

Linux/Shell

1. Shell program to find second largest number in the list.

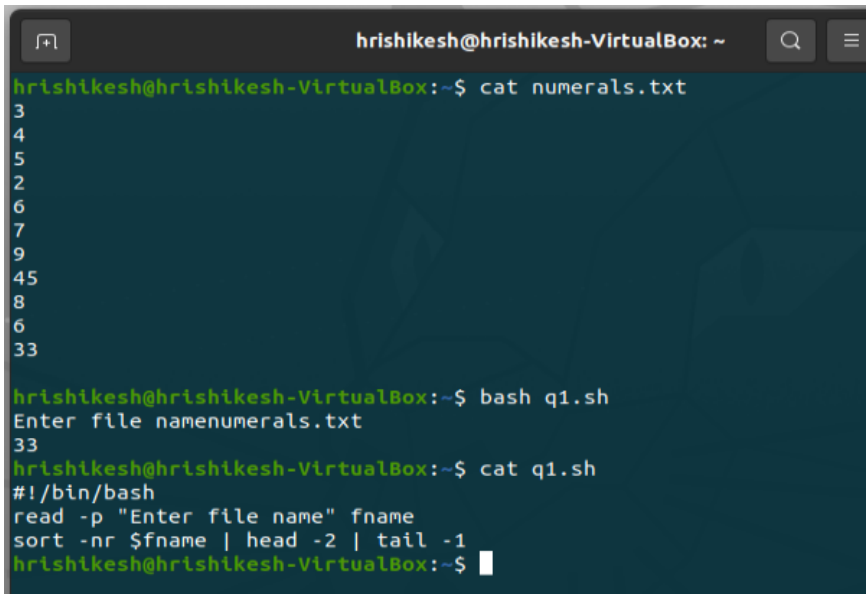
```
#!/bin/bash
```

```
read -p "Enter filename: " fname
```

```
#Reads the file name and stores in fname
```

```
sort -nr $fname | head -2 | tail -1
```

```
#To sort the file using numerical values and then reverse the sorted list and  
then print the second highest value using head and tail
```



```
hrishikesh@hrishikesh-VirtualBox: ~  
hrishikesh@hrishikesh-VirtualBox:~$ cat numerals.txt  
3  
4  
5  
2  
6  
7  
9  
45  
8  
6  
33  
  
hrishikesh@hrishikesh-VirtualBox:~$ bash q1.sh  
Enter file namenumerals.txt  
33  
hrishikesh@hrishikesh-VirtualBox:~$ cat q1.sh  
#!/bin/bash  
read -p "Enter file name" fname  
sort -nr $fname | head -2 | tail -1  
hrishikesh@hrishikesh-VirtualBox:~$
```

2. chmod

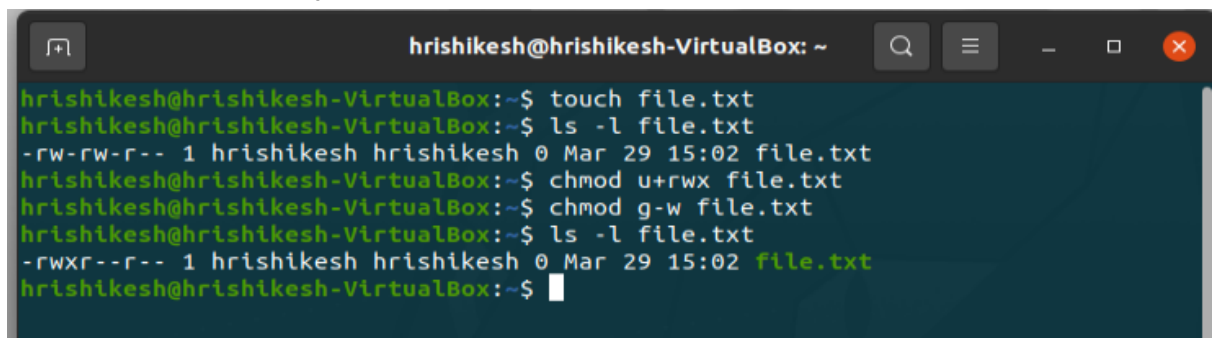
```
touch file.txt #created file
```

```
ls -l file.txt
```

```
chmod u+rw #give owner read write execute
```

```
chmod g-w #removed write permissions for group
```

```
ls -l file.txt #check file permissions
```



```
hrishikesh@hrishikesh-VirtualBox: ~  
hrishikesh@hrishikesh-VirtualBox:~$ touch file.txt  
hrishikesh@hrishikesh-VirtualBox:~$ ls -l file.txt  
-rw-rw-r-- 1 hrishikesh hrishikesh 0 Mar 29 15:02 file.txt  
hrishikesh@hrishikesh-VirtualBox:~$ chmod u+rw file.txt  
hrishikesh@hrishikesh-VirtualBox:~$ chmod g-w file.txt  
hrishikesh@hrishikesh-VirtualBox:~$ ls -l file.txt  
-rwxr--r-- 1 hrishikesh hrishikesh 0 Mar 29 15:02 file.txt  
hrishikesh@hrishikesh-VirtualBox:~$
```

3. Directory

`mkdir -p backup/{daily,weekly}` #created directory backup with daily, weekly as subdirectories
`tree backup`

```
hrishikesh@hrishikesh-VirtualBox: ~  
hrishikesh@hrishikesh-VirtualBox:~$ mkdir -p backup/{daily,weekly}  
hrishikesh@hrishikesh-VirtualBox:~$ tree backup  
backup  
├── daily  
└── weekly  
  
2 directories, 0 files  
hrishikesh@hrishikesh-VirtualBox:~$
```

`cd backup`
`ls`
`cd daily`
`touch backup.txt` #created backup.txt file under daily
`ls`

```
hrishikesh@hrishikesh-VirtualBox:~$ cd backup  
hrishikesh@hrishikesh-VirtualBox:~/backup$ ls  
daily  weekly  
hrishikesh@hrishikesh-VirtualBox:~/backup$ cd daily  
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ touch backup.txt  
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ ls  
backup.txt
```

`ls`
`cp backup.txt ~/backup/weekly` #copied backup.txt to backup/weekly
`cd`
`tree backup`

```
hrishikesh@hrishikesh-VirtualBox: ~  
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ ls  
backup.txt  
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ cp backup.txt ~/backup/weekly/  
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ cd  
hrishikesh@hrishikesh-VirtualBox:~$ tree backup  
backup  
├── daily  
│   └── backup.txt  
└── weekly  
    └── backup.txt  
  
2 directories, 2 files  
hrishikesh@hrishikesh-VirtualBox:~$
```

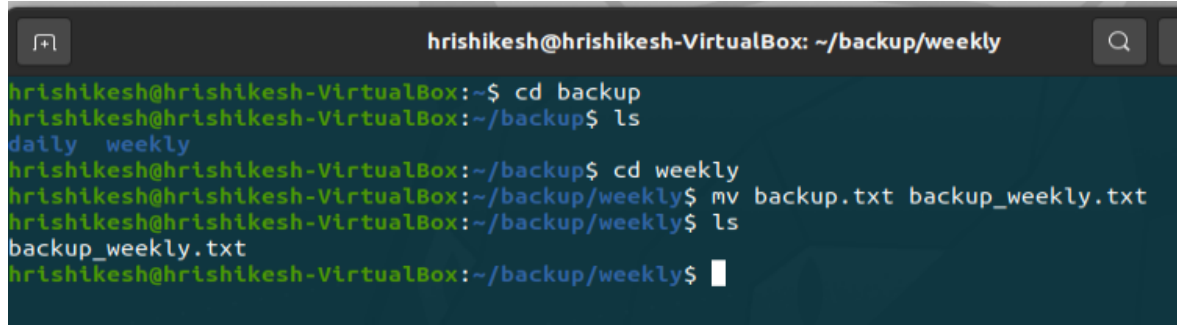
cd backup

ls

cd weekly

mv backup.txt backup_weekly.txt #renamed backup.txt to backup_weekly.txt which is under weekly

ls



```
hrishikesh@hrishikesh-VirtualBox: ~/backup/weekly
hrishikesh@hrishikesh-VirtualBox:~$ cd backup
hrishikesh@hrishikesh-VirtualBox:~/backup$ ls
daily  weekly
hrishikesh@hrishikesh-VirtualBox:~/backup$ cd weekly
hrishikesh@hrishikesh-VirtualBox:~/backup/weekly$ mv backup.txt backup_weekly.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/weekly$ ls
backup_weekly.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/weekly$
```

ls

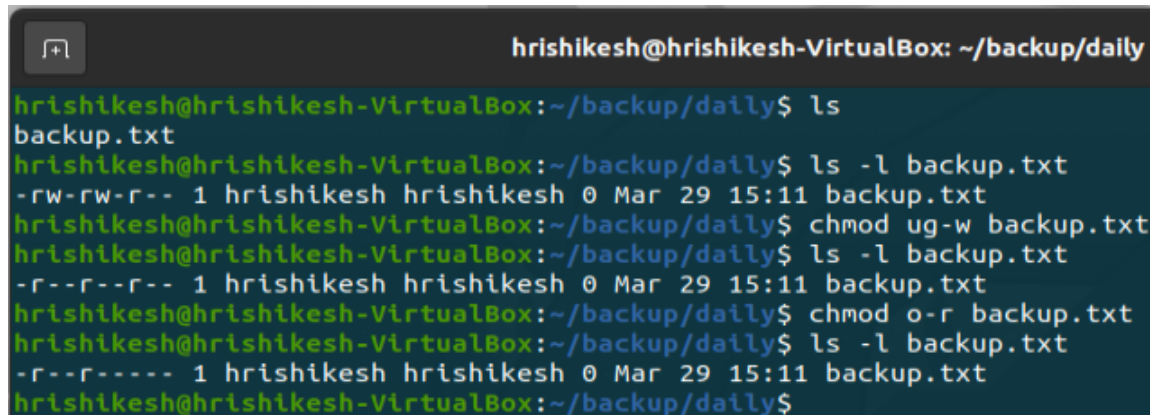
ls -l backup.txt #checked for existing permissions of file backup.txt

chmod ug-w backup.txt #removed write permissions for user and group

ls -l backup.txt

chmod o-r backup.txt #removed all permissions for others

ls -l backup.txt

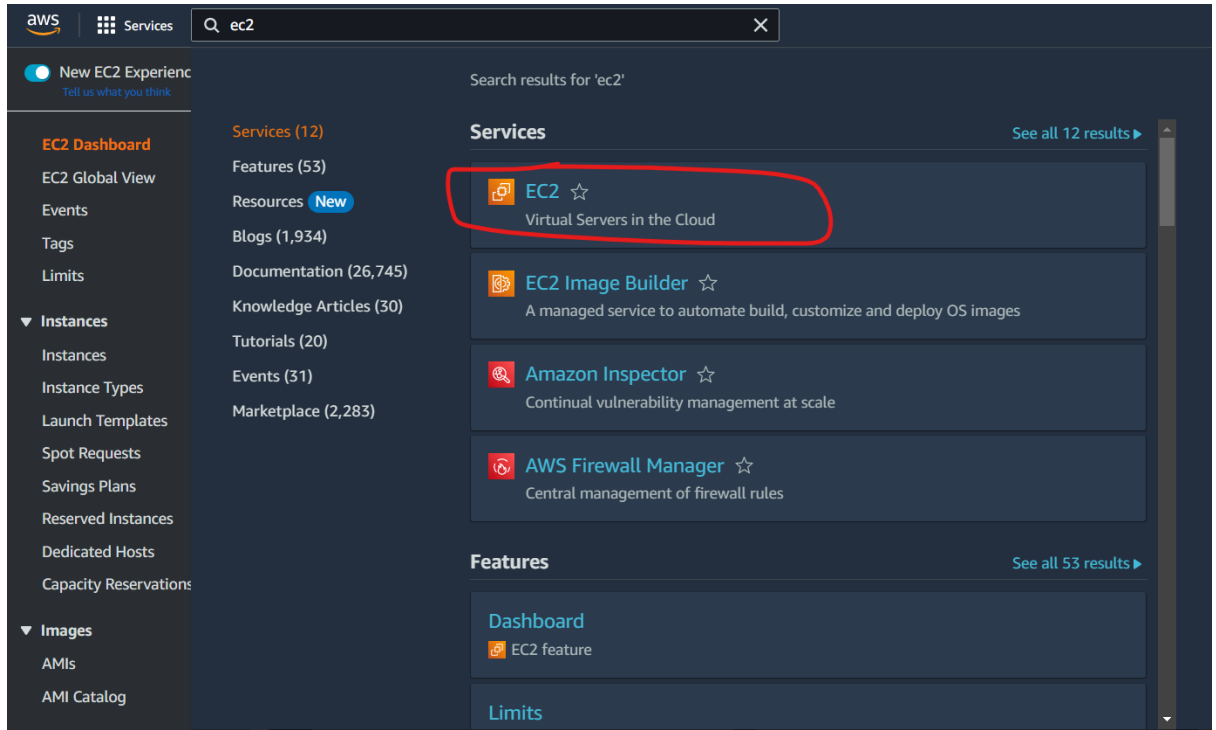


```
hrishikesh@hrishikesh-VirtualBox: ~/backup/daily
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ ls
backup.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ ls -l backup.txt
-rw-rw-r-- 1 hrishikesh hrishikesh 0 Mar 29 15:11 backup.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ chmod ug-w backup.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ ls -l backup.txt
-r--r--r-- 1 hrishikesh hrishikesh 0 Mar 29 15:11 backup.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ chmod o-r backup.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$ ls -l backup.txt
-r--r----- 1 hrishikesh hrishikesh 0 Mar 29 15:11 backup.txt
hrishikesh@hrishikesh-VirtualBox:~/backup/daily$
```

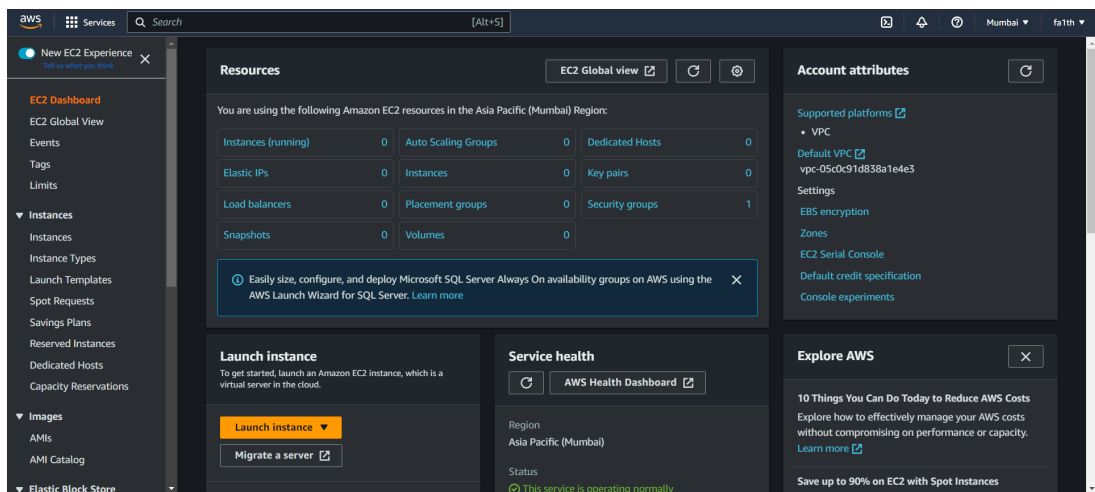
Cloud

4. Create a Linux EC2

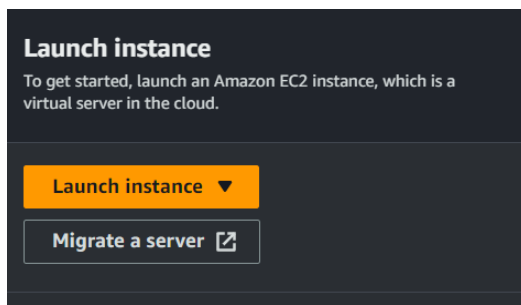
Search for ec2 instance in services



EC2 Dashboard



Launch Instance



Suitable name for the instance

[EC2](#) > [Instances](#) > [Launch an instance](#)

Launch an instance [Info](#)

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags [Info](#)

Name

[Add additional tags](#)

Selecting the OS and architecture.

Here we are selecting **Amazon Linux 64 bit architecture**

▼ **Application and OS Images (Amazon Machine Image)** [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Quick Start

Amazon Linux

aws

macOS

Mac

Ubuntu

ubuntu

Windows

Microsoft

Red Hat

Red Hat

S

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

Amazon Linux 2023 AMI

Free tier eligible ▼

ami-0376ec8eacdf70aae (64-bit (x86), uefi-preferred) / ami-0405dec981e646696 (64-bit (Arm), uefi)

Virtualization: hvm ENA enabled: true Root device type: ebs

Description

Amazon Linux 2023 AMI 2023.0.20230322.0 x86_64 HVM kernel-6.1

Architecture

Boot mode

AMI ID

64-bit (x86) ▼

uefi-preferred

ami-0376ec8eacdf70aae

Verified provider

Instance type as per the requirement

Here t2.micro

1 vCPU and GiB Memory



▼ Instance type [Info](#)

Instance type

t2.micro Free tier eligible

Family: t2 1 vCPU 1 GiB Memory

On-Demand Linux pricing: 0.0124 USD per Hour

On-Demand Windows pricing: 0.017 USD per Hour

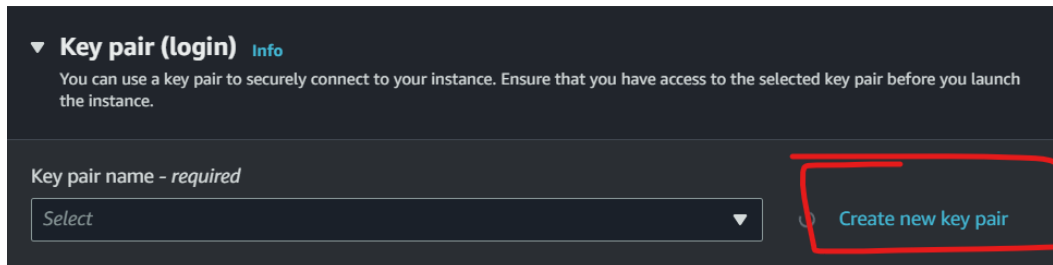
On-Demand RHEL pricing: 0.0724 USD per Hour

On-Demand SUSE pricing: 0.0124 USD per Hour

[Compare instance types](#)

Now we need key pair for authentication

So we create new key



▼ Key pair (login) [Info](#)

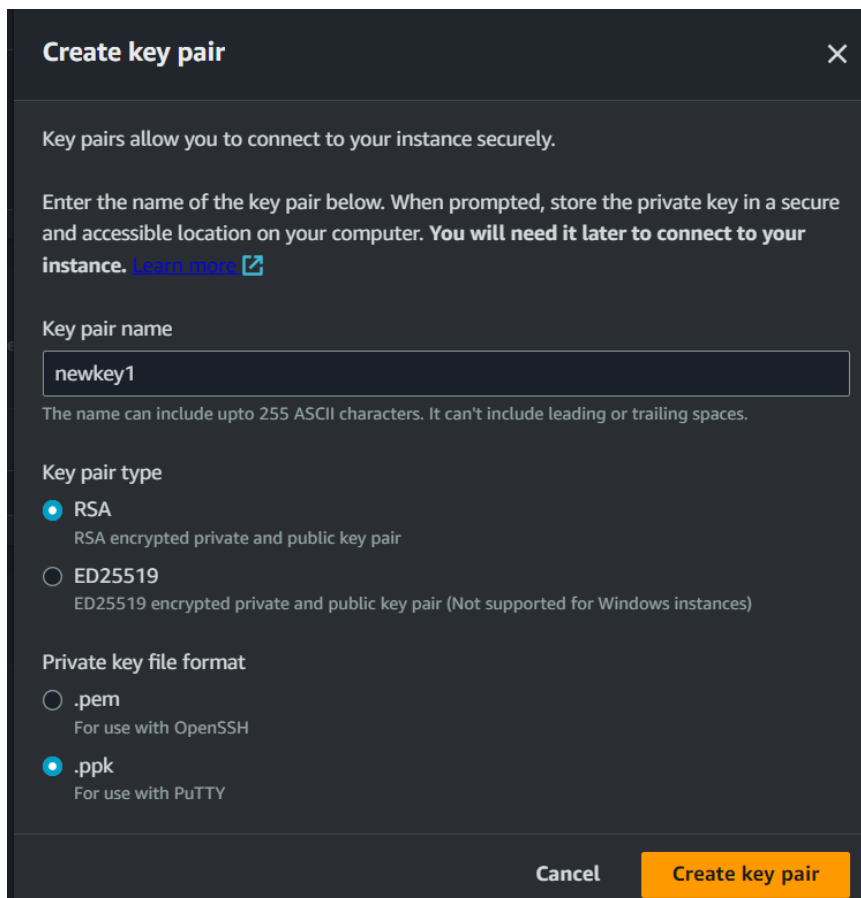
You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - required

Select ▼

[Create new key pair](#)

New key name and type .ppk since we have to connect using putty.



Create key pair ✕

Key pairs allow you to connect to your instance securely.

Enter the name of the key pair below. When prompted, store the private key in a secure and accessible location on your computer. **You will need it later to connect to your instance.** [Learn more](#)

Key pair name

newkey1

The name can include upto 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type

☒ RSA
RSA encrypted private and public key pair

☐ ED25519
ED25519 encrypted private and public key pair (Not supported for Windows instances)

Private key file format

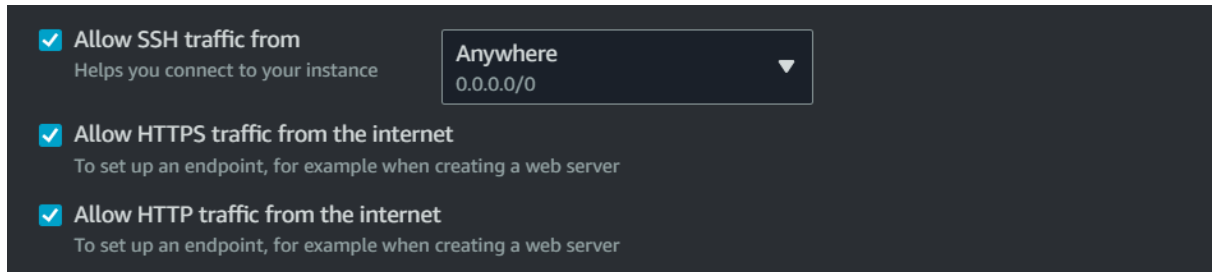
☐ .pem
For use with OpenSSH

☒ .ppk
For use with PuTTY

Cancel [Create key pair](#)

Key will be downloaded.

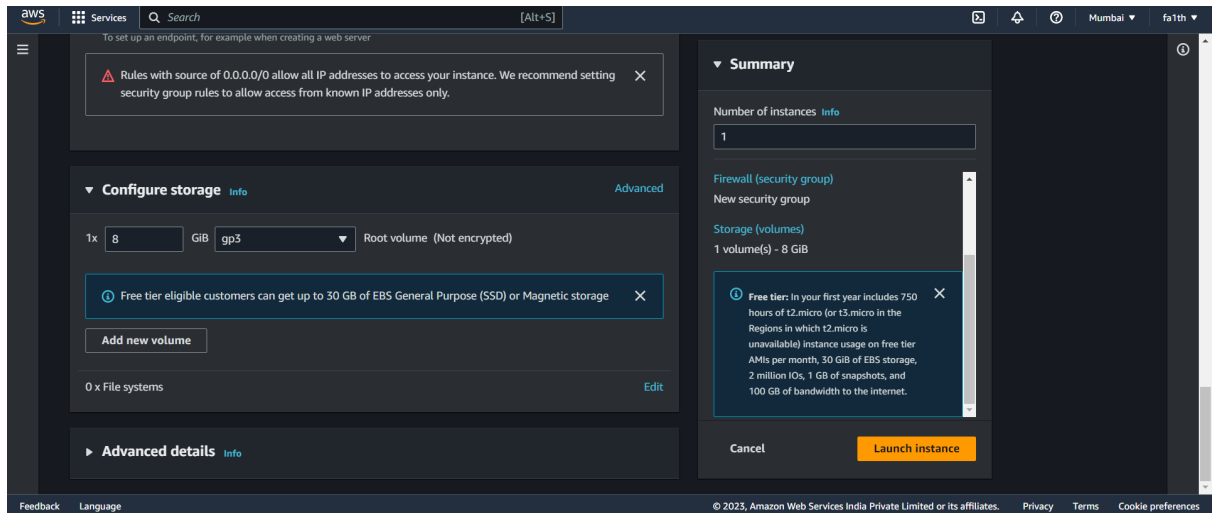
Now we need to allow traffic from anywhere



This screenshot shows the 'Inbound rules' configuration for a security group. Three rules are checked and configured to allow traffic from 'Anywhere' (0.0.0.0/0):

- ☒ **Allow SSH traffic from**
Helps you connect to your instance
- ☒ **Allow HTTPS traffic from the internet**
To set up an endpoint, for example when creating a web server
- ☒ **Allow HTTP traffic from the internet**
To set up an endpoint, for example when creating a web server

Now Launch instance



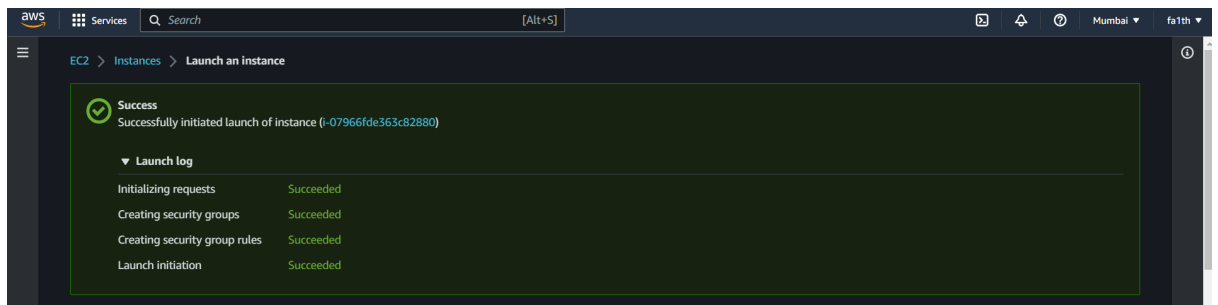
This screenshot shows the 'Launch instance' wizard in the AWS Management Console. The 'Summary' tab is selected, showing the following configuration:

- Number of instances:** 1
- Firewall (security group):** New security group
- Storage (volumes):** 1 volume(s) - 8 GiB

A warning message states: 'Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.'

At the bottom, there are 'Cancel' and 'Launch instance' buttons.

Instance successfully created



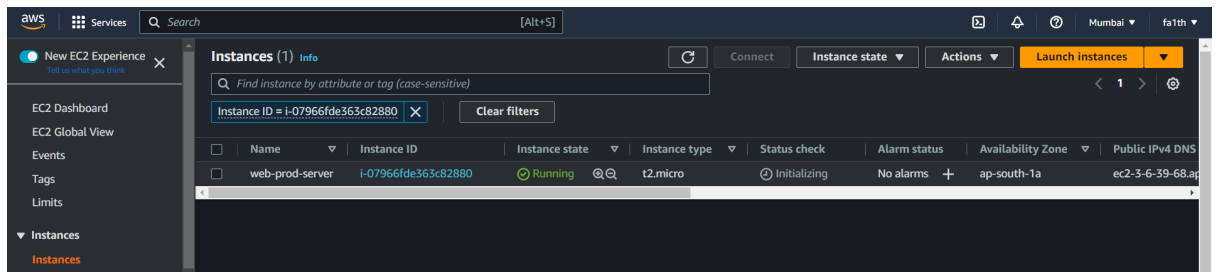
This screenshot shows the 'Launch an instance' page in the AWS Management Console. A green success message is displayed:

Success
Successfully initiated launch of instance (i-07966fde363c82880)

Below the message is a 'Launch log' section showing the following steps and their status:

Step	Status
Initializing requests	Succeeded
Creating security groups	Succeeded
Creating security group rules	Succeeded
Launch initiation	Succeeded

Now we click on instance id and it will redirect to console



This screenshot shows the 'Instances (1)' page in the AWS Management Console. The instance 'web-prod-server' with ID 'i-07966fde363c82880' is listed. The instance is in the 'Running' state and is a 't2.micro' type.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
web-prod-server	i-07966fde363c82880	Running	t2.micro	Initializing	No alarms	ap-south-1a	ec2-3-6-39-68.ap...

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EC2 > Instances > i-07966fde363c82880

Instance summary for i-07966fde363c82880 (web-prod-server) Info

Updated less than a minute ago

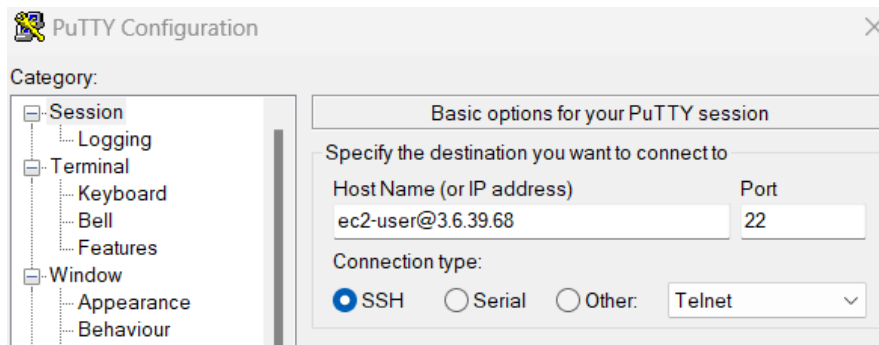
Connect Instance state Actions

Instance ID i-07966fde363c82880 (web-prod-server)	Public IPv4 address 3.6.39.68 open address	Private IPv4 addresses 172.31.46.255
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-3-6-39-68.ap-south-1.compute.amazonaws.com open address
Hostname type IP name: ip-172-31-46-255.ap-south-1.compute.internal	Private IP DNS name (IPv4 only) ip-172-31-46-255.ap-south-1.compute.internal	Elastic IP addresses -
Answer private resource DNS name IPv4 (A)	Instance type t2.micro	AWS Compute Optimizer finding Opt-in to AWS Compute Optimizer for recommendations. Learn more
Auto-assigned IP address 3.6.39.68 [Public IP]	VPC ID vpc-05c0c91d838a1e4e3	Auto Scaling Group name -
IAM Role -	Subnet ID subnet-0774e00e3a4c74306	

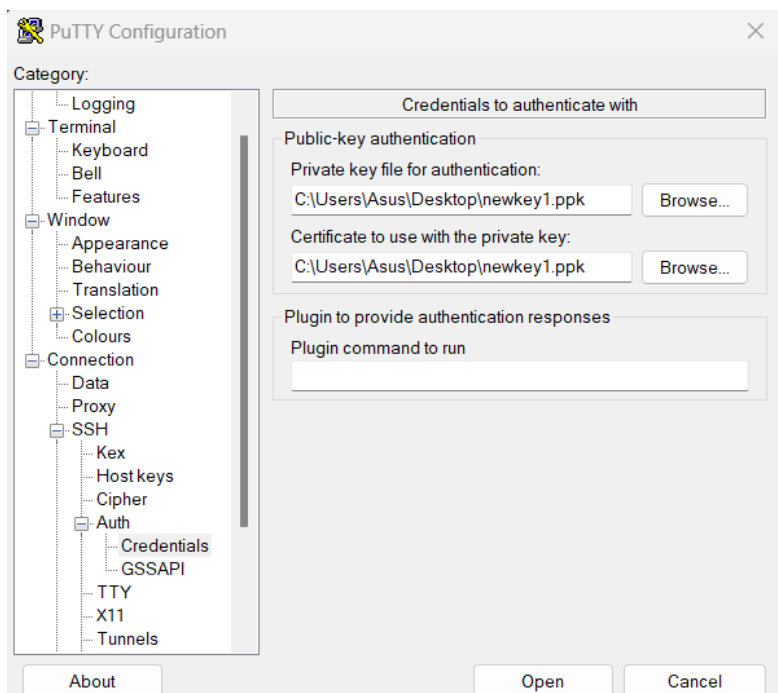
Details Security Networking Storage Status checks Monitoring Tags

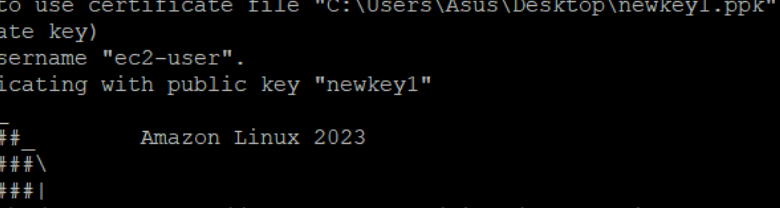
Now we open Putty on our local machine

We enter the user name and public ip of the instance and select ssh



SSH > Auth > Credentials





```
ec2-user@ip-172-31-46-255:~
Unable to use certificate file "C:\Users\Asus\Desktop\newkey1.ppk" (PuTTY SSH
-2 private key)
Using username "ec2-user".
Authenticating with public key "newkey1"

#_
~\#### Amazon Linux 2023
~~~\#####\
~~~\###|
~~~\#/ https://aws.amazon.com/linux/amazon-linux-2023
~~~V~'-'>
~~~~
~~~.-.
~~~/_/_'/_/

[ec2-user@ip-172-31-46-255 ~]$
```

```
yum update -y
```

```
root@ip-172-31-46-255:~  
[root@ip-172-31-46-255 ~]# yum update -y  
Last metadata expiration check: 0:05:28 ago on Wed Mar 29 10:05:23 2023.  
Dependencies resolved.  
Nothing to do.  
Complete!  
[root@ip-172-31-46-255 ~]#
```

```
yum install httpd -y
```

```
[root@ip-172-31-46-255 ~]# yum install httpd -y
Last metadata expiration check: 0:06:12 ago on Wed Mar 29 10:05:23 2023.
Dependencies resolved.

=====
Package                Arch      Version                               Repository      Size
=====
Installing:
  httpd                x86_64    2.4.56-1.amzn2023                   amazonlinux     48 k
Installing dependencies:
  apr                  x86_64    1.7.2-2.amzn2023.0.2                amazonlinux     129 k
  apr-util             x86_64    1.6.3-1.amzn2023.0.1                amazonlinux     98 k
  generic-logos-httpd  noarch    18.0.0-12.amzn2023.0.3              amazonlinux     19 k
  httpd-core           x86_64    2.4.56-1.amzn2023                   amazonlinux     1.4 M
  httpd-filesystem     noarch    2.4.56-1.amzn2023                   amazonlinux     15 k
  httpd-tools          x86_64    2.4.56-1.amzn2023                   amazonlinux     82 k
  libbrotli            x86_64    1.0.9-4.amzn2023.0.2                amazonlinux     315 k
  mailcap              noarch    2.1.49-3.amzn2023.0.3               amazonlinux     33 k
Installing weak dependencies:
  apr-util-openssl     x86_64    1.6.3-1.amzn2023.0.1                amazonlinux     17 k
```

After installing the service, we need to start and enable the httpd service

`systemctl start httpd`

`systemctl enable httpd`

`systemctl status httpd`

Thus the status of httpd is active and running

```
[root@ip-172-31-46-255 ~]# systemctl enable httpd
Created symlink /etc/systemd/system/multi-user.target.wants/httpd.service → /usr/lib/systemd/system/httpd.service.
[root@ip-172-31-46-255 ~]# systemctl status httpd
● httpd.service - The Apache HTTP Server
   Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
   Active: active (running) since Wed 2023-03-29 10:13:11 UTC; 16s ago
     Docs: man:httpd.service(8)
  Main PID: 25381 (httpd)
    Status: "Total requests: 0; Idle/Busy workers 100/0; Requests/sec: 0; Bytes served/sec: 0.00"
    Tasks: 177 (limit: 1112)
   Memory: 12.8M
      CPU: 75ms
   CGroup: /system.slice/httpd.service
           └─25381 /usr/sbin/httpd -DFOREGROUND
             └─25382 /usr/sbin/httpd -DFOREGROUND
               └─25383 /usr/sbin/httpd -DFOREGROUND
                 └─25384 /usr/sbin/httpd -DFOREGROUND
                   └─25385 /usr/sbin/httpd -DFOREGROUND

Mar 29 10:13:11 ip-172-31-46-255.ap-south-1.compute.internal systemd[1]: Starting The Apache HTTP Server: httpd.
Mar 29 10:13:11 ip-172-31-46-255.ap-south-1.compute.internal systemd[1]: Started The Apache HTTP Server: httpd.
Mar 29 10:13:11 ip-172-31-46-255.ap-south-1.compute.internal httpd[25381]: Server started.
lines 1-19/19 (END)
```

Now we need to create a html page. For that we need to go into
`/var/www/html`

`cd /var/www/html`

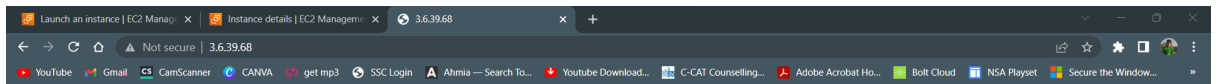
`vim index.html`

```
root@ip-172-31-46-255:/var/www/html
<html>
  <body>
    <h1> Hello </h1>
    <p> Welcome to the webpage </p>
  </body>
</html>
```

Copy the public IP

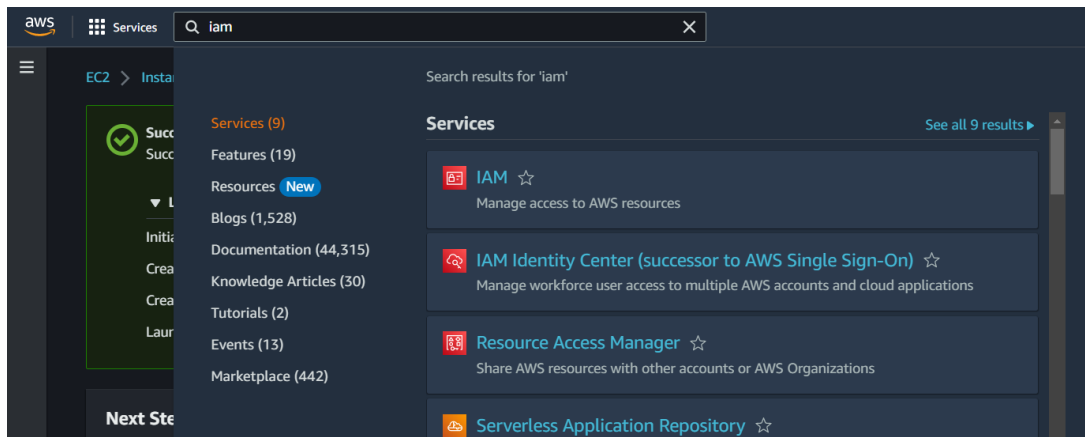
Public IPv4 address
3.6.39.68 | [open address](#)

Paste in another tab and it will show the contents of html file

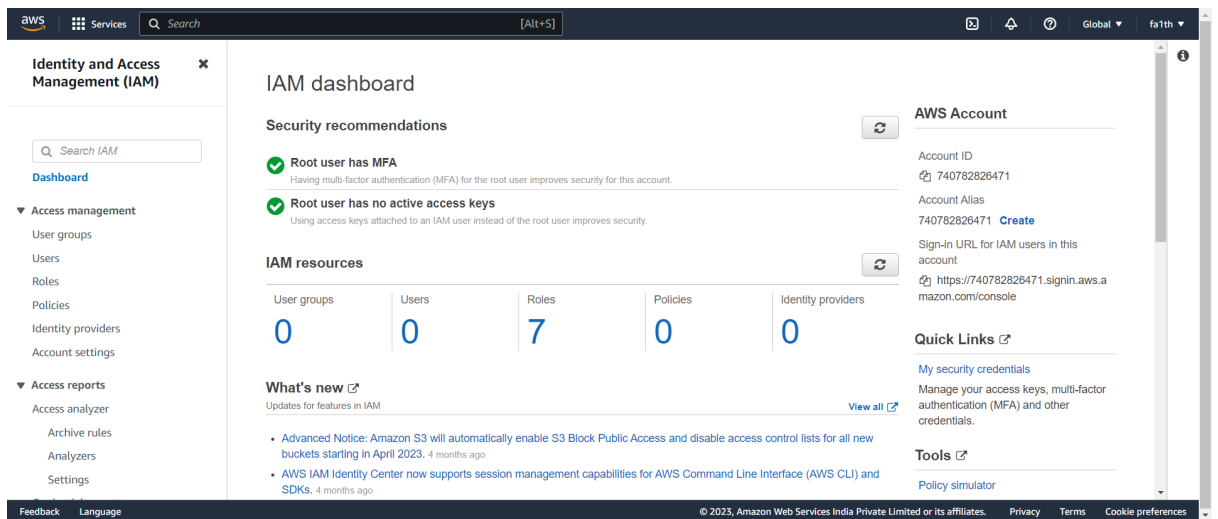


5. IAM

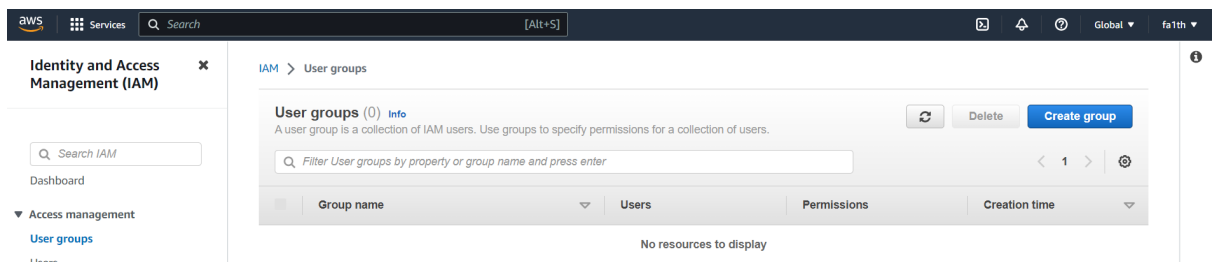
Search IAM in services



IAM Dashboard will open up



Then we click on groups and create new group - devops



IAM > User groups

User groups (1) [Info](#)

A user group is a collection of IAM users. Use groups to specify permissions for a co

<input type="checkbox"/>	Group name	Users
<input type="checkbox"/>	devops	

Create user

IAM > Users

Users (0) [Info](#)

An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.

[Refresh](#) [Delete](#) [Add users](#)

< 1 >

<input type="checkbox"/>	User name	Groups	Last activity	MFA	Password age	Active key age
No resources to display						

Specify the user details

Specify user details

User details

User name

The user name can have up to 64 characters. Valid characters: A-Z, a-z, 0-9, and + = , . @ _ - (hyphen)

Add the user to the group as well

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Set B

Set permissions

Add user to an existing group or create a new one. Using groups is a best-practice way to manage user's permissions by job functions. [Learn more](#)

Permissions options

☒ Add user to group

Add user to an existing group, or create a new group. We recommend using groups to manage user permissions by job function.

☐ Copy permissions

Copy all group memberships, attached managed policies, and inline policies from an existing user.

☐ Attach policies directly

Attach a managed policy directly to a user. As a best practice, we recommend attaching policies to a group instead. Then, add the user to the appropriate group.

User groups (1/1)

Search groups



Create group

< 1 >

<input checked="" type="checkbox"/>	Group name	Users	Attached policies	Created
<input checked="" type="checkbox"/>	devops	0	None	2023-03-29 (2 minutes ago)

User is created and added to the group

IAM > Users

Users (1) Info

An IAM user is an identity with long-term credentials that is used to interact with AWS in an account.



Delete

Add users

Find users by username or access key

< 1 >

<input type="checkbox"/>	User name	Groups	Last activity	MFA	Password age	Active key age
<input type="checkbox"/>	jane	devops	Never	None	None	-

Click on the username and we attach policies giving full access to EC2

☐ Add user to group

Add user to an existing group, or create a new group. We recommend using groups to manage user permissions by job function.

☐ Copy permissions

Copy all group memberships, attached managed policies, inline policies, and any existing permissions boundaries from an existing user.

☒ Attach policies directly

Attach a managed policy directly to a user. As a best practice, we recommend attaching policies to a group instead. Then, add the user to the appropriate group.

Permissions policies (1/1060)

ec2 38 matches



Create policy

< 1 2 >

<input type="checkbox"/>	Policy name	Type	Attached entities
<input type="checkbox"/>	AmazonEC2ContainerRegistryFullAc...	AWS managed	0
<input type="checkbox"/>	AmazonEC2ContainerRegistryPowe...	AWS managed	0
<input type="checkbox"/>	AmazonEC2ContainerRegistryRead...	AWS managed	0
<input type="checkbox"/>	AmazonEC2ContainerServiceAutosc...	AWS managed	0
<input type="checkbox"/>	AmazonEC2ContainerServiceEvents...	AWS managed	0
<input type="checkbox"/>	AmazonEC2ContainerServiceforEC2...	AWS managed	0
<input type="checkbox"/>	AmazonEC2ContainerServiceRole	AWS managed	0
<input checked="" type="checkbox"/>	AmazonEC2FullAccess	AWS managed	0

Thus, policy has been added

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Set B

Permissions policies (1)
Permissions are defined by policies attached to the user directly or through groups.

Find policies

<input type="checkbox"/>	Policy name ↗	Type	Attached via ↗
<input type="checkbox"/>	AmazonEC2FullAccess	AWS managed	Directly

Now we go to IAM Policy Simulator
And click on the user we created - jane
Here we can see the assigned policy to the user.

IAM Policy Simulator Mode: Existing Policies - faith -

Policies [Back](#) [Create New Policy](#)

Selected user: jane

Amazon EC2 599 Action(s) s... [Select All](#) [Deselect All](#) [Reset Contexts](#) [Clear Results](#) [Run Simulation](#)

IAM Policies

Filter

☒ AmazonEC2FullAccess

Global Settings

Action Settings and Results [599 actions selected, 599 actions not simulated, 0 actions allowed, 0 actions denied.]

Service	Action	Resource Type	Simulation Resource	Permission
Amazon EC2	AcceptAddressTransfer	elastic-ip	*	Not simulated

Once we click simulate. All the selected actions will be simulated and allowed to the user.

Policy Simulator

Amazon EC2 599 Action(s) s... [Select All](#) [Deselect All](#) [Reset Contexts](#) [Clear Results](#) [Run Simulation](#)

Global Settings

Action Settings and Results [599 actions selected, 0 actions not simulated, 599 actions allowed, 0 actions denied.]

Service	Action	Resource Type	Simulation Resource	Permission
Amazon EC2	AcceptAddressTransfer	elastic-ip	*	allowed 1 matching statements.
Amazon EC2	AcceptReservedInstancesExc...	not required	*	allowed 1 matching statements.
Amazon EC2	AcceptTransitGatewayMulticas...	not required	*	allowed 1 matching statements.
Amazon EC2	AcceptTransitGatewayPeering...	transit-gateway-attach...	*	allowed 1 matching statements.
Amazon EC2	AcceptTransitGatewayVpcAtta...	transit-gateway-attach...	*	allowed 1 matching statements.
Amazon EC2	AcceptVpcEndpointConnections	vpc-endpoint-service	*	allowed 1 matching statements.
Amazon EC2	AcceptVpcPeeringConnection	vpc,vpc-peering-conn...	*	allowed 1 matching statements.
Amazon EC2	AdvertiseByoipCidr	not required	*	allowed 1 matching statements.
Amazon EC2	AllocateAddress	elastic-ip	*	allowed 1 matching statements.
Amazon EC2	AllocateHosts	dedicated-host	*	allowed 1 matching statements.
Amazon EC2	AllocatelpamPoolCidr	ipam-pool	*	allowed 1 matching statements.
Amazon EC2	ApplySecurityGroupsToClientV...	client-vpn-endpoint,se...	*	allowed 1 matching statements.

Thus we have verified user permissions, all actions allowed because we have given EC2 full access.