

# EE450 Socket Programming Project: Alternatives to the Provided VM

Only Applicable to Mac M1 Users

As the new Apple Mac M1 machine does not support VM execution, students are facing difficulties in testing their socket programming project in the provided Ubuntu VM. Here I am providing an alternative solution based on Amazon AWS cloud EC2 instances. For the students who cannot launch the provided Ubuntu VM, please follow the below steps to test your project before submission.

## Step 0: create an AWS account

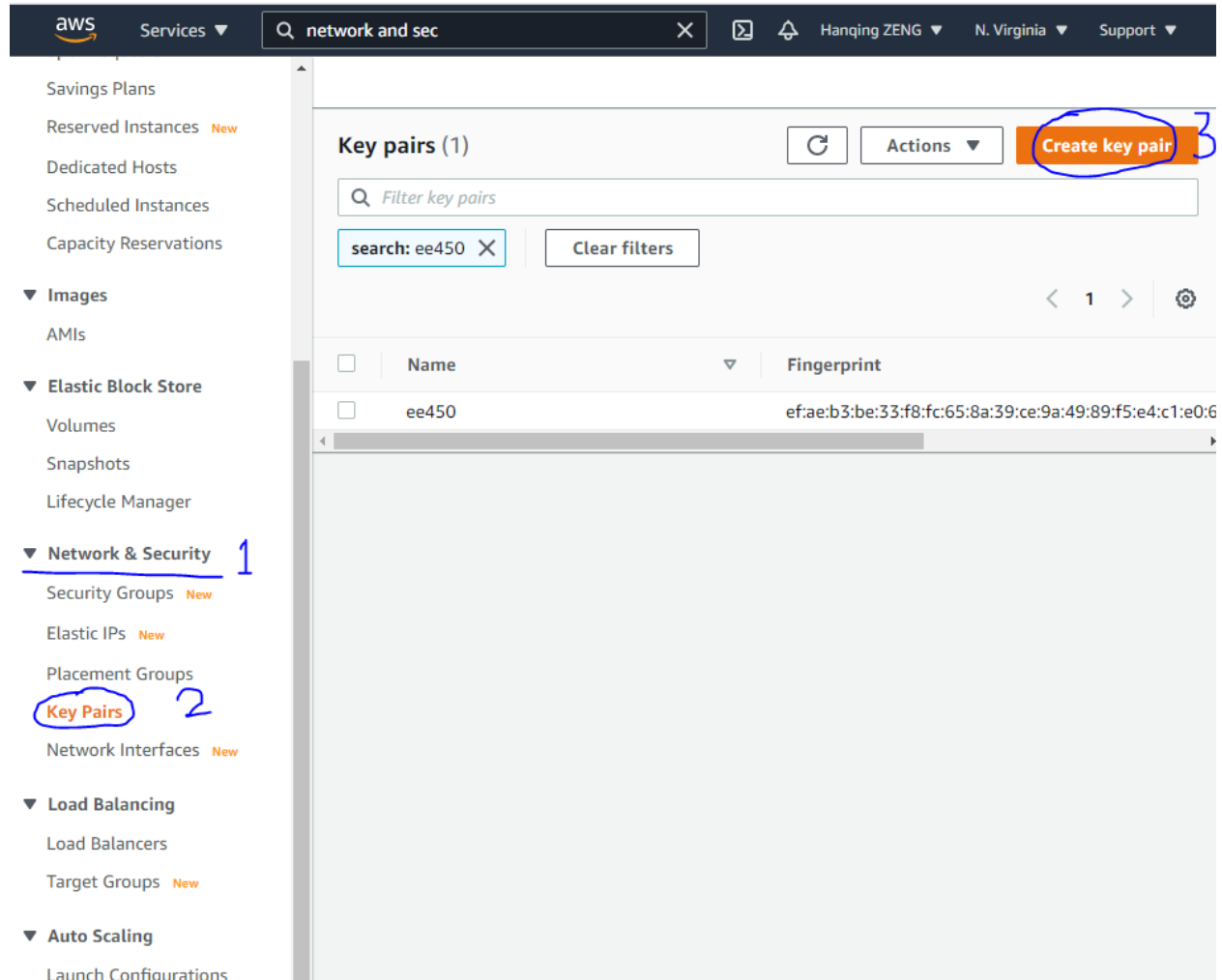
Google amazon aws and create your own account.

Be aware that AWS charges you based on your hourly usage. Always remember to terminate your instance after you are done using it. Otherwise, you may be surprised by your monthly bill!

## Step 1: Create Key Pairs

The key pair is used later on to securely log in (via `ssh`) your launched EC2 instance.

Go to the dashboard. Click “Network & Security” → “Key Pairs” on the left panel. Then click “Create key pair” on the right panel. Give whatever name to your newly created key-pair (in the example, I named it “ee450”). For Mac M1, you should create the file in the \*.pem format. After successful creation, you should see a new row in the dashboard, and your browser should download the “\*.pem” file automatically for you. Save the downloaded file to some local folder, as this file will be needed to log in the ec2 later on.



## Step 2: Launch EC2 instance

Now you are ready to launch EC2 instances in Ubuntu.

**Step 2.1** Go back to the main dashboard, and click “Instances” → “Instances” on the left panel. Then click “Launch instances” on the right panel.

The screenshot shows the AWS Management Console interface. On the left sidebar, under the 'Instances' section, the 'Instances' link is circled in blue and labeled with a handwritten '2'. In the main content area, the 'Launch instances' button is circled in blue and labeled with a handwritten '3'. The main content area displays a table of instances with the following data:

	Name	Instance ID	Instance state	Instance type
<input type="checkbox"/>	-	i-0e4a5d720fcf94fad	Running	t2.micro
<input type="checkbox"/>	-	i-06626ebe4c5a60fb1	Running	t2.micro

**Step 2.2** You should see the following page. Scroll down and find “Ubuntu Server 18.04 LTS”. Click “Select”.

aws Services ▾ Search for services, features, marketplace [Alt+S] Hanqing ZENG ▾ N. Virginia ▾ Support ▾

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 1: Choose an Amazon Machine Image (AMI) Cancel and Exit

**SUSE Linux Enterprise Server 15 Service Pack 2 (HVM), EBS General Purpose (SSD) Volume Type.** Amazon EC2 AMI Tools preinstalled; Apache 2.2, MySQL 5.5, PHP 5.3, and Ruby 1.8.7 available.

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

☐ 64-bit (Arm)

---

**Ubuntu Server 20.04 LTS (HVM), SSD Volume Type** - ami-042e8287309f5df03 (64-bit x86) / ami-0b75998a97c952252 (64-bit Arm)

Free tier eligible

Ubuntu Server 20.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

☒ 64-bit (x86)  
☐ 64-bit (Arm)

---

**Ubuntu Server 18.04 LTS (HVM), SSD Volume Type** - ami-013f17f36f8b1fefb (64-bit x86) / ami-02ed82f3a38303e6f (64-bit Arm)

Free tier eligible

Ubuntu Server 18.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

☒ 64-bit (x86)  
☐ 64-bit (Arm)

---

**Microsoft Windows Server 2019 Base** - ami-07817f5d0e3866d32

Free tier eligible

Microsoft Windows 2019 Datacenter edition. [English]

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

☐ 64-bit (x86)

---

**Deep Learning AMI (Ubuntu 18.04) Version 42.1** - ami-0e956fe81fa11d0a9

MXNet-1.8.0 & 1.7.0 TensorFlow-2.4.1 & 2.1.3 & 1.15.5 PyTorch-1.4.0 &

☐ 64-bit (x86)

**Step 2.3** Now set the instance type to be “t2.micro”. The socket programming project does not need much processing power or memory storage. So the “t2.micro” instance should be fine. If you select other instance types, you will then need to pay for their usage out of your own pocket.

Then directly click “Review and Launch”. We don’t need to do any other configurations.

aws

Services

Q

Search for services, features, marketplace [Alt+S]

Hangqing ZENG

N. Virginia

Support

1. Choose AMI

2. Choose Instance Type

3. Configure Instance

4. Add Storage

5. Add Tags

6. Configure Security Group

7. Review

## Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by:

All instance families

Current generation

Show/Hide Columns

Currently selected: t2.micro (- ECUs, 1 vCPUs, 2.5 GHz, -, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance	Support
<input type="checkbox"/>	t2	t2.nano	1	0.5	EBS only	-	Low to Moderate	
<input checked="" type="checkbox"/>	t2	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate	
<input type="checkbox"/>	t2	t2.small	1	2	EBS only	-	Low to Moderate	
<input type="checkbox"/>	t2	t2.medium	2	4	EBS only	-	Low to Moderate	
<input type="checkbox"/>	t2	t2.large	2	8	EBS only	-	Low to Moderate	
<input type="checkbox"/>	t2	t2.xlarge	4	16	EBS only	-	Moderate	
<input type="checkbox"/>	t2	t2.2xlarge	8	32	EBS only	-	Moderate	
<input type="checkbox"/>	t3	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	
<input type="checkbox"/>	t3	t3.micro	2	1	EBS only	Yes	Up to 5 Gigabit	
<input type="checkbox"/>	t3	t3.small	2	2	EBS only	Yes	Up to 5 Gigabit	
<input type="checkbox"/>	t3	t3.medium	2	4	EBS only	Yes	Up to 5 Gigabit	
<input type="checkbox"/>	t3	t3.large	2	8	EBS only	Yes	Up to 5 Gigabit	

Cancel

Previous

Review and Launch

Next: Configure Instance Details

Step 2.4 In the following page, click "Launch".

Services

Search for services, features, marketplace [Alt+S]

Hanqing ZENG
N. Virginia
Support

1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. Review

## Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.

**Improve your instances' security. Your security group, launch-wizard-3, is open to the world.**  
Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only.  
You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. [Edit security groups](#)

**Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-013f17f36f8b1fefb**

Free tier eligible

Ubuntu Server 18.04 LTS (HVM), EBS General Purpose (SSD) Volume Type. Support available from Canonical (<http://www.ubuntu.com/cloud/services>).  
Root Device Type: ebs    Virtualization type: hvm

Edit AMI

**Instance Type**

Edit instance type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t2.micro	-	1	1	EBS only	-	Low to Moderate

**Security Groups**

Edit security groups

Security group name
Description

launch-wizard-3
launch-wizard-3 created 2021-04-04T21:40:20.423-07:00

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	0.0.0.0/0	

Cancel
Previous
**Launch**

**Step 2.5** Now you need to confirm the key pair to use. Select the key-pair that you just created (it probably selected for you by default).

Finally, "Launch instances".

aws Services Search for services, features, marketplace [Alt+S] Hanqing ZENG N. Virginia Support

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.

**⚠ Improve your instances' security. Your security group, launch-wizard-3, is open to the world.**

Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only.

You can...  
(80) for...  
g., HTTP

**Select an existing key pair or create a new key pair** ✕

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about removing existing key pairs from a public AMI.

Choose an existing key pair

**Select a key pair**

ee450

☐ I acknowledge that I have access to the selected private key file (ee450.pem), and that without this file, I won't be able to log into my instance.

Cancel Launch Instances

**AMI Details**

Free tier eligible

**Instance Type**

Instance Type

t2.micro

**Security Group**

Security group name launch-wizard-3

Description launch-wizard-3 created 2021-04-04T21:40:20.423-07:00

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ	Description ⓘ
SSH	TCP	22	0.0.0.0/0	

Cancel Previous Launch

**Step 2.6** Now go back to the main dashboard. You should be able to see a new entry listed under “Instances”. It will probably take a few minutes before the “Instance state” to become “Running”.

The screenshot displays the AWS Management Console interface for the EC2 service. The top navigation bar includes the AWS logo, a search bar, and user information. The left sidebar lists various EC2-related services, with 'Instances' currently selected. The main panel shows the 'Instances (2)' page, which includes a table of running instances. The first instance, with ID `i-0e4a5d720fc94fad`, is highlighted by a blue line. Below the table, a section titled 'Select an instance above' contains three small icons.

	Name	Instance ID	Instance state	Instance type
<input type="checkbox"/>	-	i-0e4a5d720fc94fad	Running	t2.micro
<input type="checkbox"/>	-	i-06626ebe4c5a60fb1	Running	t2.micro

## Step 3 Connect

After the status becomes “running”, select the instance you just launched. Click “Connect”.



The screenshot displays the AWS Management Console interface for the EC2 service. The left-hand navigation pane shows the 'Instances' section selected. The main content area is titled 'Instances (1/2)' and includes a 'Connect' button, an 'Instance state' dropdown, and an 'Actions' dropdown. A search bar labeled 'Filter instances' is present, with a blue arrow pointing to it. Below the search bar, a table lists the instances. The first instance, with ID 'i-0e4a5d720fcf94fad', is highlighted in blue, and a blue checkmark is visible in the selection column. The second instance, with ID 'i-06626ebe4c5a60fb1', is also listed. Below the table, the details for the selected instance 'i-0e4a5d720fcf94fad' are shown, including its public IPv4 address '54.162.99.3' and its state 'Running'.

Name	Instance ID	Instance state	Instance type
- 1	i-0e4a5d720fcf94fad	Running	t2.micro
-	i-06626ebe4c5a60fb1	Running	t2.micro

Instance: i-0e4a5d720fcf94fad

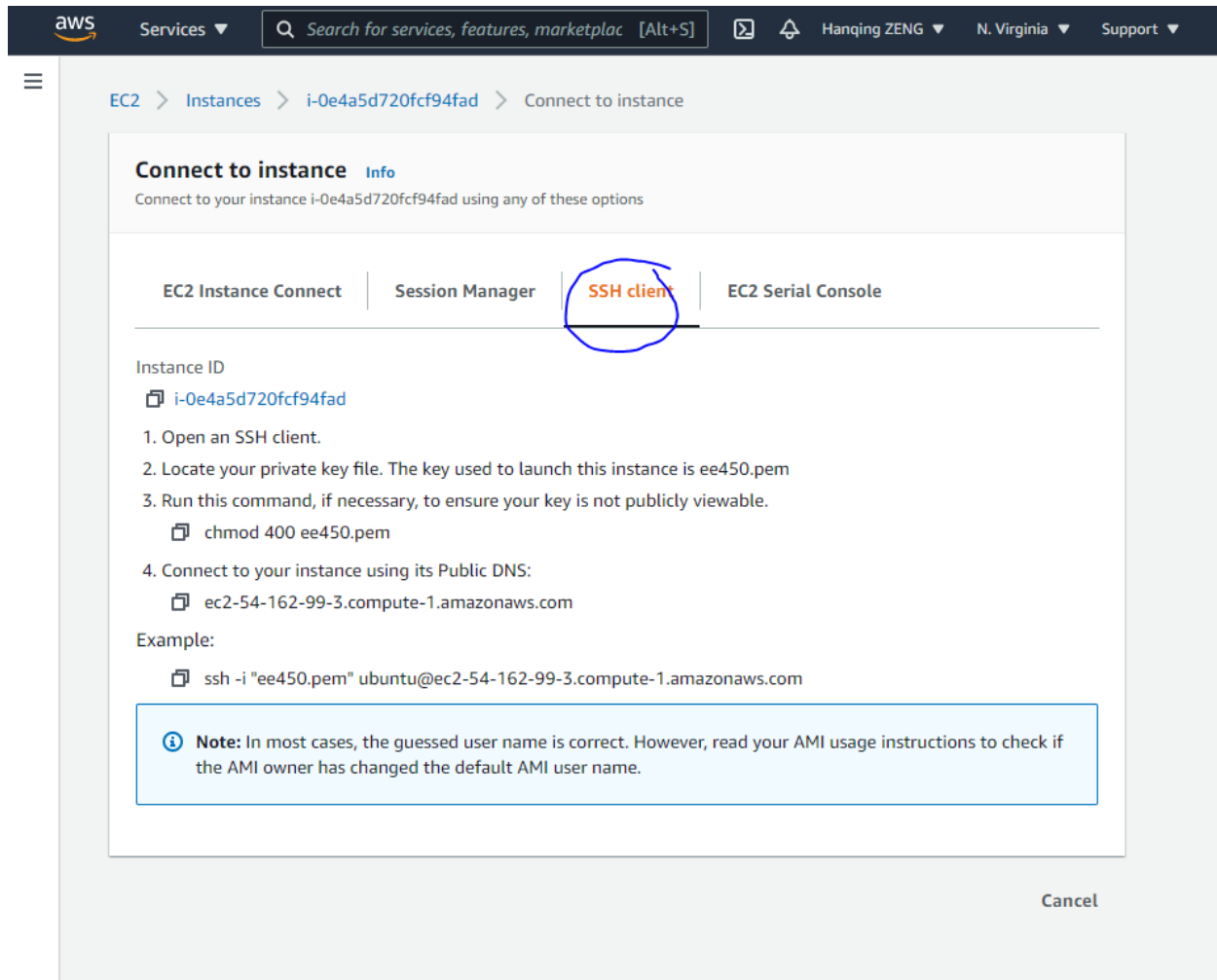
Details | Security | Networking | Storage | Status checks | Monitoring

Tags

Instance summary

Instance ID	Public IPv4 address
i-0e4a5d720fcf94fad	54.162.99.3   open address
Private IPv4 addresses	Instance state
172.31.61.157	Running

You should be able to see the following page. Select the “SSH client” tab, and follow the instructions to login the instance. Basically, you need to open a new terminal in your laptop, go to the local folder containing your “\*.pem” key-pair file, and type the `ssh` command as shown in the webpage.



## Step 4 Install some basic software.

After you `ssh` into the EC2 instance, type the following in your EC2 terminal to get `gcc` ready:

```
$ sudo apt update
$ sudo apt install build-essential
$ sudo apt install manpages-dev
```

You can also install text editors such as vim.

At this point, you should be able to compile and run your socket programming project. You may need to open multiple terminals and `ssh` into the EC2 to test the communication.

## Step 5 (Optional) Save your own image

You may save your own EC2 image as “AMI”, so that you don’t need to do the above Step 4 each time you launch a new instance. If you do so, you would then just select the image you created on your own rather than the “Ubuntu 18.04” in Step 2.2. You may want to check out

<https://docs.aws.amazon.com/toolkit-for-visual-studio/latest/user-guide/tkv-create-ami-from-instance.html>

for more details.

## Notes

As stated before, for M1 users, please be sure to test your project in the EC2 instance before submission. When grading, we will also run your project in the EC2 instance.

For other users, please stick to the provided VM, and we will grade your project in exactly the same VM.