

CLOUD COMPUTING

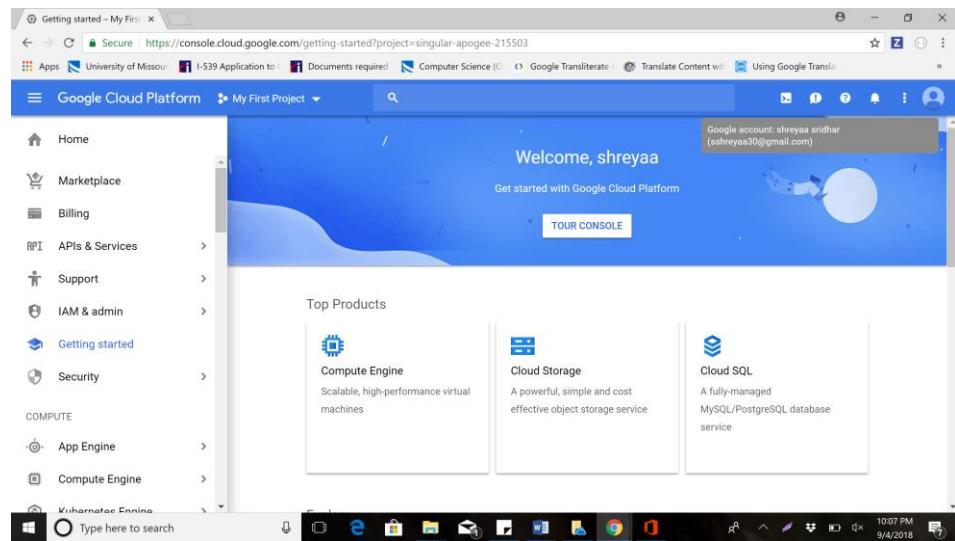
ASSIGNMENT 1

Name : Shreyaa Sridhar

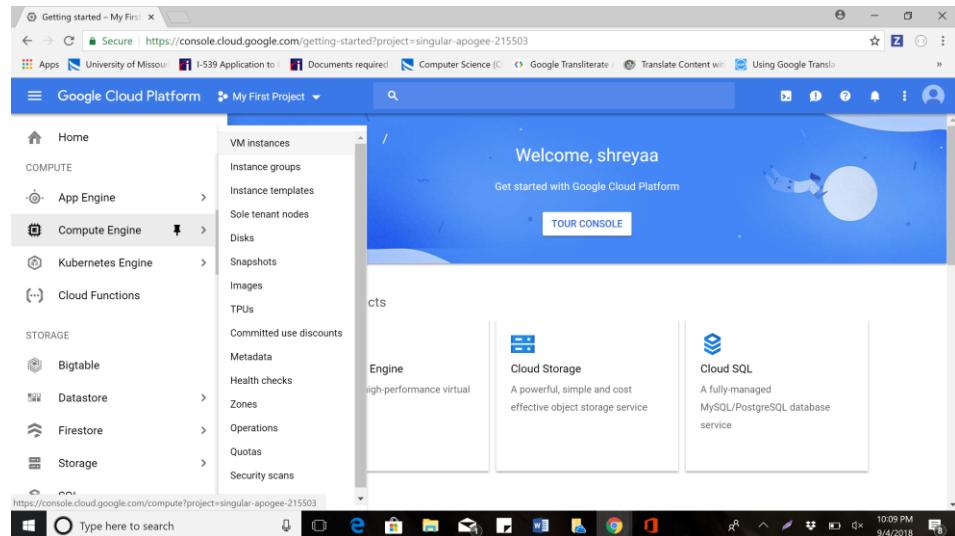
Student ID : 16251190

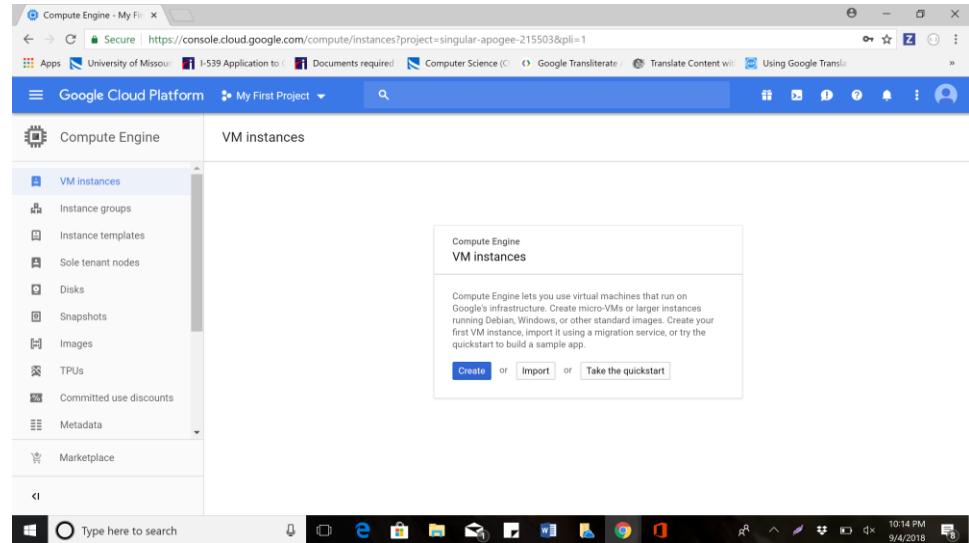
GOOGLE CLOUD PLATFORM

On successful account creation

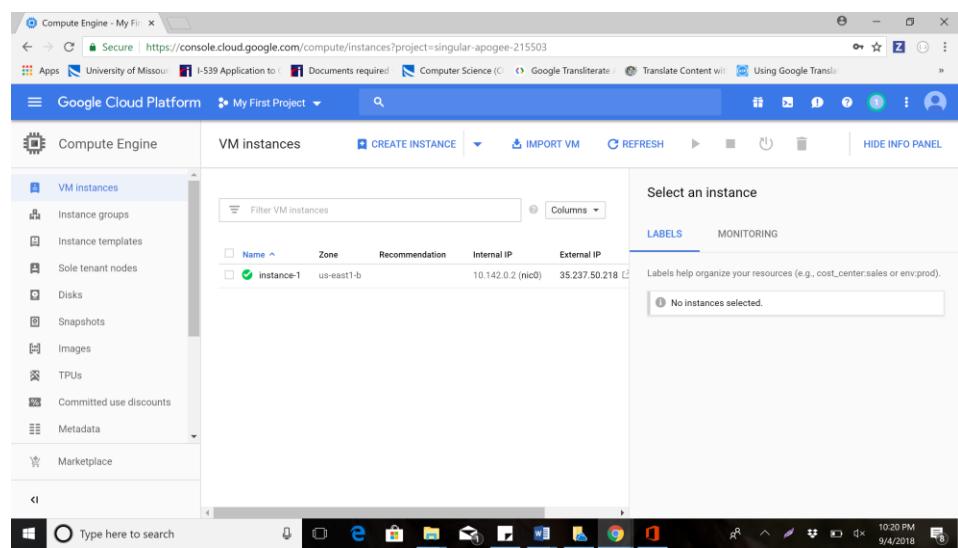
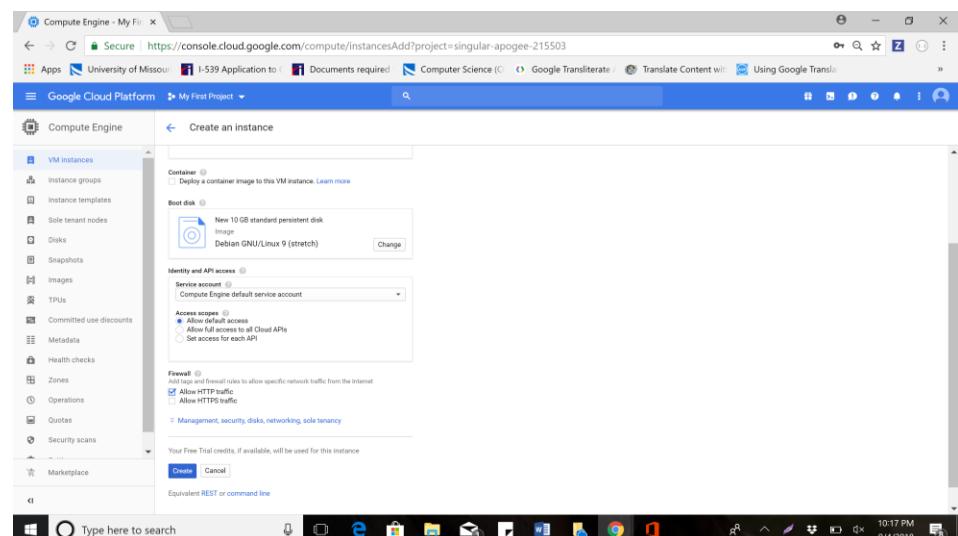


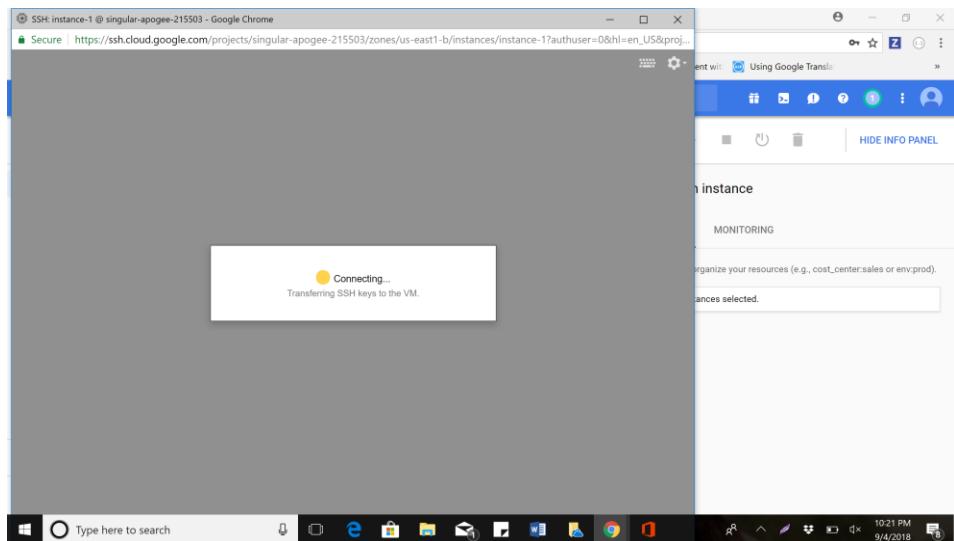
Click on Compute Engine -> VM Instances





Click on
Create to
create an
instance





```
sshreyaa30@instance-1: ~ - Google Chrome
Secure | https://ssh.cloud.google.com/projects/singular-apogee-215503/zones/us-east1-b/instances/instance-1?authuser=0&hl=en_US&proj...
Connected, host fingerprint: SSH-rsa 2048 5f:59:1a:c2:16:f4:43:34:7b:55:d6:9b:bc:da:53:ac:fb:7c:b0:b5:34:1a:11:02:03:20:05:b0:4c:0c:9c:0c
Linux instance-1 4.9.0-8-amd64 #1 SMP Debian 4.9.110-3+deb9u3 (2018-08-19) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
sshreyaa30@instance-1:~$
```

```
sshreyaa30@instance-1: ~ - Google Chrome
Secure | https://ssh.cloud.google.com/projects/singular-apogee-215503/zones/us-east1-b/instances/instance-1?authuser=0&hl=en_US&proj...
Connected, host fingerprint: SSH-rsa 2048 5f:59:1a:c2:16:f4:43:34:7b:55:d6:9b:bc:da:53:ac:fb:7c:b0:b5:34:1a:11:02:03:20:05:b0:4c:0c:9c:0c
Linux instance-1 4.9.0-8-amd64 #1 SMP Debian 4.9.110-3+deb9u3 (2018-08-19) x86_64

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the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

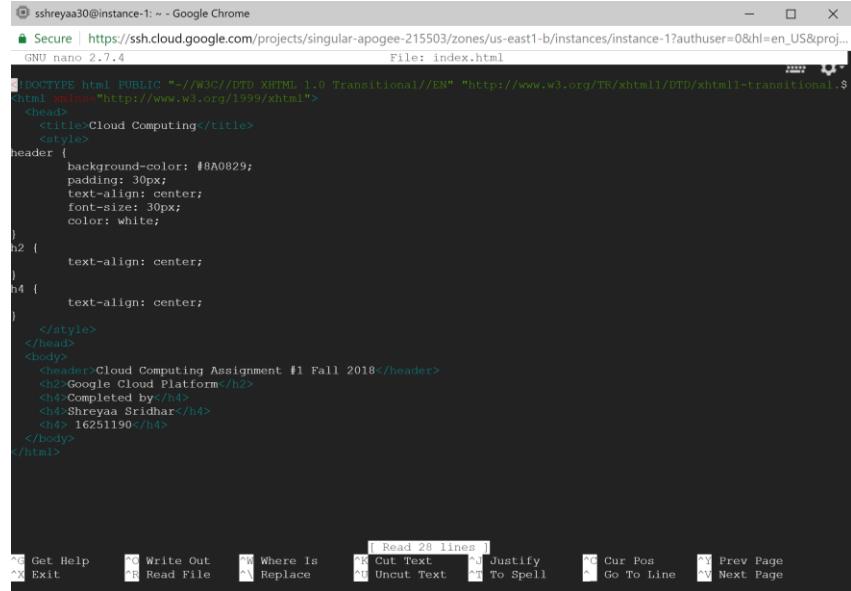
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
sshreyaa30@instance-1:~$ sudo apt-get update && sudo apt-get install apache2 -y
```

Installing the apache2

```
sshreya30@instance-1: ~ - Google Chrome
Secure | https://ssh.cloud.google.com/projects/singular-apogee-215503/zones/us-east1-b/instances/instance-1?authuser=0&hl=en_US&proj...
Setting up libaprutil1-ldap:amd64 (1.5.4-3) ...
Setting up libaprutil1-dbd-sqlite3:amd64 (1.5.4-3) ...
Setting up rename (0.20-4) ...
update-alternatives: using /usr/bin/file-rename to provide /usr/bin/rename (rename) in auto mode
Setting up apache2-utils (2.4.25-3+deb9u5) ...
Setting up apache2-bin (2.4.25-3+deb9u5) ...
Setting up apache2 (2.4.25-3+deb9u5) ...
Enabling module mpm_event.
Enabling module authz_core.
Enabling module authz_host.
Enabling module authn_core.
Enabling module auth_basic.
Enabling module access_compat.
Enabling module authn_file.
Enabling module authz_user.
Enabling module alias.
Enabling module dir.
Enabling module autoindex.
Enabling module env.
Enabling module mime.
Enabling module negotiation.
Enabling module setenvif.
Enabling module filter.
Enabling module deflate.
Enabling module status.
Enabling module reqtimeout.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-ssl-bin.
Enabling site 000-default.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service → /lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service → /lib/systemd/system/apache-htcacheclean.service.
Processing triggers for libc-bin (2.24-11+deb9u3) ...
Processing triggers for sgml-base (1.29) ...
Processing triggers for systemd (232-25+deb9u4) ...
sshreya30@instance-1:~$
```

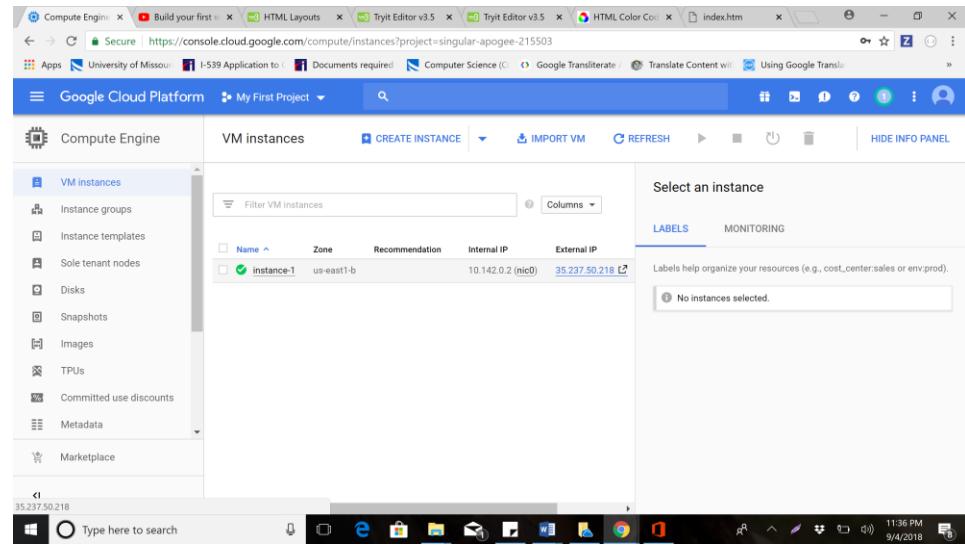
```
sshreya30@instance-1: ~ - Google Chrome
Secure | https://ssh.cloud.google.com/projects/singular-apogee-215503/zones/us-east1-b/instances/instance-1?authuser=0&hl=en_US&proj...
Building dependency tree
Reading state information... Done
apache2 is already the newest version (2.4.25-3+deb9u5).
0 upgraded, 0 newly installed, 0 to remove and 5 not upgraded.
sshreya30@instance-1:~$ sudo apt-get update && sudo apt-get install apache2 -y
Hit:1 http://security.debian.org stretch/updates InRelease
Ign:2 http://deb.debian.org/debian stretch InRelease
Hit:3 http://deb.debian.org/debian stretch-updates InRelease
Hit:4 http://deb.debian.org/debian stretch-backports InRelease
Hit:5 http://packages.cloud.google.com/apt cloud-sdk-stretch InRelease
Hit:6 http://deb.debian.org/debian stretch Release
Hit:7 http://packages.cloud.google.com/apt google-compute-engine-stretch-stable InRelease
Hit:8 http://packages.cloud.google.com/apt google-cloud-packages-archive-keyring-stretch InRelease
Reading package lists... Done
Reading package lists... Done
Building dependency tree
Reading state information... Done
apache2 is already the newest version (2.4.25-3+deb9u5).
0 upgraded, 0 newly installed, 0 to remove and 5 not upgraded.
sshreya30@instance-1:~$ ls
sshreya30@instance-1:~$ cd var
-bash: cd: var: No such file or directory
sshreya30@instance-1:~$ cd
sshreya30@instance-1:~$ sudo su
root@instance-1:/home/sshreya30# ls
root@instance-1:/home/sshreya30# cd /
root@instance-1:~/#
bin dev home initrd.img.old lib64 media opt root sbin sys usr vmlinuz
boot etc initrd.img lib lost+found mnt proc run srv tmp var vmlinuz.old
root@instance-1:~/var# ls
backups cache lib local lock log mail opt run spool tmp www
root@instance-1:~/var# cd www
root@instance-1:/var/www# ls
html
root@instance-1:/var/www# cd html
root@instance-1:/var/www/html# ls
index.html
root@instance-1:/var/www/html#
```

Open the editor using nano index.html command to rewrite the code



```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/1999/xhtml">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<title>Cloud Computing</title>
<style>
header {
background-color: #8A0829;
padding: 30px;
text-align: center;
font-size: 30px;
color: white;
}
h2 {
text-align: center;
}
h4 {
text-align: center;
}
</style>
</head>
<body>
<header>Cloud Computing Assignment #1 Fall 2018</header>
<h2>Google Cloud Platform</h2>
<h4>Completed by:</h4>
<h4>Shreyaa Sridhar</h4>
<h4>16251190</h4>
</body>
</html>
```

Double click on the External IP address to launch web server



Web server launched



Summary

Google cloud platform provides \$300 credit for 12 months. Setting up an account was easier when compared to AWS and Azure, I was able to access the platform as soon as I set up the account. It is easier to launch web server just by clicking on the external IP associated to the VM, instead of using another command. Putty application is not required to launch the prompt. Easy to edit the code using an editor. In my experience launching a web application on the Google Cloud platform VM, I found this easier when compare to AWS and Azure.

AMAZON AWS

On successful account creation

The screenshot shows the AWS Management Console home page. At the top, there's a search bar labeled "Find a service by name or feature (for example, EC2, S3 or VM, storage)." Below it, a "Recently visited services" dropdown and a "All services" link. To the right, a "Helpful tips" section with links to "Manage your costs" and "Create an organization". Further down, a "Build a solution" section with links to "Launch a virtual machine", "Build a web app", "Build using virtual servers", "Connect an IoT device", "Start a development project", and "Register a domain". On the far right, there's a "Explore AWS" section for Machine Learning with Amazon SageMaker. The bottom of the screen shows a Windows taskbar with various pinned icons.

Click on Services -> EC2

The screenshot shows the AWS EC2 Management Console home page. On the left, a sidebar titled "History" lists "Console Home", "EC2", and "Compute". Under "Compute", "EC2" is selected and expanded, showing "Lightsail", "Elastic Container Service", "EKS", "Lambda", "Batch", and "Elastic Beanstalk". Other sections include "Storage" (S3, EFS, Glacier, Storage Gateway), "Database", "Developer Tools" (CodeStar, CodeCommit, CodeBuild, CodeDeploy, CodePipeline, Cloud9, X-Ray), "Management Tools" (CloudWatch, AWS Auto Scaling, CloudFormation, CloudTrail, Config, OpsWorks), "Analytics" (Athena, EMR, CloudSearch, Elasticsearch Service, Kinesis, QuickSight, Data Pipeline, AWS Glue), "Customer Engagement" (Amazon Connect, Pinpoint, Simple Email Service), "Business Productivity" (Alexa for Business, Amazon Chime, WorkDocs, WorkMail), "Security, Identity & Compliance" (IAM, Cognito, Secrets Manager, GuardDuty), and "Desktop & App Streaming" (WorkSpaces, AppStream 2.0). The bottom of the screen shows a Windows taskbar with various pinned icons.

Click on Launch instance

EC2 Management Console

Services Resource Groups

EC2 Dashboard

Events Tags Reports Limits

INSTANCES Instances Launch Templates Spot Requests Reserved Instances Dedicated Hosts

IMAGES AMIs Bundle Tasks

ELASTIC BLOCK STORE Volumes Snapshots Lifecycle Manager

Resources

You are using the following Amazon EC2 resources in the US East (Ohio) region:

0 Running Instances	0 Elastic IPs
0 Dedicated Hosts	0 Snapshots
0 Volumes	0 Load Balancers
0 Key Pairs	1 Security Groups
0 Placement Groups	

Learn more about the latest in AWS Compute from AWS re:Invent 2017 by viewing the [EC2 Videos](#).

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

[Launch Instance](#)

Note: Your instances will launch in the US East (Ohio) region

Service Health Scheduled Events

Service Status: US East (Ohio):

AWS Marketplace

Find free software trial products in the AWS Marketplace from the [EC2 Launch](#)

Feedback English (US)

Type here to search

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shreyaa Ohio Support

Choose the first AMI

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)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

Quick Start

My AMIs AWS Marketplace Community AMIs

Free tier only ⓘ

Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0cf31d971a3ca20d6 Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. Root device type: ebs Virtualization type: hvm	Select 64-bit
Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-0b59bfae064b78 The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages. Root device type: ebs Virtualization type: hvm	Select 64-bit
Red Hat Enterprise Linux 7.5 (HVM), SSD Volume Type - ami-03291866 Red Hat Enterprise Linux version 7.5 (HVM), EBS General Purpose (SSD) Volume Type Root device type: ebs Virtualization type: hvm	Select 64-bit
Ubuntu Server 16.04 LTS (HVM), SSD Volume Type - ami-0552e3455b9bc8d50 Ubuntu Server 16.04 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	Select 64-bit

Cancel and Exit

1 to 35 of 35 AMIs

Choose free instance type

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 types Current generation Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

Family	Type	vCPUs ⓘ	Memory (GiB) ⓘ	Instance Storage (GiB) ⓘ	EBS-Optimized Available ⓘ	Network Performance ⓘ	IPv6 Support ⓘ
General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate	Yes
General purpose	t2.micro <small>Free tier eligible</small>	1	1	EBS only	-	Low to Moderate	Yes
General purpose	t2.small	1	2	EBS only	-	Low to Moderate	Yes
General purpose	t2.medium	2	4	EBS only	-	Low to Moderate	Yes
General purpose	t2.large	2	8	EBS only	-	Low to Moderate	Yes
General purpose	t2.xlarge	4	16	EBS only	-	Moderate	Yes
General purpose	t2.2xlarge	8	32	EBS only	-	Moderate	Yes
General purpose	t3.nano	2	0.5	EBS only	Yes	Up to 5 Gigabit	Yes

Cancel Previous Review and Launch Next: Configure Instance Details

Feedback English (US)

Type here to search

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The first screenshot shows the 'Step 6: Configure Security Group' page. It displays a table of security group rules. A warning message at the bottom states: 'Warning: 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.'

The second screenshot shows the 'Step 7: Review Instance Launch' page. It lists the selected AMI (Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0cf31d971a3ca20d6), instance type (t2.micro), and security group (launch-wizard-1). A warning message says: '⚠ Improve your instances' security. Your security group, launch-wizard-1, 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'.

The third screenshot shows the 'Launch Instances' confirmation dialog. It asks to 'Select an existing key pair or create a new key pair'. A note says: '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.' A note below says: '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.' A dropdown menu shows 'Choose an existing key pair' and 'Select a key pair'. A message box says: '⚠ No key pairs found. You don't have any key pairs. Please create a new key pair by selecting the Create a new key pair option above to continue.' A 'Create a new key pair' button is available. At the bottom are 'Cancel' and 'Launch Instances' buttons.

After Launch , a pop-up opens. Select ‘create a new key pair’ and provide a name for it. Click on download key pair which will be saved as .pem file.

The left screenshot shows the initial state of the dialog with the message: 'Select an existing key pair or create a new key pair'. It includes a note about key pairs and a dropdown menu with options: 'Choose an existing key pair' and 'Select a key pair'. Below is a message: '⚠ No key pairs found. You don't have any key pairs. Please create a new key pair by selecting the Create a new key pair option above to continue.' At the bottom are 'Cancel' and 'Launch Instances' buttons.

The right screenshot shows the dialog after selecting 'Create a new key pair'. It now displays a 'Key pair name' input field with 'sample' typed in and a 'Download Key Pair' button. A note at the bottom says: '⚠ You have to download the private key file (*.pem file) before you can continue. Store it in a secure and accessible location. You will not be able to download the file again after it's created.' At the bottom are 'Cancel' and 'Launch Instances' buttons.

Launch Status

- Your instances are now launching
The following instance launches have been initiated: i-0cbcb7d3f4537a96e View launch log
- Get notified of estimated charges
Create billing alerts to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

How to connect to your instances

Your instances are launching, and it may take a few minutes until they are in the **running** state, when they will be ready for you to use. Usage hours on your new instances will start immediately and continue to accrue until you stop or terminate your instances.

Click [View Instances](#) to monitor your instances' status. Once your instances are in the **running** state, you can [connect](#) to them from the Instances screen. [Find out](#) how to connect to your instances.

Here are some helpful resources to get you started

- How to connect to your Linux instance
- Amazon EC2 User Guide
- Learn about AWS Free Usage Tier
- Amazon EC2: Discussion Forum

While your instances are launching you can also

- Create status check alarms to be notified when these instances fail status checks. (Additional charges may apply)
- Create and attach additional EBS volumes (Additional charges may apply)
- Manage security groups

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EC2 Management Console Services Resource Groups

Launch Instance Connect Actions

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4 Public IP	IPv6 IPs
i-0cbcb7d3f4537a96e	i2.micro	us-east-2b	running	initializing	None	ec2-18-222-223-150.us-east-2.compute.amazonaws.com	18.222.223.150	-	

Instance: i-0cbcb7d3f4537a96e Public DNS: ec2-18-222-223-150.us-east-2.compute.amazonaws.com

Description Status Checks Monitoring Tags

Instance ID: i-0cbcb7d3f4537a96e
 Instance state: running
 Instance type: i2.micro
 Elastic IPs:
 Availability zone: us-east-2b
 Security groups: launch-wizard-1, view inbound rules, view outbound rules
 Scheduled events: No scheduled events
 AMI ID: ami-n2i-ami-hvm-2.0.20180810-x86_64-gp2 (ami-0cbcb7d3f4537a96e)
 Platform: ia32
 IAM role: -
 Public DNS (IPv4): ec2-18-222-223-150.us-east-2.compute.amazonaws.com
 IPv4 Public IP: 18.222.223.150
 IPv6 IPs: -
 Private DNS: ip-172-31-29-175.us-east-2.compute.internal
 Private IPs: 172.31.29.175
 Secondary private IPs: -
 VPC ID: vpo-7c3a0714
 Subnet: subnet-4b79ea31
 Network interface: eth0
 Source/dest. check: True

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After successful launch, instance is created.

Use putty key generator to convert .pem file to .ppk file.

PuTTY Key Generator

File Key Conversions Help

Key

Public key for pasting into OpenSSH authorized_keys file:

```
ssh-rsa AAAAB3NzaC1yc2EAAAQABQAAQEAin7qoHD4PGYAcSEKqrlLct7B1RloL0JP6QEKtTrmpotHVP5uNYGOlyYbhyVysmOAto3aF8d0NnOEMn2zZicQvNdFgvVlp5gCkaq9g1KVmQzkojtajUMWpJ82lW8Wbw3ToRYBhNn2c10KHNO6Hg3JWUgxeOpP6YMIK9n70hJAP65qy9Eu62ySfSzqwmOlek891GzZGWEOskprMYG9Lvh/K8ZUpc
```

Key fingerprint: ssh-rsa 2048 0e:91:10:13:88:77:a6:a4:37:40:a7:d9:50:4a:86

Key comment: rsa-key-20180905

Key passphrase:

Confirm passphrase:

Actions

Generate a public/private key pair Generate

Load an existing private key file Load

Save the generated key Save public key Save private key

Parameters

Type of key to generate: RSA DSA ECDSA ED25519 SSH-1 (RSA)

Number of bits in a generated key: 2048

PuTTY Key Generator

File Key Conversions Help

Key

Public key for pasting into OpenSSH authorized_keys file:

```
ssh-rsa AAAAB3NzaC1yc2EAAAQABQAAQEAin7qoHD4PGYAcSEKqrlLct7B1RloL0JP6QEKtTrmpotHVP5uNYGOlyYbhyVysmOAto3aF8d0NnOEMn2zZicQvNdFgvVlp5gCkaq9g1KVmQzkojtajUMWpJ82lW8Wbw3ToRYBhNn2c10KHNO6Hg3JWUgxeOpP6YMIK9n70hJAP65qy9Eu62ySfSzqwmOlek891GzZGWEOskprMYG9Lvh/K8ZUpc
```

Key fingerprint: ssh-rsa 2048 0e:91:10:13:88:77:a6:a4:37:40:a7:d9:50:4a:86

Key comment: rsa-key-20180905

Key passphrase:

Confirm passphrase:

Actions

Generate a public key Generate

Load an existing private key file Load

Save the generated key Save public key Save private key

Parameters

Type of key to generate: RSA DSA ECDSA ED25519 SSH-1 (RSA)

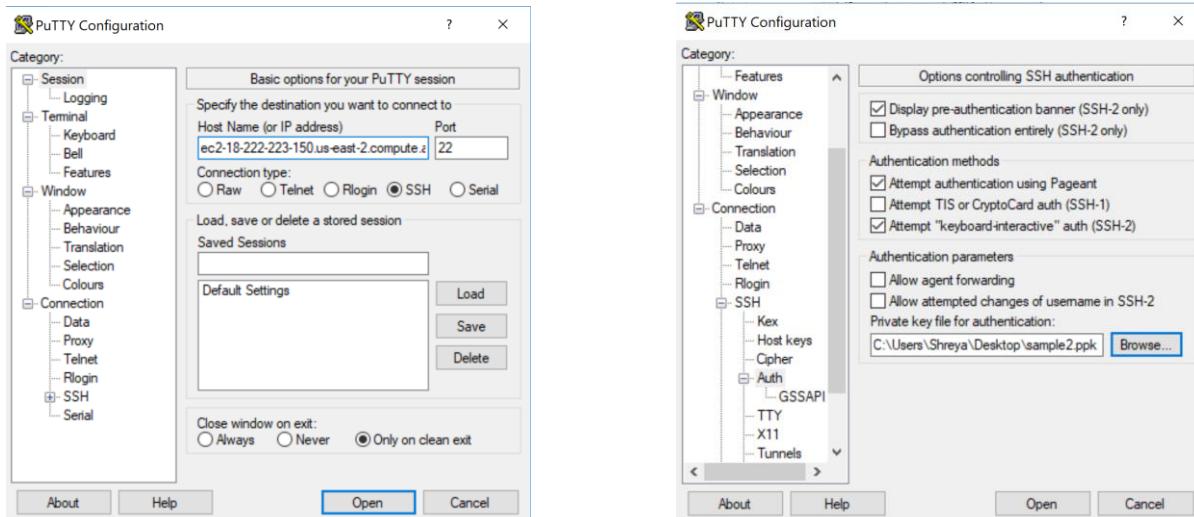
Number of bits in a generated key: 2048

PuTTYgen Notice

Successfully imported foreign key (OpenSSH SSH-2 private key (old PEM format)). To use this key with PuTTY, you need to use the 'Save private key' command to save it in PuTTY's own format.

OK

Now using Putty application, upload the .ppk file and launch the amazon prompt.



Amazon
Prompt
successfully
launched.

```
ec2-user@ip-172-31-29-175:~  
login as: ec2-user  
Authenticating with public key "imported-openssh-key"  
  
           _ )  
          _ \| /  Amazon Linux 2 AMI  
         _ \_\|_|_ |  
  
https://aws.amazon.com/amazon-linux-2/  
No packages needed for security; 1 packages available  
Run "sudo yum update" to apply all updates.  
[ec2-user@ip-172-31-29-175 ~]$  
  
  
ec2-user@ip-172-31-29-175:~  
Run "sudo yum update" to apply all updates.  
(ec2-user@ip-172-31-29-175 ~)$ sudo yum update  
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd  
amzn2-core                                         | 2.4 kB   00:00  
Resolving Dependencies  
--> Running transaction check  
--> Package yum.noarch 0:3.4.3-158.amzn2.0.1 will be updated  
--> Package yum.noarch 0:3.4.3-158.amzn2.0.2 will be an update  
--> Finished Dependency Resolution  
Dependencies Resolved  
=====  
# Package      Arch    Version       Repository      Size  
Updating: yum      noarch  3.4.3-158.amzn2.0.2      amzn2-core     1.2 M  
Transaction Summary  
=====  
Upgrade 1 Package  
Total download size: 1.2 M  
Is this ok (y/d/N): y  
Downloading packages:  
Delta RPMs disabled because /usr/bin/applydeltarpm not installed.  
yum-3.4.3-158.amzn2.0.2.noarch.rpm          | 1.2 MB   00:00  
Running transaction check  
Running transaction test  
Transaction test succeeded  
Running transaction  
  Updating : yum-3.4.3-158.amzn2.0.2.noarch          1/2  
    Cleanup : yum-3.4.3-158.amzn2.0.1.noarch          2/2  
  Verifying : yum-3.4.3-158.amzn2.0.2.noarch          1/2  
  Verifying : yum-3.4.3-158.amzn2.0.1.noarch          2/2  
Updated:  
  yum.noarch 0:3.4.3-158.amzn2.0.2  
Complete!  
(ec2-user@ip-172-31-29-175 ~)$
```

Install httpd

```
[ec2-user@ip-172-31-29-175 ~]$ sudo yum install httpd -y
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : apr-1.6.3-5.amzn2.x86_64
  Installing : apr-util-bdb-1.6.1-5.amzn2.x86_64
  Installing : apr-util-1.6.1-5.amzn2.x86_64
  Installing : apr-util-tools-2.4.34-1.amzn2.0.x86_64
  Installing : generic-logs-httpd-10.0.0-4.amzn2.noarch
  Installing : mailcap-2.1.41-2.amzn2.noarch
  Installing : httpd-filesystem-2.4.34-1.amzn2.1.0.noarch
  Installing : mod_http2-1.10.18-1.amzn2.0.x86_64
  Installing : httpd-2.4.34-1.amzn2.1.0.x86_64
  Verifying : apr-1.6.3-5.amzn2.x86_64
  Verifying : apr-util-1.6.1-5.amzn2.x86_64
  Verifying : httpd-filesystem-2.4.34-1.amzn2.1.0.noarch
  Verifying : mod_http2-1.10.18-1.amzn2.0.x86_64
  Verifying : httpd-tools-2.4.34-1.amzn2.1.0.x86_64
  Verifying : httpd-2.4.34-1.amzn2.1.0.x86_64
  Verifying : mailcap-2.1.41-2.amzn2.noarch
  Verifying : generic-logs-httpd-10.0.0-4.amzn2.noarch
  Verifying : apr-util-bdb-1.6.1-5.amzn2.x86_64
Installed:
  httpd.x86_64 0:2.4.34-1.amzn2.1.0

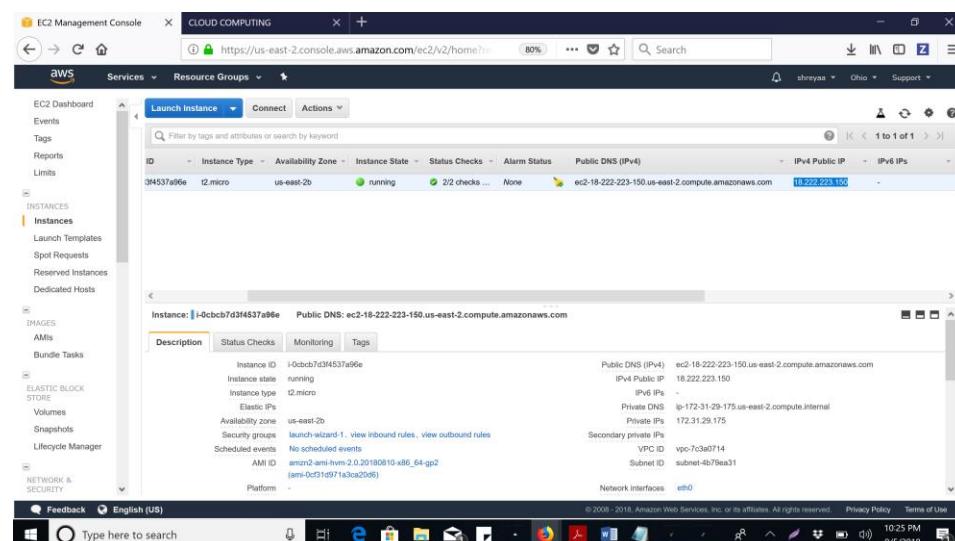
Dependency Installed:
  apr.x86_64 0:1.6.3-5.amzn2
  generic-logs-httpd.noarch 0:10.0.0-4.amzn2
  mailcap.noarch 0:2.1.41-2.amzn2

Complete!
[ec2-user@ip-172-31-29-175 ~]$
```

Launch web server

```
[ec2-user@ip-172-31-29-175 ~]$ echo '<!doctype html><html><head><title>CLOUD COMPUTING</title><style>h4{text-align: center; } h2{text-align: center; color: #8A0829;} header{ background-color: blue; padding: 30px; text-align: center; font-size: 35px; color: white;}</style></head><body><header><h1>Cloud Computing #1 Fall 2018</h1></header><h2>Amazon Web Services</h2><h4>Completed by</h4><h4>Shreyaa Sridhar</h4><h4>16251190</h4></body></html>' | sudo tee /var/www/html/index.html
[ec2-user@ip-172-31-29-175 ~]$ sudo apachectl start
[ec2-user@ip-172-31-29-175 ~]$
```

Copy the IPv4 address and paste on a web browser





Amazon Web Services

Completed by

Shreyaa Sridhar

16251190

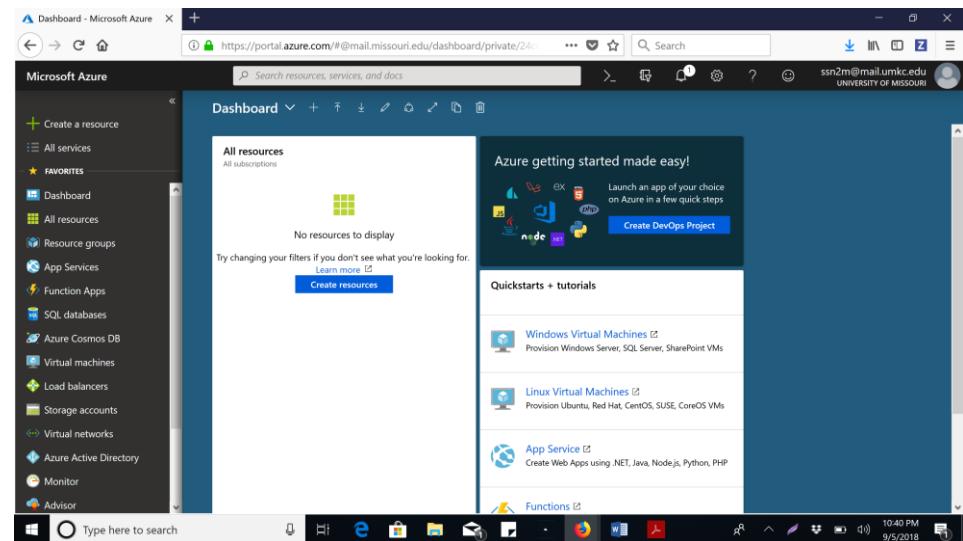


Summary

Amazon Web Services provide 12 months of free services with quite long hours to work with and after you exceed the limit you have an option to go with pay per service. It took 1 day for amazon to accept my free account. Requires Puttygen application to convert .pem files to .ppk file and putty application to launch amazon prompt. Here we need to launch the web server using a command. I had difficulties in finding the command to use editor. In my experience I would prefer AWS next to GCP.

MICROSOFT AZURE

On successful account creation



Click Virtual
Machines->
create

The screenshot shows the Microsoft Azure portal interface. On the left, the navigation menu includes options like Create a resource, All services, Favorites, Dashboard, All resources, Resource groups, App Services, Function Apps, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, Storage accounts, Virtual networks, Azure Active Directory, and Monitor. Under Virtual machines, there is a sub-menu for Add, Edit columns, Refresh, Assign tags, Start, Stop, Delete, and Services. The main content area is titled "Virtual machines" and shows a table with columns: NAME, TYPE, STATUS, RESOURCE GRP..., LOCATION, MAINTENANCE, and SUBSCRIPTION. A message at the bottom states "No virtual machines to display". Below this, there are links to "Create a virtual machine" and "Learn more about Windows virtual machines" and "Learn more about Linux virtual machines". The URL in the address bar is https://portal.azure.com/#blade/HubsExtension/Resources/resourceType/Microsoft.Compute/VirtualMachines.

Click Ubuntu
Server ->
Ubuntu
Server 14.04

The screenshot shows the Microsoft Azure portal interface, specifically the Ubuntu Server marketplace gallery. The left sidebar has the same navigation as the previous screenshot. The main content area shows a grid of icons for different virtual machine images, including Red Hat Enterprise Linux, Ubuntu Server (selected), SQL Server 2017 Enterprise, Virtual machine scale set, and Container Service. To the right, a detailed view of the Ubuntu Server image is shown, listing versions: 14.04 LTS, 16.04 LTS, 17.10, and 18.04 LTS, all from Canonical. The URL in the address bar is https://portal.azure.com/#blade/Microsoft_Azure_Marketplace/GalleryBlade/Compute/UbuntuServer.

The screenshot shows the Microsoft Azure portal interface, specifically the "Create virtual machine" dialog for Ubuntu Server 14.04 LTS. The left sidebar and navigation bar are consistent with the previous screenshots. The dialog is divided into four steps: 1. Basics (Configure basic settings), 2. Size (Choose virtual machine size), 3. Settings (Configure optional features), and 4. Summary (Ubuntu Server 14.04 LTS). The "Basics" step is active, showing fields for Name (shreyaa), VM disk type (Premium SSD), Username (shrey), Authentication type (SSH public key selected), Password, Confirm password, and Login with Azure Active Directory (Enabled). The URL in the address bar is https://portal.azure.com/#create/Canonical.UbuntuServer1404LTS-AzureVM.

Choose a size

Search: CanonicalUbuntuServer1404LTS-AR

RECOMMENDED	SKU	TYPE	COMPUTE	vCPUs	GB RAM	DATA DISKS	MAX IOPS	LOCAL SSD	Premium	ADDITIONAL	US
B1s	Standard	General purpose	1	1	2	800	4 GB	Yes	\$7.81		
B1ms	Standard	General purpose	1	2	2	1600	4 GB	Yes	\$15.4		
B2s	Standard	General purpose	2	4	4	3200	8 GB	Yes	\$31.2		
B2ms	Standard	General purpose	2	8	4	4800	16 GB	Yes	\$62.5		
B4ms	Standard	General purpose	4	16	8	7200	32 GB	Yes	\$124		

Prices presented are estimates in your local currency that include only Azure infrastructure costs and any discounts for the subscription and location. The prices don't include any applicable software or hardware requirements.

Select

Selecting three inbound parts
– http,
ssh,rdp

Create virtual machine

1 Basics Done ✓

2 Size Done ✓

3 Settings Configure optional features >

4 Summary Ubuntu Server 14.04 LTS

Settings

Network Security Group

- Basic
- Advanced

Select public inbound ports

3 selected

- No public inbound ports
- HTTP
- HTTPS
- SSH (22) later.
- RDP (3389) later.

Extensions

No extensions

Auto-shutdown

Enable auto-shutdown

OK

Create VM

Create

Validation passed

Subscription	Free Trial
Resource group	(new) abc
Location	East US

Settings

Computer name	shreyaa
Disk type	Premium SSD
Username	shrey
Size	Standard B1s (1 vcpu, 1 GB memory)
Managed	Yes
OS disk size	30 GB
Virtual network	(new) abc-vnet

Terms of use

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with each Marketplace offering above, (b) authorize Microsoft to charge or bill my current payment method for the fees associated with my use of the offering(s), including applicable taxes, with the same billing frequency as my Azure subscription, until I discontinue use of the offering(s), (c) agree that

Create Download template and parameters

Virtual machines - Microsoft Azure

cloud computing baek young

Microsoft Azure

Virtual machines

Subscriptions: Free Trial

NAME	TYPE	STATUS	RESOURCE GR...	LOCATION	MAINTENANCE...	SUBSCRIPTION
shreyaa	Virtual machine	Running	abc	East US	-	Free Trial

Copy the local host address

Connect to virtual machine - Microsoft Azure

cloud computing baek young

Microsoft Azure

Virtual machines > shreyaa

Overview

RDP SSH

To connect to your virtual machine via SSH, select an IP address, optionally change the port number, and use one of the following commands:

IP address: Public IP address (137.135.83.40)

Port number: 22

Login using VM local account: ssh shrey@137.135.83.40

Inbound traffic to the Public IP address may be blocked. You can update inbound port rules in the **VM Networking** page.

You can troubleshoot VM connection issues by opening the **Diagnose and solve problems** page.

Open putty application and paste the URL in host name.

PUTTY Configuration

Category: Session

Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): shrey@137.135.83.40

Port: 22

Connection type:

- SSH
- Telnet
- Rlogin
- Serial

Load, save or delete a stored session

Saved Sessions

Default Settings

About Help Open Cancel

Azure prompt
opened

```
shrey@shreyaa: ~
Using username "shrey".
shrey@137.135.83.40's password:
Welcome to Ubuntu 14.04.5 LTS (GNU/Linux 4.4.0-133-generic x86_64)

 * Documentation:  https://help.ubuntu.com/
System information as of Thu Sep  6 04:00:13 UTC 2018

System load: 0.97           Memory usage: 10%   Processes:      82
Usage of /: 41.5% of 1.94GB Swap usage:  0%   Users logged in: 0

Graph this data and manage this system at:
  https://landscape.canonical.com/

Get cloud support with Ubuntu Advantage Cloud Guest:
  http://www.ubuntu.com/business/services/cloud

0 packages can be updated.
0 updates are security updates.

Your Hardware Enablement Stack (HWE) is supported until April 2019.

The programs included with the Ubuntu system are free software;
```

```
shrey@shreyaa: ~
shrey@shreyaa:~$ sudo apt-get update
Ign http://azure.archive.ubuntu.com trusty InRelease
Get:1 http://azure.archive.ubuntu.com trusty-updates InRelease [65.9 kB]
Hit http://azure.archive.ubuntu.com trusty-backports InRelease
Hit http://azure.archive.ubuntu.com trusty Release.gpg
Get:2 http://azure.archive.ubuntu.com trusty-updates/main Sources [422 kB]
Get:3 http://azure.archive.ubuntu.com trusty-updates/restricted Sources [6,322 B]
]
Get:4 http://azure.archive.ubuntu.com trusty-updates/universe Sources [208 kB]
Get:5 http://azure.archive.ubuntu.com trusty-updates/multiverse Sources [7,441 B]
]
Get:6 http://azure.archive.ubuntu.com trusty-updates/main amd64 Packages [1,101 kB]
Get:7 http://security.ubuntu.com trusty-security InRelease [65.9 kB]
Get:8 http://azure.archive.ubuntu.com trusty-updates/restricted amd64 Packages [17.2 kB]
Get:9 http://azure.archive.ubuntu.com trusty-updates/universe amd64 Packages [47 4 kB]
Get:10 http://azure.archive.ubuntu.com trusty-updates/multiverse amd64 Packages [14.6 kB]
Get:11 http://azure.archive.ubuntu.com trusty-updates/main Translation-en [546 kB]
]
Get:12 http://security.ubuntu.com trusty-security/main Sources [162 kB]
```

Install apache2

```
shrey@shreyaa: ~
Get:23 http://security.ubuntu.com trusty-security/main Translation-en [413 kB]
Hit http://azure.archive.ubuntu.com trusty-backports/universe Translation-en
Hit http://azure.archive.ubuntu.com trusty Release
Get:24 http://azure.archive.ubuntu.com trusty/main Sources [1,064 kB]
Get:25 http://security.ubuntu.com trusty-security/universe Translation-en [134 kB]
Get:26 http://azure.archive.ubuntu.com trusty/restricted Sources [5,433 B]
Get:27 http://azure.archive.ubuntu.com trusty/universe Sources [6,399 kB]
Get:28 http://azure.archive.ubuntu.com trusty/multiverse Sources [174 kB]
Hit http://azure.archive.ubuntu.com trusty/main amd64 Packages
Hit http://azure.archive.ubuntu.com trusty/restricted amd64 Packages
Hit http://azure.archive.ubuntu.com trusty/universe amd64 Packages
Hit http://azure.archive.ubuntu.com trusty/multiverse amd64 Packages
Hit http://azure.archive.ubuntu.com trusty/main Translation-en
Hit http://azure.archive.ubuntu.com trusty/multiverse Translation-en
Hit http://azure.archive.ubuntu.com trusty/restricted Translation-en
Hit http://azure.archive.ubuntu.com trusty/universe Translation-en
Ign http://azure.archive.ubuntu.com trusty/main Translation-en_US
Ign http://azure.archive.ubuntu.com trusty/multiverse Translation-en_US
Ign http://azure.archive.ubuntu.com trusty/restricted Translation-en_US
Ign http://azure.archive.ubuntu.com trusty/universe Translation-en_US
Fetched 12.7 MB in 6s (2,054 kB/s)
Reading package lists... Done
shrey@shreyaa:~$ ^

shrey@shreyaa: ~
Reading package lists... Done
shrey@shreyaa:~$ sudo apt-get install apache2 -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  apache2-bin apache2-data libapr1 libaprutil libaprutil-dbd-sqlite3
  libaprutil-ldap ssl-cert
Suggested packages:
  apache2-doc apache2-suexec-pristine apache2-suexec-custom apache2-utils
  openssl-blacklist
The following NEW packages will be installed:
  apache2 apache2-bin apache2-data libapr1 libaprutil libaprutil-dbd-sqlite3
  libaprutil-ldap ssl-cert
0 upgraded, 8 newly installed, 0 to remove and 10 not upgraded.
Need to get 1,289 kB of archives.
After this operation, 5,368 kB of additional disk space will be used.
Get:1 http://azure.archive.ubuntu.com/ubuntu/ trusty/main libapr1 amd64 1.5.0-1
[85.1 kB]
Get:2 http://azure.archive.ubuntu.com/ubuntu/ trusty/main libaprutil amd64 1.5.
3-1 [76.4 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu/ trusty/main libaprutil-dbd-sqlite3
amd64 1.5.3-1 [10.5 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu/ trusty/main libaprutil-ldap amd64 v
```

```

shrey@shreyaa: ~
Enabling module filter.
Enabling module deflate.
Enabling module status.
Enabling conf charset.
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
 * Starting web server apache2
AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 10.0.0.4. Set the 'ServerName' directive globally to suppress this message
 *
Setting up ssl-cert (1.0.33) ...
sent invalidate(group) request, exiting
sent invalidate(passwd) request, exiting
sent invalidate(group) request, exiting
sent invalidate(group) request, exiting
sent invalidate(group) request, exiting
Processing triggers for libc-bin (2.19-0ubuntu6.14) ...
Processing triggers for ufw (0.34~rc-0ubuntu2) ...
Processing triggers for ureadahead (0.100.0-16) ...
shrey@shreyaa:~$ 

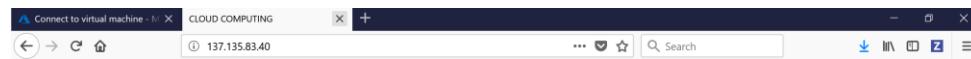
```

Open editor to edit code

```

root@shreyaa:/home/shrey# cd /
root@shreyaa:# cd var
root@shreyaa:/var# cd www
root@shreyaa:/var/www# cd html
root@shreyaa:/var/www/html# nano index.html
root@shreyaa:/var/www/html# index.html
index.html: command not found
root@shreyaa:/var/www/html# echo'<html></html>' | sudo tee index.html
bash: echo'<html></html>': No such file or directory
root@shreyaa:/var/www/html# echo '<html></html>' | sudo tee index.html
<html></html>
root@shreyaa:/var/www/html# nano index.html

```



Web Server launched successfully

Cloud Computing Assignment #1 Fall 2018

Microsoft Azure

Completed by

Shreyaa Sridhar

16251190



Summary

Microsoft Azure provide a service of 12 months of free services. But their free tier plans are confusing when compared to GCP and AWS. They provide a \$200 credit which is valid for 30days only. So technically they are free only for a month. Like AWS this requires Putty application for window users to launch the Azure prompt. Easy to edit the code in an editor.