Operations Playbook

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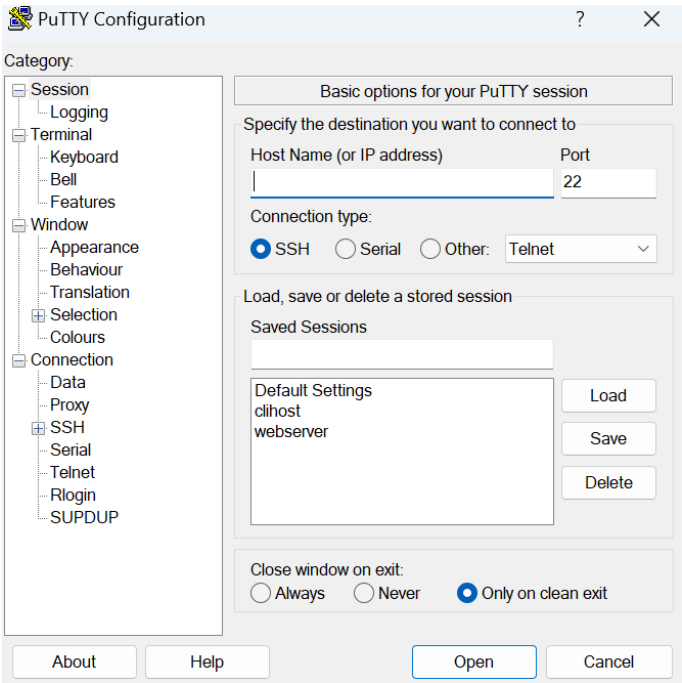
Date: September 16, 2024

Class/Semester IFT 422 Fall 2024

Contents

How to connect to the Mom & Pop Cafe Test EC2 instance

1. Ensure you have a copy of the ppk/pem file used to authenticate with your instance
2. Open putty and configure the connection to the following settings
3. Connection - Seconds between keepalives - Set to 30
4. Add the public IPv4 address of the EC2 instance to the hostname field
5. Add the ppk/pem file to the connection
6. Click on open and use the user "ec2-user" to connect to the instance



How to use the AWS CLI to connect to your AWS account

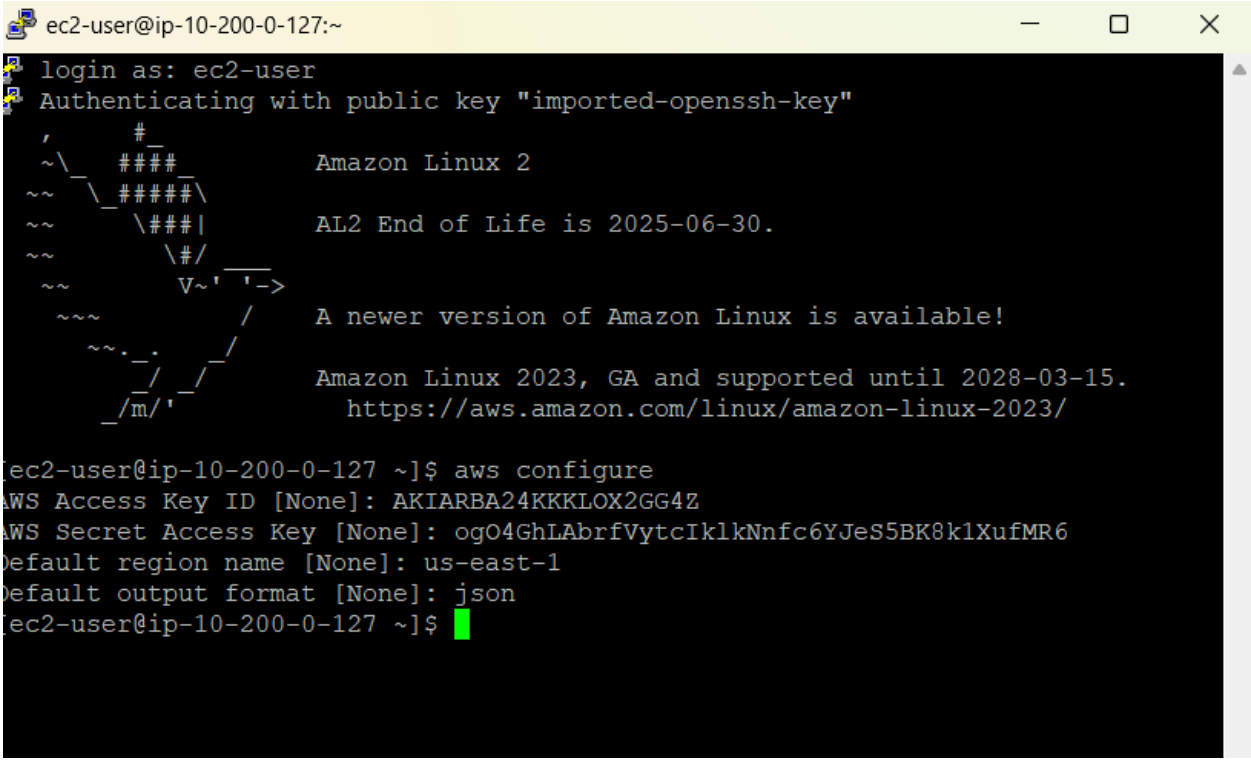
1. Once connected to the ec2-user instance, run the configuration command “aws configure”
2. At the prompts enter:

   AWS Access Key ID:

   AWS Secret Access Key:

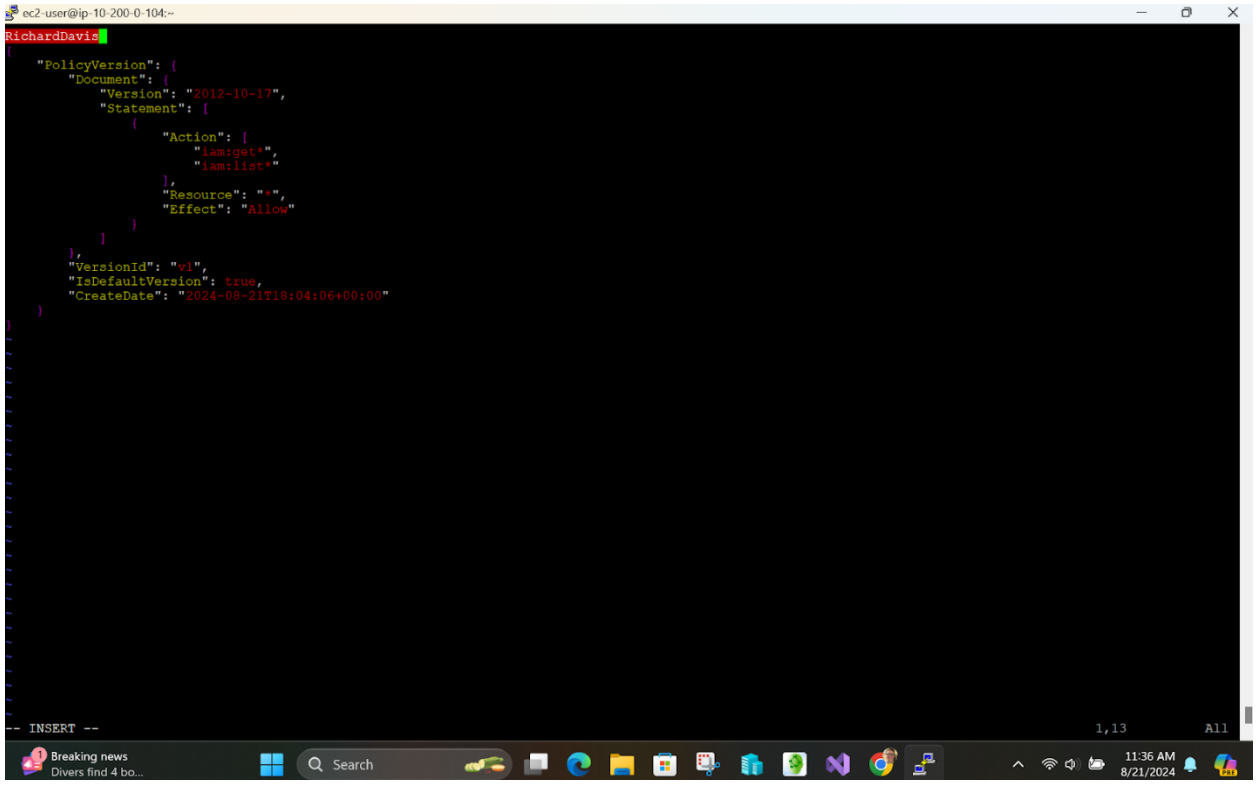
   Default Region:

   Default output format:



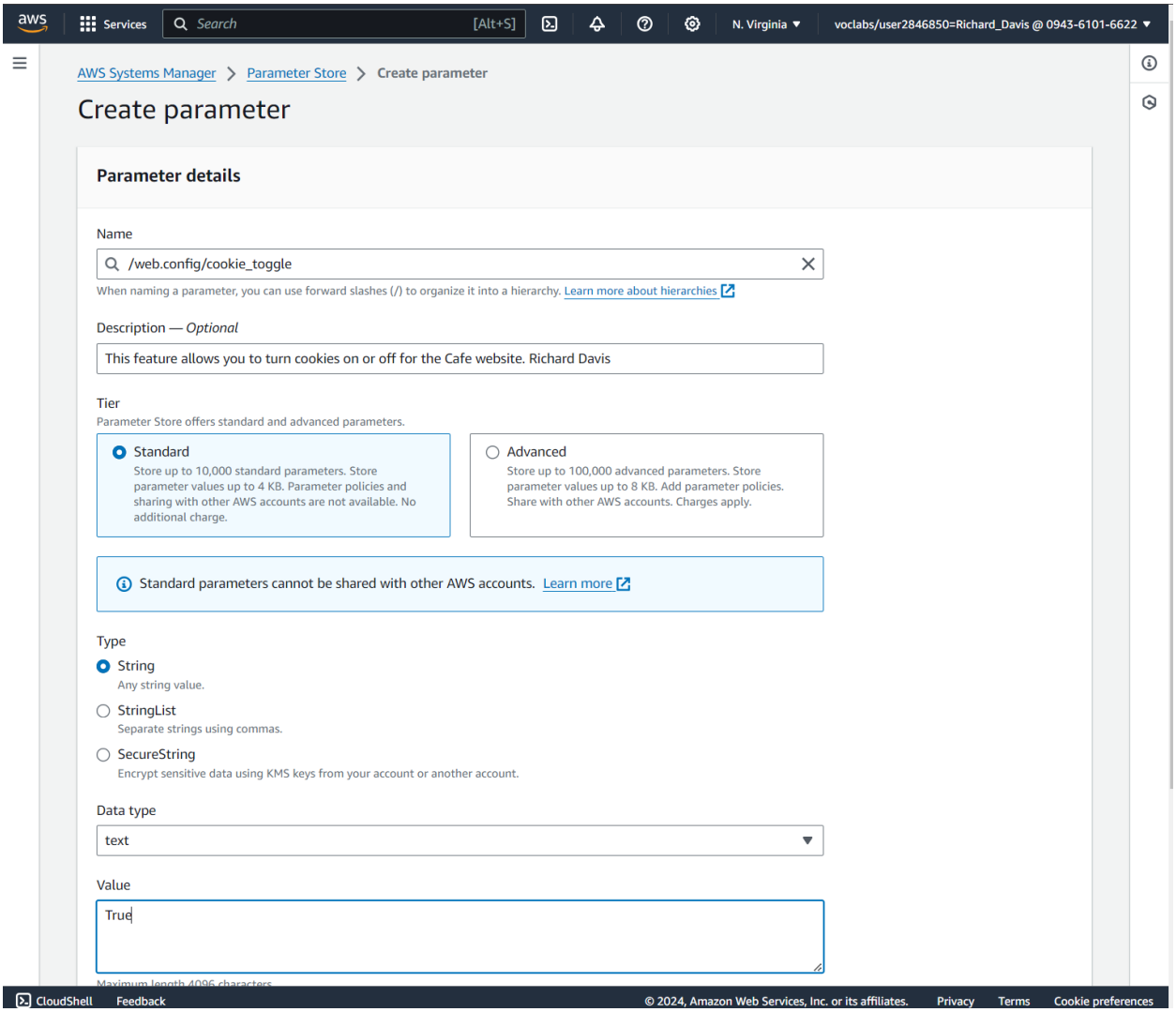
How to make a modification to the lab policy using the AWS CLI

1. Use the following commands to find the policy:
   "aws iam list-policies"
   "aws iam list-policies --scope Local"
   "aws iam get-policy-version --policy-arn <arn value> --version-id <version id> >lab_policy.json" (taken from previous step)
   In the last command, the arn value and version id are taken from the lab policy you want to change that is visible from the previous commands. Then the output is piped to the .json file
2. Use the command "Vi lab_policy.json" or "cat lab_policy.json" to see the results.



How to add a parameter to the parameter store for allowing cookies on the website

1. Use the AWS Systems Manager Parameter Store
2. Use the Management Console tab. In the left navigation pane, under Application Management, click Parameter Store.
3. Click Create parameter and configure:
   - Name: /web.config/cookie_toggle
   - Description: This feature allows you to turn cookies on or off for the Cafe website.
   - Value: True
4. Click Create parameter
5. The parameter can be specified as a hierarchical path, such as: /dashboard/<option>



How to connect to an EC2 instance to describe instances

1. In the Management Console, in the left navigation pane, click Session Manager.
2. Click Start Session
3. Select Managed Instance.
4. Click Start session
5. Click in the session to activate the cursor.
6. Run this command in the session window:
   - ls /var/www/html
7. You will see application files that were installed on the instance.
8. Run this command in the session window:
   - # Get region
     AZ=`curl -s http://169.254.169.254/latest/meta-data/placement/availability-zone`
     export AWS_DEFAULT_REGION=${AZ::-1}

     # List information about EC2 instances
     aws ec2 describe-instances

Session ID: user2846850=Richard_Davis-63elx4n75l3ut2a2hp6ldztcea Instance ID: i-0077f0b4fbfb2c400 Terminate

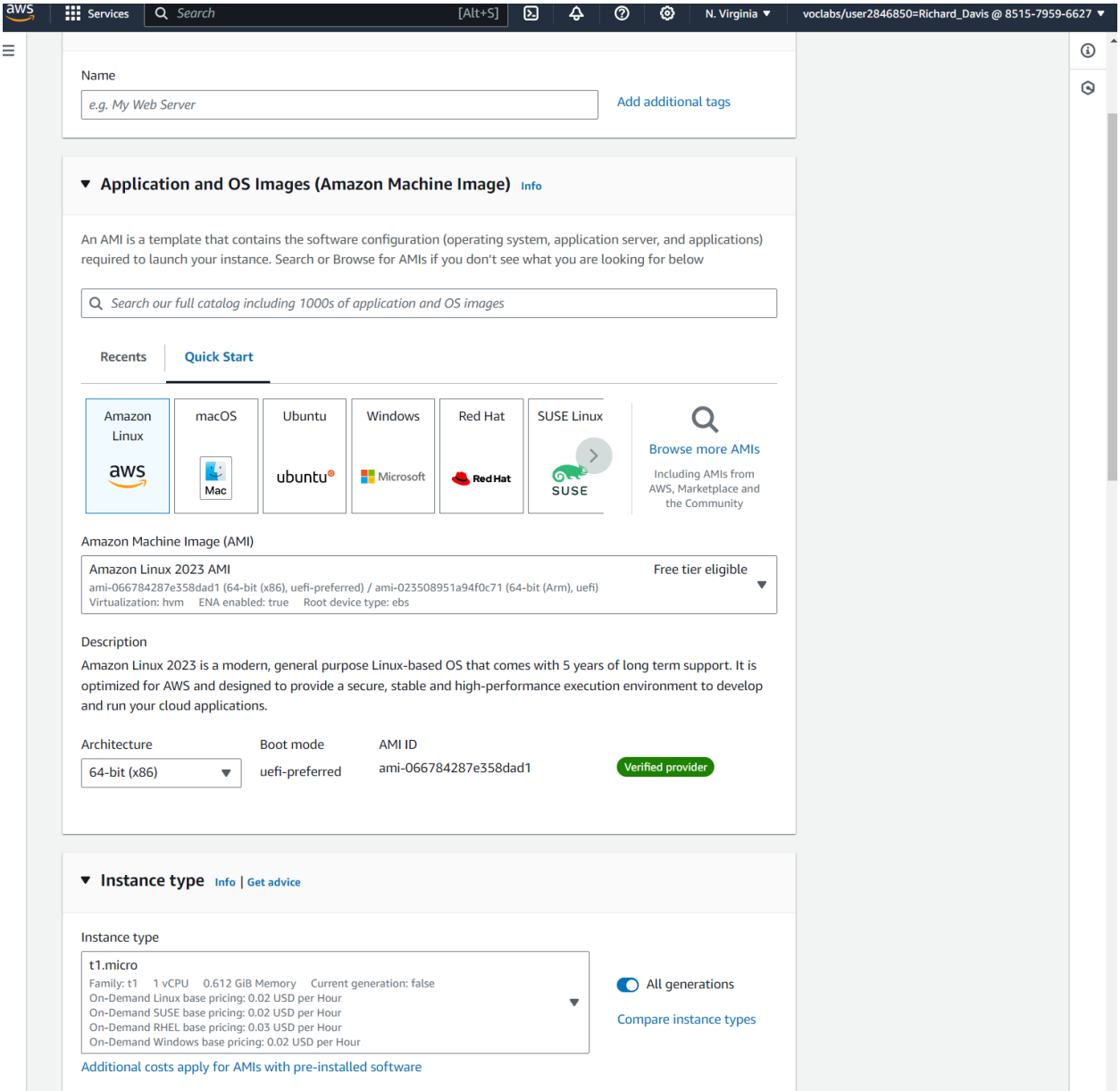

```
                    ],
                    "Architecture": "x86_64",
                    "RootDeviceType": "ebs",
                    "IamInstanceProfile": {
                        "Id": "AIPAXELXBVD2360QIF7YP",
                        "Arn": "arn:aws:iam::490412812533:instance-profile/App-Role"
                    },
                    "RootDeviceName": "/dev/xvda",
                    "VirtualizationType": "hvm",
                    "Tags": [
                        {
                            "Value": "c130857a331428017397296t1w490412812533",
                            "Key": "cloudlab"
                        },
                        {
                            "Value": "arn:aws:cloudformation:us-east-1:490412812533:stack/c130857a331428017397296t1w490412812533/c5d890e0
-63f0-11ef-9dc8-121d62c03f89",
                            "Key": "aws:cloudformation:stack-id"
                        },
                        {
                            "Value": "SSMInstance",
                            "Key": "aws:cloudformation:logical-id"
                        },
                        {
                            "Value": "c130857a331428017397296t1w490412812533",
                            "Key": "aws:cloudformation:stack-name"
                        },
                        {
                            "Value": "Managed Instance",
                            "Key": "Name"
                        }
                    ],
                    "HibernationOptions": {
                        "Configured": false
                    },
                    "MetadataOptions": {
                        "State": "applied",
                        "HttpEndpoint": "enabled",
                        "HttpTokens": "optional",
                        "HttpPutResponseHopLimit": 1
                    },
                    "AmiLaunchIndex": 0
                }
            ],
            "ReservationId": "r-0f088e06abe83541b",
            "RequesterId": "043234062703",
            "Groups": [],
            "OwnerId": "490412812533"
        }
    ]
}
sh-4.2$ Richard Davis
```


How to launch an EC2 instance

1. Choose the Services menu, locate the Compute services, and select EC2. Choose the Launch instance button in the middle of the page, and then select Launch instance from the dropdown menu.
2. Name the instance:
   Give it the name Bastion Server
   Tags allow you to categorize your AWS resources in different ways, such as by purpose, owner, or environment. This is useful when you have many resources of the same type — you can quickly identify a specific resource by their tags. Each tag consists of a Key and a Value, both of which you define.
3. Choose an AMI from which to create the instance:
   In the list of available Quick Start AMIs, keep the default Amazon Linux AMI selected.
   Select Amazon Linux 2.
4. Choose an Instance Type
   In the Instance type panel, keep the default t1.micro selected.
5. Step 4: Choose a key pair

Select the key pair to associate with the instance:
From the Key pair name menu, select vockey.
The vockey key pair you selected will allow you to connect to this instance via SSH after it has launched.

6. Network settings
   You will launch the instance in a public subnet within the Lab VPC network.
   Next to Network settings, choose Edit.
   For VPC, choose the Lab VPC.
   For Subnet accept the Public Subnet.
   Keep the Auto-assign public IP setting set to Enable.
   Under Firewall (security groups), keep the default Create security group option chosen.
7. You will create a new Security Group that permits SSH connections. This security group will allow you to log in to the Bastion Server via SSH.
8. Configure the security group:
   Security group name: Bastion security group
   Description: Permit SSH connections
   Permissions to allow inbound access via SSH (port 22) have already been configured by default. Keep these settings.
9. Configure storage
   In the Configure storage section, keep the default settings.
10. Advanced details
    Expand the Advanced details panel and for IAM instance profile, choose Bastion-Role
11. Launch the instance
    At the bottom of the Summary panel on the right side of the screen choose Launch instance
    You will see a Success message.
    Choose View all instances
    The Bastion Server instance will first appear in the Pending state, which means it is being launched. The state will then change to Running, which indicates that the instance has started booting. It takes a few minutes for the instance to boot.
    Select the Bastion Server instance and review the information in the Details tab that displays in the lower pane.
    Notice that the instance has a Public IPv4 address. You can use this IP address to communicate with the instance from the internet.
    Before you continue, wait for your instance to display the following:
    Instance state: Running
    Status check: 2/2 checks passed
    This may take a few minutes. Choose the refresh icon at the top of the page every 30 seconds or so to more quickly become aware of the latest status of the instance.



How to fix a misconfigured web server with (_security group_) issue

1. Open EC2 on AWS.
   Open the Instances page.
   Select the Misconfigured Web Server instance.
   Copy the public IPv4.
2. Open Putty.exe.
   Enter the IPv4 value into the hostname box on the Session Box.
   Use the downloaded PPK file and select it in the Connection > SSH > Credentials.
   Open the putty configuration.
   Have a timeout error.
3. Go back to the AWS instances page.
   Select the Misconfigured Web Server instance.

Go to the Security tab.
Edit the inbound rules.
Add an inbound rule to allow SSH from IPv4.
Save changes.

4. Repeat steps to connect via Putty.exe.
   Press Accept.
   Login as ec2-user.

How to change the AMI instance on the create-lamp-instance.sh script

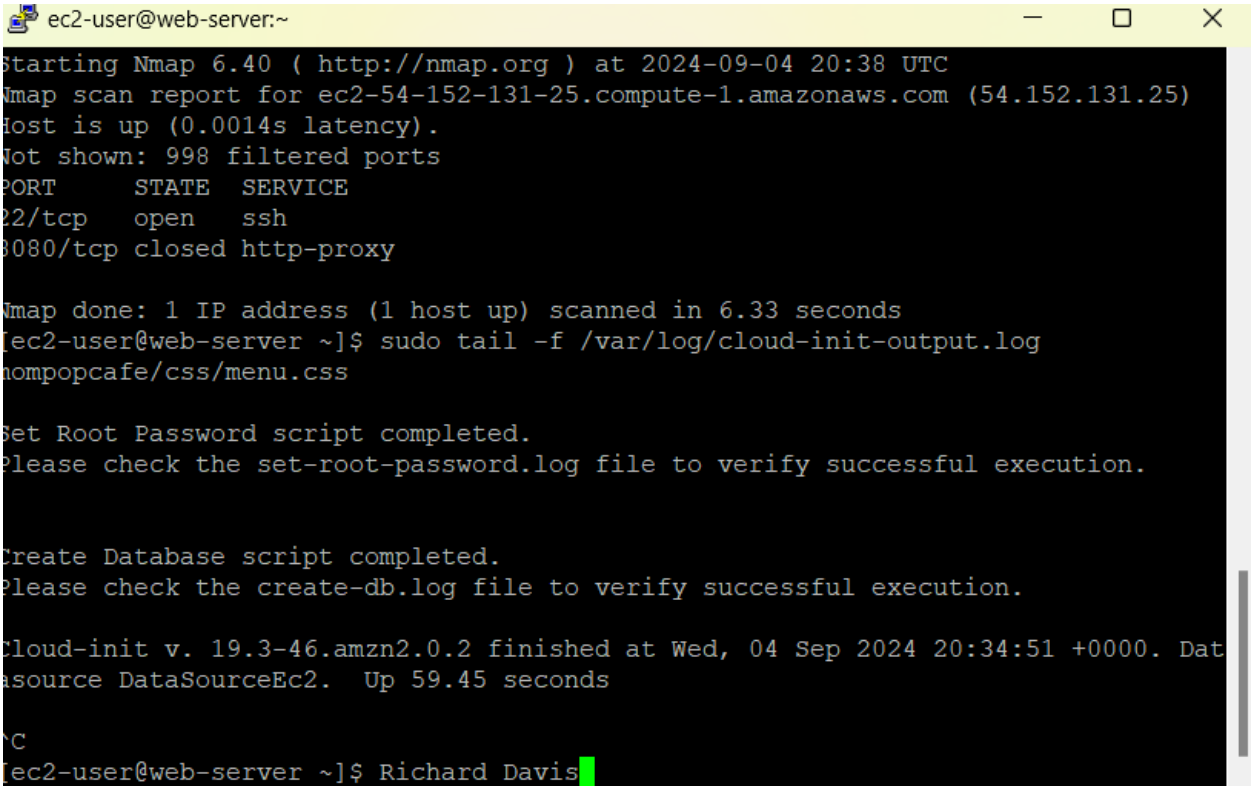
1. Connect to the Bastion Host instance via SSH using the appropriate PPK file
2. Update the AWS CLI using the “aws configure” command
3. Provide Access Key, Secret Access Key, region name, and output format
4. Use commands “cd ~/sysops-activity-files/starters” and “cp create-lamp-instance.sh create-lamp-instance.backup”
5. Open VI editor with “vi create-lamp-instance.sh”
6. Find the line of code where instance type is declared
7. Press “i” on keyboard to insert text
8. Replace the instance present with instance desired
9. Press “esc” on keyboard to exit insert mode
10. Type “:wq!” to save file and exit VI editor
11. Use command “./create-lamp-instance.sh” to run the script

ec2-user@cli-host:~/sysops-activity-files/starters

```
#!/bin/bash
DATE=`date '+%Y-%m-%d %H:%M:%S'`
echo
echo "Running create-instance.sh on "$DATE
echo

# Hard coded values
region="us-east-1"
echo "Region: "$region
instanceType="t2.small"
echo "Instance Type: "$instanceType
profile="default"
echo "Profile: "$profile

echo
echo "Looking up account values..."

# get vpcId
vpc=$(aws ec2 describe-vpcs \
--filters "Name=tag:Name,Values='MomPopCafe VPC'" \
--region $region \
--profile $profile | grep VpcId | cut -d '"' -f4 | sed -n 1p)
echo "VPC: "$vpc
                                                    10,1          Top
```

How to tail a log in Linux

1. Connect to the Bastion Host instance via SSH using the appropriate PPK file
2. Update the AWS CLI using the “aws configure” command
3. Provide Access Key, Secret Access Key, region name, and output format
4. Run command “sudo tail -f /var/log/cloud-init-output.log”
5. The tail will run until “CTRL+C” then “ENTER” are pressed
6. You can alter the command to change the number of lines printed with “sudo tail -n…”
7. The original command uses the “-f” to make it a running tail, meaning it will continue tailing until stopped, to avoid this, remove the “-f”.

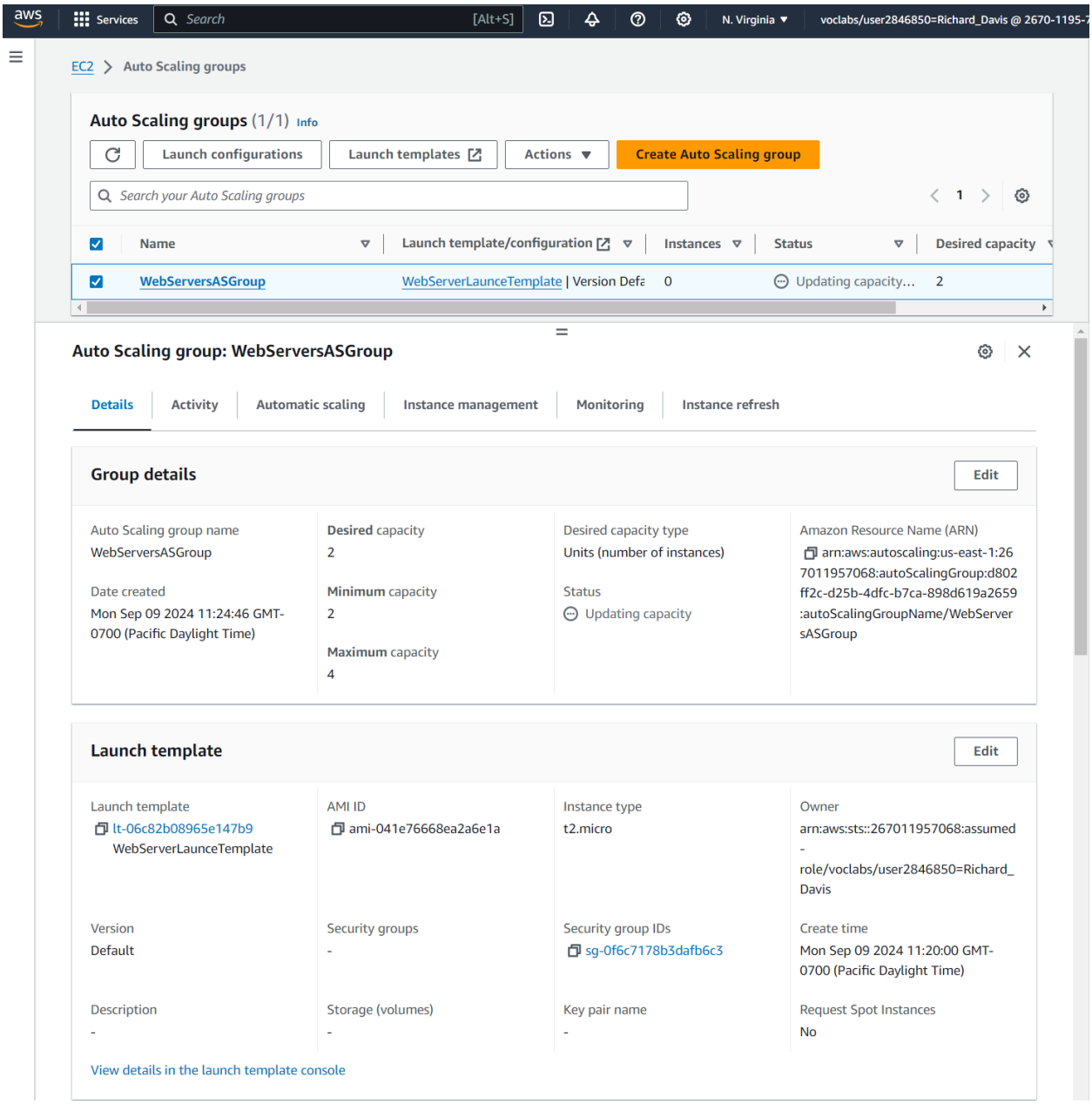


How to create an Auto Scaling Group in the AWS UI

1. In the EC2 left navigation pane, scroll to the bottom of the menu, and choose Auto Scaling Groups and choose Create Auto Scaling group again on the following page.
2. In Step 1, Choose launch template or configuration, configure:
   Auto Scaling group name: Enter a name
   Launch template: Choose a template
   Choose Next
3. In the Network pane, configure:
   VPC: Choose VPC
   Subnets: Choose Private Subnet 1 and Private Subnet 2
   Choose Next
4. In the Load balancing pane, choose Attach to an existing load balancer.
   In the Attach to an existing load balancer pane, for Existing load balancer target groups, choose a load balancer.
   In the Additional settings pane, select Enable group metrics collection within CloudWatch.
   Choose Next
5. In the Group size pane, configure:
   Desired capacity: Enter 7
   Minimum capacity: Enter 5
   Maximum capacity: Enter 10
6. In the Scaling policies pane, choose Target tracking scaling policy, and configure:
   Scaling policy name: Enter a name
   Metric type: Choose Average CPU utilization

Target value: Enter 45
Choose Next

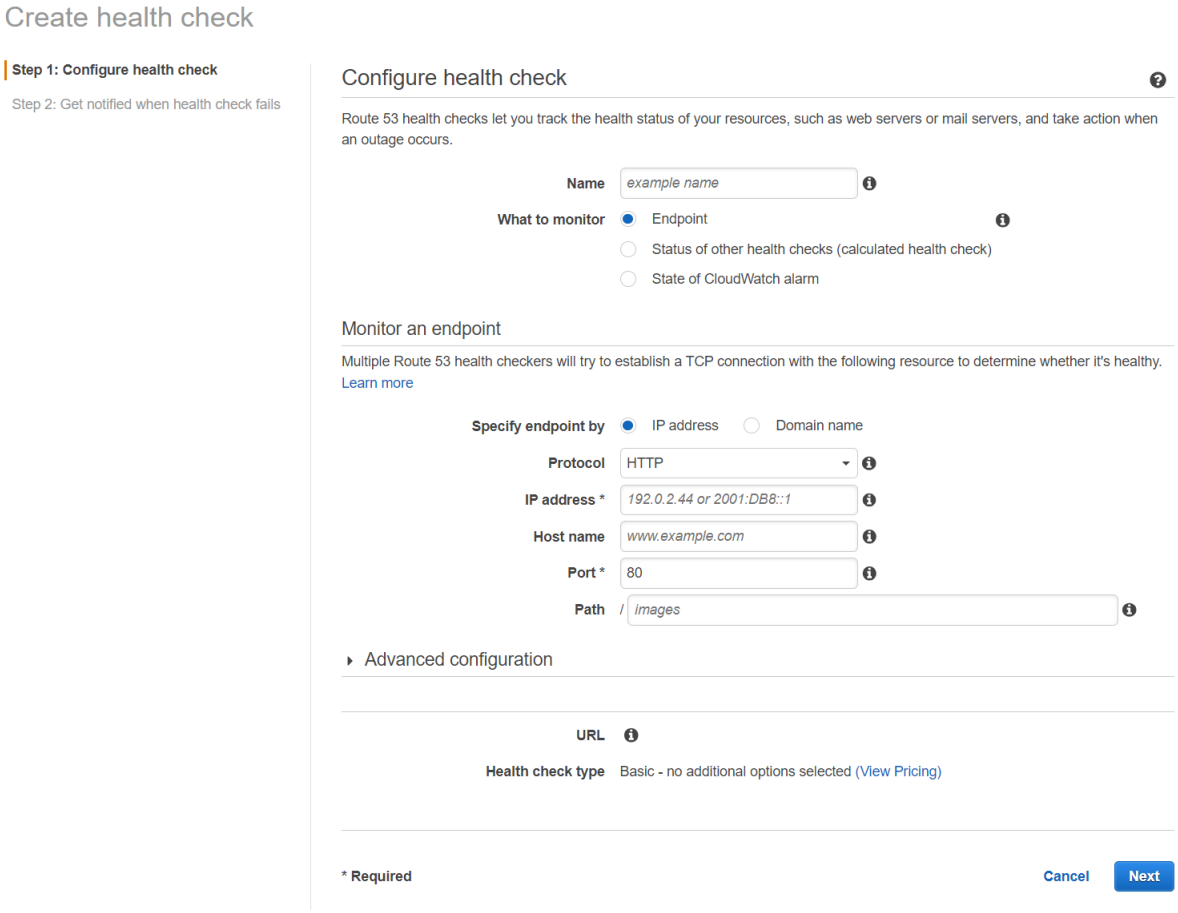
7. On the Add notifications page, choose Next
8. On the Add tags page, choose Add tag and configure:
   Key: Enter Name
   Value: Enter a name
   Choose Next
9. At the bottom of the Review page, choose Create Auto Scaling group



How to create a Route 53 health check

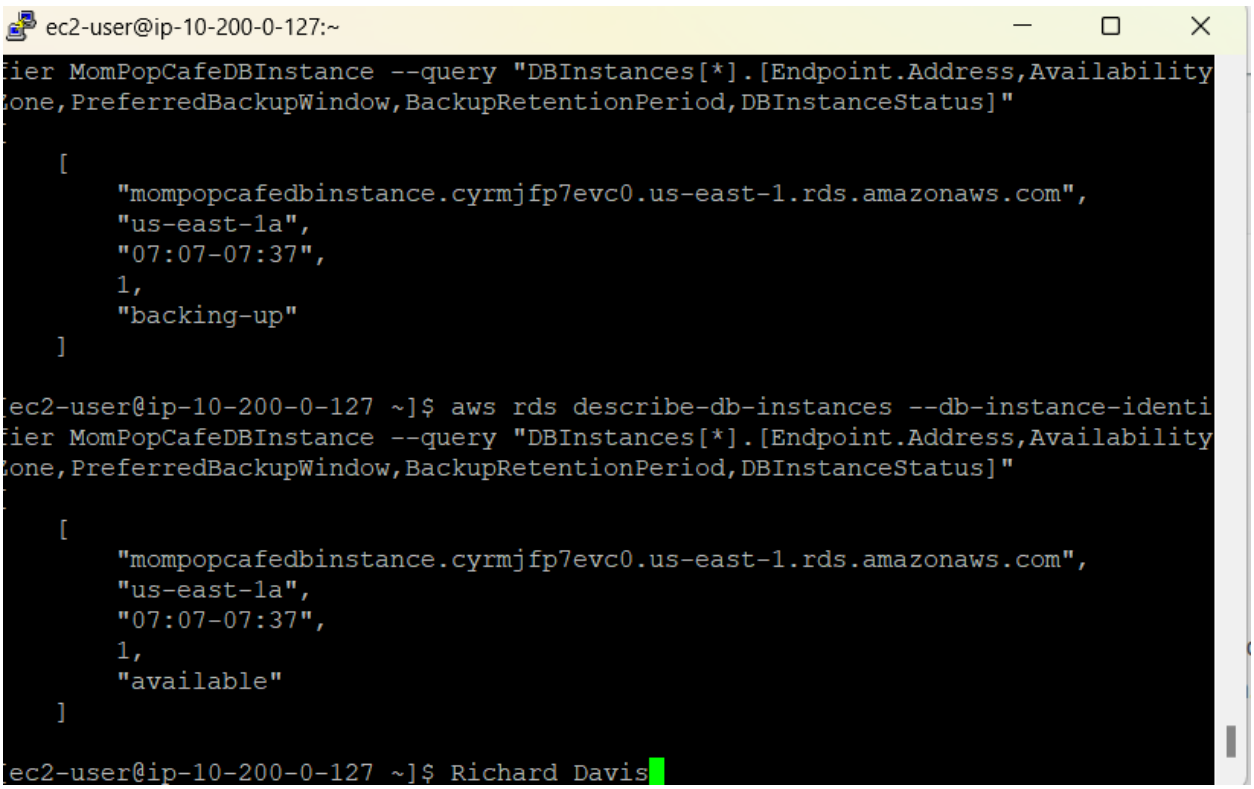
1. In the AWS Management Console, from the Services menu, choose Route 53.
   In the left navigation pane, click Health checks.

2. Click Create health check, and configure the following, leaving all other fields with their default values:
   Name:
   What to monitor:
   Specify endpoint by: IP address
   IP address:
   Path:
3. Expand Advanced configuration and configure the following, leaving all other fields with their default values:
   Request interval: Fast (10 seconds)
   Failure threshold: 2
   This will make your health check respond faster.
   Click Next.
4. Configure the following:
   Create alarm: Yes
   Send notification to: New SNS topic
   Topic name:
   Recipient email address: enter an email address that you can access
5. Click Create health check.



How to create an Amazon RDS instance using the CLI

1. After finding all relevant information, use the command:
   aws rds create-db-instance --db-instance-identifier DBInstance --engine mariadb --engine-version 10.6.14 --db-instance-class db.t3.micro --allocated-storage 20 --availability-zone <Instance Availability Zone> --db-subnet-group-name "DB Subnet Group" --vpc-security-group-ids <DatabaseSG Group ID> --no-publicly-accessible --master-username root --master-user-password 'Re:Start!9'
2. Monitor the database instance, until it shows a value of available. In the SSH window, enter:
   aws rds describe-db-instances --db-instance-identifier DBInstance --query "DBInstances[*].[Endpoint.Address,AvailabilityZone,PreferredBackupWindow,BackupRetentionPeriod,DBInstanceStatus]"



How to collect information about an instance

1. Determine the Instance ID, Instance Type, Public DNS name, Public IP address, and Availability Zone of the instance. Use the command:
   aws ec2 describe-instances –filters "Name=tag:Name,Values= NameOfInstance" –query "Reservations[*].Instances[*].[InstanceId,InstanceType,PublicDnsName,PublicIpAddress,Placement.AvailabilityZone,VpcId,SecurityGroups[*].GroupId]"
2. Determine the IPv4 CIDR block of the VPC. In the SSH window, enter:
   aws ec2 describe-vpcs --vpc-ids <VPC ID> --filters "Name=tag:Name,Values= VPC" --query "Vpcs[*].CidrBlock"
3. Determine the Subnet ID and IPv4 CIDR block of Public Subnet 1, which is the only subnet in the VPC. In the SSH window, enter:

aws ec2 describe-subnets --filters "Name=vpc id,Values=<Instance VPC ID>" --query "Subnets[*].[SubnetId,CidrBlock]"

4. Determine the list of Availability Zones in the Region. In the SSH window, enter:
   aws ec2 describe-availability-zones --filters "Name=region-name,Values=<region>" --query "AvailabilityZones[*].ZoneName

How to create two subnets in a subnet group via the AWS CLI

1. With the VPC IPv4 CIDR block known, enter the command:
   aws ec2 create-subnet --vpc-id <VPC ID> --cidr-block 10.200.2.0/23 --availability-zone <Instance Availability Zone[a]>
2. For the second subnet use the same command:
   “aws ec2 create-subnet --vpc-id <VPC ID> --cidr-block 10.200.10.0/23 --availability-zone <Instance Availability Zone[b]>

How to use the mysqldump tool to take a backup of a SQL database and restore it on another SQL instance

1. In the SSH window, enter:
   mysqldump --user=root --password='Re:Start!9' --databases name_of_db --add-drop-database > nameofdb-backup.sql
2. if you want to view the backup using the Linux “less” command, in the SSH window, enter:
   less nameofdb-backup.sql
3. To restore the database from the backup, use the command:
   mysql --user=root --password='Re:Start!9' --host=<RDS Instance Database Endpoint Address> < nameofdb-backup.sql
4. To verify, open a mysql session, use the command:
   mysql --user=root --password='Re:Start!9' --host=<RDS Instance Database Endpoint Address> name_of_db
5. Enter the SQL statement “select * from product;”
6. You can exit the mysql session with “exit”.

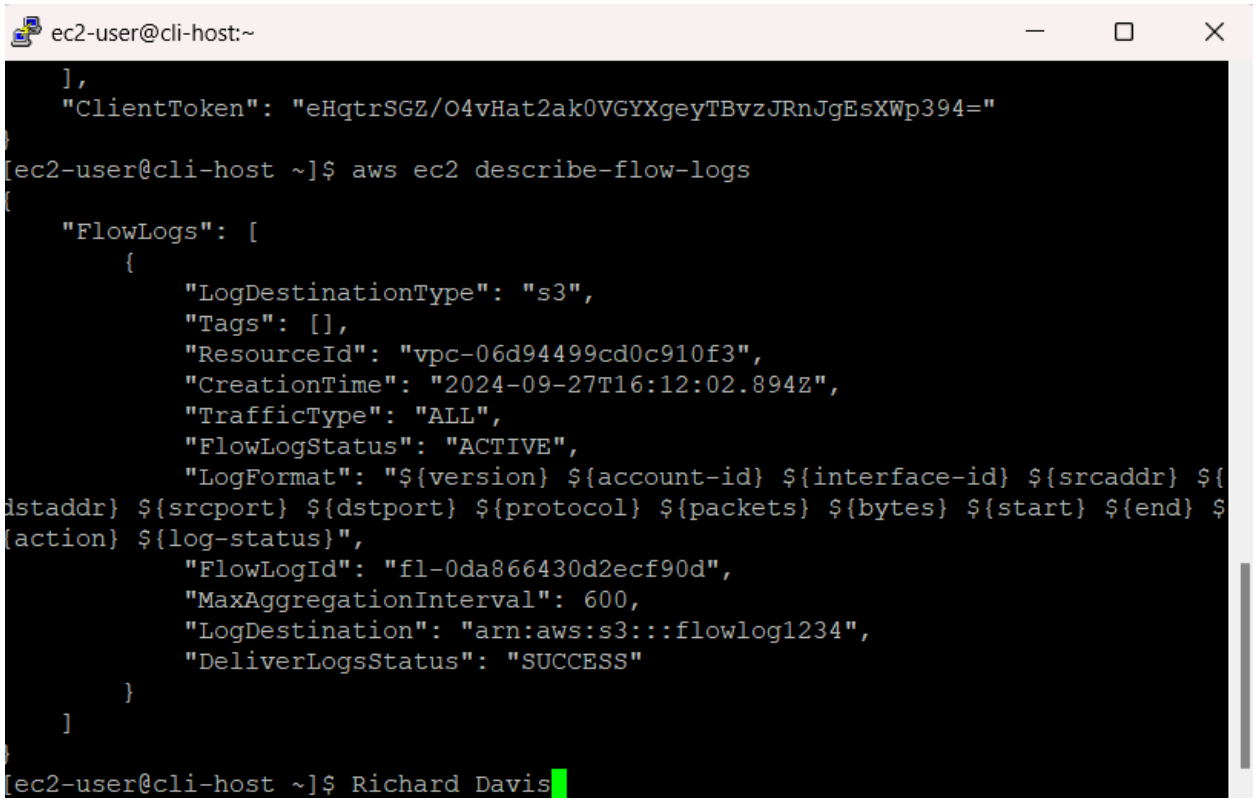
How to enable VPC Flow Logs via the command line interface

1. Log into your CLI Host via SSH
2. Create the S3 bucket that will hold the flow logs by using the following command:
   aws s3api create-bucket --bucket flowlog#### --region <region> --create-bucket-configuration LocationConstraint=<region>
   In the command, replace #### with four random numbers and replace both occurrences of <region> with the region where the EC2 instances were created (for example, eu-west-2).
   If the region is us-east-1, delete the --create-bucket-configuration LocationConstraint=<region> portion of the command before you run it.

3. Run the following command to get the VPC ID for VPC1, which you must have to enable VPC Flow Logs:
   aws ec2 describe-vpcs --query 'Vpcs[*].[VpcId,Tags[?Key==`Name`].Value,CidrBlock]' --filters "Name=tag:Name,Values='VPC1'"
4. Enable VPC Flow Logs on VPC1 by running the following command.

aws ec2 create-flow-logs --resource-type VPC --resource-ids <vpc-id> --traffic-type ALL --log-destination-type s3 --log-destination arn:aws:s3:::<flowlog####>

5. In the command above, replace <flowlog####> with the actual bucket name. Also replace <vpc-id> with the actual VPC ID of VPC1.
6. If the command runs successfully, you should see that a FlowLogId and a ClientToken are returned.
7. Run the following command to confirm the flow log was created:
   aws ec2 describe-flow-logs
   The command output should show a single flow log was created with a FlowLogStatus of ACTIVE and a log destination that points to your S3 bucket.



How to troubleshoot network connectivity on an instance

1. Log into the CLI host using SSH
2. (Method 1) Use nmap with the ServerIP (ex. nmap 44.206.229.197)
   Check security groups with command
   aws ec2 describe-security-groups –group-ids <sg-####>
   View output to see if there may be a rule blocking connection.

3. (Method 2) Check the route tables with command
   aws ec2 describe-route-tables –filter “Name=association.subnet-id,Values=’<subnet id>’”
   Check the route tables and add a route if needed with command
   aws ec2 create-route –route-table-id <rtb id> --destination-cidr-block <cidr-block> --gateway-id <igw id>
4. (Method 3) If you still cannot connect to the instance, reconnect to CLI host
   Check the network ACL with the command
   aws ec2 describe-network-acls --filter "Name=association.subnet-id,Values='VPC1PublicSubnetID'" --query 'NetworkAcls[*].[NetworkAclId,Entries]'
   Check the outputs and see if something is blocking connection
5. If there is, to delete the ACL entry that is blocking connection, use the command
   aws ec2 delete-network-acl-entry –network-acl-id <acl id> --ingress –rule-number <rule number>
   Connection should be reestablished.

```
ec2-user@cli-host:~
                "Egress": false,
                "CidrBlock": "0.0.0.0/0",
                "RuleAction": "deny"
            }
        ]
    ]
]
[ec2-user@cli-host ~]$ aws ec2 delete-network-acl-entry --network-acl-id acl-036
ae0d1ffa598443 --ingress --rul-number 40
Note: AWS CLI version 2, the latest major version of the AWS CLI, is now stable
and recommended for general use. For more information, see the AWS CLI version 2
 installation instructions at: https://docs.aws.amazon.com/cli/latest/userguide/
install-cliv2.html

usage: aws [options] <command> <subcommand> [<subcommand> ...] [parameters]
To see help text, you can run:

  aws help
  aws <command> help
  aws <command> <subcommand> help
aws: error: argument --rule-number is required
[ec2-user@cli-host ~]$ aws ec2 delete-network-acl-entry --network-acl-id acl-036
ae0d1ffa598443 --ingress --rule-number 40
[ec2-user@cli-host ~]$
```

6. (Method 4) To parse and search network logs to troubleshoot, reconnect to the CLI host
7. Create a local directory on the CLI Host where you can download the flow log files:
   mkdir flowlogs
   Change the directory to the new directory:
   cd flowlogs
   List the S3 buckets to recall the bucket name:
   aws s3 ls
   Download the flow logs by running the following command (replace <flowlog####> with the actual bucket name).
   aws s3 cp s3://<flowlog####>/ . --recursive
   If the command is successful, you should see that many files are downloaded.
8. Use the cd command and ls commands repeatedly (or cd followed by pressing TAB multiple times) as needed. The logs will be in an AWSLogs/<account-num>/vpcflowlogs/<region>/yyyy/mm/dd subdirectory.
   Notice that the file names all end in log.gz, which indicates that they are compressed as GNU zip files.
   Run this command to extract the logs:
   gunzip *.gz
   Run ls again. Notice that all files are now extracted.
9. Copy one of the file names that were returned by the ls command that you ran.
   Enter head in the terminal window, followed by a space, and then paste the copied file name.
   Run the command.
   Notice that the header row indicates the kind of data that each log entry contains. Each entry contains information, such as the IP address of the source of the event (in the fourth column),

the destination port (seventh column), start and end timestamps (in Unix timestamp format), and the action that resulted (one of ACCEPT or REJECT).

10. Run a grep command the looks in each log file in the current directory, and returns lines that contain the word REJECT:
    grep -rn REJECT .
    This command should return a large dataset because it includes every event where the VPC settings rejected the request.
    Find out how many records were returned:
    grep -rn REJECT . | wc -l
    The result shows the number of lines in your result set.
11. Refine your search by only looking for lines that contain 22 (which is the port number where you attempted to connect to the web server when access was blocked):
    grep -rn ' 22 ' . | grep REJECT
    This command should return a smaller number of results.
12. To isolate the result set—so that it only displays the log entries that correspond to the failed SSH connection attempts that you made—you must filter the results further.
    Recall that your failed attempts to use SSH to connect the web server were initiated from your local machine. In this next step, you will determine the IP address by which you local machine is addressable from the internet.
13. Find the IP address to which your local computer is addressable from the internet.
    Log in to the AWS Management Console.
    Go to the EC2 service in the same Region where your EC2 instances are running.
    Choose Security Groups.
    Choose WebSecurityGroup and then choose the Inbound tab.
    Choose Edit, then choose Add Rule.
    In the third row that was just created, for Source, choose My IP.
    Copy the IP address from the Classless Inter-Domain Routing (CIDR) block that is automatically populated (it will end in /32).
    Copy only the IP address, not the /32 suffix.
    Then, choose Cancel. You do not need to modify any security groups in this account. The purpose of this step is to capture this IP address.
14. Back in the CLI Host SSH terminal session, run a more refined query on the flow logs (replace <ip-address> with the IP address that you copied):
    grep -rn ' 22 ' . | grep REJECT | grep <ip-address>
    The number of lines in the result set should now match the number of times you tried and failed to use SSH to connect the web server instance.
    Notice that the elastic network interface ID is in each of the log entries that were returned by your query.
15. Run the following command (replace <WebServerIP> with the actual IP address):
    aws ec2 describe-network-interfaces --filters "Name=association.public-ip,Values='<WebServerIP>'" --query 'NetworkInterfaces[*].[NetworkInterfaceId,Association.PublicIp]'

The result set should confirm that the network interface ID that is recorded in the flow log matches the network interface that is assigned to the web server instance (as part of the network interface).

16. Translate the timestamps to human-readable form.
    Notice the two long numbers that appear towards the end of each log entry, before the REJECT term.
    These numbers are Unix-formatted timestamps.The first timestamp indicates the start time of each event that was captured. The second timestamp indicates the end time. You can convert them to human-readable form by using the Linux date command line utility.
    date -d @1554496931
    Run the date -d @ command for one of the captured timestamps from one of the filtered REJECT results. It should indicate a time from today that corresponds with when you were working through this activity. Run the date command to compare the result to the current time.

How to take a snapshot of an EBS volume

1. To get a full description of the Processor instance, copy the following command and run it from within your instance:
   aws ec2 describe-instances --filter 'Name=tag:Name,Values=Processor'
   This command uses the --filter tag to limit the results description to the new instance that you created in the previous section. The command will respond with a full, JSON-based description of the instance and all of its attributes. You will now modify this command to return just the subset of data—the Amazon EBS volume information—that you are interested in.
2. To narrow down the results of the previous command further, copy the following command and run it from within your instance:
   aws ec2 describe-instances --filter 'Name=tag:Name,Values=Processor' --query 'Reservations[0].Instances[0].BlockDeviceMappings[0].Ebs.{VolumeId:VolumeId}'
   This modified command uses the --query attribute to specify a JMESPath query that returns only the volume ID of the only volume (the root volume) attached to the Processor instance. You should receive a response similar to this:
   { "VolumeId": "vol-1234abcd" }
   This value will be referred to as volume-id in subsequent commands.
3. Before taking a snapshot, you will shut down the Processor instance, which requires its instance ID. To obtain the instance ID, copy the following command and run it from within your instance:
   aws ec2 describe-instances --filters 'Name=tag:Name,Values=Processor' --query 'Reservations[0].Instances[0].InstanceId'
   This value will be referred to as instance-id in subsequent commands.
4. To shut down the Processor instance, copy the following command, replace INSTANCE-ID with your instance id, and run it from within your instance:
   aws ec2 stop-instances --instance-ids INSTANCE-ID
   Before moving to the next step in this procedure, verify that the Processor instance has stopped by running the following command, replacing INSTANCE-ID with your instance id. When the Processor instance has stopped, the command will return to a prompt.
   aws ec2 wait instance-stopped --instance-id INSTANCE-ID

5. To create your first snapshot of the root volume of your Processor instance, copy the following command, replace VOLUME-ID_ with your volume id, and run it in your SSH window:
   aws ec2 create-snapshot --volume-id VOLUME-ID
   The command will return a set of information that includes a SnapshotId value that uniquely identifies the new snapshot. This value will be referred to as snapshot-id in subsequent commands.
6. To check the status of your snapshot, copy the following command, replace SNAPSHOT-ID your snapshot-id, and run it in your SSH window:
   aws ec2 wait snapshot-completed --snapshot-id SNAPSHOT-ID
   Continue with the below procedure when the command completes.
7. To restart the Processor instance, copy the following command, replace the INSTANCE-ID to your instance id and run it in your SSH window:
   aws ec2 start-instances --instance-ids INSTANCE-ID
8. To check on the status of the restart operation, copy the following command, replace INSTANCE-ID with your instance id, and run it in your SSH window:
   aws ec2 wait instance-running --instance-id INSTANCE-ID

```
ec2-user@ip-10-5-0-169:~
[ec2-user@ip-10-5-0-169 ~]$  aws ec2 wait instance-stopped --instance-id i-0c627
c00a23642228
[ec2-user@ip-10-5-0-169 ~]$ aws ec2 wait snapshot-completed --snapshot-id snap-0
05a9df18354293b9
[ec2-user@ip-10-5-0-169 ~]$ aws ec2 start-instances --instance-ids i-0c627c00a23
642228
{
    "StartingInstances": [
        {
            "CurrentState": {
                "Code": 0,
                "Name": "pending"
            },
            "InstanceId": "i-0c627c00a23642228",
            "PreviousState": {
                "Code": 80,
                "Name": "stopped"
            }
        }
    ]
}
[ec2-user@ip-10-5-0-169 ~]$ aws ec2 wait instance-running --instance-id i-0c627c
00a23642228
[ec2-user@ip-10-5-0-169 ~]$
```

How to synchronize files using the command line (aws s3api and aws s3)

1. Login to the Processor instance.
2. To download the sample files on the Processor instance, copy the following command and run it from within your instance:
   wget https://aws-tc-largeobjects.s3-us-west-2.amazonaws.com/CUR-TF-200-RESOPS/lab5vocareum/files.zip

3. To unzip the directory, use the following command:
   unzip files.zip

   Synchronizing Files
4. Before synchronizing content with your Amazon S3 bucket, you will need to enable versioning on your bucket. To enable versioning, copy the following command (replacing S3-BUCKET-NAME with your bucket name) and run it from within your instance:
   aws s3api put-bucket-versioning --bucket S3-BUCKET-NAME --versioning-configuration Status=Enabled
5. To synchronize the contents of the files folder with your Amazon S3 bucket, copy the following command (replacing S3-BUCKET-NAME with your bucket name) and run it from within your instance:
   aws s3 sync files s3://S3-BUCKET-NAME/files/
6. To confirm the state of your files, use the following command (replacing S3-BUCKET-NAME with your bucket name):
   aws s3 ls s3://S3-BUCKET-NAME/files/
7. To delete one of the files on the local drive, use the following command:
   rm files/file1.txt
8. To delete the same file from the server, use the --delete option to the aws s3 sync command. Copy the following command (replacing S3-BUCKET-NAME with your bucket name) and run it from within your instance:
   aws s3 sync files s3://S3-BUCKET-NAME/files/ --delete
9. Verify that the file was deleted remotely on the server:
   aws s3 ls s3://S3-BUCKET-NAME/files/
10. Now, try to recover the old version of file1.txt. To view a list of past versions of this file, use the aws s3api list-object-versions command:
    aws s3api list-object-versions --bucket S3-BUCKET-NAME --prefix files/file1.txt
11. Because there is no direct command to restore an older version of an Amazon S3 object to its own bucket, you will need to re-download the old version and then sync again to Amazon S3. To download the previous version of file1.txt, copy the following command (replacing VERSION-ID with your version-id and S3-BUCKET-NAME with your bucket name) and run it from within your instance:
    aws s3api get-object --bucket S3-BUCKET-NAME --key files/file1.txt --version-id VERSION-ID files/file1.txt
12. To verify that the file has been restored locally, use the following command:
    ls files
13. To re-sync the contents of the files/ folder to Amazon S3, copy the following command (replacing S3-BUCKET-NAME with your bucket name) and run it from within your instance:
    aws s3 sync files s3://S3-BUCKET-NAME/files/
14. Finally, to verify that a new version of file1.txt has been pushed to Amazon S3, copy the following command (replacing S3-BUCKET-NAME with your bucket name) and run it from within your instance:
    aws s3 ls s3://S3-BUCKET-NAME/files/

```
ec2-user@ip-10-5-0-50:~
[ec2-user@ip-10-5-0-50 ~]$ aws s3api get-object --bucket rdavis39-s3 --key files
/file1.txt --version-id R1DvkI9YTS4aDcXgTmqEMcmPz3BgCEmp files/file1.txt
{
    "AcceptRanges": "bytes",
    "ContentType": "text/plain",
    "LastModified": "Thu, 03 Oct 2024 18:49:40 GMT",
    "ContentLength": 30318,
    "VersionId": "R1DvkI9YTS4aDcXgTmqEMcmPz3BgCEmp",
    "ETag": "\"b76b2b775023e60be16bc332496f8409\"",
    "ServerSideEncryption": "AES256",
    "Metadata": {}
}
[ec2-user@ip-10-5-0-50 ~]$ ls files
file1.txt  file2.txt  file3.txt
[ec2-user@ip-10-5-0-50 ~]$ aws s3 sync files s3://rdavis39-s3/files/
upload: files/file1.txt to s3://rdavis39-s3/files/file1.txt
[ec2-user@ip-10-5-0-50 ~]$ aws s3 ls files s3://rdavis39-s3/files/

Unknown options: s3://rdavis39-s3/files/
[ec2-user@ip-10-5-0-50 ~]$ aws s3 ls s3://rdavis39-s3/files/
2024-10-03 18:54:06      30318 file1.txt
2024-10-03 18:49:40      43784 file2.txt
2024-10-03 18:49:40      96675 file3.txt
[ec2-user@ip-10-5-0-50 ~]$ Richard Davis
```

How to create a S3 bucket via the CLI

1. Create the <mompopcafe-xxxnnn> S3 bucket. Because an S3 bucket name must be unique across all existing bucket names in Amazon S3, you will add a suffix to the name with a format of -xxxnnn. For xxx, substitute your initials. For nnn, substitute a random number. In the SSH window for the CLI Host instance, enter:
   aws s3 mb s3://<mompopcafe-xxxnnn> --region <region>
   In the command, substitute <mompopcafe-xxxnnn> with your unique S3 bucket name. Also, substitute <region> with the region where your CLI Host instance is running.
   When the make bucket (mb) command completes successfully, it returns the name of the bucket.
2. Load some images in the S3 bucket under the /images prefix. Sample image files are provided in the initial-images folder on the CLI Host. In the SSH window for the CLI Host instance, enter:
   aws s3 sync ~/initial-images/ s3://<mompopcafe-xxxnnn>/images
   In the command, substitute <mompopcafe-xxxnnn> with your unique S3 bucket name.
   As the synchronize (sync) command runs, you will see the names of the image files being uploaded.
3. List the bucket contents by using the s3 ls command. Choose to display the list in human-readable form with summary totals for the number of objects and their total size at the bottom. In the SSH window for the CLI Host instance, enter:
   aws s3 ls s3://<mompopcafe-xxxnnn>/images/ --human-readable --summarize
   In the command, substitute <mompopcafe-xxxnnn> with your unique S3 bucket name.
   When the list (ls) command completes, you will see the details of the image files that were uploaded, and their total number and size.

```
ec2-user@ip-10-200-0-105:~
t-1
-bash: mompopcafe-red123: No such file or directory
[ec2-user@ip-10-200-0-105 ~]$ aws s3 sync ~/initial-images/ s3://<mompopcafe-red
123>/images
-bash: mompopcafe-red123: No such file or directory
[ec2-user@ip-10-200-0-105 ~]$ aws s3 mb s3://mompopcafe-red123 --region us-east-
1
make_bucket: mompopcafe-red123
[ec2-user@ip-10-200-0-105 ~]$ aws s3 sync ~/initial-images/ s3://mompopcafe-red1
23/images
upload: initial-images/Cup-of-Hot-Chocolate.jpg to s3://mompopcafe-red123/images
/Cup-of-Hot-Chocolate.jpg
upload: initial-images/Donuts.jpg to s3://mompopcafe-red123/images/Donuts.jpg
upload: initial-images/Strawberry-Tarts.jpg to s3://mompopcafe-red123/images/Str
awberry-Tarts.jpg
[ec2-user@ip-10-200-0-105 ~]$ aws s3 ls s3://mompopcafe-red123/images/ --human-r
eadable --summarize
2024-10-03 19:21:49  308.7 KiB Cup-of-Hot-Chocolate.jpg
2024-10-03 19:21:49  371.8 KiB Donuts.jpg
2024-10-03 19:21:49  468.0 KiB Strawberry-Tarts.jpg

Total Objects: 3
   Total Size: 1.1 MiB
[ec2-user@ip-10-200-0-105 ~]$ Richard Davis
```

How to add an event notification to a S3 bucket

1. In Services choose Simple Notification Service.
2. If necessary, choose the menu icon () on the left to open the navigation pane.
3. In the navigation pane, select Topics.
4. Choose Create topic.
5. Choose Standard.
6. In the Name box, enter s3NotificationTopic.
7. Choose Create topic.
   A message is displayed indicating that the s3NotificationTopic was successfully created.
8. Copy and paste the value of the topic ARN field in a text editor to save it.
   You will need to supply it when you create the topic's access policy in the next steps and also later.
9. Configure the topic's access policy. In the s3NotificationTopic pane, choose Edit.
10. Expand the Access policy - optional section.
    Replace the contents of the JSON editor with the following policy:

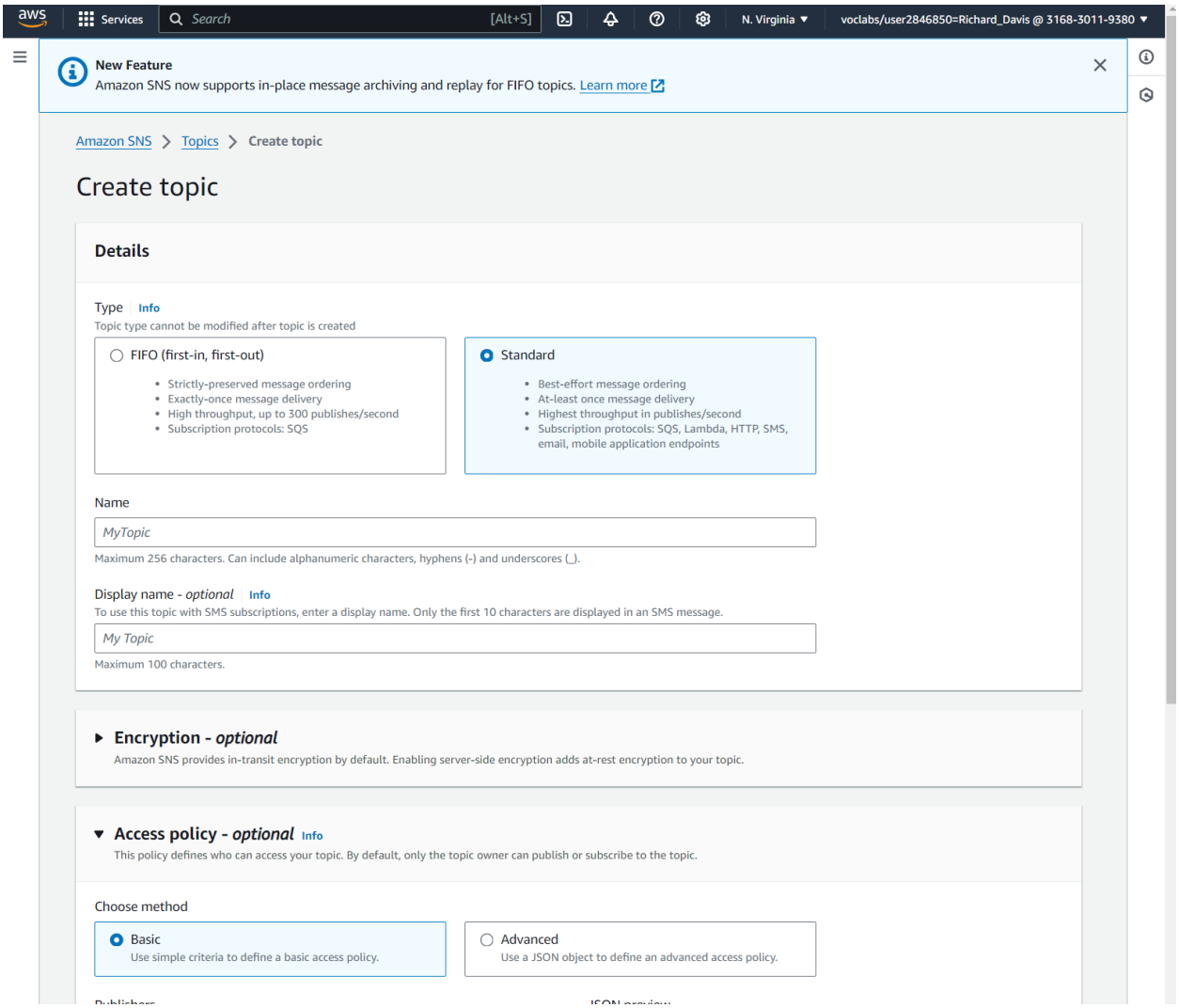
```
{
 "Version": "2008-10-17",
 "Id": "S3PublishPolicy",
 "Statement": [
  {
   "Sid": "AllowPublishFromS3",
   "Effect": "Allow",
```

```
      "Principal": {
        "Service": "s3.amazonaws.com"
      },
      "Action": "SNS:Publish",
      "Resource": "<ARN of s3NotificationTopic>",
      "Condition": {
        "ArnLike": {
          "aws:SourceArn": "arn:aws:s3:*:*:<mompopcafe-xxxnnn>"
        }
      }
    }
  ]
}
```

In the JSON object, substitute <ARN of s3NotificationTopic> with the value of the topic ARN that you recorded earlier, and <mompopcafe-xxxnnn> with your unique S3 bucket name. Also remember to remove the enclosing angle brackets (< >) during the substitution.

Take a moment to review the intent of this policy. It grants the mompopcafe S3 share bucket the permission to publish messages to the s3NotificationTopic.

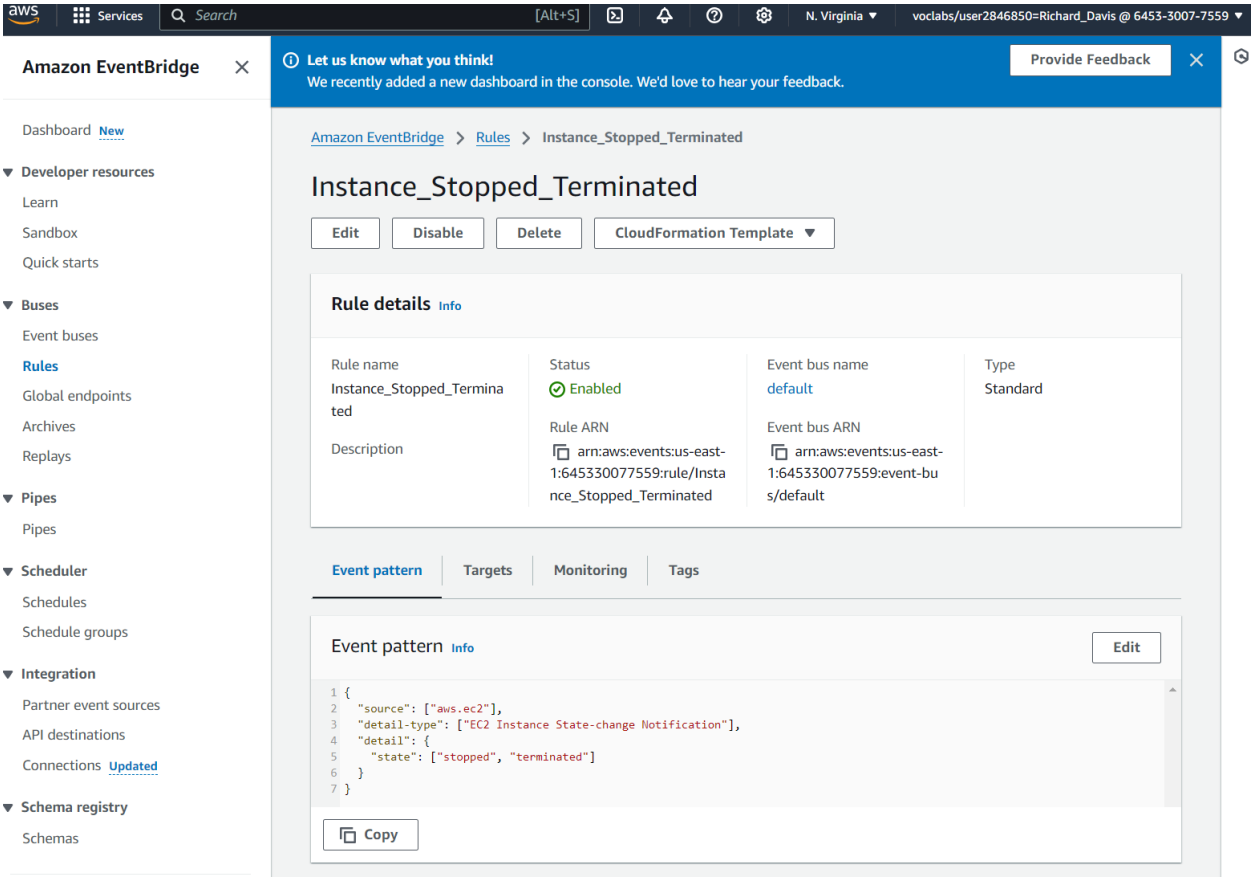
11. Choose Save changes.
12. Lastly, subscribe Pop to the topic as the mompopuser who will receive the event notifications from the S3 share bucket.
    Choose Create subscription.
    In the topic ARN box, the s3NotificationTopic already appears.
13. In the Protocol menu, select Email.
14. In the Endpoint box, enter an email address that you can access.
    Note: For the purposes of this activity, you are going to pretend that you are Pop so you receive the S3 event notifications.
    Choose Create subscription. A message is displayed confirming that the subscription was created successfully.
    Check the inbox for the email address that you provided. How to install the CloudWatch Agent



How to create a CloudWatch Events/CloudWatch EventBridge notification rule

1. Go to Amazon EventBridge
2. Choose Create rule
   Enter a name
   Choose Next
3. In the Event pattern section near the bottom of the page, configure the following settings:
   Event source: From the drop down list, choose AWS services.
   AWS service: From the drop down list, choose EC2.
   Event type: From the drop down list, choose EC2 Instance State-change Notification.
   Select Specific state(s)
   From the drop down list, choose stopped and terminated.
   Choose Next
4. In the Target 1 section, configure the following settings:
   From the Select a target drop down list, choose SNS topic.
   From the Topic drop down list, choose Default_CloudWatch_Alarms_Topic.
   On the Configure tags - optional page, choose Next

5. On the Review and create page, choose Create rule



How to use the prebuilt stopinator script to turn off instances with the tag value of your full name

1. From the Linux shell, run the stopinator.php script:
   ./stopinator.php -t”Richard Davis"
   The output should look like this, indicating that two instances will be stopped in your current AWS region. (Your results will differ depending on the region in which your lab is running.)
2. Region is us-east-1
   No instances to stop in region
   Region is us-west-1
   No instances to stop in region
   Region is us-west-2
   Found instance i-9552ba9f
   Found instance i-d35fb7d9
   Stopping all identified instances...
   [...]
   No instances to stop in region
   Region is sa-east-1
   No instances to stop in region
3. On the Services menu, choose EC2.

4. In the navigation pane, choose Instances.
5. Verify that two instances are stopping or have already been stopped.
6. Return to the SSH session for Command Host, and from the Linux prompt, restart your instances with the following command:
   ./stopinator.php -t"Richard Davis" -s
   Return to the EC2 Management Console window and verify that the two instances that were previously shut down are now restarting.

```
ec2-user@ip-10-5-0-180:~/aws-tools
PHP Notice:  Array to string conversion in /home/ec2-user/aws-tools/stopinator.p
hp on line 115

        Stopping identified instances in Array...
Region is us-east-2
PHP Notice:  Array to string conversion in /home/ec2-user/aws-tools/stopinator.p
hp on line 120

        No instances to stop in Array.
Region is us-west-1
PHP Notice:  Array to string conversion in /home/ec2-user/aws-tools/stopinator.p
hp on line 120

        No instances to stop in Array.
Region is us-west-2
PHP Notice:  Array to string conversion in /home/ec2-user/aws-tools/stopinator.p
hp on line 120

        No instances to stop in Array.
[ec2-user@ip-10-5-0-180 aws-tools]$  aws-tools]$ ./stopinator.php -t"Project=ERP
System;Environment=development" -s
-bash: aws-tools]$: command not found
[ec2-user@ip-10-5-0-180 aws-tools]$  aws-tools]$ ./stopinator.php -t"Richard Dav
is" -S
```

How to resize an EC2 instance using the AWS CLI

1. Stop the local database and uninstall it from the Mom & Pop Café instance. In the SSH window for the MomPopCafeInstance, enter:
   sudo systemctl stop mariadb
   sudo yum -y remove mariadb-server
2. If the last command runs successfully, you will see a Complete! message in the output.
3. Close the SSH window for the MomPopCafeInstance because you no longer need it.
4. Determine the Instance ID of the MomPopCafeInstance. Switch to the SSH window for the CLI Host instance and enter:
   aws ec2 describe-instances \
   --filters "Name=tag:Name,Values= MomPopCafeInstance" \
   --query "Reservations[*].Instances[*].InstanceId"
5. Record the value returned as:
   MomPopCafeInstance Instance ID: i-nnnnnnnnnn

6. Stop the Mom & Pop Café instance and change its instance type to t2.micro. In the SSH window for the CLI Host instance, enter:
   aws ec2 stop-instances --instance-ids <MomPopCafeInstance Instance ID>
   In the command, substitute <MomPopCafeInstance Instance ID> with the value that you recorder earlier.
7. Change the instance type to t2.micro. In the SSH window for the CLI Host instance, enter:
   aws ec2 modify-instance-attribute \
   --instance-id <MomPopCafeInstance Instance ID> \
   --instance-type "{\"Value\": \"t2.micro\"}"
   In the command, substitute <MomPopCafeInstance Instance ID> with the value that you recorder earlier.
   If the command completes successfully, no output is returned.
8. Start the Mom & Pop Café instance. In the SSH window for the CLI Host instance, enter:
   aws ec2 start-instances --instance-ids <MomPopCafeInstance Instance ID>
   In the command, substitute <MomPopCafeInstance Instance ID> with the value that you recorder earlier.
9. Check the current state of 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 <MomPopCafeInstance Instance ID> \
   --query
   "Reservations[*].Instances[*].[InstanceType,PublicDnsName,PublicIpAddress,State.Name]"
   In the command, substitute <MomPopCafeInstance Instance ID> with the value that you recorder earlier.
10. 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 the following format:
    Downsized MomPopCafeInstance Public DNS Name: ec2-zzz-zzz-zzz-zzz.eu-west-2.compute.amazonaws.com
    Downsized MomPopCafeInstance 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.
11. Test the Mom & Pop Café website to make sure that it is functional. In a browser window, enter the following URL:
    http://<Downsized MomPopCafeInstance Public DNS Name>/mompopcafe
    Substitute <Downsized MomPopCafeInstance Public DNS Name> with the value that you recorded.

```
ec2-user@cli-host:~
        }
    ]
}
[ec2-user@cli-host ~]$ aws ec2 modify-instance-attribute \
> --instance-id <MomPopCafeInstance Instance ID> \
> --instance-type "{\"Value\": \"t2.micro\"}"
-bash: MomPopCafeInstance: No such file or directory
[ec2-user@cli-host ~]$ aws ec2 modify-instance-attribute --instance-id i-03a231
24df3725f3e --instance-type "{\"Value\": \"t2.micro\"}"
[ec2-user@cli-host ~]$ aws ec2 start-instances --instance-ids i-03a23124df3725f
3e
{
    "StartingInstances": [
        {
            "InstanceId": "i-03a23124df3725f3e",
            "CurrentState": {
                "Code": 0,
                "Name": "pending"
            },
            "PreviousState": {
                "Code": 80,
                "Name": "stopped"
            }
```

```
ec2-user@cli-host:~
            }
        }
    ]
}
[ec2-user@cli-host ~]$ aws ec2 describe-instances \
> --instance-ids <MomPopCafeInstance Instance ID> \
> --query "Reservations[*].Instances[*].[InstanceType,PublicDnsName,PublicIpAdd
ress,State.Name]"
-bash: MomPopCafeInstance: No such file or directory
[ec2-user@cli-host ~]$ aws ec2 describe-instances --instance-ids i-03a23124df37
25f3e --query "Reservations[*].Instances[*].[InstanceType,PublicDnsName,PublicI
pAddress,State.Name]"
[
    [
        [
            "t2.micro",
            "ec2-3-81-134-158.compute-1.amazonaws.com",
            "3.81.134.158",
            "running"
        ]
    ]
]
[ec2-user@cli-host ~]$
```

How to detect drift in a CloudFormation template

1. To start drift detection on your stack, run the following command:
   aws cloudformation detect-stack-drift --stack-name myStack

The command should return a StackDriftDetectionId.

2. Monitor the status of the drift detection by running the following command (replace <driftId> with the actual value of StackDriftDetectionId):
   aws cloudformation describe-stack-drift-detection-status \
   --stack-drift-detection-id driftId
   Notice that the output shows "StackDriftStatus": "DRIFTED"
3. Finally, describe the resources that drifted by running the following describe-stack-resource-drifts command:
   aws cloudformation describe-stack-resource-drifts \
   --stack-name myStack
   The output from the command is extensive. Try a different approach.
4. Run a describe-stack-resources command with a query parameter that will return only the resource type, resource status, and drift status.
5. The following command outputs the results as a table:
   aws cloudformation describe-stack-resources \
   --stack-name myStack \
   --query
   'StackResources[*].[ResourceType,ResourceStatus,DriftInformation.StackResourceDriftStatus]' \
   --output table
   This output is easier to read because of the query parameter, which is written in JMESPath.
   Notice that not all resources are checked for drift. However, the resources that are checked for drift show a status.
   On this stack, all checked resources have a status of IN_SYNC, except for the security group that you manually modified, which has a status of MODIFIED.
   Also notice that though you placed an object in the S3 bucket, the bucket still shows a status of IN_SYNC. If you had modified some property of the bucket, then the bucket would show a status of MODIFIED. However, only adding files to a bucket does not register as drift in AWS CloudFormation.
6. Retrieve the specific details of the drift for the resource that has a StackResourceDriftStatus of MODIFIED:
   aws cloudformation describe-stack-resource-drifts \
   --stack-name myStack \
   --stack-resource-drift-status-filters MODIFIED
   Notice the PropertyDifferences section of the output. It should show that port 22 is now open only to your IP address, instead of the 0.0.0.0/0 Classless Inter-Domain Routing (CIDR) block that is defined in the AWS CloudFormation template.
7. Try updating the stack:
   aws cloudformation update-stack \
   --stack-name myStack \
   --template-body file://template1.yaml \
   --parameters ParameterKey=KeyName,ParameterValue=vockey
   The output should indicate that an error occurred. This is expected.
   The update-stack command will not automatically resolve drift, though drift has occurred. You must manually resolve these issues to eliminate the drift.

ec2-user@cli-host:~

```
(NoSuchBucket) when calling the PutObject operation: The specified bucket does n
ot exist
[ec2-user@cli-host ~]$ aws s3 cp myfile s3://mystack-mybucket-zxxqlhdppdde/
upload: ./myfile to s3://mystack-mybucket-zxxqlhdppdde/myfile
[ec2-user@cli-host ~]$ aws s3 ls mystack-mybucket-zxxqlhdppdde
2024-10-09 20:38:19          0 myfile
[ec2-user@cli-host ~]$ aws cloudformation detect-stack-drift --stack-name myStac
k
{
    "StackDriftDetectionId": "86debbc0-867e-11ef-bad8-0ea92c7d3591"
}
[ec2-user@cli-host ~]$ aws cloudformation describe-stack-drift-detection-status
\
> --stack-drift-detection-id 86debbc0-867e-11ef-bad8-0ea92c7d3591
{
    "StackId": "arn:aws:cloudformation:us-east-1:150225838146:stack/myStack/5a3a
9f40-867d-11ef-b11f-1264993986c7",
    "StackDriftDetectionId": "86debbc0-867e-11ef-bad8-0ea92c7d3591",
    "StackDriftStatus": "DRIFTED",
    "Timestamp": "2024-10-09T20:39:05.852Z",
    "DetectionStatus": "DETECTION_COMPLETE",
    "DriftedStackResourceCount": 1
}
[ec2-user@cli-host ~]$
```

ec2-user@cli-host:~

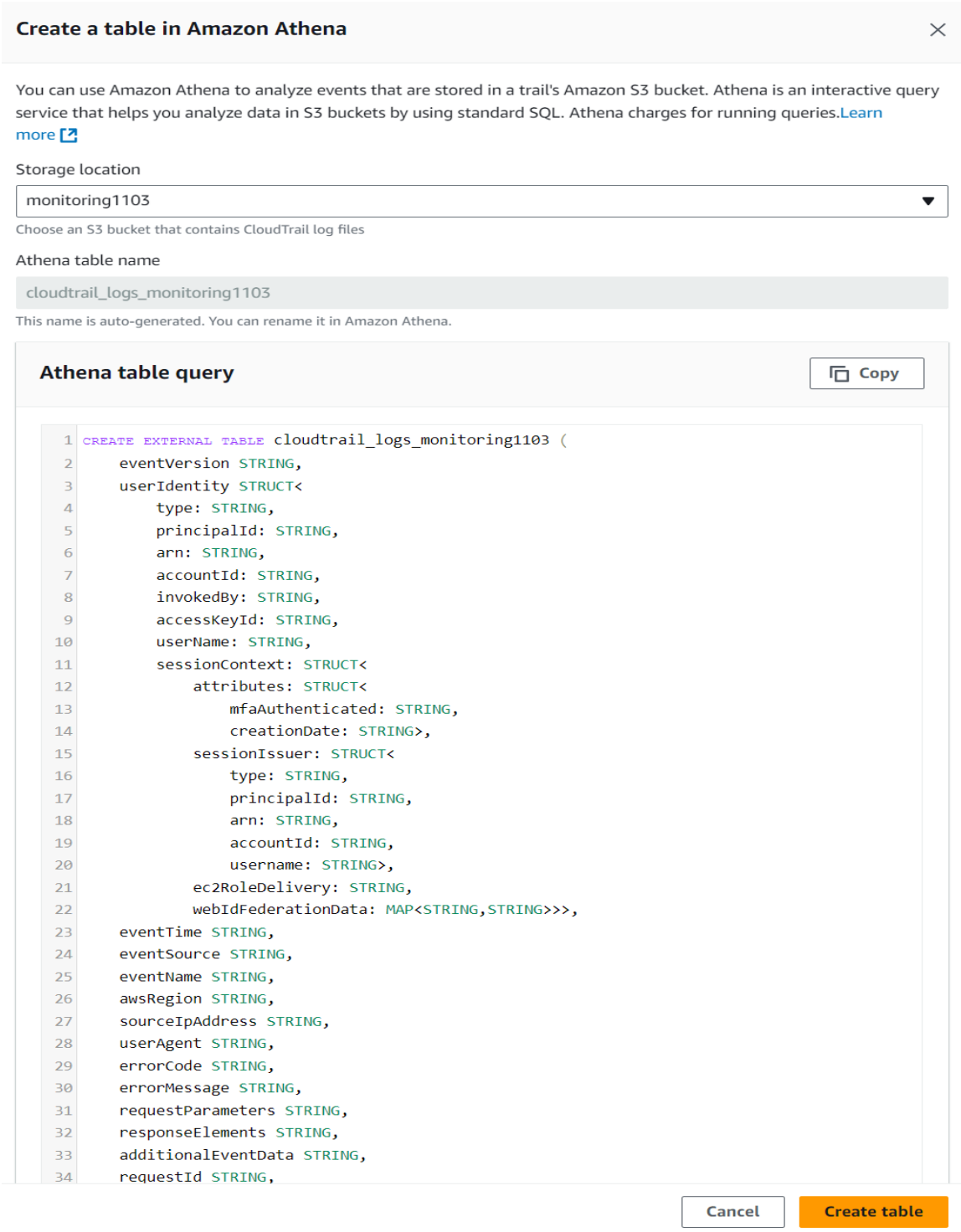
```
-----------------------------------------------------------------------------------
|                              DescribeStackResources                             |
+-----------------------------------------+------------------+---------------+
|  AWS::EC2::InternetGateway              |  CREATE_COMPLETE |  IN_SYNC      |
|  AWS::EC2::VPC                          |  CREATE_COMPLETE |  IN_SYNC      |
|  AWS::S3::Bucket                        |  CREATE_COMPLETE |  IN_SYNC      |
|  AWS::EC2::Route                        |  CREATE_COMPLETE |  IN_SYNC      |
|  AWS::EC2::RouteTable                   |  CREATE_COMPLETE |  IN_SYNC      |
|  AWS::EC2::SubnetRouteTableAssociation  |  CREATE_COMPLETE |  NOT_CHECKED  |
|  AWS::EC2::Subnet                       |  CREATE_COMPLETE |  IN_SYNC      |
|  AWS::EC2::VPCGatewayAttachment         |  CREATE_COMPLETE |  NOT_CHECKED  |
|  AWS::CloudFormation::WaitCondition     |  CREATE_COMPLETE |  NOT_CHECKED  |
|  AWS::CloudFormation::WaitConditionHandle |  CREATE_COMPLETE |  NOT_CHECKED  |
|  AWS::EC2::SecurityGroup                |  CREATE_COMPLETE |  MODIFIED     |
|  AWS::EC2::Instance                     |  CREATE_COMPLETE |  IN_SYNC      |
+-----------------------------------------+------------------+---------------+
[ec2-user@cli-host ~]$ aws cloudformation describe-stack-resource-drifts \
> --stack-name myStack \
> --stack-resource-drift-status-filters MODIFIED
{
    "StackResourceDrifts": [
        {
            "StackId": "arn:aws:cloudformation:us-east-1:150225838146:stack/mySt
ack/5a3a9f40-867d-11ef-b11f-1264993986c7",
```

```
ec2-user@cli-host:~
.0.0.0/0\",\"FromPort\":22,\"IpProtocol\":\"tcp\",\"ToPort\":22},{\"CidrIp\":\"0
.0.0.0/0\",\"FromPort\":80,\"IpProtocol\":\"tcp\",\"ToPort\":80}],\"Tags\":[{\"K
ey\":\"Name\",\"Value\":\"WebServerSG\"}],\"VpcId\":\"vpc-011b2d8559b8ee0f5\"}",

            "PropertyDifferences": [
                {
                    "PropertyPath": "/SecurityGroupIngress/0/CidrIp",
                    "ActualValue": "76.240.119.242/32",
                    "ExpectedValue": "0.0.0.0/0",
                    "DifferenceType": "NOT_EQUAL"
                }
            ],
            "LogicalResourceId": "WebSecurityGroup"
        }
    ]
}
[ec2-user@cli-host ~]$ aws cloudformation update-stack \
> --stack-name myStack \
> --template-body file://template1.yaml \
> --parameters ParameterKey=KeyName,ParameterValue=vockey

An error occurred (ValidationError) when calling the UpdateStack operation: No u
pdates are to be performed.
[ec2-user@cli-host ~]$ Richard Davis
```

How to create an Amazon Athena table

1. open the CloudTrail console.
2. In the navigation pane, choose Event history.
3. Notice that CloudTrail provides this event history interface where you can apply filters and conduct a basic search based on parameters, such as Event name or Resource type. The Event history page can be a useful tool, and you are free to explore it. However, in this activity, you will use Amazon Athena.
4. From the Event history page, choose Create Athena table.
5. Storage location: Choose the monitoring#### Amazon S3 bucket where you configured CloudTrail to store log files.
6. Take a moment to analyze how the Amazon Athena CREATE TABLE statement is formed.
7. It will create a database column for each of the standard name-value pairs in each JSON-formatted CloudTrail log entry. Refer back to the image of the JSON format of a typical log entry in Task 3.4 to confirm this.
8. At the bottom of the CREATE TABLE SQL statement, notice the LOCATION statement. This indicates the Amazon S3 location where the table data will be stored. In this case, the data is already there. You are defining the table schema that will be used to parse existing JSON-structured data.
   For details on AWS CloudTrail record structure, see https://docs.aws.amazon.com/awscloudtrail/latest/userguide/cloudtrail-event-reference.html.
   For details on how this Amazon Athena table was created, see the CREATE EXTERNAL TABLE document at https://docs.aws.amazon.com/athena/latest/ug/cloudtrail-logs.html.
9. After you are done analyzing the CREATE TABLE details, choose Create table.

10. The table is created with a default name that includes the name of the Amazon S3 bucket.
11. In the search box next to Services search for and select the Athena service to open the Athena console.



How to manually review access logs to find anomalous user activity

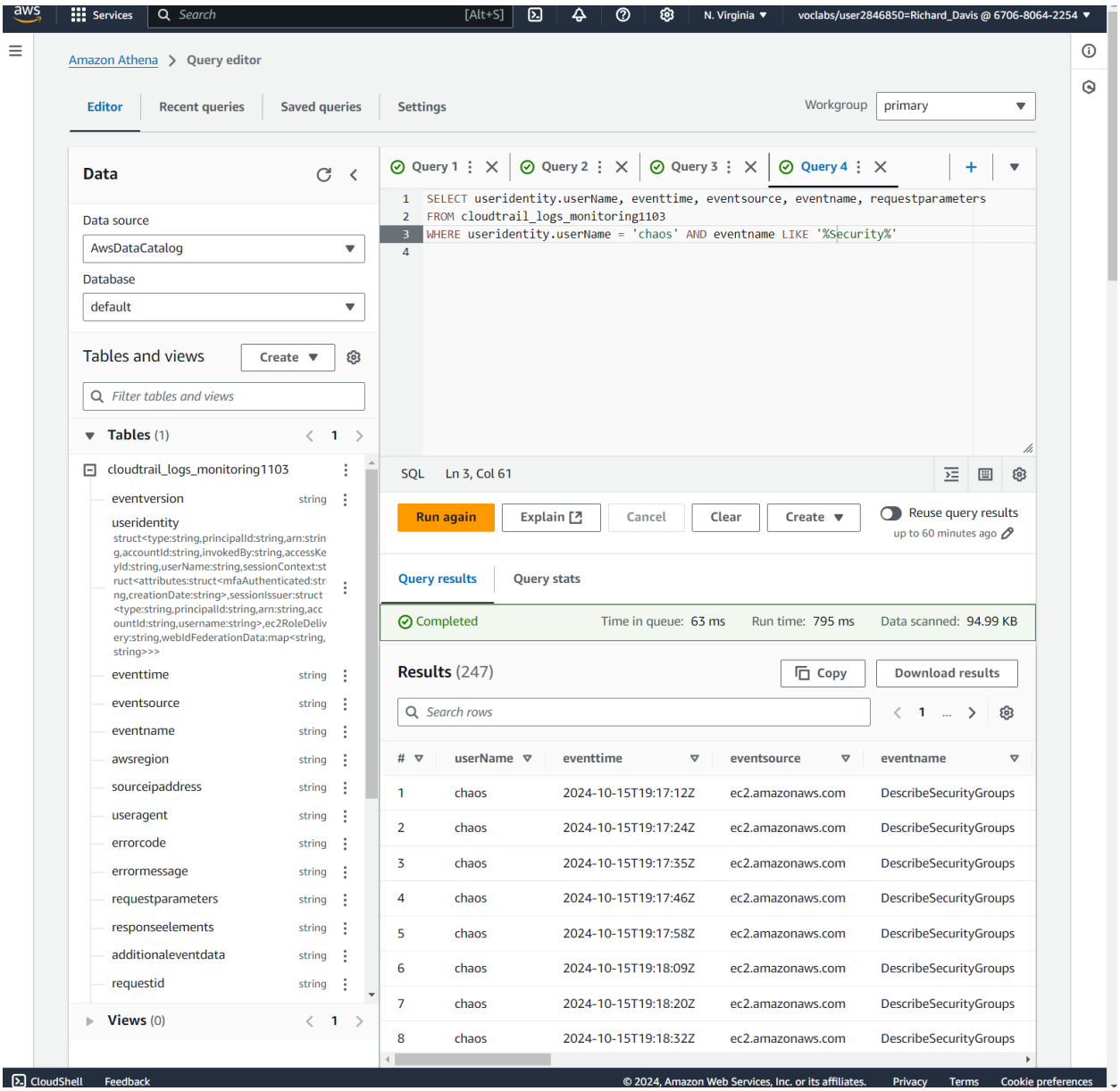
1. In the left panel of the Athena Query Editor, you should see the cloudtrail_logs_monitoring#### table.
2. Choose the plus icon next to table name to reveal the column names.
   Analysis: Notice how each standard child element that exists in a CloudTrail log record in JSON format has a corresponding column name in this database. The useridentity database column is a struct, because it contains more than a single name-value pair. Similarly, the resources database column is an array.
3. Start by setting up a query results location and then running a simple query to get an idea of the data that is available in the logs.
4. Choose the View settings button that appears above the query panel, then choose Manage.
5. Choose Browse S3, select your monitoring#### bucket, and select Choose.
6. In the Location of query result box, add /results/ to the value, so that it now reads s3://monitoring####/results/where monitoring#### is the name of the bucket you created earlier.
   Choose Save.
7. Return to the Editor tab.
8. Paste the following SQL query into the New query 1 panel. Replace #### with the numbers in your actual table, and choose Run.
   SELECT *
   FROM cloudtrail_logs_monitoring####
   LIMIT 5
   This query returns 5 rows of data. Look at the result set (scroll to the right in the Results panel to see additional column data).
   The useridentity, eventtime, eventsource, eventname, requestparameters columns look like they contain interesting data.
   That useridentity column has lots of detail that make it more difficult to read though. You will now return only the user name for that column.
9. Run a new query that selects only those columns that were previously mentioned. This time, limit the results to 30 rows:
   SELECT useridentity.userName, eventtime, eventsource, eventname, requestparameters
   FROM cloudtrail_logs_monitoring####
   LIMIT 30
   This information is interesting, but recall what you are looking for.
   Specifically, someone modified the security group that is associated with the Cafe Web Server instance, and you want to know who it was.
10. TIP #1: Choose the + icon next to New query 1 to create a second query tab. This way, you can preserve older queries without deleting them.
    TIP #2: Try filtering by events that are related to the EC2 service. Remember that you can add WHERE clauses, such as WHERE eventsource = 'ec2.amazonaws.com'
    TIP #3: To ensure you are querying the entire log set, remove the LIMIT clause from your query.
    TIP #4: Take a look at the kind of data that is captured in the eventname column. Can you further refine your SQL query so that it looks for only events that contain the word Security? Remember that SQL allows you to use compound WHERE clauses that look for pattern matches.

For example: WHERE columnName = 'some value' AND otherColumnName LIKE '%part of some value%'

TIP #5: After you have successfully filtered all security-related actions in the log, analyze the eventnames further. Do any of them look suspicious? Can you adjust the WHERE clause to search for a particular eventname?

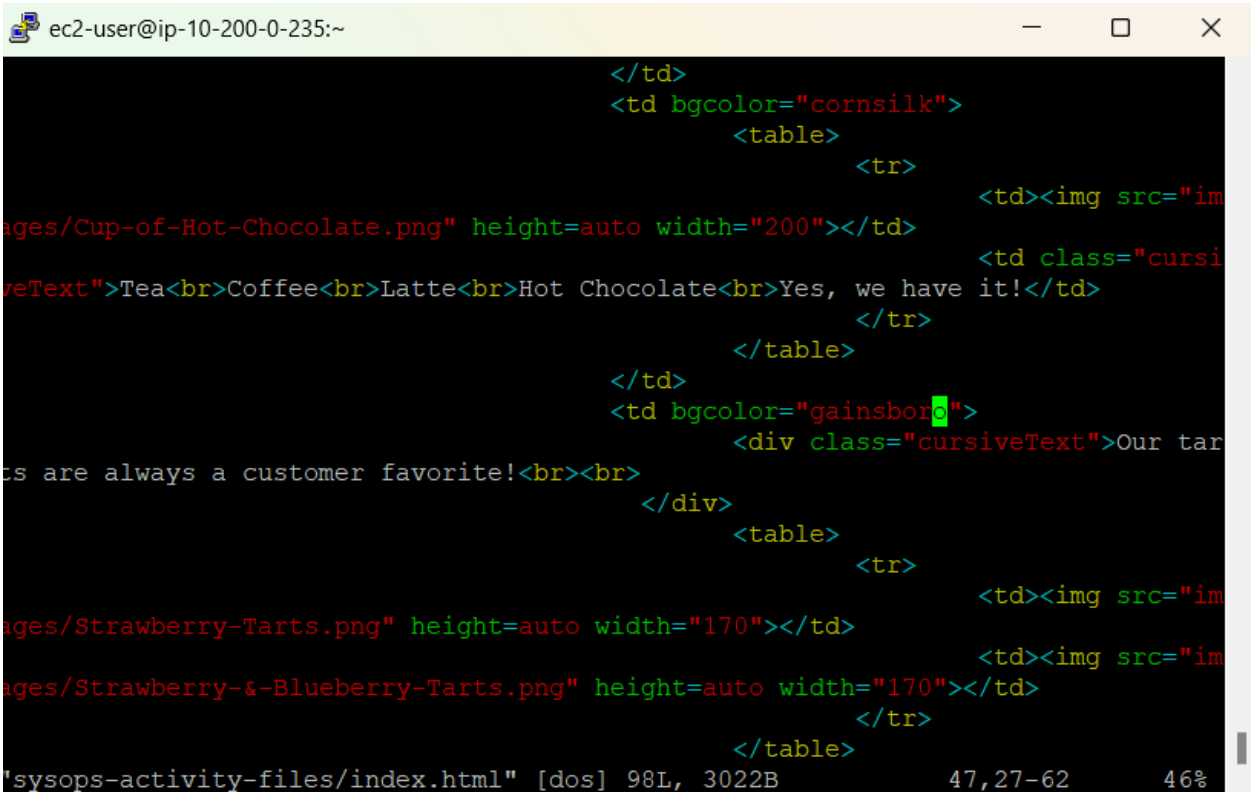
TIP #6: If you are still looking for the entry that shows who opened port 22 to the world, here is a general query that is often useful to run. This query might help identify the action:

SELECT DISTINCT useridentity.userName, eventName, eventSource FROM cloudtrail_logs_monitoring#### WHERE from_iso8601_timestamp(eventtime) > date_add('day', -1, now()) ORDER BY eventSource;



How to create a batch file to update the café website to change its colors

1. Use PuTTY to SSH to Amazon EC2 instances by using the Public DNS or IPv4 address of the Bastion Host, use the .ppk file for credentials, login as “ec2-user”
2. Update AWS CLI software using command “aws configure”, use AWS AccessKey, AWS SecretKey, region, and output format.
3. Create an empty file using command “touch update-website.sh”
4. Use the VI editor with command “vi update-website.sh”, enter editing mode by pressing “A”
5. Enter the following code into the file, where “<my-bucket>” is replaced with the actual bucket name:
   - #!/bin/bash
     aws s3 cp ~/sysops-activity-files/ s3://<my-bucket>/ --recursive --acl public-read
6. Quit the file by pressing ESC, typing “:wq” and then pressing ENTER.
7. Use the command “chmod +x update-website.sh” to make the file executable.
8. Open the index.html file with the VI editor
9. In the file, find the locations of the code “bgcolor=” and change the color from ‘aquamarine’ to ‘gainsboro’ and ‘orange’ to ‘cornsilk’, save and exit the file using the same method as before.

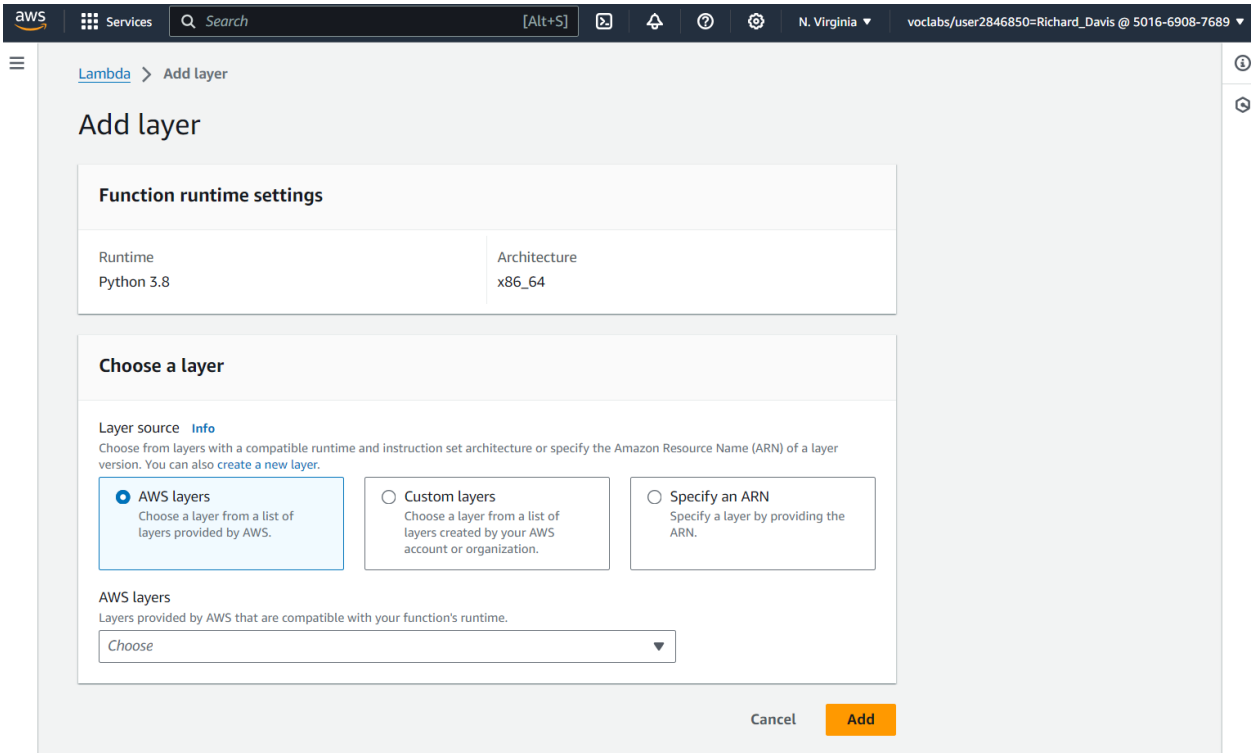


10. Use the command “./update-website.sh” to run the batch file.

```
ec2-user@ip-10-200-0-235:~
    8  ls
    9  rm static-website.tar.gz
   10  ls
   11  aws s3api put-bucket-ownership-controls --bucket <my-bucket> \
   12  aws s3api put-bucket-ownership-controls --bucket rdavis113 --ownership-co
ntrols "Rules=[{ObjectOwnership=BucketOwnerPreferred}]"
   13  aws s3api put-public-access-block --bucket rdavis113 --public-access-bloc
k-configuration "BlockPublicAcls=false,IgnorePublicAcls=false,BlockPublicPolicy=
false,RestrictPublicBuckets=false"
   14  aws s3 website s3://rdavis113/ --index-document index.html
   15  aws s3 cp . s3://rdavis113/ --recursive --acl public-read
   16  aws s3 ls rdavis113
   17  history
[ec2-user@ip-10-200-0-235 sysops-activity-files]$ cd ~
[ec2-user@ip-10-200-0-235 ~]$ touch update-website.sh
[ec2-user@ip-10-200-0-235 ~]$ vi update-website.sh
[ec2-user@ip-10-200-0-235 ~]$ chmod +x update-website.sh
[ec2-user@ip-10-200-0-235 ~]$ vi sysops-activity-files/index.html
[ec2-user@ip-10-200-0-235 ~]$ ./update-website.sh
[ec2-user@ip-10-200-0-235 ~]$ cat update-website.sh
#!/bin/bash
#aws s3 cp ~/sysops-activity-files/ s3://rdavis113/ --recursive --acl public-rea
d
[ec2-user@ip-10-200-0-235 ~]$ Richard Davis
```

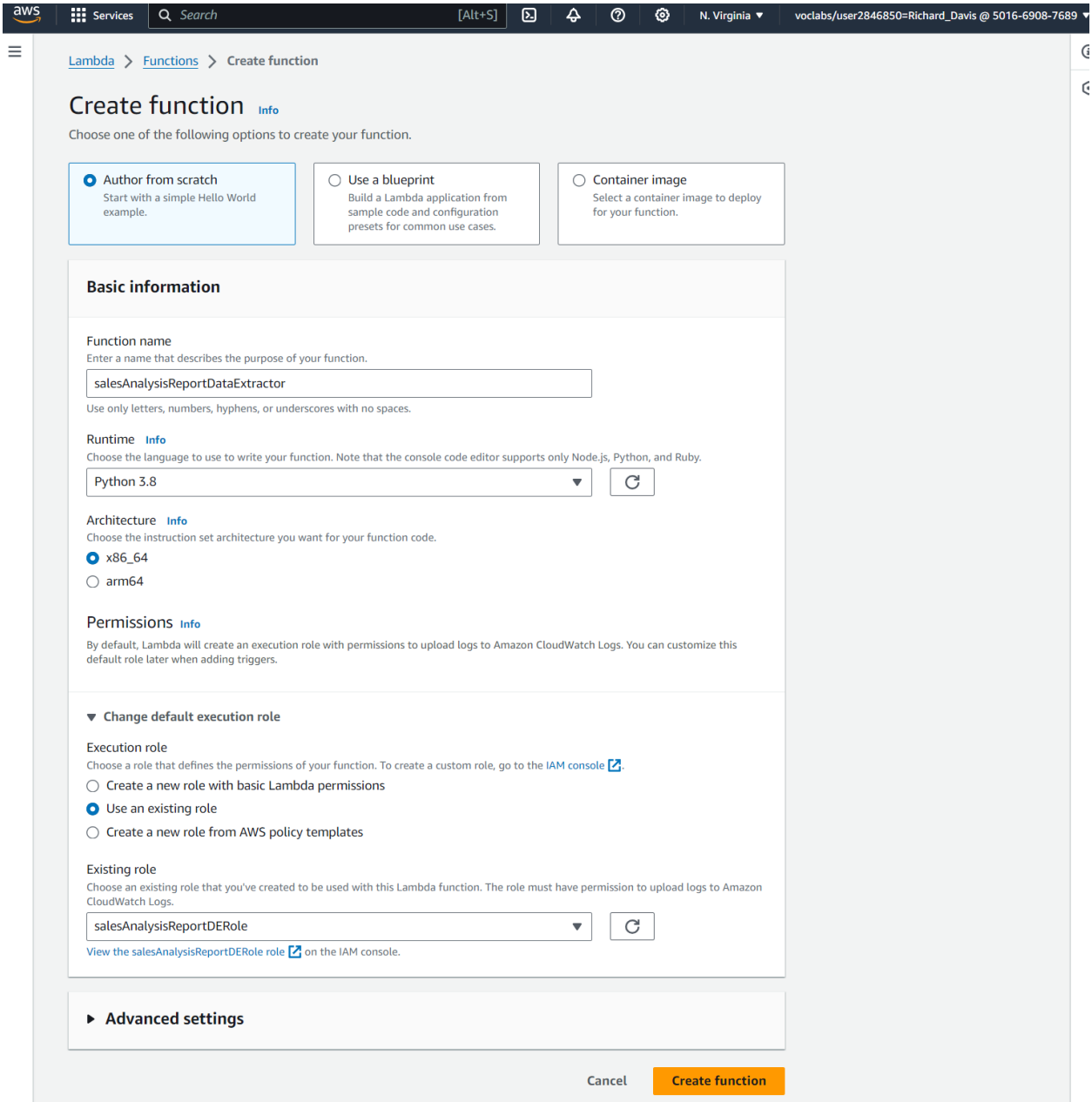
How to create a Lambda Layer and add it to a Lambda function

1. In the Lambda Function overview panel, your function, choose Layers.
2. In the Layers panel at the bottom of the page, choose Add a layer.
   In the Add layer page, configure as follows:
3. Choose a layer: Select the Custom layers card
   Custom layers:
   Version:
4. Choose Add.



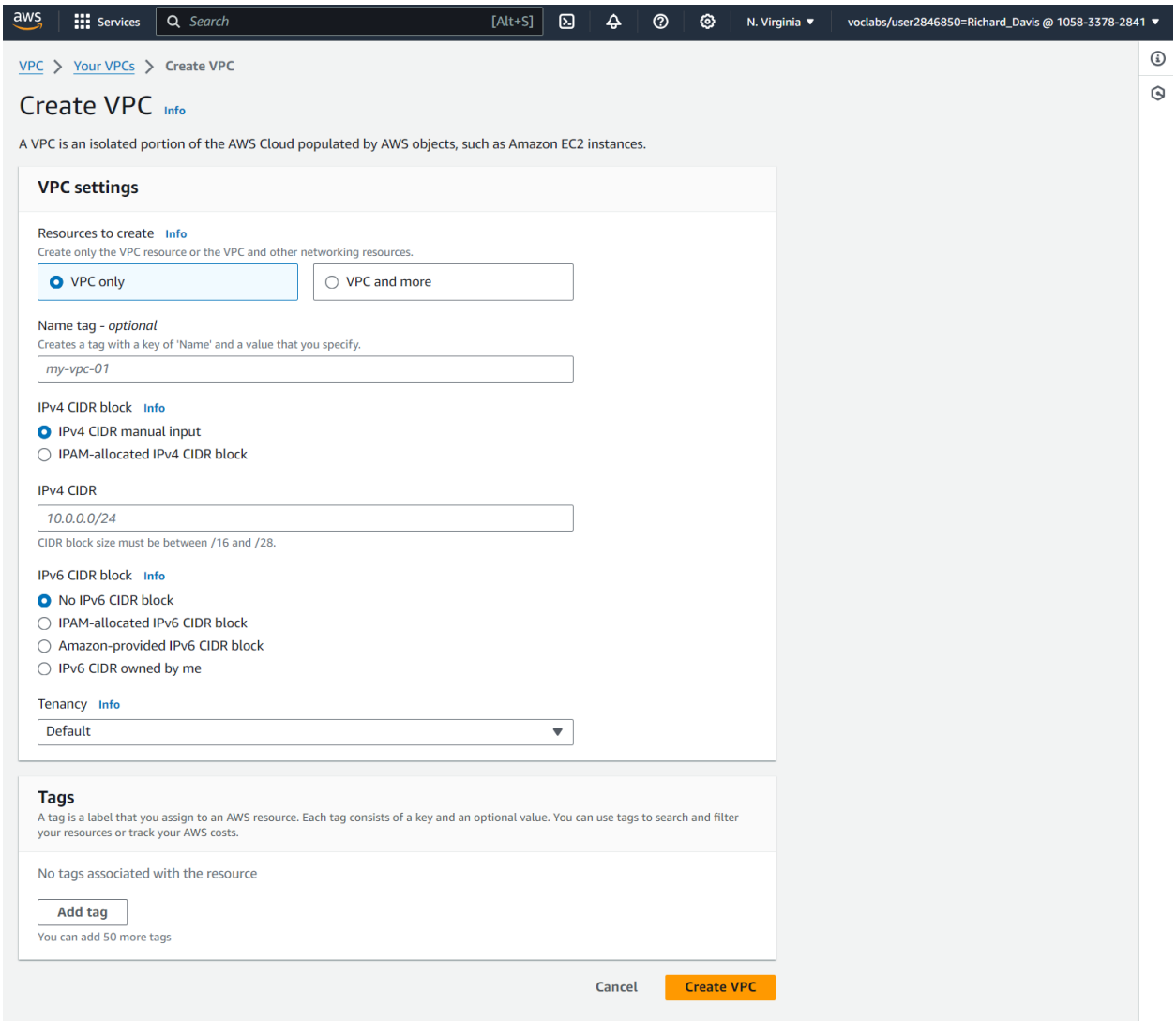
How to create a Lambda function from a prebuilt package

1. In the AWS Management Console, select Services > Lambda.
2. Choose Layers.
3. Choose Create layer.
   Configure the layer settings as follows:
   Name:
   Description:
   Code entry type: Upload a .zip file
   Choose Upload, navigate to the folder where your zip file is and open it.
   Compatible runtimes: Choose Python 3.8 .
4. Choose Create.



How to setup a VPC

1. Navigate to the VPC service.
2. Choose Create VPC and configure:
   Name tag: VPC name
   IPv4 CIDR block: 10.0.0.0/16
3. Choose Create VPC.
4. Choose Actions and select Edit DNS hostnames.
5. Under DNS hostnames, select Enable, then choose Save changes

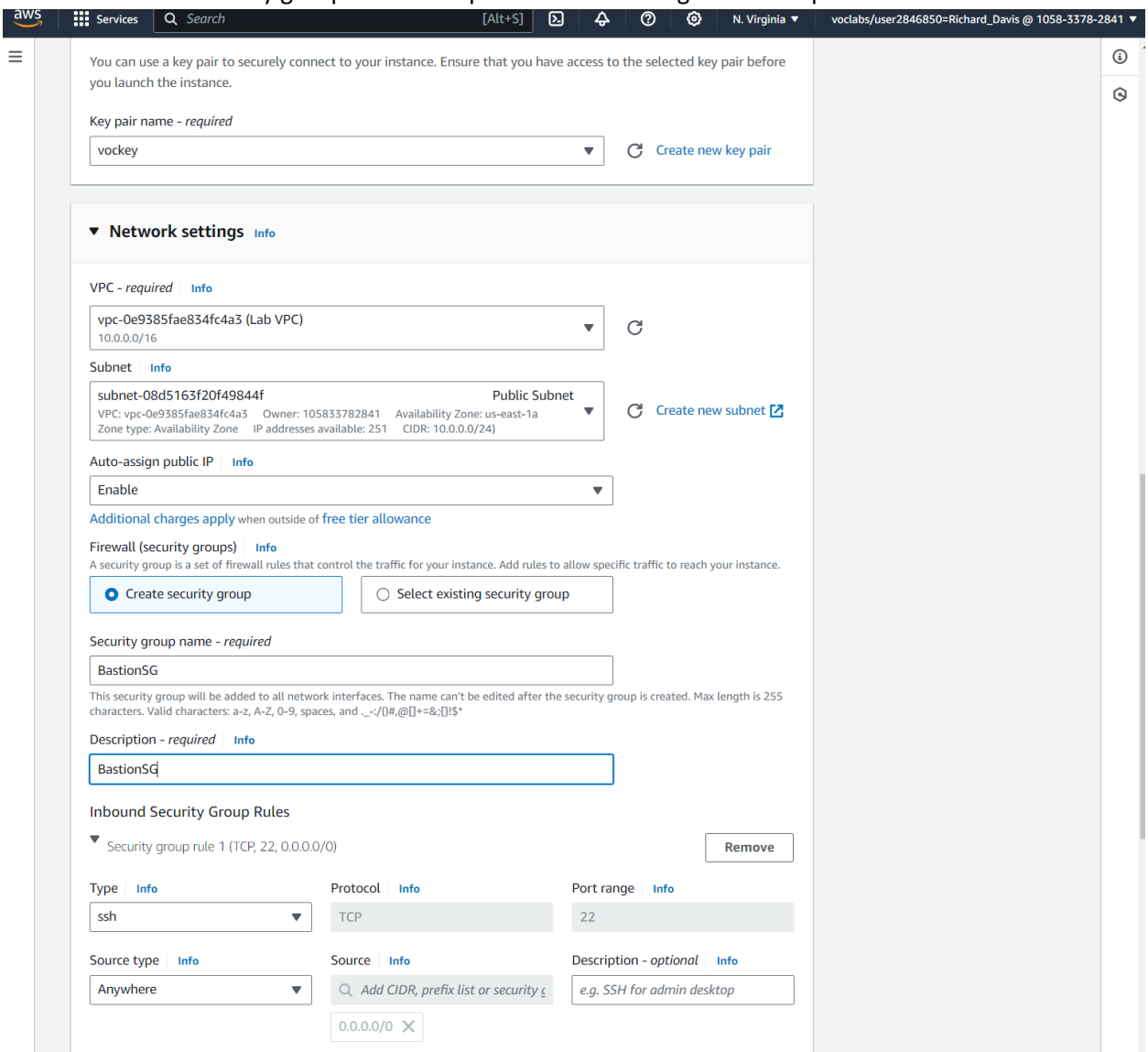


How to add a bastion host (Linux) to the public subnet of a VPC to connect to instances in the private subnet

1. Navigate to EC2 service.
2. Select Launce Instance.
3. Configure:
   Name: Bastion Server
   Application and OS Images:
   Quick Start: Amazon Linux
   AMI: Amazon Linux 2023 AMI (HVM)
4. Instance Type:
   Instance Type: t2.micro
   Key pair (login):
   Key pair name: vockey
5. Network settings:
   Choose Edit

VPC: Lab VPC
Subnet: Public Subnet
Auto-assign public IP: Enable
Security group name: BastionSG
Description: BastionSG

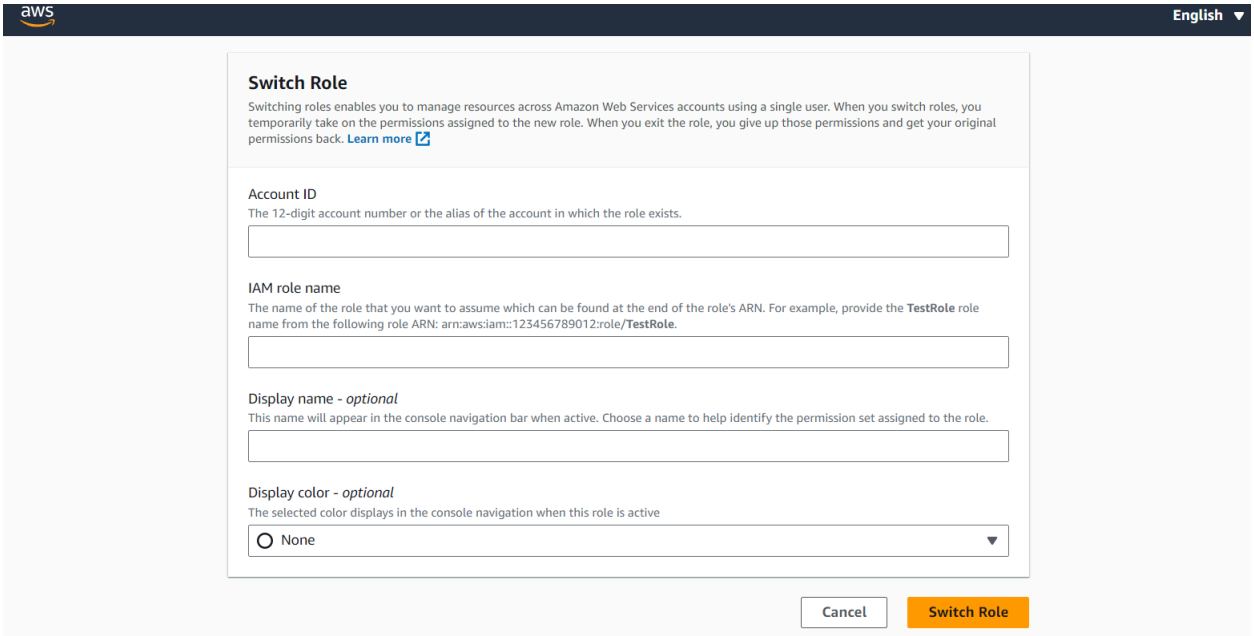
6. Inbound security groups rules: Keep the default setting which will provide SSH access.



How to setup IAM so a user can assume an IAM role to access a resource

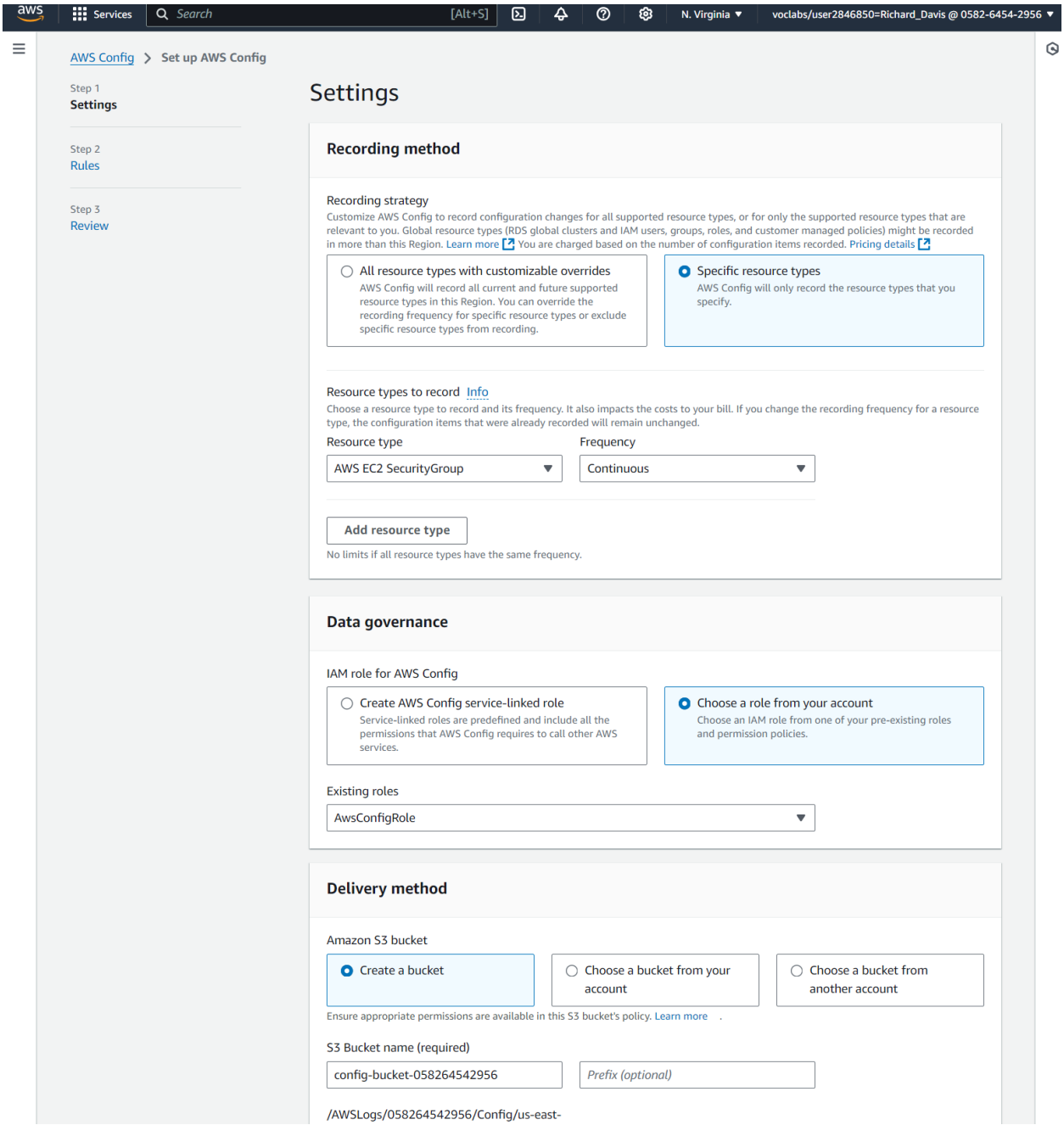
1. Find out what role is needed to access a resource.
2. In the upper right corner of the page, select the username.
3. Then choose **Switch Role**
4. Configure the following:
   Account ID
   Role
   Display name: leave blank

5. Choose Switch Role



How to setup AWS Config to monitor resources

1. In the search box to the right of Services, search for and choose Config.
2. Choose Get started, and configure the following settings:
3. Under Recording strategy. Choose Specific resource types.
4. Resource type: Choose AWS EC2 SecurityGroup. For Frequency choose Continuous.
5. IAM role for AWS Config Choose Choose a role from your account.
6. Existing roles: Choose AwsConfigRole.
   Note: Recall that AwsConfigRole was the second role that you analyzed in the previous task.
7. In the Delivery method section, notice that AWS Config will store findings in an S3 bucket by default. Keep the default settings, and choose Next.
8. On the AWS Managed Rules page, choose Next at the bottom of the page.
9. Review the AWS Config setup details, and then choose Confirm.

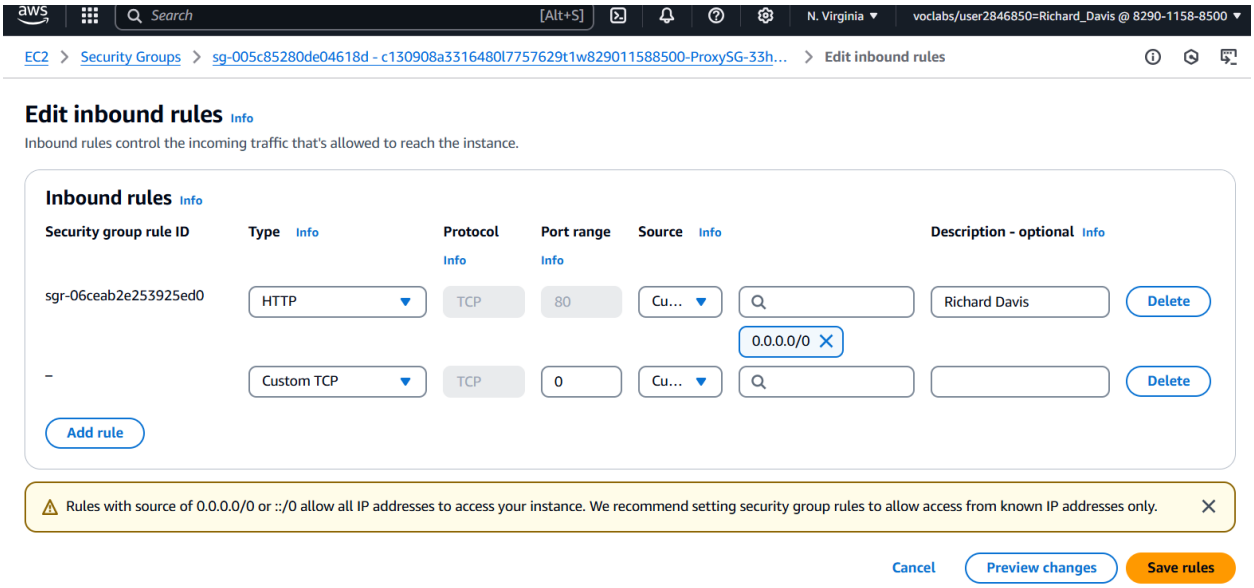


How to add inbound rules to both security groups and network ACLs

1. Add a new inbound rule on the LabVPC network ACL to deny all inbound traffic on port 80.
2. Return to the browser tab where the Amazon VPC console is open.
3. In the navigation pane, choose Network ACLs.
4. Select the network ACL that is associated with LabVPC.
5. Choose the Inbound rules tab, and then choose Edit inbound rules.
6. Choose Add new rule, and configure as follows:
   Rule number: Enter 99
   Type: Choose HTTP.

Allow/Deny: Choose Deny.
Choose Save changes.

7. In the Amazon EC2 console, in the navigation pane, choose Security Groups.
8. Select the AppServerSG security group.
9. Choose the Inbound rules tab, and then choose Edit inbound rules.
10. Choose Add rule, and configure as follows:
    Type: Choose SSH.
    Source: Choose Custom.
    Next, paste the BastionPrivateIP value from the lab instructions into the Source field.
    After pasting, add /32 to the end of the IP address.
    Choose Save rules.

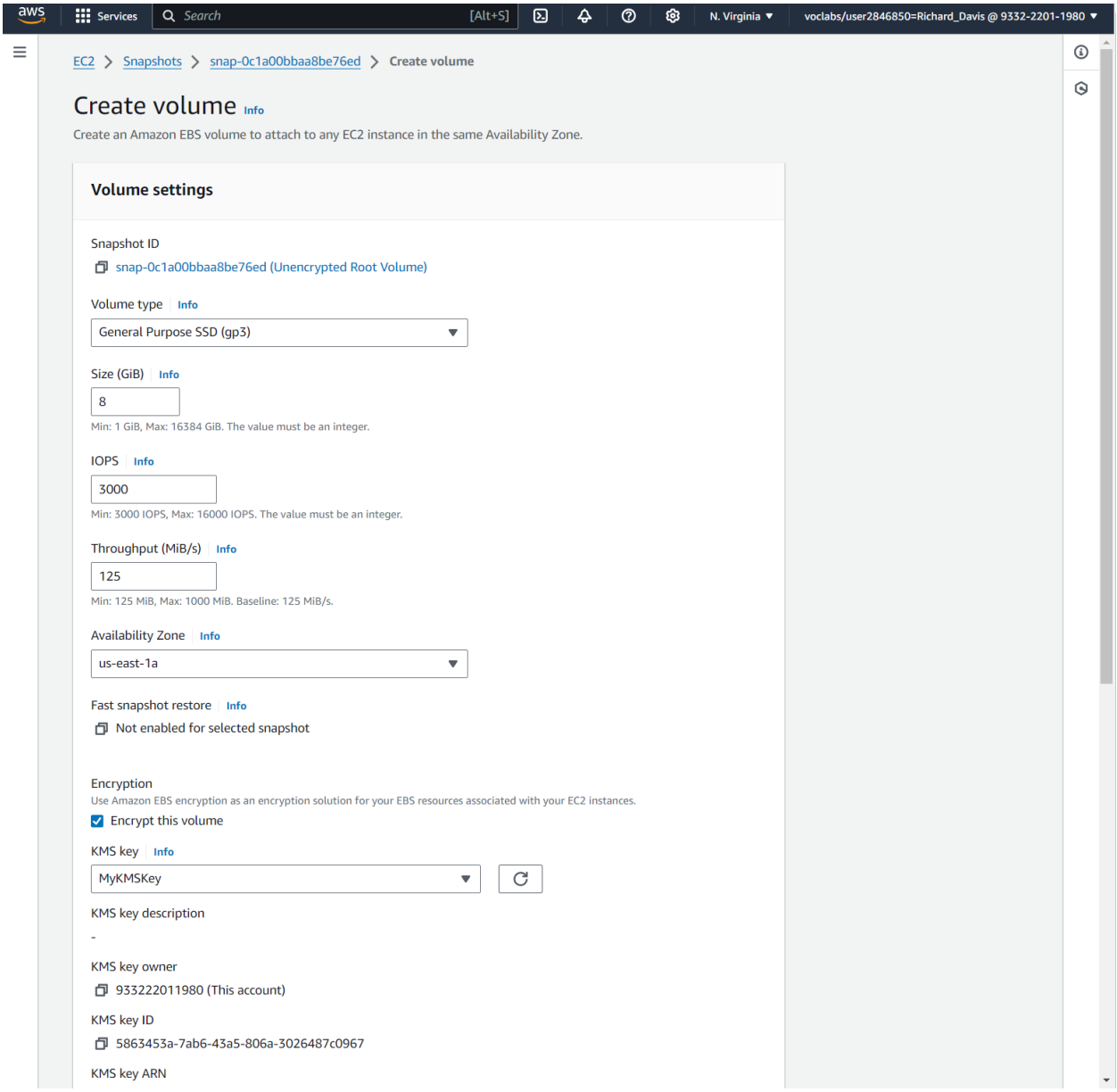


How to encrypt the root volume of an existing EC2 instance

1. Go to EC2>Instances.
2. Select LabInstance, and choose Instance state > Stop instance.
   To confirm the action, choose Stop.
3. Create a snapshot of the root EBS volume of the existing EC2 instance.
4. Choose the Storage tab.
5. In the Block devices section, choose the link for the Volume ID.
6. Choose the link for the Volume ID again.
7. Note the Availability Zone where the volume exists (for example, us-east-1a or us-east-1b).
   Important: You will need this information in a moment.
8. Choose Actions > Create snapshot.
   Choose Add tag, and add a tag with the following information:
   Key: Enter Name
   Value: Enter Unencrypted Root Volume
   Choose Create snapshot.
9. Create an encrypted volume from the unencrypted snapshot.
10. In the navigation pane, under Elastic Block Store, choose Snapshots.

Choose the link for the Unencrypted Root Volume snapshot ID that you just created.
Wait until the Snapshot status shows Completed.
Notice that the encryption status of the snapshot is Not encrypted.
Choose Actions > Create volume from snapshot, and configure the following:
Availability Zone: Choose the Availability Zone where the existing volume exists.
Select Encrypt this volume.
KMS key: Choose MyKMSKey.
Choose Create volume.
Label the volumes.

11. In the navigation pane, under Elastic Block Store, choose Volumes.
    Notice that two volumes are now listed.
12. For the volume with a Volume state of In-use, change the volume name:
    Hover on the Name field, and choose the pencil and paper icon.
    In the Edit Name box, enter Old unencrypted root volume
    Choose Save.
    Follow the same steps to change the name of the volume with a Volume state of Available to New encrypted root volume
13. Swap the root volume that the EC2 instance uses.
    Select Old unencrypted root volume, and then choose Actions > Detach volume.
    To confirm, choose Detach.
14. Select New encrypted root volume, and then choose Actions > Attach volume and configure the following:
    Instance: Choose (LabInstance) (stopped).
    Device name: Enter /dev/xvda
    Note: This is the device name where the existing instance expects to find the root volume.
15. Choose Attach volume.
    Notice that the root volume is now encrypted.
    Return to the Instances screen, and select LabInstance.
    Choose the Storage tab, and notice that the attached volume is now encrypted and has a AWS KMS key ID.
    Note: You might need to refresh the page to see the latest information for the attached volume.

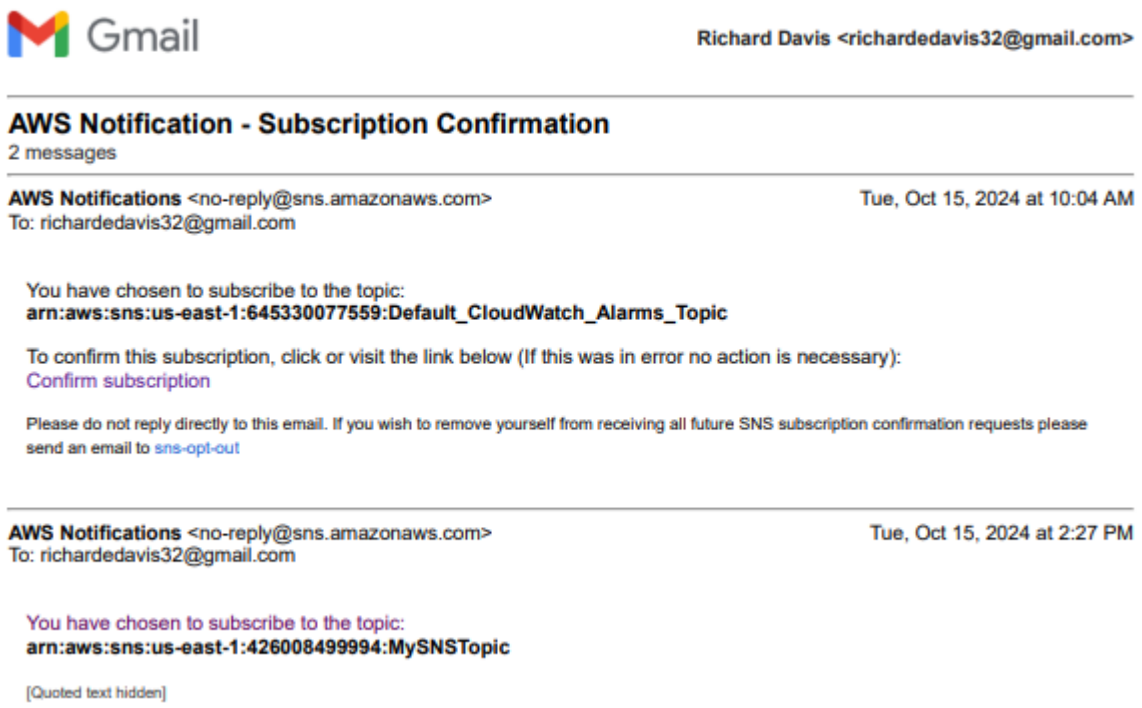


How to create a SNS topic

1. Open the Amazon SNS console.
   In the navigation pane, choose Topics.
2. Choose Create topic, and configure the following:
   Type: Choose Standard.
   Name: Enter MySNSTopic
3. Expand the Access policy - optional section.
   Define who can publish messages to the topic: Choose Everyone.
   Define who can subscribe to this topic: Choose Everyone.
   At the bottom of the page, choose Create topic.

How to subscribe to a SNS topic

1. To create an email subscription to the SNS topic, choose Create subscription, and configure the following:
   Topic ARN: Notice that the Amazon Resource Number (ARN) of the topic that you just created is already filled in.
   Protocol: Choose Email.
   Endpoint: Enter an email address where you can receive emails during this lab.
   Scroll to the bottom of the page and choose Create subscription.
2. Check your email and confirm the subscription.
   Check your email for a message from AWS Notifications.
   In the email body, choose the Confirm subscription link.
   A webpage opens and displays a message that the subscription was successfully confirmed.


Gmail

Richard Davis <richardedavis32@gmail.com>

AWS Notification - Subscription Confirmation
2 messages

AWS Notifications <no-reply@sns.amazonaws.com> Tue, Oct 15, 2024 at 10:04 AM
To: richardedavis32@gmail.com

You have chosen to subscribe to the topic:
arn:aws:sns:us-east-1:645330077559:Default_CloudWatch_Alarms_Topic

To confirm this subscription, click or visit the link below (If this was in error no action is necessary):
Confirm subscription

Please do not reply directly to this email. If you wish to remove yourself from receiving all future SNS subscription confirmation requests please send an email to sns-opt-out

AWS Notifications <no-reply@sns.amazonaws.com> Tue, Oct 15, 2024 at 2:27 PM
To: richardedavis32@gmail.com

You have chosen to subscribe to the topic:
arn:aws:sns:us-east-1:426008499994:MySNSTopic

[Quoted text hidden]

How to create a CloudWatch alarm using a metrics-based filter

1. Create a CloudWatch metric filter.
   In the search box to the right of Services, search for and choose CloudWatch to open the CloudWatch console.
   In the navigation pane, expand Logs, and then choose Log groups.
   Select the check box for CloudTrailLogGroup.
   Note: Recall that when you created the CloudTrail trail, you configured it to create this log group.
   Choose Actions > Create metric filter, and then configure the following:
   Filter pattern: Copy and paste the following code:
   { ($.eventName = ConsoleLogin) && ($.errorMessage = "Failed authentication") }

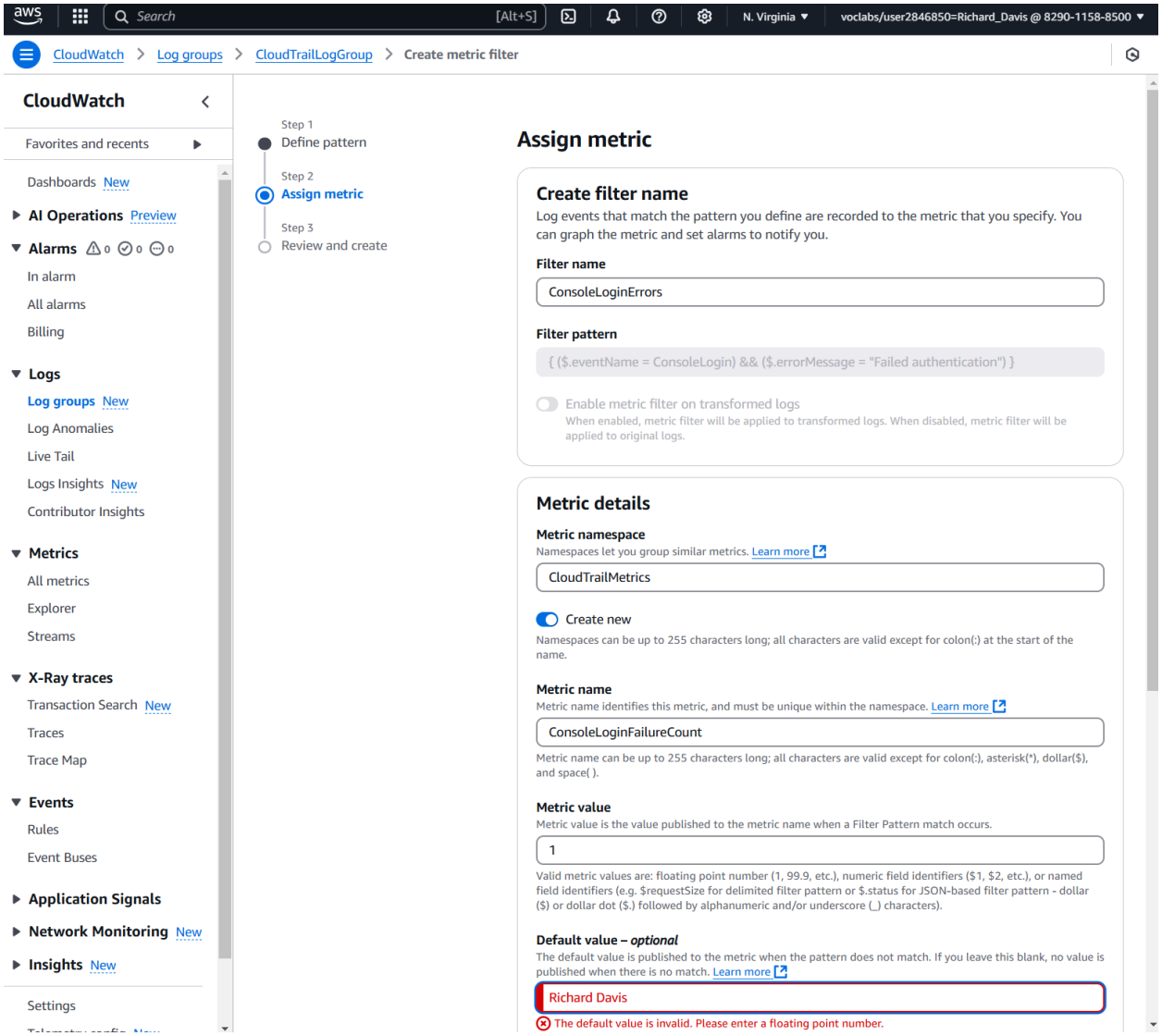
Choose Next.
Filter name: Enter ConsoleLoginErrors
Metric namespace: Enter CloudTrailMetrics
Metric name: Enter ConsoleLoginFailureCount
Metric value: Enter 1
At the bottom of the page, choose Next.
Choose Create metric filter.

2. Create a CloudWatch alarm based on the metric filter.
   On the Metric filters tab, select the check box to the right of the ConsoleLoginErrors metric filter that you just created.
   Choose Create alarm.
   A new browser tab opens.
   On the Specify metric and conditions page, in the Conditions section, configuring the following alarm details:
   Whenever ConsoleLoginFailureCount is: Choose Greater/Equal.
   than...: Enter 3
   Observe the settings. This alarm will be invoked whenever the sum of the ConsoleLoginFailureCount metric that you defined is greater than or equal to 3 within any 5-minute period.
   Choose Next.
   On the Configure actions page, configure the following:
   Select an SNS topic: Choose Select an existing topic.
   Send a notification to...: Choose MySNSTopic.
   Choose Next.
   On the Add name and description page, configure the following:
   Alarm name: Enter FailedLogins
   Choose Next.
   Scroll to the bottom of the page, and choose Create alarm.
3. Test the CloudWatch alarm by attempting to log in to the console with incorrect credentials at least three times.
   In the search box to the right of Services, search for and choose IAM to open the IAM console.
   In the navigation pane, choose Users.
   Choose the link for the test user name.
   Choose the Security credentials tab, and then copy the Console sign-in link.
   Paste the copied link into a new browser tab to load the console sign-in page.
   Enter credentials, including an incorrect password, and attempt to sign in. Repeat this at least three times:
   IAM user name: Enter test
   Password: test
   Choose Sign in.
   Note: Each time that you attempt to log in, you will see a message indicating that your authentication information is incorrect. This is expected!
6. Re-establish your access to the AWS account.
   Close all browser tabs where you have the AWS Management Console open.

On the lab instructions page, choose the AWS link above these instructions to log in again as the voclabs user.
Important: Your attempts to log in to the console as the test user cleared the previous authentication information from your browser's cache. Therefore, you need to re-authenticate to gain access to the console.

7. Graph the metric that you created.
   Navigate to the CloudWatch console.
   In the navigation pane, expand Metrics, and then choose All metrics.
   In the Metrics section, under Custom namespaces, choose CloudTrailMetrics.
   Note: If CloudTrailMetrics does not yet appear, wait until the SNS notification is received.
   Choose Metrics with no dimensions.
   Choose ConsoleLoginFailureCount and then choose Graph this metric only.
   In the graph area at the top of the page, a small blue dot should appear. The dot indicates that a login failure was detected.
5. Check the alarm status and details in the CloudWatch console.
   In the navigation pane, expand Alarms, and then choose All alarms.
   The State for the FailedLogins alarm should be In alarm.
   Note: If the alarm doesn't show this state, wait a minute or two. To refresh the page, choose the refresh icon.

   Tip: To find out if the alarm was invoked recently, choose the link for the FailedLogins alarm name, and then choose the History tab.
6. Check the inbox of the email address that you subscribed to the SNS topic.



How to install the CloudWatch Agent

1. Open the Systems Manager console.
   In the left navigation pane, choose Run Command under Node Management.
2. Choose Run a Command
3. Select the radio button next to AWS-ConfigureAWSPackage.
4. Go down to the Command parameters section and configure:
   Action: Install
   Name: AmazonCloudWatchAgent
   Version: latest
5. In the Targets section, select Choose instances manually and then select Web Server.
   This configuration will install the CloudWatch Agent on the Web Server.
6. At the bottom of the page, choose Run
   Wait for the Overall status to change to Success. You can occasionally choose refresh towards the top of the page to update the status.
   You can view the output from the job to confirm that it ran successfully.

7. Under Targets and outputs, choose the instance-id displayed under Instance ID
8. Expand Step 2 - Command description and status.
   You should see the message: Successfully installed arn:aws:ssm:::package/AmazonCloudWatchAgent