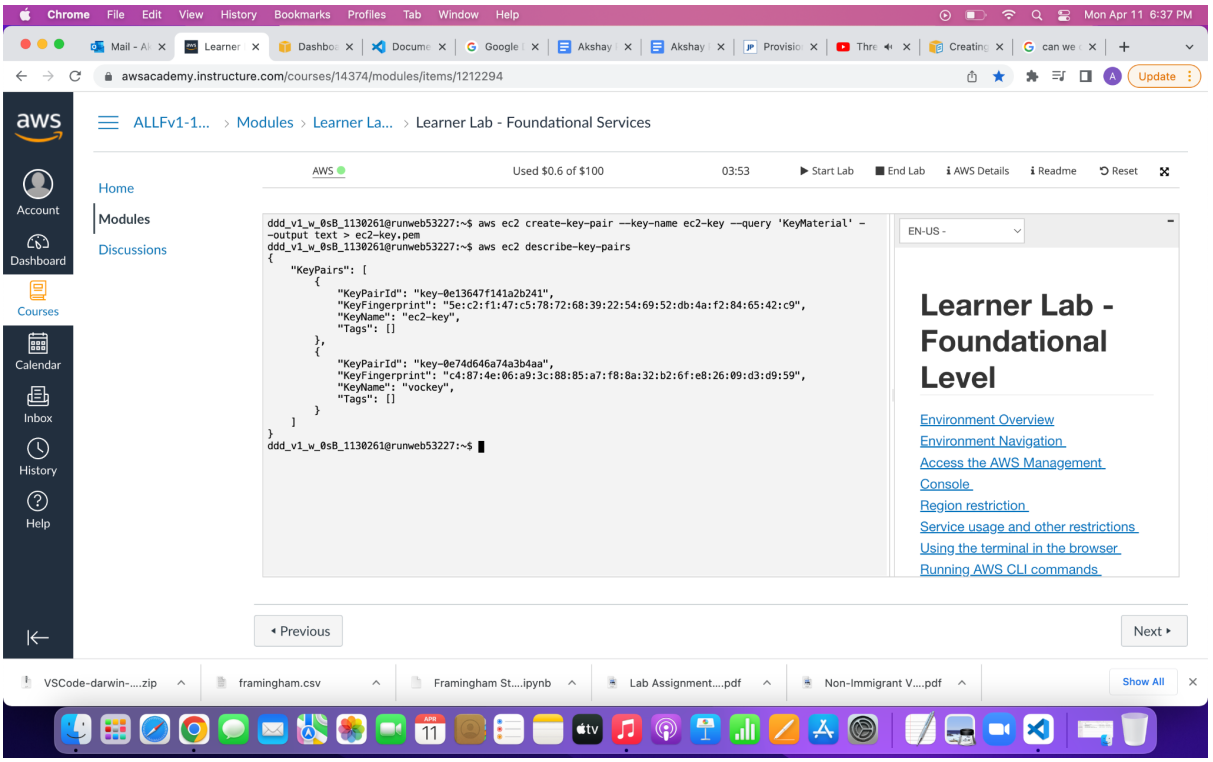
As we know for creating an ec2 instance we need four things.

1. Key
2. Subnet id
3. Security Group id
4. Amazon Machine Image ID.

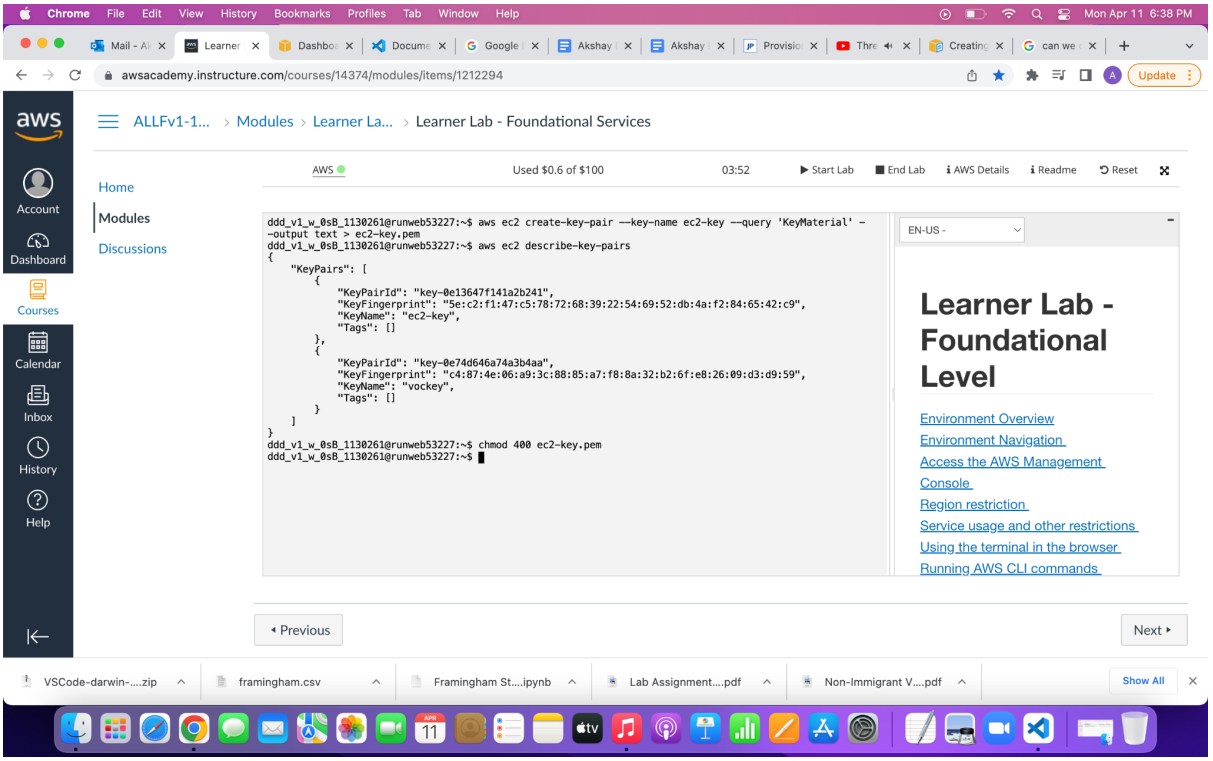
Let us first create a key using amazon cli

aws ec2 create-key-pair --key-name ec2-key --query 'KeyMaterial' --output text > ec2-key.pem

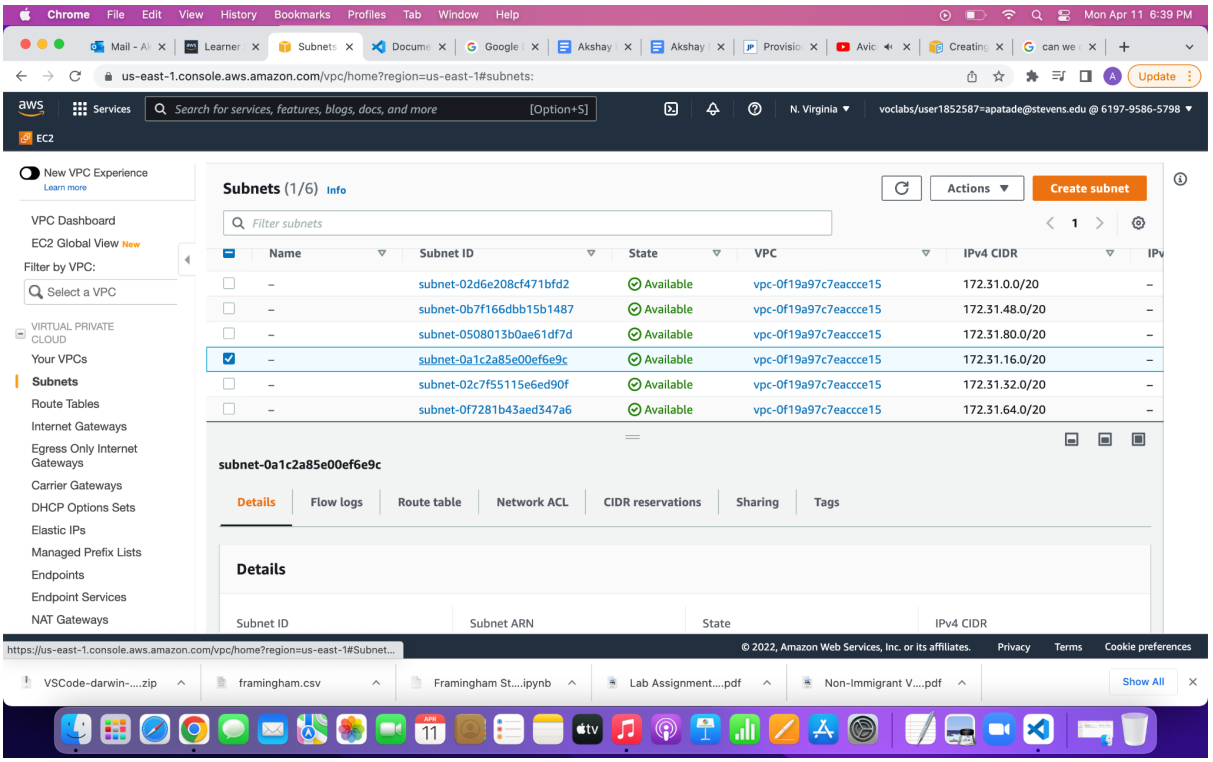
We will be using the same key to create 5 EC2 instances.



Here we can see we have created the key. Let us give read-only permission to this key.



2. We can create a new subnet and use that subnet id or we can use the existing subnets. For this lab, we will use the existing subnets present in the us-east-1a zone. subnet-0a1c2a85e00ef6e9c



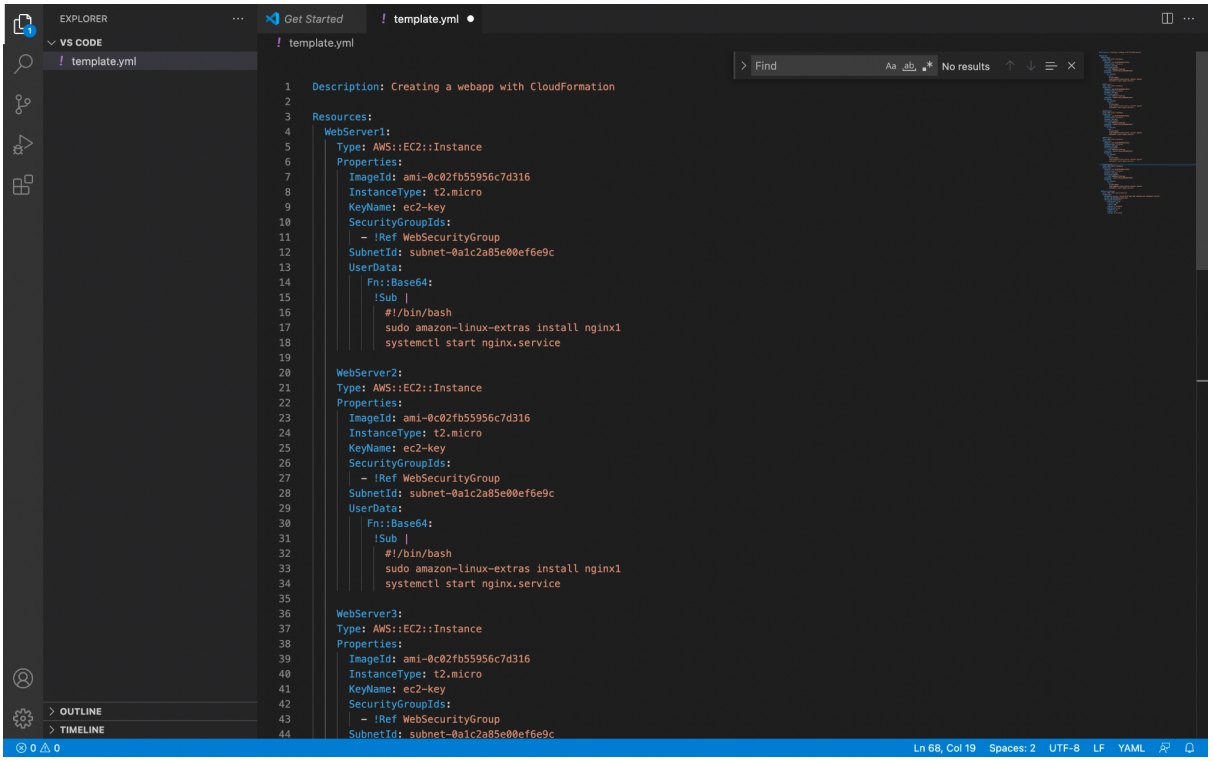
3. We will create a new security group using the cloud formation template so for the time being we will ignore it. We will continue this while creating a cloud formation template for ec2.

4. Amazon Machine Image Id: We will log in to the management console and copy the machine image id. For this lab, we will use ami-0c02fb55956c7d316 id.

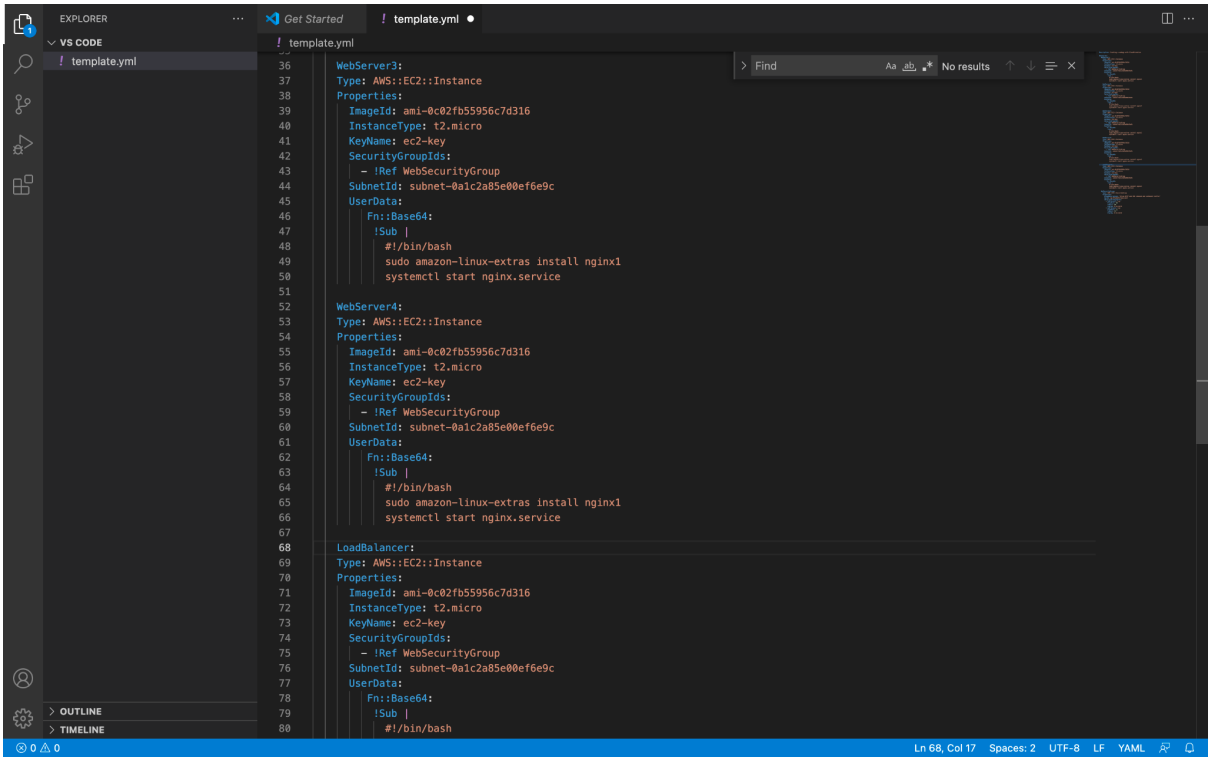
Creating an EC2 instance and Security group using Cloud formation

Now we will create our ec2 template and security group using Cloud Formation Template. One interesting thing we are doing here is that we have mentioned the script that will be executed while installing the ec2 instance.

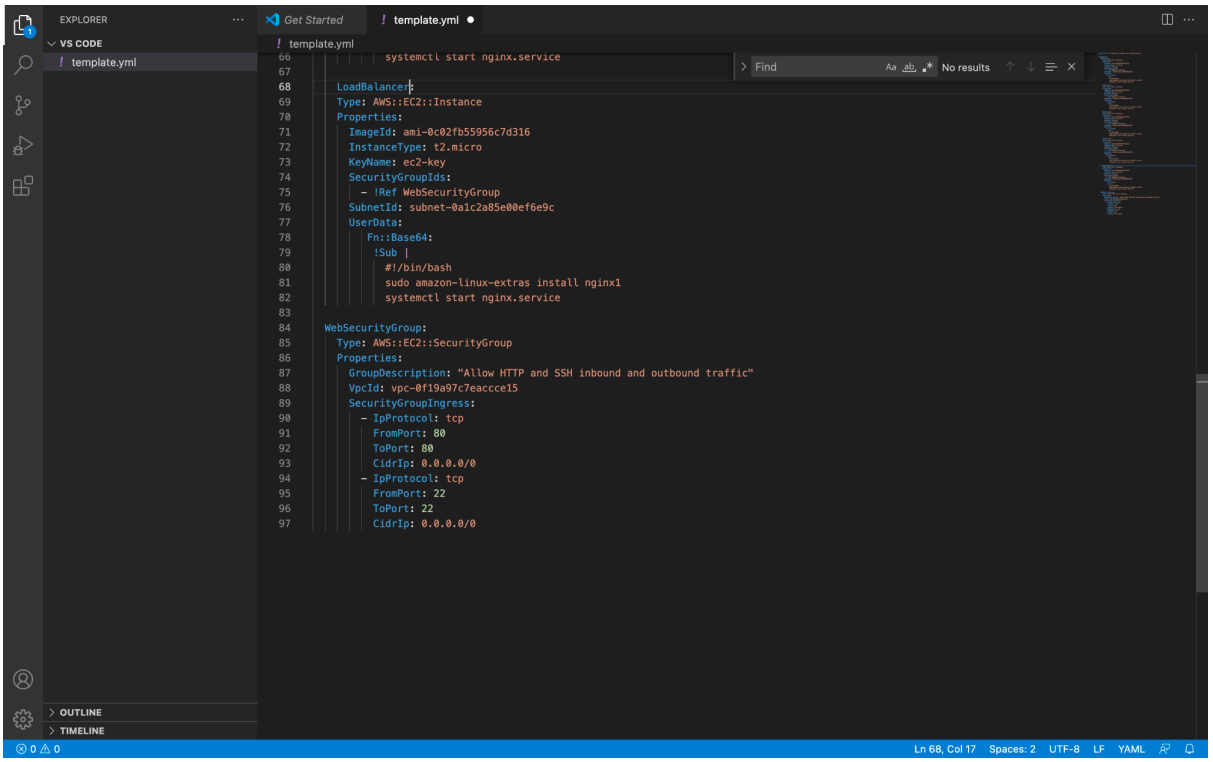
This script will install Nginx and start the server for us, so we don't need to log in to the server and do all these activities. We have to just update the Html pages so that they will be distinguishable.




```
Description: Creating a webapp with CloudFormation

Resources:
  WebServer1:
    Type: AWS::EC2::Instance
    Properties:
      ImageId: ami-0c02fb55956c7d316
      InstanceType: t2.micro
      KeyName: ec2-key
      SecurityGroupIds:
        - !Ref WebSecurityGroup
      SubnetId: subnet-0a1c2a85e00ef6e9c
      UserData:
        Fn::Base64:
          !Sub |
            #!/bin/bash
            sudo amazon-linux-extras install nginx1
            systemctl start nginx.service

  WebServer2:
    Type: AWS::EC2::Instance
    Properties:
      ImageId: ami-0c02fb55956c7d316
      InstanceType: t2.micro
      KeyName: ec2-key
      SecurityGroupIds:
        - !Ref WebSecurityGroup
      SubnetId: subnet-0a1c2a85e00ef6e9c
      UserData:
        Fn::Base64:
          !Sub |
            #!/bin/bash
            sudo amazon-linux-extras install nginx1
            systemctl start nginx.service

  WebServer3:
    Type: AWS::EC2::Instance
    Properties:
      ImageId: ami-0c02fb55956c7d316
      InstanceType: t2.micro
      KeyName: ec2-key
      SecurityGroupIds:
        - !Ref WebSecurityGroup
      SubnetId: subnet-0a1c2a85e00ef6e9c
```

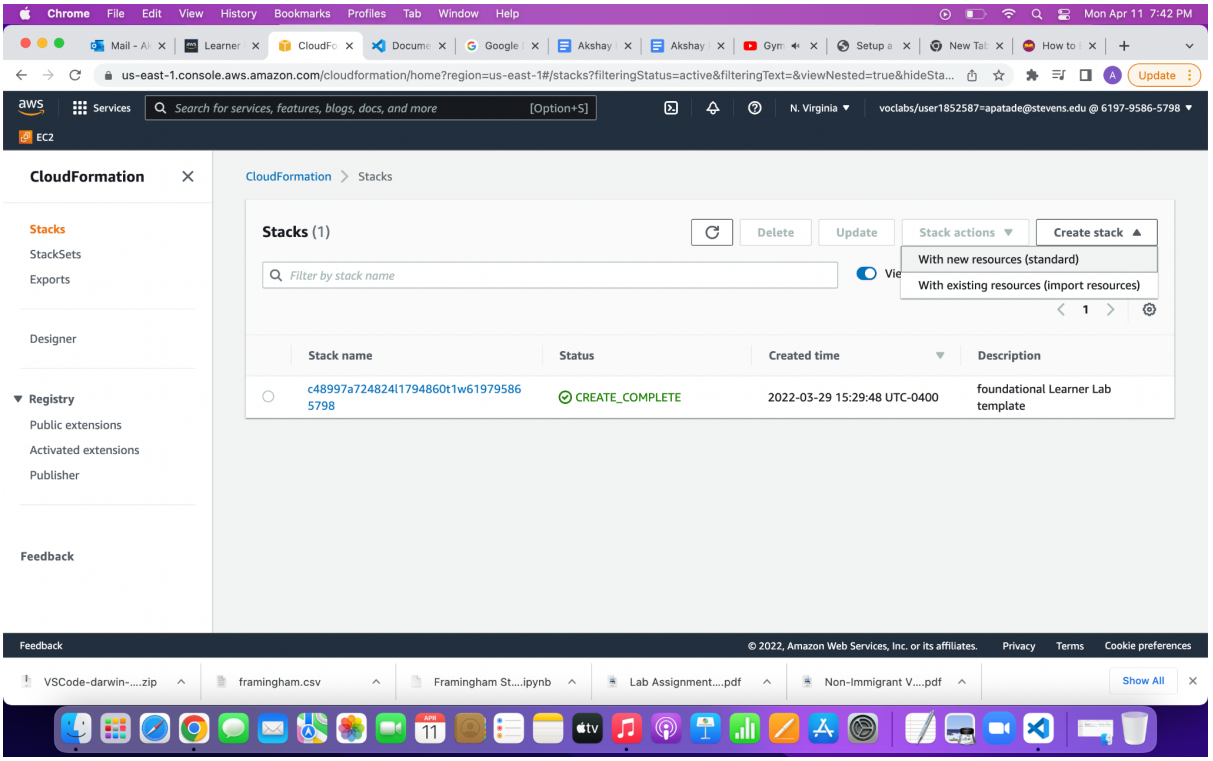



```
WebServer3:
Type: AWS::EC2::Instance
Properties:
  ImageId: ami-0c02fb55956c7d316
  InstanceType: t2.micro
  KeyName: ec2-key
  SecurityGroupIds:
    - !Ref WebSecurityGroup
  SubnetId: subnet-0a1c2a85e00ef6e9c
  UserData:
    Fn::Base64:
     !Sub |
      #!/bin/bash
      sudo amazon-linux-extras install nginx1
      systemctl start nginx.service

WebServer4:
Type: AWS::EC2::Instance
Properties:
  ImageId: ami-0c02fb55956c7d316
  InstanceType: t2.micro
  KeyName: ec2-key
  SecurityGroupIds:
    - !Ref WebSecurityGroup
  SubnetId: subnet-0a1c2a85e00ef6e9c
  UserData:
    Fn::Base64:
     !Sub |
      #!/bin/bash
      sudo amazon-linux-extras install nginx1
      systemctl start nginx.service

LoadBalancer:
Type: AWS::EC2::Instance
Properties:
  ImageId: ami-0c02fb55956c7d316
  InstanceType: t2.micro
  KeyName: ec2-key
  SecurityGroupIds:
    - !Ref WebSecurityGroup
  SubnetId: subnet-0a1c2a85e00ef6e9c
  UserData:
    Fn::Base64:
     !Sub |
      #!/bin/bash
```

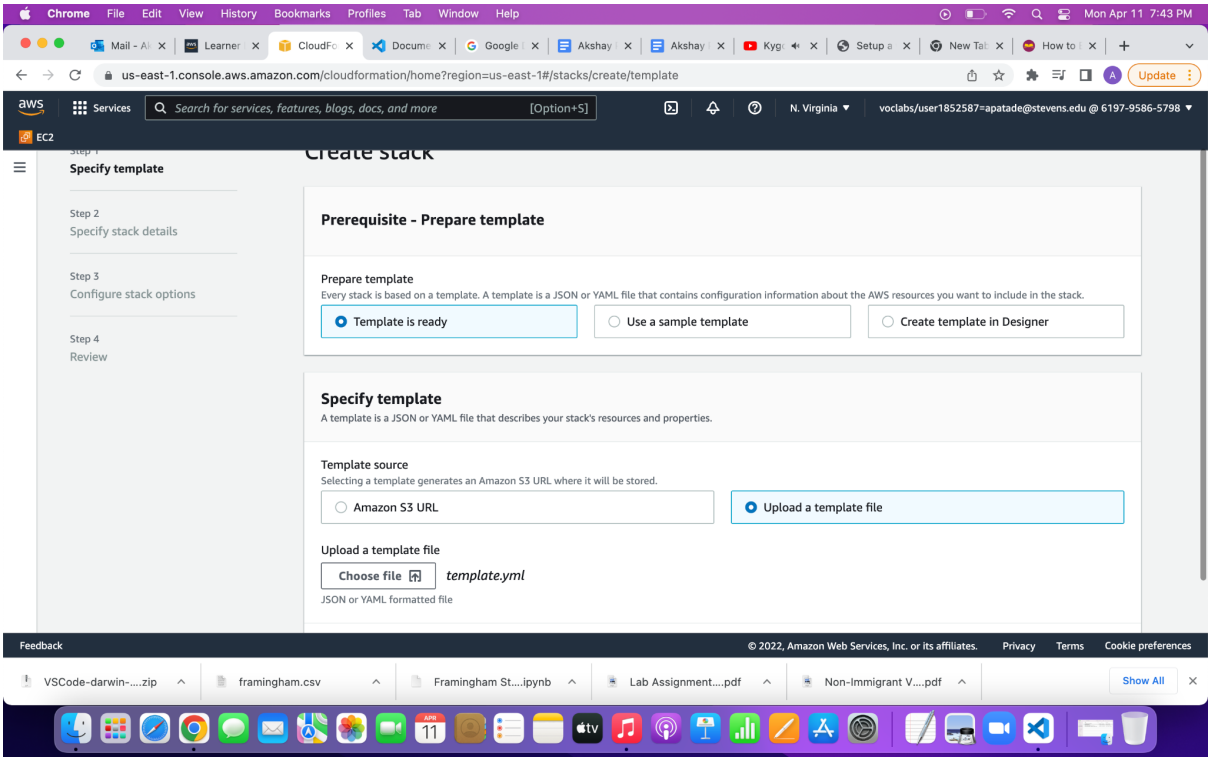



```
      systemctl start nginx.service

LoadBalancer:
Type: AWS::EC2::Instance
Properties:
  ImageId: ami-0c02fb55956c7d316
  InstanceType: t2.micro
  KeyName: ec2-key
  SecurityGroupIds:
    - !Ref WebSecurityGroup
  SubnetId: subnet-0a1c2a85e00ef6e9c
  UserData:
    Fn::Base64:
     !Sub |
      #!/bin/bash
      sudo amazon-linux-extras install nginx1
      systemctl start nginx.service

WebSecurityGroup:
  Type: AWS::EC2::SecurityGroup
  Properties:
    GroupDescription: "Allow HTTP and SSH inbound and outbound traffic"
    VpcId: vpc-0f19a97c7eaccce15
    SecurityGroupIngress:
      - IpProtocol: tcp
        FromPort: 80
        ToPort: 80
        CidrIp: 0.0.0.0/0
      - IpProtocol: tcp
        FromPort: 22
        ToPort: 22
        CidrIp: 0.0.0.0/0
```

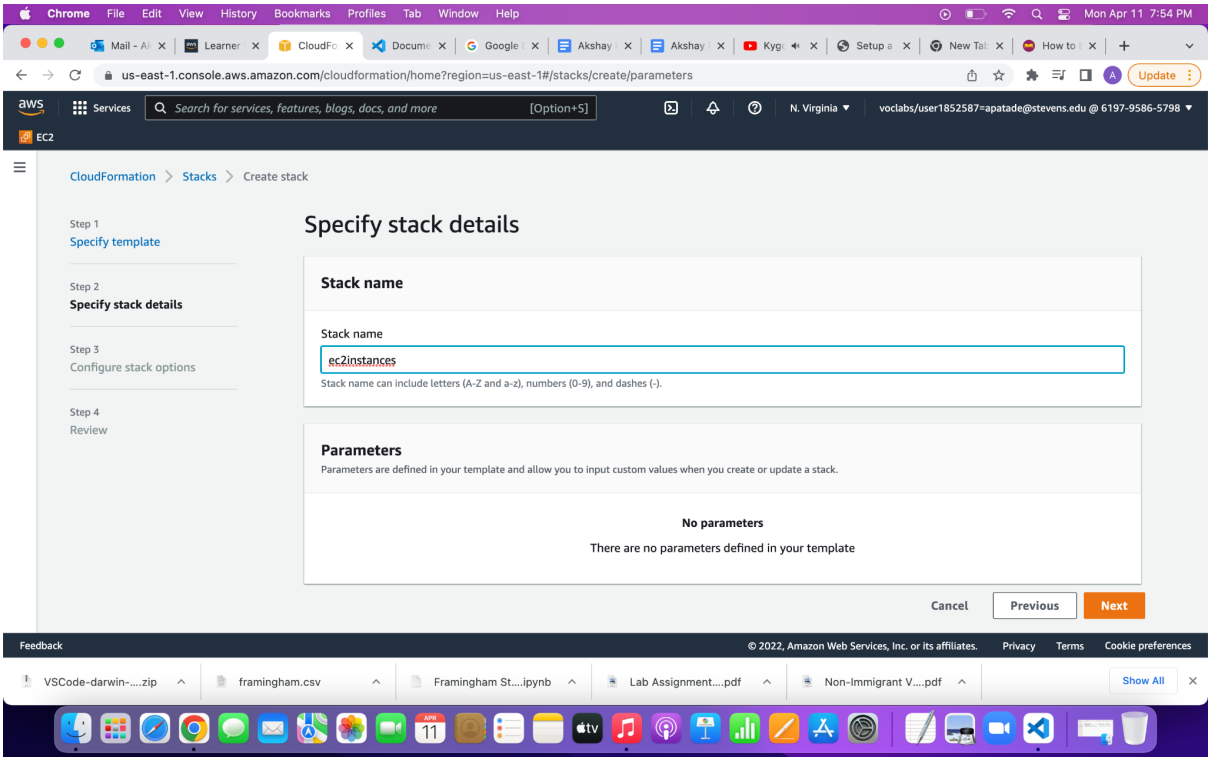
Once the template is created we will log in to Amazon Management Console and go to CloudFormation and click on create stack button and select with new resources button.



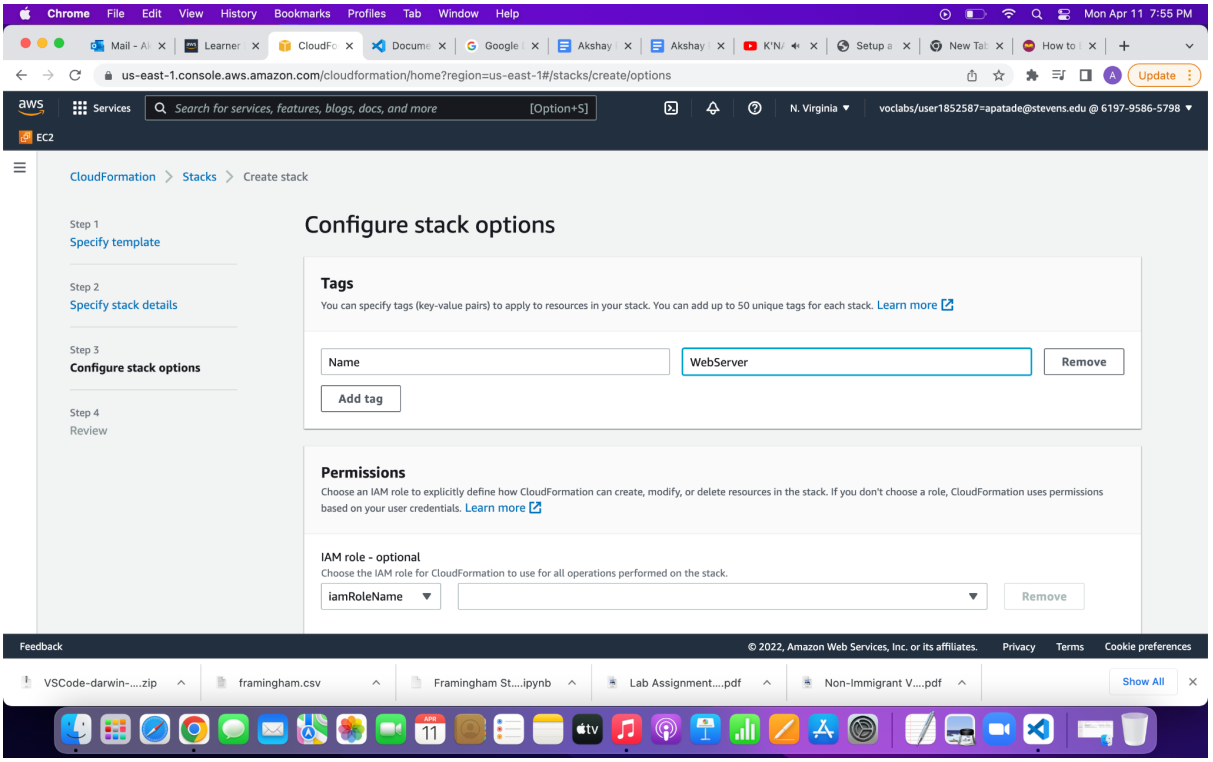
Next, click on the upload a template file radio button and then upload your template file, and then click on the upload button.



Next, write a name for your stack and then click on next. I have mentioned ec2instances.

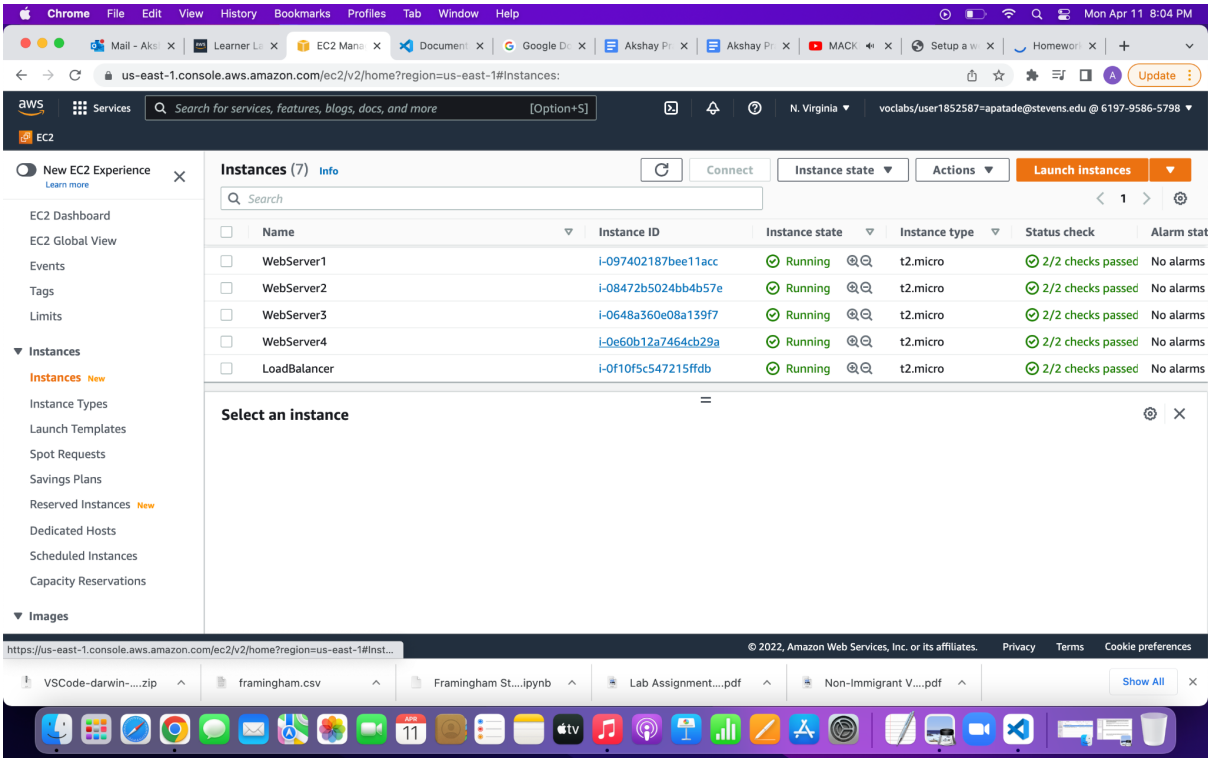


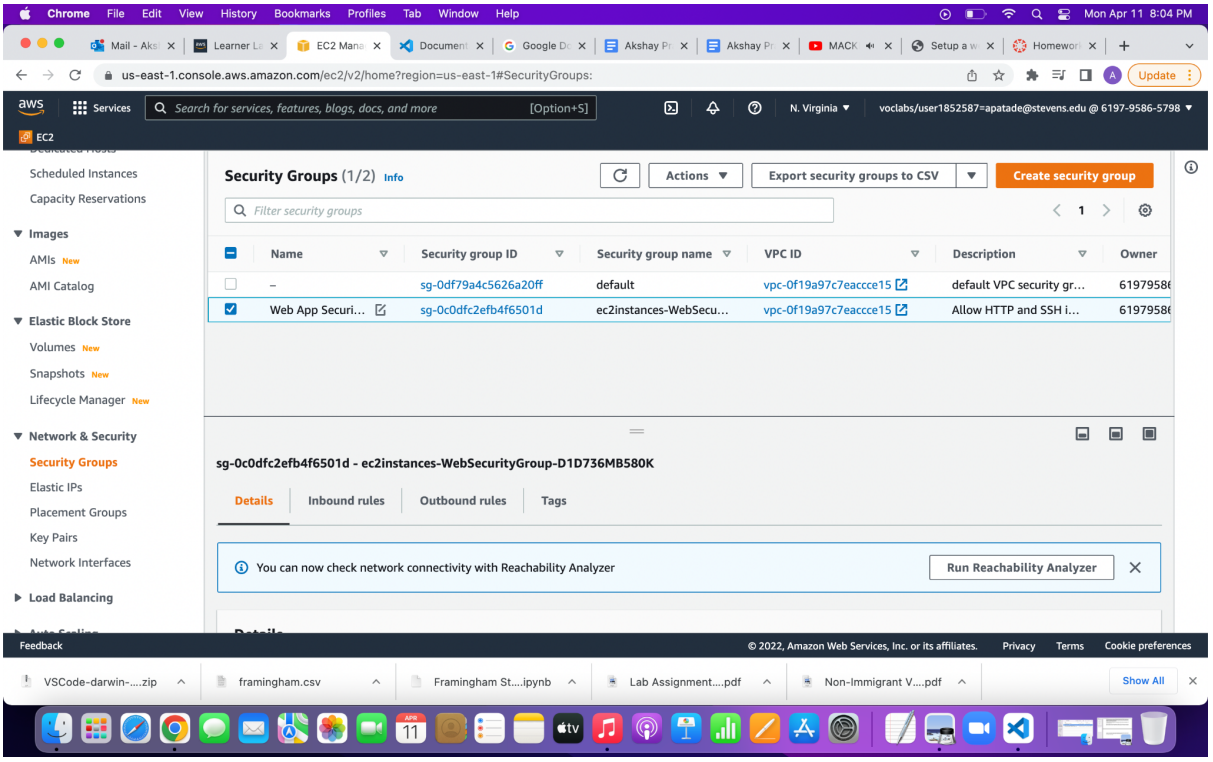
You can configure your stack. For this lab work, we will just hit next.



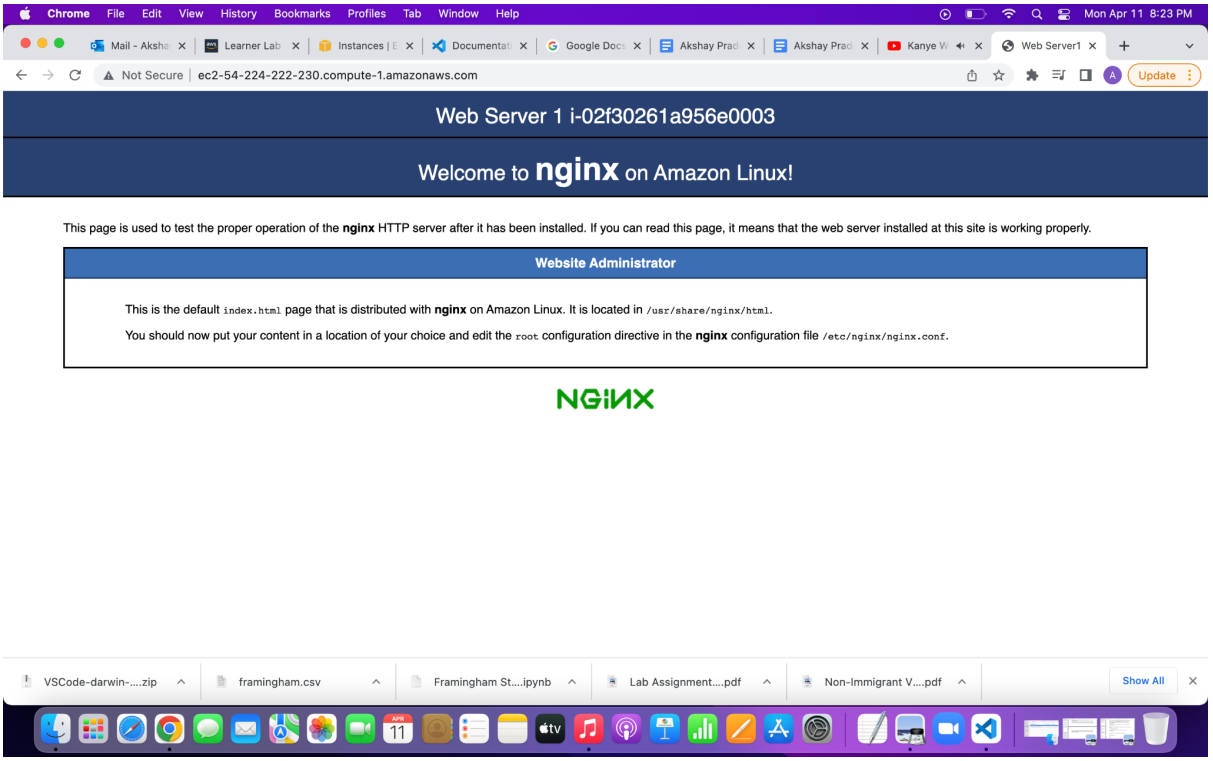
Review your stack and hit create stack button.

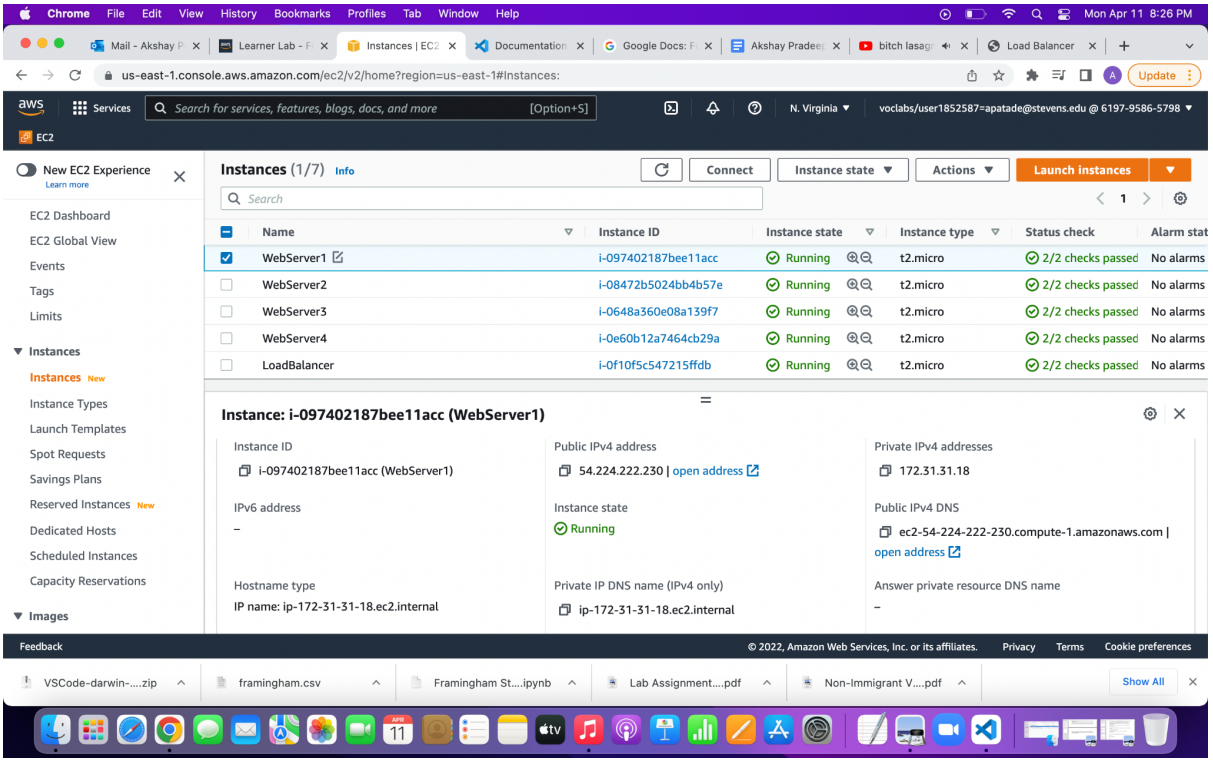
Now go to ec2 instance and security group to check whether the instances and security group are successfully created or not.

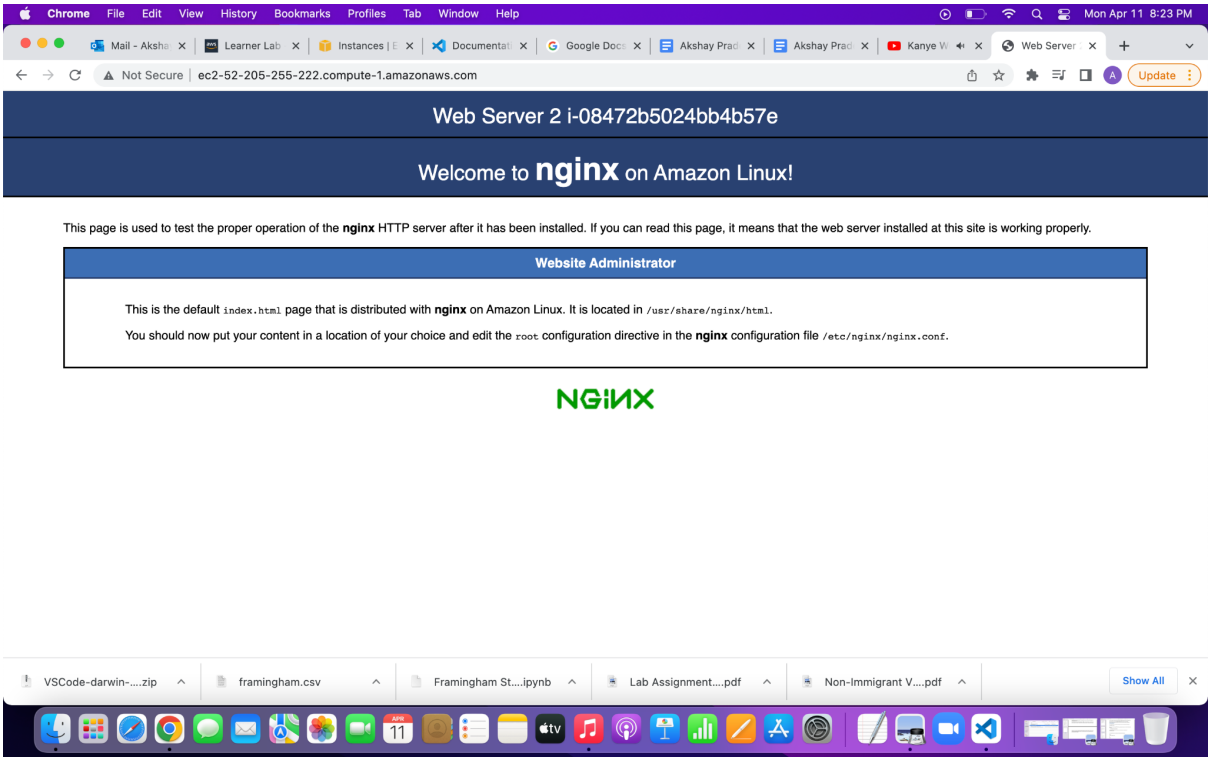


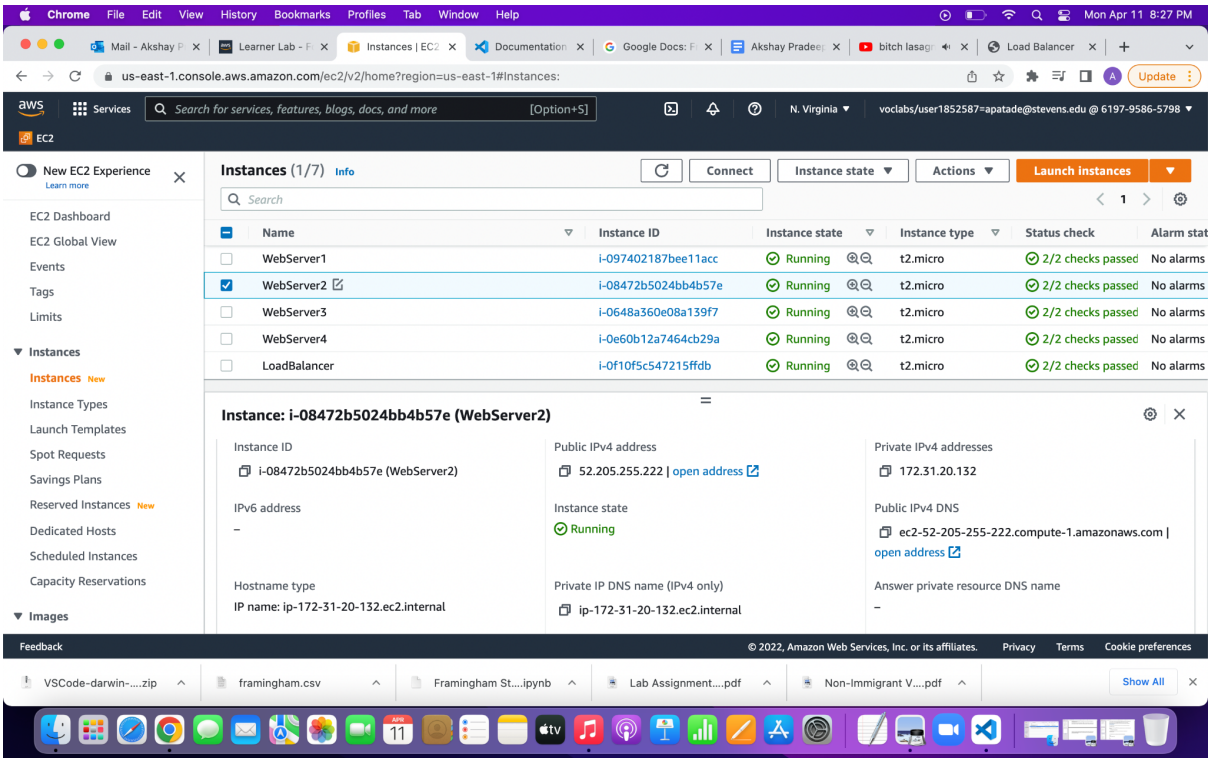


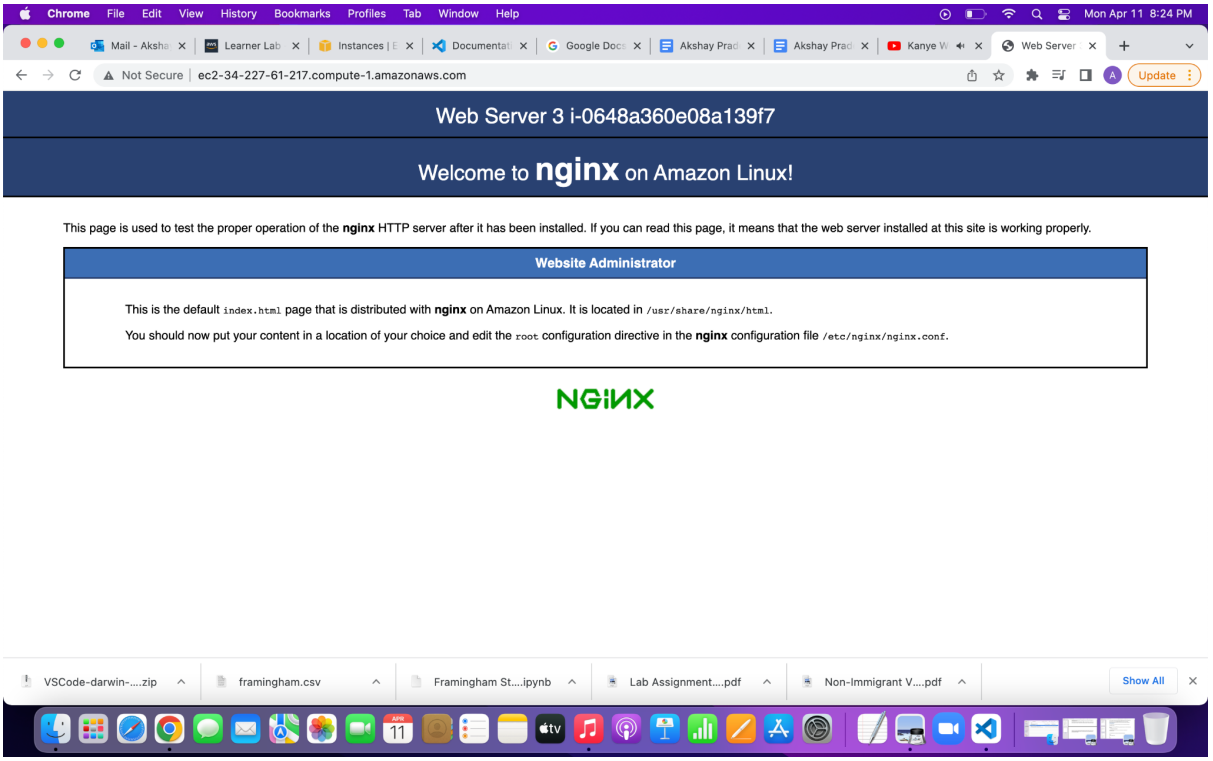
Here we can see that our instances and the security group are successfully created. Now we update the Html of each server so that it is distinguishable and we will check whether we can access the server or not.

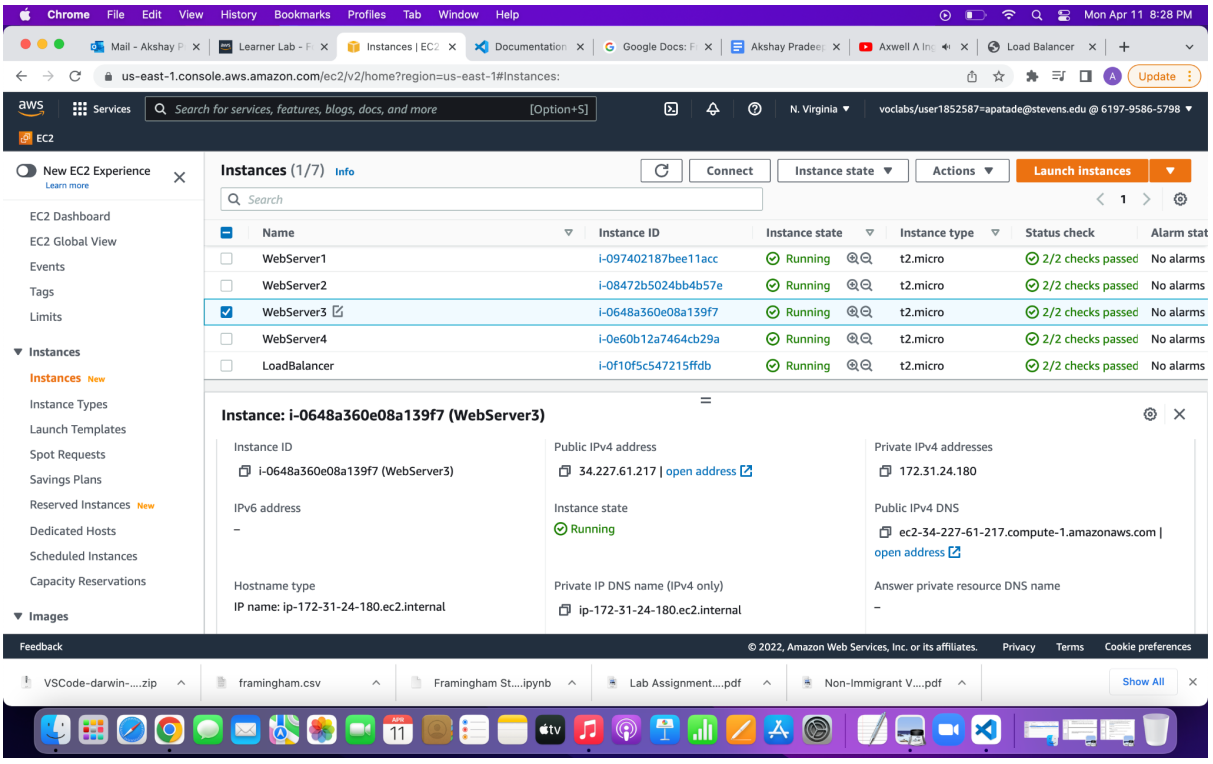

Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:23 PM
Not Secure | ec2-54-224-222-230.compute-1.amazonaws.com
Update
Web Server 1 i-02f30261a956e0003
Welcome to nginx on Amazon Linux!
This page is used to test the proper operation of the nginx HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.
Website Administrator
This is the default index.html page that is distributed with nginx on Amazon Linux. It is located in /usr/share/nginx/html.
You should now put your content in a location of your choice and edit the root configuration directive in the nginx configuration file /etc/nginx/nginx.conf.
NGINX
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All

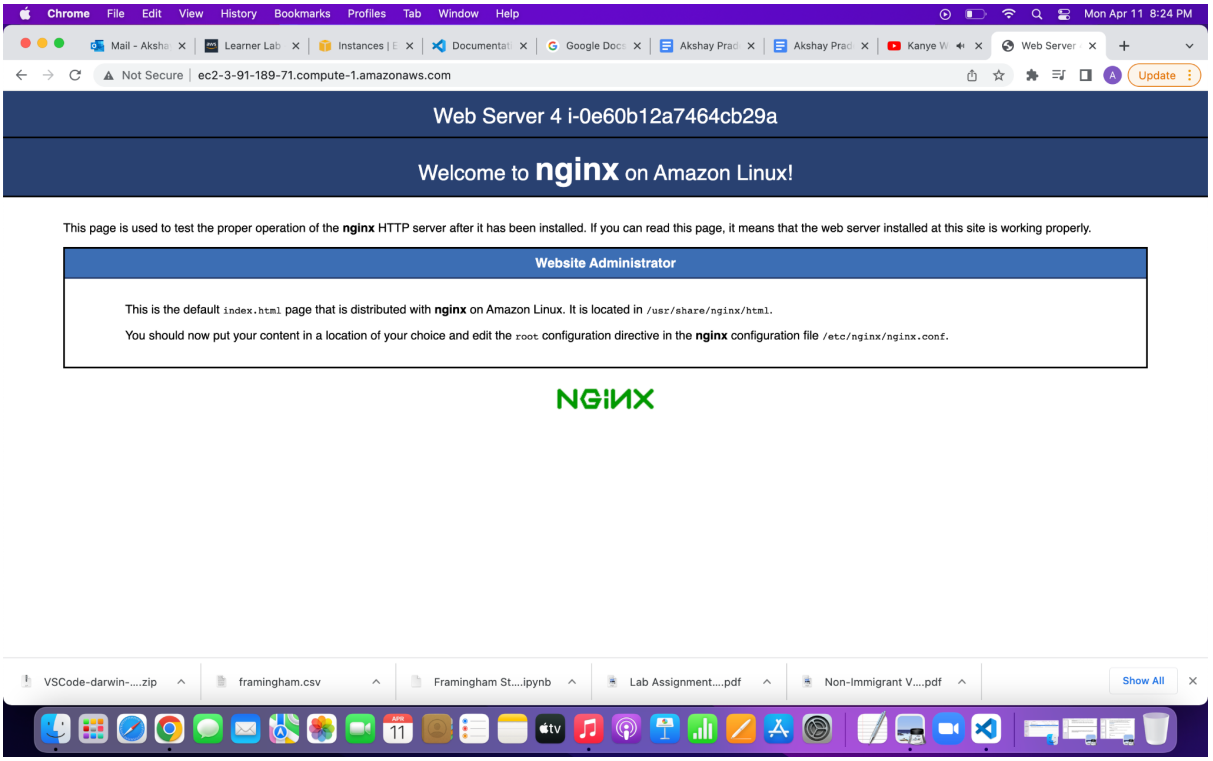

Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:26 PM
us-east-1.console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:
Update
Services
Search for services, features, blogs, docs, and more [Option+S]
N. Virginia
voclabs/user1852587=apatade@stevens.edu @ 6197-9586-5798
EC2
New EC2 Experience
Learn more
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances New
Dedicated Hosts
Scheduled Instances
Capacity Reservations
Images
Instances (1/7) Info
Connect
Instance state
Actions
Launch instances
Search
Name
Instance ID
Instance state
Instance type
Status check
Alarm stat
WebServer1 i-097402187bee11acc Running t2.micro 2/2 checks passed No alarms
WebServer2 i-08472b5024bb4b57e Running t2.micro 2/2 checks passed No alarms
WebServer3 i-0648a360e08a139f7 Running t2.micro 2/2 checks passed No alarms
WebServer4 i-0e60b12a7464cb29a Running t2.micro 2/2 checks passed No alarms
LoadBalancer i-0f10f5c547215ffdb Running t2.micro 2/2 checks passed No alarms
Instance: i-097402187bee11acc (WebServer1)
Instance ID
i-097402187bee11acc (WebServer1)
IPv6 address
–
Hostname type
IP name: ip-172-31-31-18.ec2.internal
Public IPv4 address
54.224.222.230 | open address
Instance state
Running
Private IP DNS name (IPv4 only)
ip-172-31-31-18.ec2.internal
Private IPv4 addresses
172.31.31.18
Public IPv4 DNS
ec2-54-224-222-230.compute-1.amazonaws.com | open address
Answer private resource DNS name
–
Feedback
© 2022, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All


Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:23 PM
Not Secure | ec2-52-205-255-222.compute-1.amazonaws.com
Update
Web Server 2 i-08472b5024bb4b57e
Welcome to nginx on Amazon Linux!
This page is used to test the proper operation of the nginx HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.
Website Administrator
This is the default index.html page that is distributed with nginx on Amazon Linux. It is located in /usr/share/nginx/html.
You should now put your content in a location of your choice and edit the root configuration directive in the nginx configuration file /etc/nginx/nginx.conf.
NGINX
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All


Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:27 PM
us-east-1.console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:
Update
Services
Search for services, features, blogs, docs, and more [Option+S]
N. Virginia
voclabs/user1852587=apatade@stevens.edu @ 6197-9586-5798
EC2
New EC2 Experience
Learn more
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances New
Dedicated Hosts
Scheduled Instances
Capacity Reservations
Images
Instances (1/7) Info
Connect
Instance state
Actions
Launch instances
Search
Name
Instance ID
Instance state
Instance type
Status check
Alarm stat
WebServer1 i-097402187bee11acc Running t2.micro 2/2 checks passed No alarms
WebServer2 i-08472b5024bb4b57e Running t2.micro 2/2 checks passed No alarms
WebServer3 i-0648a360e08a139f7 Running t2.micro 2/2 checks passed No alarms
WebServer4 i-0e60b12a7464cb29a Running t2.micro 2/2 checks passed No alarms
LoadBalancer i-0f10f5c547215ffdb Running t2.micro 2/2 checks passed No alarms
Instance: i-08472b5024bb4b57e (WebServer2)
Instance ID
i-08472b5024bb4b57e (WebServer2)
Public IPv4 address
52.205.255.222 | open address
Private IPv4 addresses
172.31.20.132
IPv6 address
–
Instance state
Running
Public IPv4 DNS
ec2-52-205-255-222.compute-1.amazonaws.com | open address
Hostname type
IP name: ip-172-31-20-132.ec2.internal
Private IP DNS name (IPv4 only)
ip-172-31-20-132.ec2.internal
Answer private resource DNS name
–
Feedback
© 2022, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All


Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:24 PM
Not Secure | ec2-34-227-61-217.compute-1.amazonaws.com
Update
Web Server 3 i-0648a360e08a139f7
Welcome to nginx on Amazon Linux!
This page is used to test the proper operation of the nginx HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.
Website Administrator
This is the default index.html page that is distributed with nginx on Amazon Linux. It is located in /usr/share/nginx/html.
You should now put your content in a location of your choice and edit the root configuration directive in the nginx configuration file /etc/nginx/nginx.conf.
NGINX
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All


Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:28 PM
us-east-1.console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:
Update
Services
Search for services, features, blogs, docs, and more [Option+S]
N. Virginia
voclabs/user1852587=apatade@stevens.edu @ 6197-9586-5798
EC2
New EC2 Experience
Learn more
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances New
Dedicated Hosts
Scheduled Instances
Capacity Reservations
Images
Instances (1/7) Info
Connect
Instance state
Actions
Launch instances
Search
Name
Instance ID
Instance state
Instance type
Status check
Alarm stat
WebServer1 i-097402187bee11acc Running t2.micro 2/2 checks passed No alarms
WebServer2 i-08472b5024bb4b57e Running t2.micro 2/2 checks passed No alarms
WebServer3 i-0648a360e08a139f7 Running t2.micro 2/2 checks passed No alarms
WebServer4 i-0e60b12a7464cb29a Running t2.micro 2/2 checks passed No alarms
LoadBalancer i-0f10f5c547215ffdb Running t2.micro 2/2 checks passed No alarms
Instance: i-0648a360e08a139f7 (WebServer3)
Instance ID
i-0648a360e08a139f7 (WebServer3)
Public IPv4 address
34.227.61.217 | open address
Private IPv4 addresses
172.31.24.180
IPv6 address
–
Instance state
Running
Public IPv4 DNS
ec2-34-227-61-217.compute-1.amazonaws.com | open address
Hostname type
IP name: ip-172-31-24-180.ec2.internal
Private IP DNS name (IPv4 only)
ip-172-31-24-180.ec2.internal
Answer private resource DNS name
–
Feedback
© 2022, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All


Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:24 PM
Not Secure | ec2-3-91-189-71.compute-1.amazonaws.com
Update
Web Server 4 i-0e60b12a7464cb29a
Welcome to nginx on Amazon Linux!
This page is used to test the proper operation of the nginx HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.
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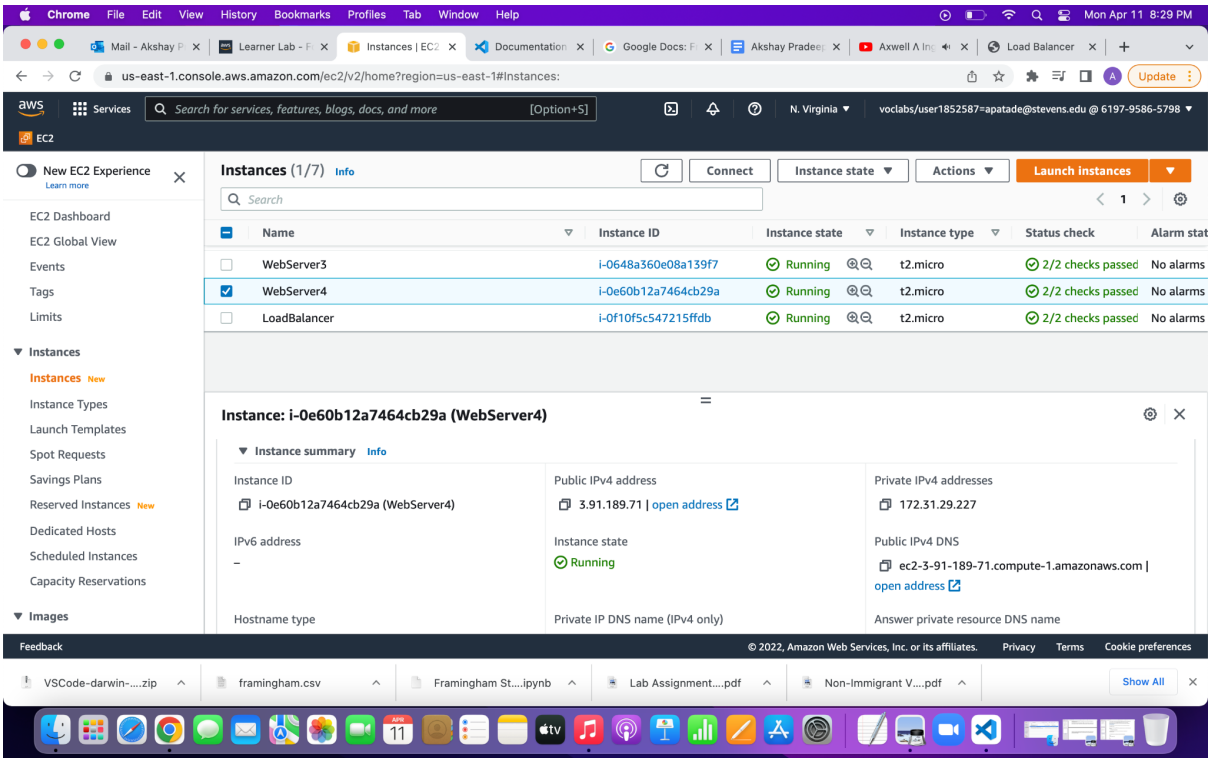
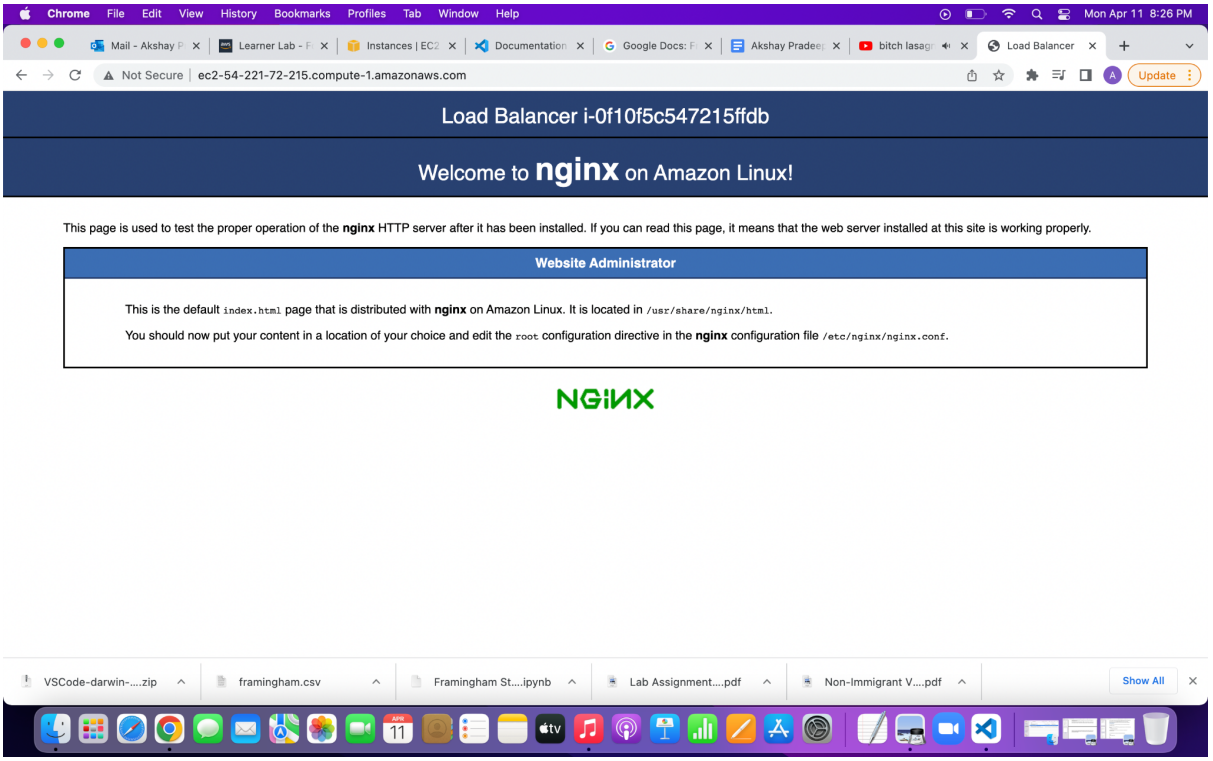
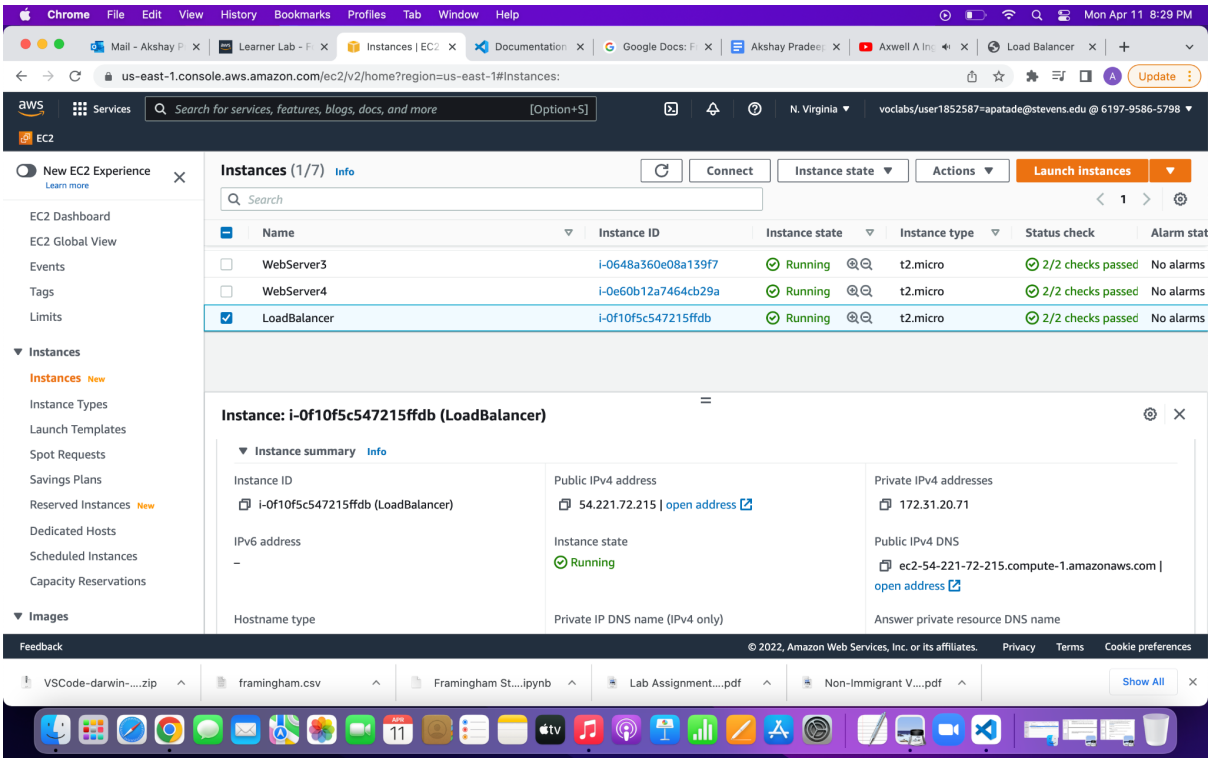
You should now put your content in a location of your choice and edit the root configuration directive in the nginx configuration file /etc/nginx/nginx.conf.
NGINX
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All

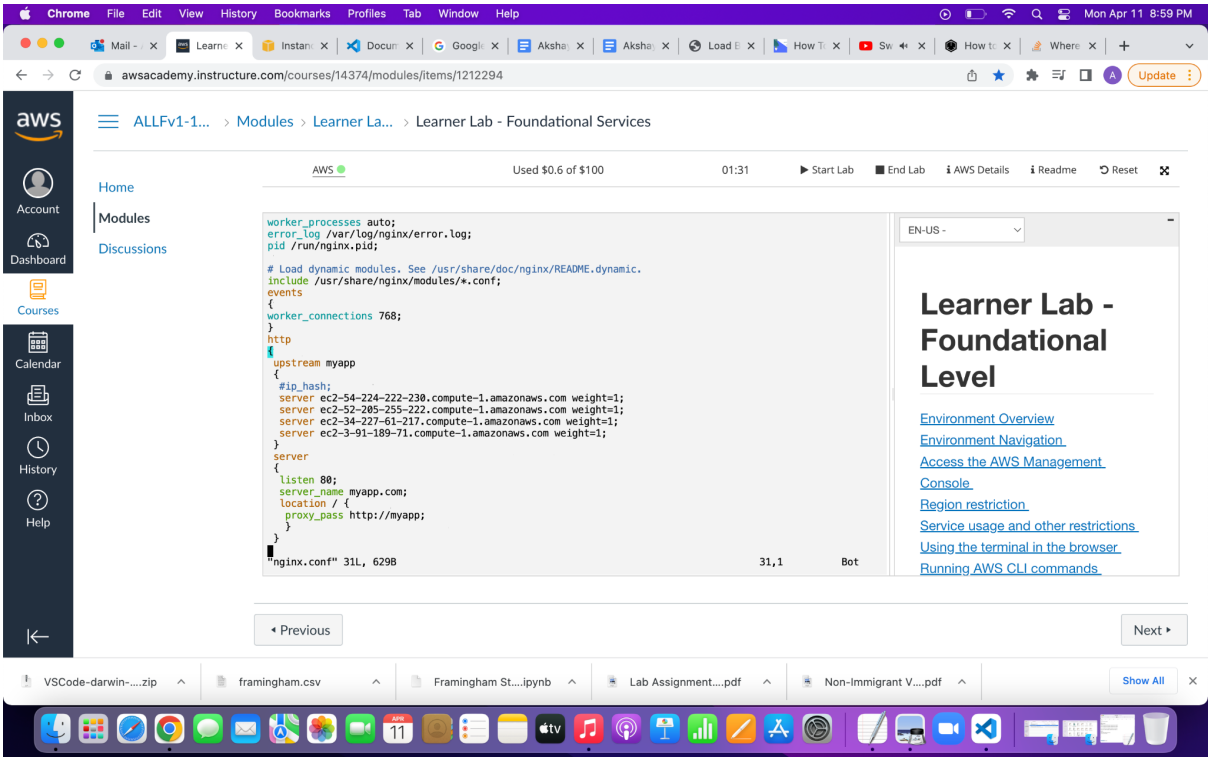

Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 8:29 PM
us-east-1.console.aws.amazon.com/ec2/v2/home?region=us-east-1#Instances:
Update
Services
Search for services, features, blogs, docs, and more [Option+S]
N. Virginia
voclabs/user1852587=apatade@stevens.edu @ 6197-9586-5798
EC2
New EC2 Experience
Learn more
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances New
Dedicated Hosts
Scheduled Instances
Capacity Reservations
Images
Instances (1/7) Info
Connect
Instance state
Actions
Launch instances
Search
Name
Instance ID
Instance state
Instance type
Status check
Alarm stat
WebServer3 i-0648a360e08a139f7 Running t2.micro 2/2 checks passed No alarms
WebServer4 i-0e60b12a7464cb29a Running t2.micro 2/2 checks passed No alarms
LoadBalancer i-0f10f5c547215ffdb Running t2.micro 2/2 checks passed No alarms
Instance: i-0e60b12a7464cb29a (WebServer4)
Instance summary Info
Instance ID
i-0e60b12a7464cb29a (WebServer4)
Public IPv4 address
3.91.189.71 | open address
Private IPv4 addresses
172.31.29.227
IPv6 address
–
Instance state
Running
Public IPv4 DNS
ec2-3-91-189-71.compute-1.amazonaws.com | open address
Hostname type
Private IP DNS name (IPv4 only)
Answer private resource DNS name
Feedback
© 2022, Amazon Web Services, Inc. or its affiliates.
Privacy
Terms
Cookie preferences
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All



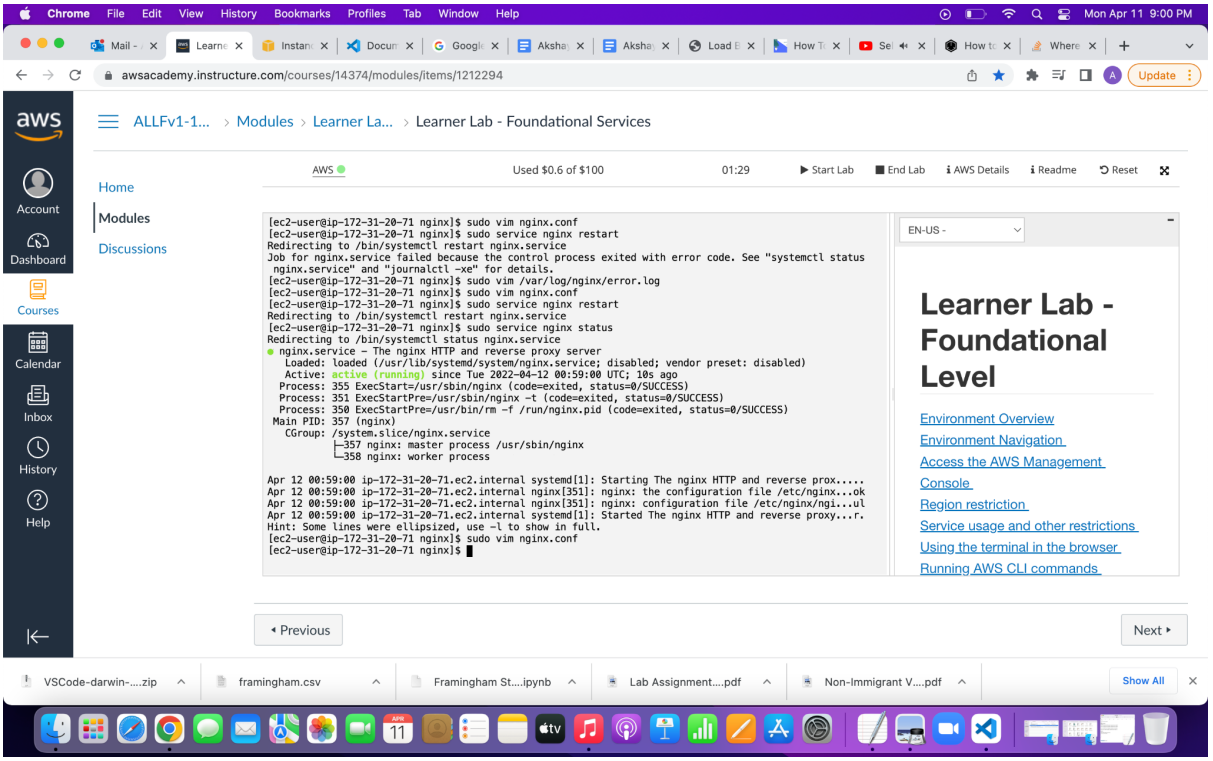


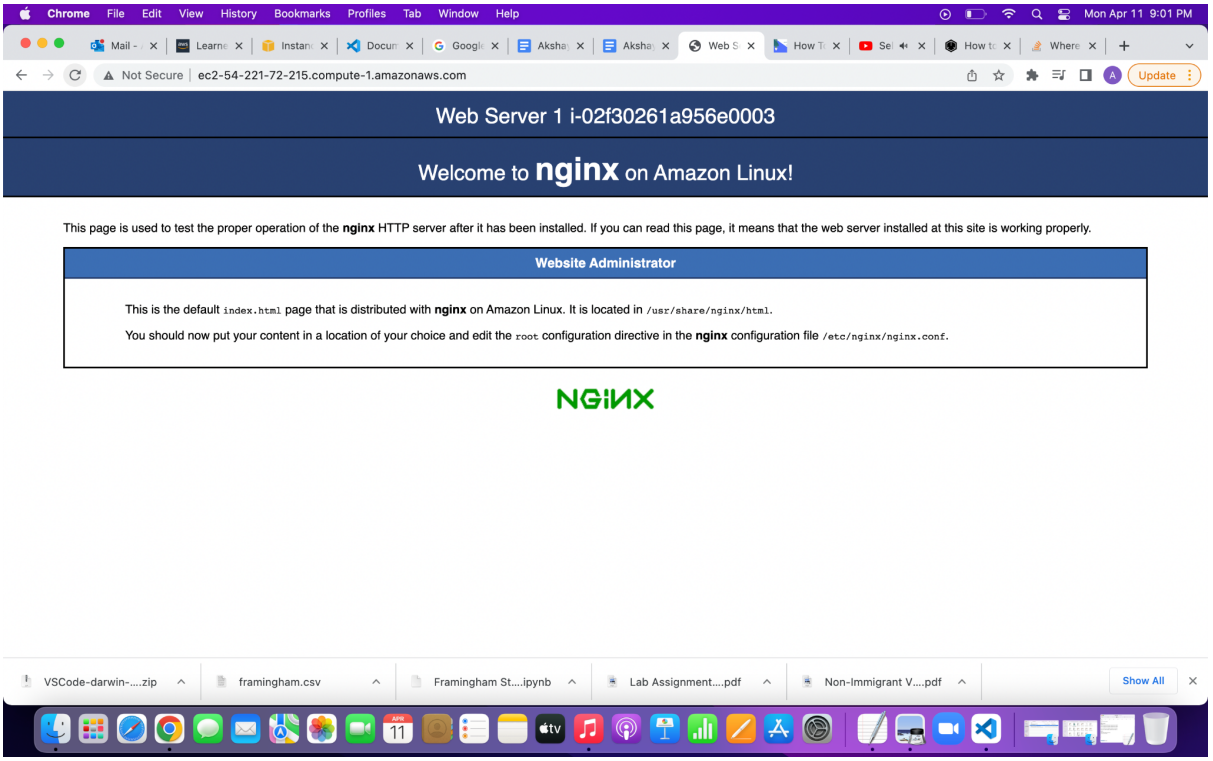
We are able to access all the webservers via ssh and HTTP.

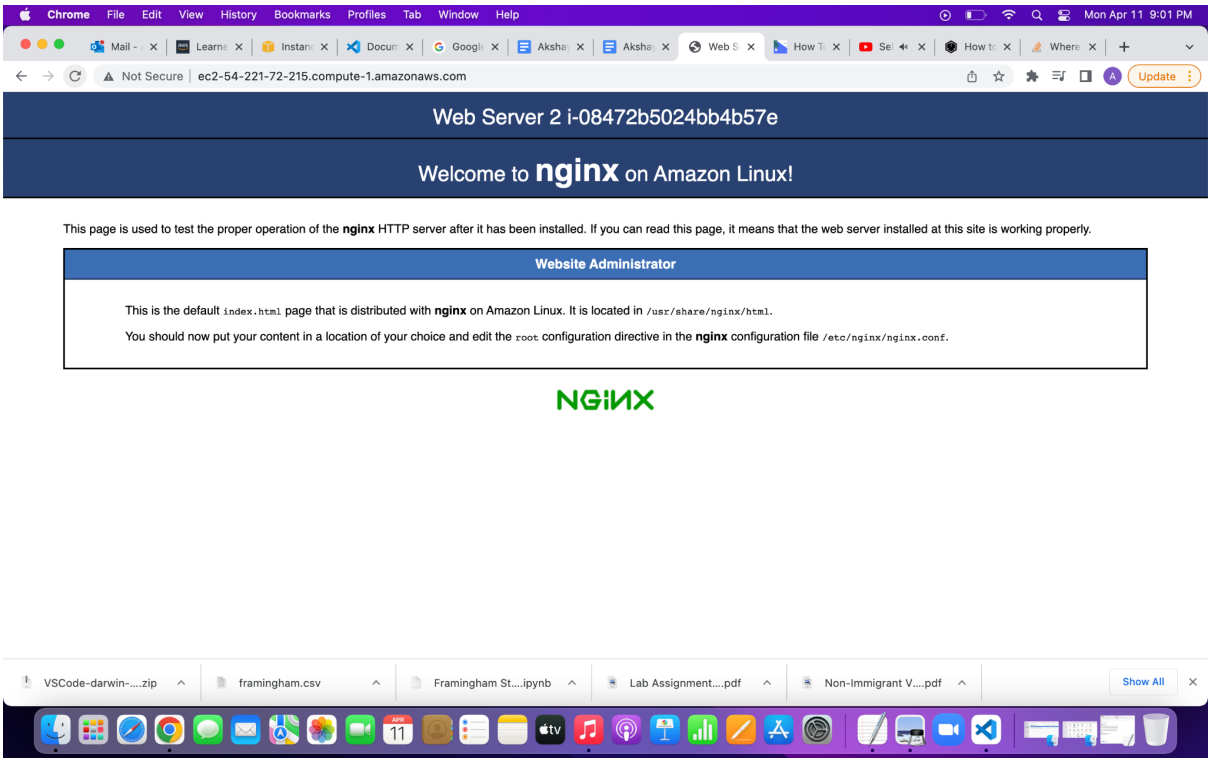
Now we will log in to the load balancer and change the configure file.

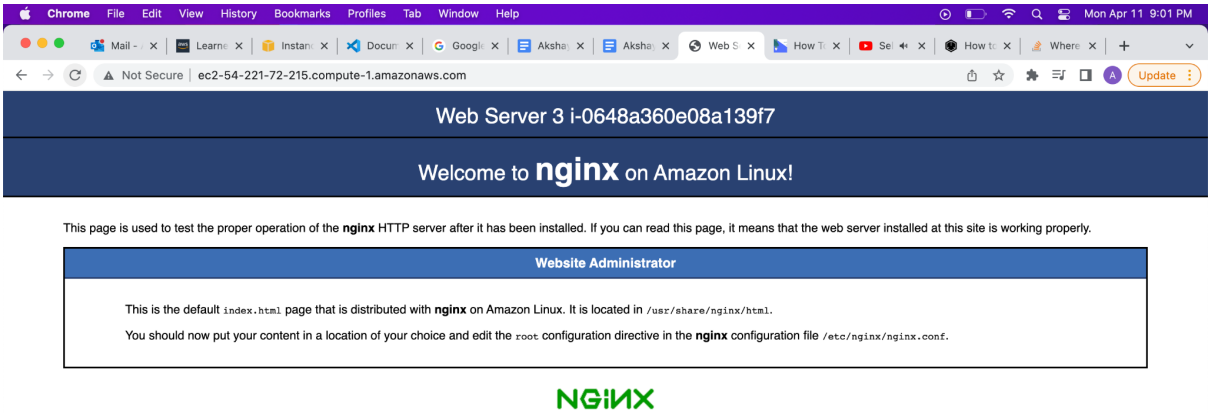


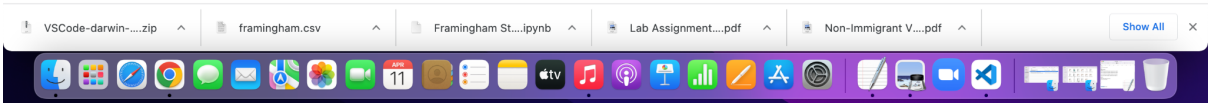
Now that we have made changes in our configuration file, we will restart the nginx and check whether the load balancing is working properly or not.

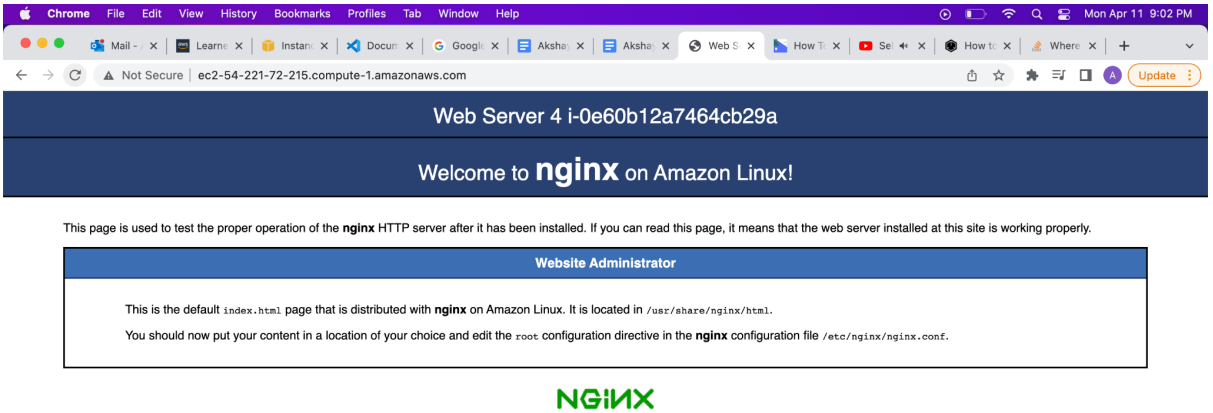


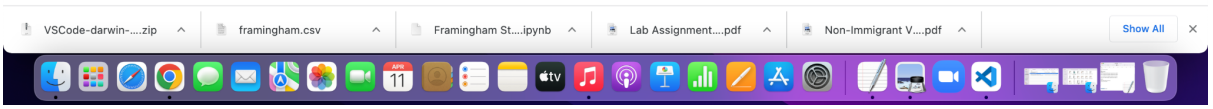

Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 9:01 PM
Not Secure ec2-54-221-72-215.compute-1.amazonaws.com
Update
Web Server 1 i-02f30261a956e0003
Welcome to nginx on Amazon Linux!
This page is used to test the proper operation of the nginx HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.
Website Administrator
This is the default index.html page that is distributed with nginx on Amazon Linux. It is located in /usr/share/nginx/html.
You should now put your content in a location of your choice and edit the root configuration directive in the nginx configuration file /etc/nginx/nginx.conf.
NGINX
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All


Chrome File Edit View History Bookmarks Profiles Tab Window Help
Mon Apr 11 9:01 PM
Not Secure ec2-54-221-72-215.compute-1.amazonaws.com
Update
Web Server 2 i-08472b5024bb4b57e
Welcome to nginx on Amazon Linux!
This page is used to test the proper operation of the nginx HTTP server after it has been installed. If you can read this page, it means that the web server installed at this site is working properly.
Website Administrator
This is the default index.html page that is distributed with nginx on Amazon Linux. It is located in /usr/share/nginx/html.
You should now put your content in a location of your choice and edit the root configuration directive in the nginx configuration file /etc/nginx/nginx.conf.
NGINX
VSCode-darwin-....zip
framingham.csv
Framingham St....ipynb
Lab Assignment....pdf
Non-Immigrant V....pdf
Show All









Template of Cloud Formation
Template.yml
Description: Creating a webapp with CloudFormation

Resources:

```
WebServer1:
  Type: AWS::EC2::Instance
  Properties:
    ImageId: ami-0c02fb55956c7d316
    InstanceType: t2.micro
    KeyName: ec2-key
    SecurityGroupIds:
      - !Ref WebSecurityGroup
    SubnetId: subnet-0a1c2a85e00ef6e9c
    UserData:
      Fn::Base64:
       !Sub |
         #!/bin/bash
         sudo amazon-linux-extras install nginx1
         systemctl start nginx.service

WebServer2:
  Type: AWS::EC2::Instance
  Properties:
    ImageId: ami-0c02fb55956c7d316
    InstanceType: t2.micro
    KeyName: ec2-key
    SecurityGroupIds:
      - !Ref WebSecurityGroup
    SubnetId: subnet-0a1c2a85e00ef6e9c
    UserData:
      Fn::Base64:
       !Sub |
         #!/bin/bash
         sudo amazon-linux-extras install nginx1
         systemctl start nginx.service

WebServer3:
  Type: AWS::EC2::Instance
  Properties:
    ImageId: ami-0c02fb55956c7d316
    InstanceType: t2.micro
    KeyName: ec2-key
    SecurityGroupIds:
      - !Ref WebSecurityGroup
    SubnetId: subnet-0a1c2a85e00ef6e9c
    UserData:
      Fn::Base64:
       !Sub |
         #!/bin/bash
         sudo amazon-linux-extras install nginx1
         systemctl start nginx.service
```

```
WebServer4:
  Type: AWS::EC2::Instance
  Properties:
    ImageId: ami-0c02fb55956c7d316
    InstanceType: t2.micro
    KeyName: ec2-key
    SecurityGroupIds:
      - !Ref WebSecurityGroup
    SubnetId: subnet-0a1c2a85e00ef6e9c
    UserData:
       Fn::Base64:
        !Sub |
          #!/bin/bash
          sudo amazon-linux-extras install nginx1
          systemctl start nginx.service

LoadBalancer:
  Type: AWS::EC2::Instance
  Properties:
    ImageId: ami-0c02fb55956c7d316
    InstanceType: t2.micro
    KeyName: ec2-key
    SecurityGroupIds:
      - !Ref WebSecurityGroup
    SubnetId: subnet-0a1c2a85e00ef6e9c
    UserData:
       Fn::Base64:
        !Sub |
          #!/bin/bash
          sudo amazon-linux-extras install nginx1
          systemctl start nginx.service

WebSecurityGroup:
  Type: AWS::EC2::SecurityGroup
  Properties:
    GroupDescription: "Allow HTTP and SSH inbound and outbound traffic"
    VpcId: vpc-0f19a97c7eaccce15
    SecurityGroupIngress:
      - IpProtocol: tcp
        FromPort: 80
        ToPort: 80
        CidrIp: 0.0.0.0/0
      - IpProtocol: tcp
        FromPort: 22
        ToPort: 22
        CidrIp: 0.0.0.0/0
```