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PRACTICAL NO: 1

AIM: To study cloud architecture and cloud computing model.

THEORY/NOTES:

Cloud computing enables companies to consume compute resources as a utility -- just like electricity -- rather than having to build and maintain computing infrastructures in-house. Cloud computing promises several attractive benefits for businesses and end users.

Three of the main **benefits of cloud computing** include:

- **Self-service provisioning:** End users can spin up computing resources for almost any type of workload on-demand.
- **Elasticity:** Companies can scale up as computing needs increase and then scale down again as demands decreases.
- **Pay per use:** Computing resources are measured at a granular level, allowing users to pay only for the resources and workloads they use.

Four types of Deployment models: (Public , Private, Hybrid or Community Cloud)

Private cloud services are delivered from a business' data center to internal users. This model offers versatility and convenience, while preserving management, control and security. Internal customers may or may not be billed for services through IT chargeback.

In the **Public cloud model**, a third-party provider delivers the cloud service over the Internet. Public cloud services are sold on-demand, typically by the minute or the hour. Customers only pay for the CPU cycles, storage or bandwidth they consume. Leading public cloud providers include Amazon Web Services (AWS), Microsoft Azure, IBM/SoftLayer and Google Compute Engine.

Hybrid cloud or heterogeneous clouds, is a combination of public cloud services and on-premises private cloud - with orchestration and automation between the two.

Communityclouds. The cloud is characterized by a multi-administrative domain involving different deployment models (public, private, and hybrid), and it is specifically designed to address the needs of a specific industry.

Three types of Service models: (IaaS, PaaS, SaaS)

IT people talk about three different kinds of cloud computing, where different services are being provided for you. Note that there's a certain amount of vagueness about how these things are defined and some overlap between them.

- **Infrastructure as a Service (IaaS)** means you're buying access to raw computing hardware over the Net, such as servers or storage. Since you buy what you need and pay-as-you-go, this is often referred to as utility computing. Ordinary web hosting is a simple example of IaaS: you pay a monthly subscription or a per-megabyte/gigabyte fee to have a hosting company serve up files for your website from their servers.
- **Software as a Service (SaaS)** means you use a complete application running on someone else's system. Web-based email and Google Documents are perhaps the best-known examples. Zoho is another well-known SaaS provider offering a variety of office applications online.

- **Platform as a Service (PaaS)** means you develop applications using Web-based tools, so they run on systems software and hardware provided by another company. So, for example, you might develop your own ecommerce website but have the whole thing, including the shopping cart, checkout, and payment mechanism running on a merchant's server. Force.com (from salesforce.com) and the Google App Engine are examples of PaaS.

Advantages:

Cloud computing has some interesting characteristics that bring benefits to both cloud serviceconsumers (CSCs) and cloud service providers (CSPs). These characteristics are:

- No up-front commitments
- On-demand access
- Nice pricing
- Simplified application acceleration and scalability
- Efficient resource allocation
- Energy efficiency
- Seamless creation and use of third-party services

Disadvantages

Instead of purchasing computers and software, cloud computing means you buy services, so one-off, upfront capital costs become ongoing operating costs instead. That might work out much more expensive in the long-term.

If you're using software as a service (for example, writing a report using an online word processor or sending emails through webmail), you need a reliable, high-speed, broadband Internet connection functioning the whole time you're working.

If you're buying in services, you can buy only what people are providing, so you may be restricted to off-the-peg solutions rather than ones that precisely meet your needs. Not only that, but you're completely at the mercy of your suppliers if they suddenly decide to stop supporting a product you've come to depend on. Instead of using "generative" systems (ones that can be added to and extended in exciting ways the developers never envisaged), you're effectively using "dumb terminals" whose uses are severely limited by the supplier.

CONCLUSION:

Cloud computing enables a convenient and on-demand network access to a wide range of resources. The different services and also the deployment models allow flexible service provider interaction with minimal human intervention. It saves costs but also can lead to risk issues and suspension of resources when in huge quantity.

PRACTICAL NO: 2

AIM: Installation and Configuration of virtualization using KVM.

OBJECTIVES: Understand the concepts of virtualization.Understand KVM architecture and its configuration.

HARDWARE / SOFTWARE REQUIRED:Ubuntu operating system open source software KVM internet

THEORY:

Virtualization is software that separates physical infrastructures to create various dedicated resources. It is the fundamental technology that powers cloud computing. The technology behind virtualization is known as a virtual machine monitor (VMM) or virtual manager, which separates compute environments from the actual physical infrastructure. There are three areas of IT where virtualization is making head roads, network virtualization, storage virtualization and server virtualization.

- Network virtualization is a method of combining the available resources in a network by splitting up the available bandwidth into channels, each of which is independent from the others, and each of which can be assigned (or reassigned) to a particular server or device in real time.
- Storage virtualization is the pooling of physical storage from multiple network storage devices into what appears to be a single storage device that is managed from a central console. Storage virtualization is commonly used in storage area networks (SANs).
- Server virtualization is the masking of server resources (including the number and identity of individual physical servers, processors, and operating systems) from server users.

PROCEDURE:

Installation Steps:

1. #sudo apt-get update
2. #sudo grep -c “svm\|vmx” /proc/cpuinfo
3. #sudo apt-get install qemu-kvm libvirt-bin bridge-utils virt-manager

QEMU is a free and open-source emulator that performs hardware virtualization.

Libvirt is a C toolkit to interact with the virtualization capabilities of recent versions of Linux (and other OSes).

The **virt-manager** application is a desktop user interface for managing virtual machines through libvirt.

The **bridge-utils** package contains a utility needed to create and manage bridge devices.

After installing *libvirt-bin*, the user used to manage virtual machines will need to be added to the *libvirdt* group. Doing so will grant the user access to the advanced networking options.

```
4. #sudo adduser asmita
```

```
#sudo adduser asmita libvirtd
```

After running this command, log out and log back in as asmita

5. Run following command after logging back in as asmita and you should see an empty list of virtual machines. This indicates that everything is working correctly.

```
#virsh -c qemu:///system list
```

6. Open Virtual Machine Manager application and Create Virtual Machine

```
#virt-manager
```

SNAPSHOTS

Step 1: #sudo apt-get update

```
root@laba06-OptiPlex-5250-AIO:~# sudo apt-get update
Hit:1 http://in.archive.ubuntu.com/ubuntu xenial InRelease
Hit:2 http://security.ubuntu.com/ubuntu xenial-security InRelease
Hit:3 http://in.archive.ubuntu.com/ubuntu xenial-updates InRelease
Hit:4 http://in.archive.ubuntu.com/ubuntu xenial-backports InRelease
*** Error in `appstreamcli': double free or corruption (fasttop): 0x0000000001d1a150 ***
=====
Backtrace: ======
/lib/x86_64-linux-gnu/libc.so.6(+0x777e5)[0x7f11d20b17e5]
/lib/x86_64-linux-gnu/libc.so.6(+0x8037a)[0x7f11d20ba37a]
/lib/x86_64-linux-gnu/libc.so.6(cfree+0x4c)[0x7f11d20be53c]
/usr/lib/x86_64-linux-gnu/libappstream.so.3(as_component_complete+0x439)[0x7f11d2436d19]
/usr/lib/x86_64-linux-gnu/libappstream.so.3(as_data_pool_update+0x44a)[0x7f11d2437f0a]
/usr/lib/x86_64-linux-gnu/libappstream.so.3(as_cache_builder_refresh+0x1c2)[0x7f11d242d272]
appstreamcli(ascli_refresh_cache+0x12e)[0x4049de]
appstreamcli(as client run+0x6fb)[0x403ceb1]
```

Step 2: #sudo grep -c "svm\|vmx" /proc/cpuinfo

```
Reading package lists... done
ubuntu@iyuser:~$ sudo grep -c "svm\|vmx" /proc/cpuinfo
4
ubuntu@iyuser:~$
```

Step 3: #sudo apt-get install qemu-kvm libvirt-bin bridge-utils virt-manager

```
ubuntu@iyuser:~$ sudo apt-get install qemu-kvm libvirt-bin bridge-utils virt-manager
Reading package lists... Done
Building dependency tree
Reading state information... Done
bridge-utils is already the newest version (1.5-15ubuntu1).
virt-manager is already the newest version (1:1.5.1-0ubuntu1.2).
The following package was automatically installed and is no longer required:
  libevent-core-2.1-6
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  libvirt-clients libvirt-daemon libvirt-daemon-driver-storage-rbd libvirt-daemon-system libvirt0
  qemu-system-x86
Suggested packages:
  libvirt-daemon-driver-storage-gluster libvirt-daemon-driver-storage-sheepdog
  libvirt-daemon-driver-storage-zfs numad radvd auditd systemtap zfsutils pm-utils vde2 qemu-block-extra
  sgabios ovmf
The following packages will be upgraded:
  libvirt-bin libvirt-clients libvirt-daemon libvirt-daemon-driver-storage-rbd libvirt-daemon-system
  libvirt0 qemu-kvm qemu-system-x86
8 upgraded, 0 newly installed, 0 to remove and 388 not upgraded.
Need to get 0 B/9,332 kB of archives.
After this operation, 8,192 B of additional disk space will be used.
```

Step 4: #sudo adduser username

After running this command, log out and log back in as username

```

ubuntu@iyuser:~$ sudo adduser asmita
Adding user `asmita' ...
make: Entering directory '/var/yp'
make[1]: Entering directory '/var/yp/iyc121-OptiPlex-5250-AIO'
Updating netid.byname...
Updating shadow.byname... Ignored -> merged with passwd
make[1]: Leaving directory '/var/yp/iyc121-OptiPlex-5250-AIO'
make: Leaving directory '/var/yp'
Adding new group `asmita' (1006) ...
make: Entering directory '/var/yp'
make[1]: Entering directory '/var/yp/iyc121-OptiPlex-5250-AIO'
Updating group.byname...
Updating group.bygid...
Updating netid.byname...
Updating shadow.byname... Ignored -> merged with passwd
make[1]: Leaving directory '/var/yp/iyc121-OptiPlex-5250-AIO'
make: Leaving directory '/var/yp'
Adding new user `asmita' (1005) with group `asmita' ...
make: Entering directory '/var/yp'
make[1]: Entering directory '/var/yp/iyc121-OptiPlex-5250-AIO'
Updating passwd.byname...
Updating passwd.byuid...
Updating netid.byname...
Updating shadow.byname... Ignored -> merged with passwd
make[1]: Leaving directory '/var/yp/iyc121-OptiPlex-5250-AIO'
make: Leaving directory '/var/yp'
Creating home directory '/home/asmita' ...
Copying files from '/etc/skel' ...
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
changing the user information for asmita
Enter the new value, or press ENTER for the default
      Full Name []:
      Room Number []:
      Work Phone []:
      Home Phone []:
      Other []:
Is the information correct? [Y/n] y

```

Step 5: #sudo adduser hrishi libvirt

After running this command, log out and log back in as username

```

ubuntu@iyuser:~$ sudo adduser asmita libvirt
Adding user `asmita' to group `libvirt' ...
make: Entering directory '/var/yp'
make[1]: Entering directory '/var/yp/iyc121-OptiPlex-5250-AIO'
Updating passwd.byname...
Updating passwd.byuid...
Updating netid.byname...
Updating shadow.byname... Ignored -> merged with passwd
make[1]: Leaving directory '/var/yp/iyc121-OptiPlex-5250-AIO'
make: Leaving directory '/var/yp'
Adding user asmita to group libvirt
make: Entering directory '/var/yp'
make[1]: Entering directory '/var/yp/iyc121-OptiPlex-5250-AIO'
Updating group.byname...
Updating group.bygid...
Updating netid.byname...
Updating shadow.byname... Ignored -> merged with passwd
make[1]: Leaving directory '/var/yp/iyc121-OptiPlex-5250-AIO'
make: Leaving directory '/var/yp'
Done.

```

Step 6: Open Virtual Machine Manager application and Create Virtual Machine #virt-manager as shown below



Step 7: Create a new virtual machine as shown below

The screenshot shows the process of creating a new virtual machine (VM) using the Virtual Machine Manager. It consists of five panels arranged vertically, each representing a step in the wizard.

- Step 1 of 5: Connection Selection**

Connection: QEMU/KVM

Choose how you would like to install the operating system:

 - Local install media (ISO image or CDROM)
 - Network Install (HTTP, FTP, or NFS)
 - Network Boot (PXE)
 - Import existing disk image

Locate your install media:

 - Use CDROM or DVD
 - No device present
 - Use ISO image:
 - /home/ubuntu/Downloads/tahr64-6.0.5.iso
 - Browse...

Automatically detect operating system based on install media
OS type: Unknown
Version: Unknown

Buttons: Cancel, Back, Forward
- Step 2 of 5: Configuration Selection**

Choose Memory and CPU settings:

 - Memory (RAM): 1024 MiB (Up to 3829 MiB available on the host)
 - CPU: 2 (Up to 4 available)

Enable storage for this virtual machine:

 - Create a disk image for the virtual machine
 - 5.0 GiB (352.9 GiB available in the default location)
 - Select or create custom storage
 - Manage...

Buttons: Cancel, Back, Forward
- Step 3 of 5: Summary**

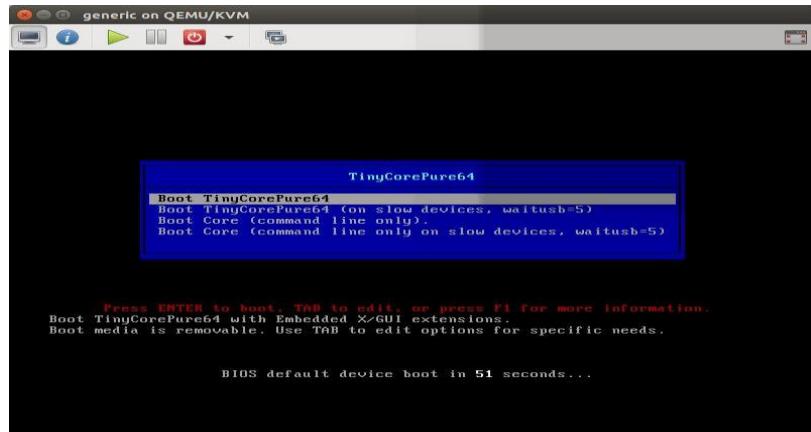
Ready to begin the installation:

 - Name: generic
 - OS: Generic
 - Install: Local CDROM/ISO
 - Memory: 1024 MiB
 - CPUs: 2
 - Storage: 5.0 GiB /var/lib/libvirt/images/generic.qcow2
 - Customize configuration before install

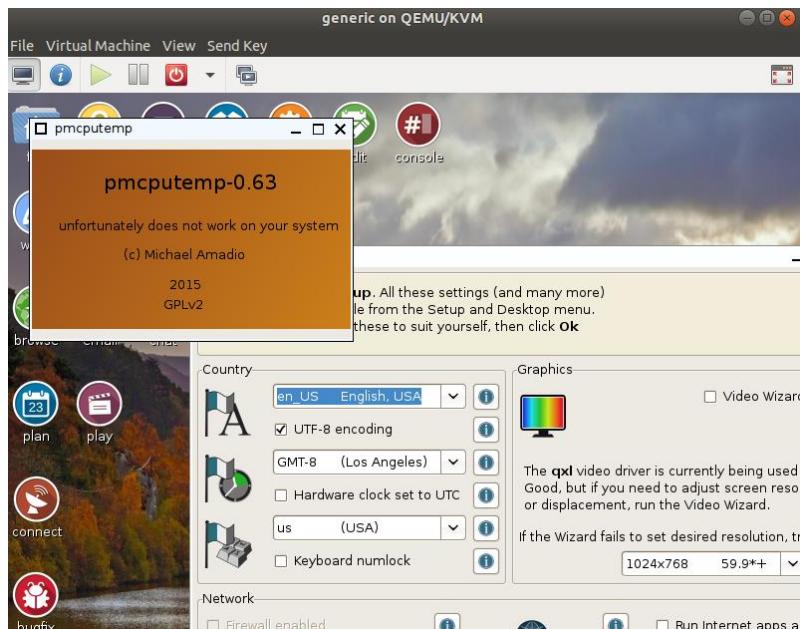
Network selection

Buttons: Cancel, Back, Finish

Step 8: Install TinyCorePure operating system on virtual



Step 9: Installation of TinyCorePure on virtual machine



CONCLUSION:

Installation and configuration of KVM have been done successfully onto Ubuntu and users added. Like this we can create as many virtual machines as possible on OS and can install any operating systems onto it.

PRACTICAL NO: 3

AIM: Study and implementation of Infrastructure as a Service.

THEORY:

OpenStack is a free and open-source software platform for cloud computing, mostly deployed as infrastructure-as-a-service, whereby virtual servers and other resources are made available to customers.

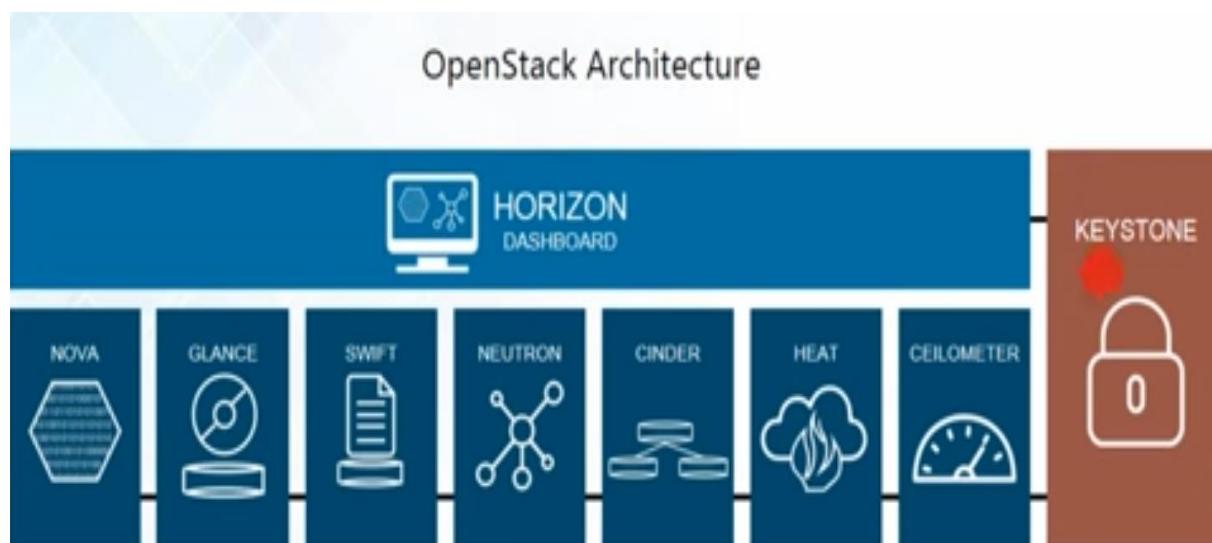
Written in: Python

License: Apache License 2.0

Stable release: Rocky (2018.08.30) / 30 August 2018; 5 months ago

Initial release date: 21 October 2010

OpenStack Components



Service	Project name	Description
Dashboard	Horizon	Provides a web-based self-service portal to interact with underlying OpenStack services, such as launching an instance, assigning IP addresses and configuring access controls.
Compute	Nova	Manages the lifecycle of compute instances in an OpenStack environment. Responsibilities include spawning, scheduling and decommissioning of virtual machines on demand.
Networking	Neutron	Enables network connectivity as a service for other OpenStack services, such as OpenStack Compute. Provides an API for users to define networks and the attachments into them. Has a pluggable architecture that supports many popular networking vendors and technologies.
Storage		
Object Storage	Swift	Stores and retrieves arbitrary unstructured data objects via a RESTful, HTTP based API. It is highly fault tolerant with its data replication and scale out architecture. Its implementation is not like a file server with mountable directories.
Block Storage	Cinder	Provides persistent block storage to running instances. Its pluggable driver architecture facilitates the creation and management of block storage devices.
Shared services		
Identity service	Keystone	Provides an authentication and authorization service for other OpenStack services. Provides a catalog of endpoints for all OpenStack services.
Image Service	Glance	Stores and retrieves virtual machine disk images. OpenStack Compute makes use of this during instance provisioning.
Telemetry	Ceilometer	Monitors and meters the OpenStack cloud for billing, benchmarking, scalability, and statistical purposes.
Higher-level services		
Orchestration	Heat	Orchestrates multiple composite cloud applications by using either the native HOT template format or the AWS CloudFormation template format, through both an OpenStack-native REST API and a CloudFormation-compatible Query API.
Database Service	Trove	Provides scalable and reliable Cloud Database-as-a-Service functionality for both relational and non-relational database engines.

Compute (Nova)

OpenStack Compute is a cloud computing fabric controller, which manages pools of computer resources and work with virtualization technologies, bare metals, and high-performance computing configurations. Nova's architecture provides flexibility to design the cloud with no proprietary software or hardware requirements and also delivers the ability to integrate the legacy systems and third-party products.

Nova can be deployed using hypervisor technologies such as KVM, VMware, LXC, XenServer, etc. It is used to manage numerous virtual machines and other instances that handle various computing tasks.

Image Service (Glance):

OpenStack image service offers discovering, registering, and restoring virtual machine images. Glance has client-server architecture and delivers a user REST API, which allows querying of virtual machine image metadata and also retrieval of the actual image. While deploying new virtual machine instances, Glance uses the stored images as templates.

OpenStack Glance supports Raw, VirtualBox (VDI), VMWare (VMDK, OVF), Hyper-V (VHD), and Qemu/KVM (qcow2) virtual machine images.

The screenshot shows the OpenStack Horizon dashboard. On the left, there is a sidebar with a 'Project' dropdown set to 'Compute', a 'Overview' section, and a 'Images' section which is highlighted with a red circle and a red arrow pointing to it. The main content area is titled 'Images' and contains a table with two rows. The table columns are 'Image Name', 'Type', 'Status', 'Public', 'Protected', 'Format', and 'Actions'. The first row shows 'Windows Server 2012 R2 Evaluation' as an 'Image' in 'Active' status, 'Yes' for public, 'No' for protected, in 'RAW' format with 'Launch' and 'More' actions. The second row shows 'CentOS 6.5 Base' as an 'Image' in 'Active' status, 'Yes' for public, 'No' for protected, in 'QCOW2' format with 'Launch' and 'More' actions. At the top right of the main content area, there is a red circle around the '+ Create Image' button, with a red arrow pointing to it from the left.

Image Name	Type	Status	Public	Protected	Format	Actions
Windows Server 2012 R2 Evaluation	Image	Active	Yes	No	RAW	Launch More
CentOS 6.5 Base	Image	Active	Yes	No	QCOW2	Launch More

Object Storage (Swift):

OpenStack Swift creates redundant, scalable data storage to store petabytes of accessible data. The stored data can be leveraged, retrieved and updated. It has a distributed architecture, providing greater redundancy, scalability, and performance, with no central point of control.

Swift is a profoundly available, shared, eventually consistent object store. It helps organizations to store lots of data safely, cheaply and efficiently. Swift ensures data replication and distribution over various devices, which makes it ideal for cost-effective, scale-out storage.

Dashboard (Horizon)

Horizon is the authorized implementation of OpenStack's Dashboard, which is the only graphical interface to automate cloud-based resources.

Identity Service (Keystone)

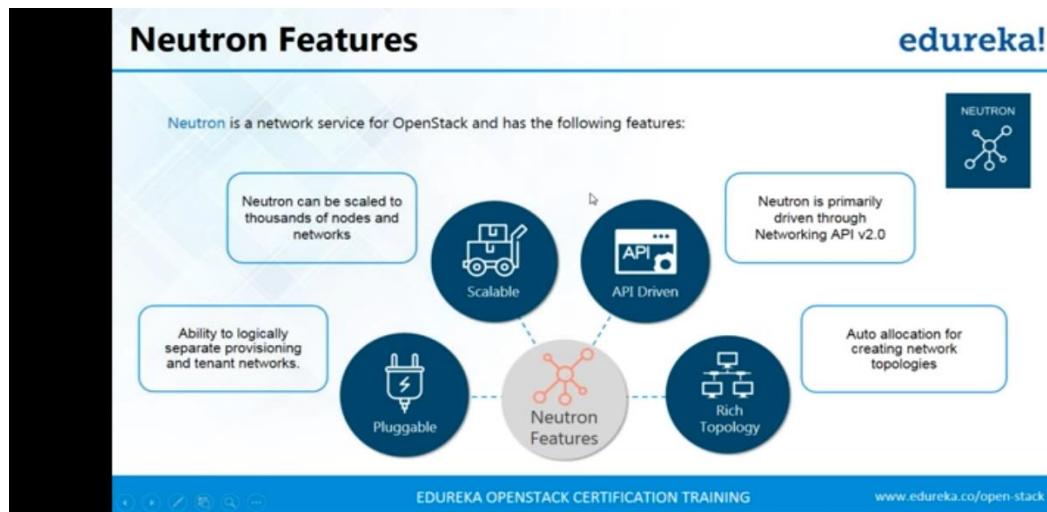
Keystone provides a central list of users, mapped against all the OpenStack services, which they can access. It integrates with existing backend services such as LDAP (Lightweight Directory Access Protocol) while acting as a common authentication system across the cloud computing system.

Keystone supports various forms of authentication like standard username & password

Networking (Neutron):

Neutron provides networking capability like managing networks and IP addresses for OpenStack. It ensures that the network is not a limiting factor in a cloud deployment and offers users with self-service ability over network configurations. [OpenStack](#) networking allows users to create their own networks and connect devices and servers to one or more networks. Developers can use SDN technology to support great levels of multi-tenancy and massive scale.

Block Storage (Cinder)



OpenStack Cinder delivers determined block-level storage devices for application with OpenStack compute instances. A cloud user can manage their storage needs by integrating block storage volumes with Dashboard and Nova.

Cinder can use storage platforms such as Linux server, EMC (ScaleIO, VMAX, and VNX), Ceph, Coraid, CloudByte, IBM, Hitachi data systems, SAN volume controller, etc. It is appropriate for expandable file systems and database storage.

Telemetry (Ceilometer)

Ceilometer delivers a single point of contact for billing systems obtaining all of the measurements to authorize customer billing across all OpenStack core components. By monitoring notifications from existing services, developers can collect the data and may configure the type of data to meet their operating requirements.

Orchestration (Heat)

Heat is a service to orchestrate multiple composite cloud applications through both the CloudFormation-compatible Query API and OpenStack-native REST API, using the AWS CloudFormation template format.

PROCEDURE:

Installation Steps: for single machine installation.

- sudo apt-get update
- Add user
 - sudo useradd -s /bin/bash -d /opt/stack -m stack
 - sudo apt-get install sudo -y
 - echo "stack ALL=(ALL) NOPASSWD: ALL" >> /etc/sudoers
 - stack run commands, run from any host, all users and groups without password & all commands
- login as stack user
- Download DevStack
 - sudo apt-get install git -y
 - git clone https://git.openstack.org/openstack-dev/devstack
 - cd devstack
- Copy local.conf file from **devstack/samples/local.conf**. to root folder of devstack.

local.conf

[[local|localrc]]

FLOATING_RANGE=192.168.1.224/27

FIXED_RANGE=10.11.12.0/24

FIXED_NETWORK_SIZE=256

FLAT_INTERFACE=eth0

ADMIN_PASSWORD=iycadmin

DATABASE_PASSWORD=\$ADMIN_PASSWORD

RABBIT_PASSWORD=\$ADMIN_PASSWORD

SERVICE_PASSWORD=\$ADMIN_PASSWORD

Add ip address to the /etc/hosts file

-> sudo vim /etc/hosts

ip devstack

→ cat /etc/hosts

```
127.0.0.1      localhost  
127.0.1.1      iycserver  
10.10.7.142      devstack  
# The following lines are desirable for IPv6 capable hosts  
::1    ip6-localhost ip6-loopback  
fe00::0 ip6-localnet  
ff00::0 ip6-mcastprefix  
ff02::1 ip6-allnodes  
ff02::2 ip6-allrouters
```

→ Run DevStack:

```
./stack.sh
```

SNAPSHOTS:

→ sudo apt-get update

```
iycserver@iycserver:~$ sudo apt-get update  
[sudo] password for iycserver:  
Hit:1 http://in.archive.ubuntu.com/ubuntu bionic InRelease  
Hit:2 http://in.archive.ubuntu.com/ubuntu bionic-updates InRelease  
Hit:3 http://in.archive.ubuntu.com/ubuntu bionic-backports InRelease  
Hit:4 http://security.ubuntu.com/ubuntu bionic-security InRelease  
Reading package lists... Done
```

```
iyc-server@iycserver:~$ sudo apt-get install sudo -y  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
sudo is already the newest version (1.8.16-0ubuntu1.5).  
0 upgraded, 0 newly installed, 0 to remove and 288 not upgraded.  
iyc-server@iycserver:~$ █
```

```
iycserver@iycserver:~$ lsb_release -d  
Description:    Ubuntu 18.04.4 LTS  
iycserver@iycserver:~$ free -m  
total        used        free      shared  buff/cache   available  
Mem:       11898        4539       4752        571        2606       6464  
Swap:        975          0         975  
iycserver@iycserver:~$ df -h  
Filesystem      Size  Used Avail Use% Mounted on  
udev            5.8G     0  5.8G   0% /dev  
tmpfs           1.2G  2.5M  1.2G   1% /run  
/dev/sda2        457G   11G  423G   3% /  
tmpfs           5.9G  45M  5.8G   1% /dev/shm  
tmpfs           5.0M  4.0K  5.0M   1% /run/lock  
tmpfs           5.9G     0  5.9G   0% /sys/fs/cgroup  
/dev/loop0        3.8M   3.8M     0  100% /snap/gnome-system-monitor/127  
/dev/loop2        1.0M   1.0M     0  100% /snap/gnome-logs/81  
/dev/loop1        15M   15M     0  100% /snap/gnome-characters/399  
/dev/loop8        4.3M   4.3M     0  100% /snap/gnome-calculator/544  
/dev/loop3        45M   45M     0  100% /snap/gtk-common-themes/1440  
/dev/loop5        92M   92M     0  100% /snap/core/8689  
/dev/loop6        92M   92M     0  100% /snap/core/8592  
/dev/loop7        55M   55M     0  100% /snap/core18/1668  
/dev/loop9       141M  141M     0  100% /snap/gnome-3-26-1604/98  
/dev/loop4       161M  161M     0  100% /snap/gnome-3-28-1804/116  
/dev/sda1        511M  6.1M   505M   2% /boot/efi  
tmpfs           1.2G  16K  1.2G   1% /run/user/122  
tmpfs           1.2G  40K  1.2G   1% /run/user/1000  
tmpfs           1.2G  44K  1.2G   1% /run/user/1001
```

→ Add user

◆ sudo useradd -s /bin/bash -d /opt/stack -m stack

```
iyc-server@iycserver:~$ sudo useradd -s /bin/bash -d /opt/stack -m stack
[sudo] password for iyc-server:
Sorry, try again.
[sudo] password for iyc-server:
iyc-server@iycserver:~$
```

◆ sudo apt-get install sudo -y

```
iycserver@iycserver:~$ who
iycserver :0          2020-03-03 12:52 (:0)
stack      :1          2020-03-03 12:53 (:1)
iycserver@iycserver:~$ uname
Linux
iycserver@iycserver:~$ hostname
iycserver
iycserver@iycserver:~$
```

◆ echo "stack ALL=(ALL) NOPASSWD: ALL" >> /etc/sudoers

```
root@iycserver: /home/iyc-server
iyc-server@iycserver:~$ sudo su
root@iycserver:/home/iyc-server# echo "stack ALL=(ALL) NOPASSWD: ALL" >> /etc/sudoers
root@iycserver:/home/iyc-server#
```

→ stack run commands, run from any host, all users and groups without password & all commands

- login as stack user
- Download DevStack
 - sudo apt-get install git -y

```
stack@iycserver: ~
stack@iycserver:~$ sudo su stack && cd ~
stack@iycserver:~$ sudo apt-get install git -y || sudo yum install -y git
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  git-man liberror-perl
Suggested packages:
  git-daemon-run | git-daemon-sysvinit git-doc git-el git-email git-gui gitk
  gitweb git-arch git-cvs git-mediawiki git-svn
```

```
stack@iycserver: ~/devstack
+ ./stack.sh:read_password:633          local xtrace
++ ./stack.sh:read_password:634          set +o
++ ./stack.sh:read_password:634          grep xtrace
++ ./stack.sh:read_password:634          xtrace='set -o xtrace'
++ ./stack.sh:read_password:635          set +o xtrace
#####
# ENTER A PASSWORD TO USE FOR HORIZON AND KEYSTONE (20 CHARS OR LESS).
#####
# This value will be written to /opt/stack/devstack/.localrc.password file so you
# don't have to enter it
# again. Use only alphanumeric characters.
# If you leave this blank, a random default value will be used.
# Enter a Password now:
lycadmin
+ ./stack.sh:main:726          is_service_enabled ldap
++ functions-common:is_service_enabled:1920  local xtrace
++ functions-common:is_service_enabled:1921  grep xtrace
++ functions-common:is_service_enabled:1921  set +o
++ functions-common:is_service_enabled:1921  xtrace='set -o xtrace'
++ functions-common:is_service_enabled:1922  set +o xtrace
++ functions-common:is_service_enabled:1950  return 1
+ ./stack.sh:main:735          is_service_enabled s-proxy
++ functions-common:is_service_enabled:1920  local xtrace
++ functions-common:is_service_enabled:1921  grep xtrace
++ functions-common:is_service_enabled:1921  set +o
++ functions-common:is_service_enabled:1921  xtrace='set -o xtrace'
++ functions-common:is_service_enabled:1922  set +o xtrace
++ functions-common:is_service_enabled:1950  return 1
+ ./stack.sh:main:747          save_stackenv 747
++ functions-common:save_stackenv:62          local tag=747
++ functions-common:save_stackenv:64          date +%F-%H%M%S
++ functions-common:save_stackenv:64          time_stamp=2019-02-08-130354
++ functions-common:save_stackenv:65          echo '# 2019-02-08-130354_747'
++ functions-common:save_stackenv:66          for i in '$STACK_ENV_VARS'
++ functions-common:save_stackenv:67          echo BASE_SQL_CONN=mysql+pymysql://ro
+ functions-common:save_stackenv:66          for i in '$STACK_ENV_VARS'
+ functions-common:save_stackenv:67          DEST=/opt/stack
```

- **gitclone**<https://git.openstack.org/openstack-dev/devstack>
 - **cddevstack**
 - Copy local.conf file from **devstack/samples/local.conf**. to root folder of devstack. edit in the same as specified above .

```
Setting up git-man (1:2.7.4-0ubuntu1.6) ...
Setting up git (1:2.7.4-0ubuntu1.6) ...
stack@lycserver:~$ git clone https://git.openstack.org/openstack-dev/devstack
Cloning into 'devstack'...
remote: Counting objects: 42864, done.
remote: Compressing objects: 100% (21557/21557), done.
remote: Total 42864 (delta 30383), reused 32597 (delta 20639)
Receiving objects: 100% (42864/42864), 8.73 MiB | 213.00 KiB/s, done.
Resolving deltas: 100% (30383/30383), done.
Checking connectivity... done.
stack@lycserver:~$
```

- add ip address to the /etc/hosts file


```
sudo vim /etc/hosts
          ip devstack
```
- cat /etc/hosts


```
127.0.0.1 localhost
127.0.1.1 iycserver
10.10.7.142 devstack
```

Run DevStack:

```
./stack.sh
```

```
File Edit View Search Terminal Help
stack@lycserver: ~/devstack
=====
' /opt/stack/devstack/local.conf
+./stack.sh:main:1490           set +o xtrace

=====
DevStack Component Timing
(times are in seconds)
=====

run_process      23
test_with_retry   3
apt-get-update    2
osc              148
wait_for_service 15
git_timed        666
dbsync           410
pip_install       194
apt-get           109
-----
Unaccounted time  849
-----
Total runtime     2419

This is your host IP address: 10.10.7.125
This is your host IPv6 address: ::1
Horizon is now available at http://10.10.7.125/dashboard
Keystone is serving at http://10.10.7.125/identity/
The default users are: admin and demo
The password: iycadmin

WARNING:
Using lib/neutron-legacy is deprecated, and it will be removed in the future

Services are running under systemd unit files.
For more information see:
https://docs.openstack.org/devstack/latest/systemd.html

DevStack Version: ussur
Change: 93d22d82988ee781feddf84535d65adf44472379 Merge "Add LIBVIRT_CPU_MODE to set CPU mode" 2020-02-17 01:05:14 +0000
OS Version: Ubuntu 18.04 bionic

2020-02-20 05:00:48.055 | stack.sh completed in 2419 seconds.
stack@lycserver:~/devstack$
```

HOW TO CREATE NEW VM IN OPENSTACK DASHBOARD (HORIZON)?

Go to Project → Compute → Instances.

Click "Launch Instance".

Insert the name of the Instance (eg. "tycs") and click Next button.

The screenshot shows the 'Instances - OpenStack Dashboard - Mozilla Firefox' window. The address bar indicates the URL is 10.10.7.125/dashboard. The main content area is titled 'Launch Instance'. It contains fields for 'Instance Name' (set to 'tycs'), 'Description' (set to 'Test Instance'), 'Availability Zone' (set to 'nova'), and 'Count' (set to '1'). Below these fields is a circular progress bar labeled '10%' with a legend: '0 Current Usage' (blue), '1 Added' (light blue), and '9 Remaining' (grey). The browser interface includes standard navigation buttons, a search bar, and a tab bar with other open tabs.

Select Instance Boot Source (eg. "Image"), and choose desired image (eg. "cirros-0.4.4-x86_64-disk") by clicking on arrow.

Instances - OpenStack Dashboard - Mozilla Firefox

pip 10 no longer uninstal × Instances - OpenStack Da × +

Instances - OpenStack Dashboard

10.10.7.125/dashboard

Launch Instance

Toggle navigation

Instance source is the template used to create an instance. You can use an image, a snapshot of an instance (image snapshot), a volume or a volume snapshot (if enabled). You can also choose to use persistent storage by creating a new volume.

Select Boot Source

Image

Create New Volume

Yes No

Volume Size (GB) *

1

Delete Volume on Instance Delete

Yes No

Allocated

Name	Updated	Size	Type	Visibility
cirros-0.4.0-x86_64-disk	2/20/2020 10:27 AM	12.13 MB	qcow2	Public

Available 0

Select one

Click here for filters or full text search.

Name	Updated	Size	Type	Visibility
No available items				

Cancel Next > Launch Instance

Choose Flavour (eg. eo1.xsmall).

Flavors manage the sizing for the compute, memory and storage capacity of the instance.

Allocated

Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public
eo1.xsmall	1	1 GB	8 GB	8 GB	0 GB	Yes

Available 22

Select one

Name	VCPUS	RAM	Total Disk	Root Disk	Ephemeral Disk	Public
ds.large.nvme	40	125 GB	64 GB	64 GB	0 GB	Yes
eo1.small	2	2 GB	16 GB	16 GB	0 GB	Yes
eo1.xmedium	1	2 GB	8 GB	8 GB	0 GB	Yes
eo1.medium	2	4 GB	16 GB	16 GB	0 GB	Yes
eo1.large	4	8 GB	32 GB	32 GB	0 GB	Yes

Click "Networks" and then choose desired networks

Instances - OpenStack Dashboard - Mozilla Firefox

pip 10 no longer uninstal Instances - OpenStack Da +

openstack. admin

Launch Instance

Details Networks provide the communication channels for instances in the cloud.

Source Allocated 2 Select networks from those listed below.

	Network	Shared	Admin State	Status
1	public	No	Up	Active
2	shared	Yes	Up	Active

Flavor

Networks Available 0 Select at least one network

Network Ports

Security Groups

Key Pair Click here for filters or full text search.

Configuration

Server Groups

Scheduler Hints

Metadata

Cancel Back Next Launch Instance

This screenshot shows the 'Launch Instance' wizard in the OpenStack dashboard. On the left, a sidebar lists options like Details, Source, Flavor, Networks, Network Ports, Security Groups, Key Pair, Configuration, Server Groups, Scheduler Hints, and Metadata. The 'Networks' tab is selected. The main area shows two allocated networks: 'public' (Network 1) and 'shared' (Network 2), both marked as Up and Active. Below this, there's a section for selecting available networks, which currently displays 'No available items'. At the bottom, there are 'Cancel', 'Back', 'Next', and a prominent blue 'Launch Instance' button.

Choose or generate SSH keypair for your VM. Next, launch your instance by clicking on blue button

Instances - OpenStack Dashboard - Mozilla Firefox

pip 10 no longer uninstal Instances - OpenStack Da +

openstack. admin

Create Key Pair

Key Pairs are how you login to your instance after it is launched. Choose a key pair name you will recognize. Names may only include alphanumeric characters, spaces, or dashes.

Key Pair Name *

Key Type *

Create Keypair Copy Private Key to Clipboard Done

This screenshot shows the 'Create Key Pair' dialog. It has fields for 'Key Pair Name' (containing 'iyc') and 'Key Type' (set to 'SSH Key'). At the bottom, there are three buttons: 'Create Keypair', 'Copy Private Key to Clipboard', and 'Done'.

Instances - OpenStack Dashboard - Mozilla Firefox

Instances - OpenStack +>

openstack. admin

Launch Instance

Details
Source + Create Key Pair Import Key Pair

Flavor
Allocated
Displaying 1 item
Name
lyc

Networks
Network Ports
Security Groups
Key Pair

Configuration
Server Groups
Scheduler Hints
Metadata

Available 0 Select one
Click here for filters or full text search.

Displaying 0 items
Name
No items to display.

Displaying 0 items

Cancel Back Next Launch Instance

You will see "Instances" menu with your newly created VM.

Open the drop-down menu and choose "Console".

Instances - OpenStack Dashboard - Mozilla Firefox

Instances - OpenStack +>

openstack. admin

Instances										
Project / Compute / Instances										
Instance ID = <input type="text"/> Filter Launch Instance Delete Instances More Actions										
Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
lyc	-	public 192.168.1.251, 2001:db8:3f:shared 192.168.233.53	m1.nano	lyc	Active	nova	None	Running	0 minutes	Create Snapshot

Project API Access Compute Instances Images Key Pairs Server Groups Volumes Network Admin Identity

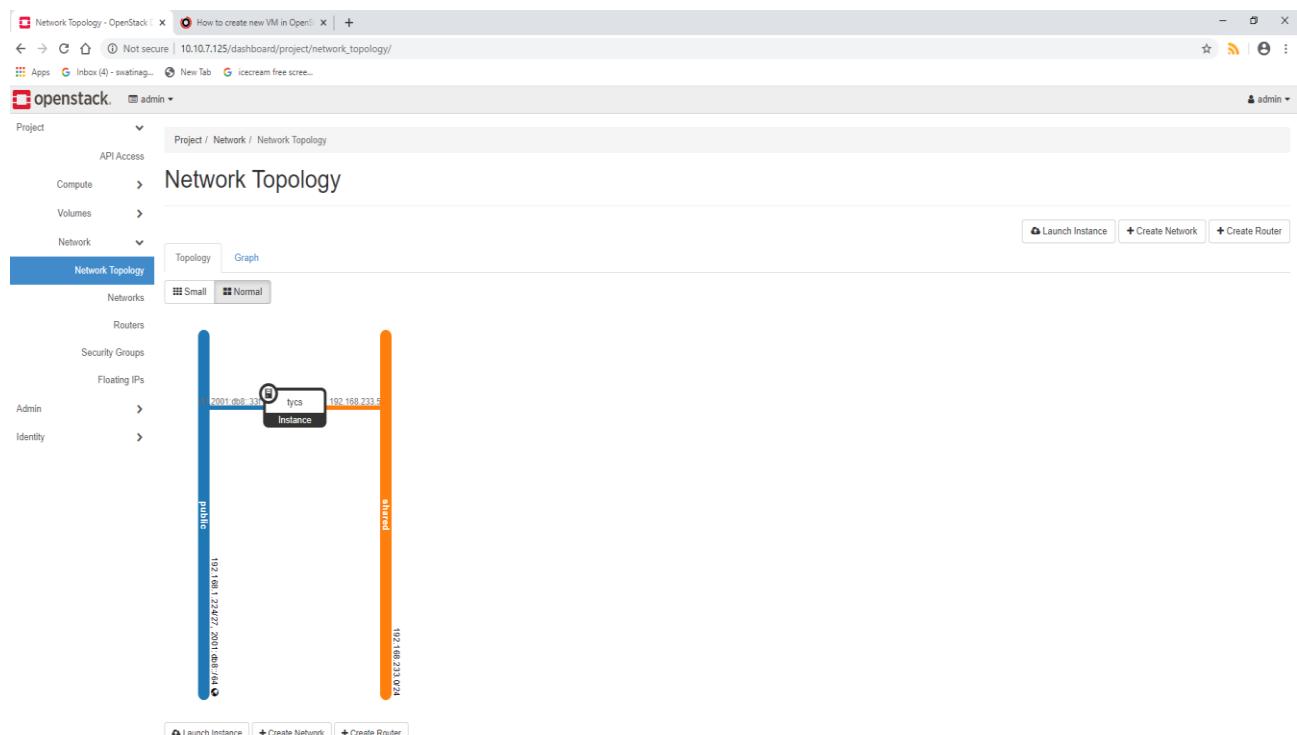
Open the drop-down menu and choose "Console".

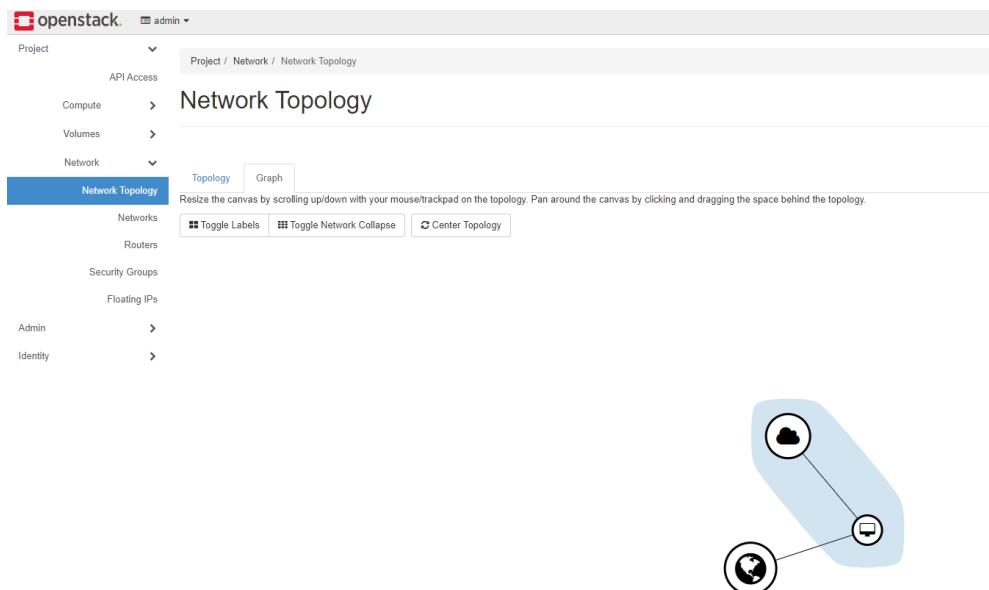
The screenshot shows the 'Instances' page of the OpenStack Dashboard. A context menu is open over an instance named 'tycs'. The menu includes options like Associate Floating IP, Attach Interface, Detach Interface, Edit Instance, Attach Volume, Detach Volume, Update Metadata, Edit Security Groups, Edit Port Security Groups, Console, View Log, Rescue Instance, Pause Instance, Suspend Instance, Shelve Instance, Resize Instance, Lock Instance, Soft Reboot Instance, Hard Reboot Instance, Shut Off Instance, Rebuild Instance, and Delete Instance.

Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
tycs	-	public 192.168.1.251, 2001:db8:33f: shared 192.168.233.53	m1.nano	yc	Active	nova	None	Running	0 minutes	Create Snapshot

In Network Topology we can see topology.

Network → Network Topology





In Networks it display those network which we added.

The screenshot shows the 'Networks' section of the OpenStack interface. The left sidebar includes 'Project', 'Compute', 'Volumes', 'Network', 'Identity', and 'Admin' sections. Under 'Network', there are 'Network Topology', 'Routers', 'Security Groups', and 'Floating IPs'. The main area shows a table titled 'Displaying 2 items' with columns for Name, Subnets Associated, Shared, External, Status, Admin State, Availability Zones, and Actions. It lists two networks: 'public' (associated with 'public-subnet 192.168.1.224/27 ipv6-public-subnet 2001:db8::/64'), 'shared' (associated with 'shared-subnet 192.168.233.0/24'), both marked as 'Yes' for Shared and External, and 'Active' for Status and Admin State, with 'nova' in the Availability Zones column. There are 'Edit Network' and 'Delete Networks' buttons for each row.

Click on the black terminal area(to activate access to the console). Type: eoconsole and hit enter.

The screenshot shows a terminal window titled 'tycs(0675ce17-67d8-4f60-82ce-5cf7c6374910) - Mozilla Firefox'. The address bar shows '10.10.7.125:6080/vnc_lite.html?path=%3Ftoken%3Dfb5fa5ca-3532-4545-b40a-7e736e941e73&title=tycs'. The title bar says 'Connected (unencrypted) to QEMU (instance-00000001)'. The terminal content is a black screen with white text showing kernel boot logs:

```

[    3.509504] Key type trusted registered
[    3.582958] Key type encrypted registered
[    3.583523] npvhmmor: npvhmmor smi policy hashing enabled
[    3.584629] lms: No TPM chip found, activating TPM-bypass!
[    3.587429] cvm: HMAC attrs: 0x1
[    3.595248] Magic number: 8:242:770
[    3.597321] rtc_cmos 00:00: setting system clock to 2020-02-28 05:16:58 UTC (1582177610)
[    3.602958] BIOS EDD facility v0.16 2004-Jun-25, 0 devices found
[    3.603395] EDD information not available.
[    3.617995] Freed unused kernel memory: 1480K (ffffffff81f42000 - ffffff1820b4000)
[    3.618892] Write protecting the kernel read-only data: 14336k
[    3.622247] Freed unused kernel memory: 1860K (ffff80000102f000 - fffff800001a0000)
[    3.626045] Freed unused kernel memory: 160K (ffff800001446000 - fffff800001c0000)
[    3.699230] clocksource: Switched to clocksource tsc
[    further output written to /dev/vtts0]
[    11.096514] random: dd urandom read with 11 bits of entropy available

login as 'cirros' user. default password: 'goesbgo', use 'sudo' for root.
cirros login:

```

```
$ exit
login as 'cirros' user. default password: 'gocubsgo'. use 'sudo' for root.
cirros login: cirros
Password:
$ ls
$ tty
/dev/ttys001
$ mkdir Sybal
$ ls
Sybal
$
```

USING PLATFORM9 IN SANDBOX FORMAT

Not Supported in 2019-2020

CONCLUSION:

OpenStack installed on single machine. + experimented on platform9.Though OpenStack is made up of several other components because of its open nature, the OpenStack community has recognized these nine components as the core components.

OpenStack will help your business in accelerating the time-to-market, integrating with a variety of key businesses, and delivering the most value from the cloud. So, enterprises need to consider building their cloud platform with OpenStack.

PRACTICAL NO : 4

AIM:To study and implementation of Storage as a Service

HARDWARE / SOFTWARE REQUIRED:

Online mode: Google account→ login into the google drive.

Offline mode: owncloud server.

THEORY:

Google Docs:

Google Docs (docs.google.com) is the most popular web-based word processor available today. Docs is actually a suite of applications that also includes Google Spreadsheets and Google Presentations; the Docs part of the Docs suite is the actual word processing application. When you log in to Google Docs with your Google account, you see the page. This is the home page for all the Docs applications (word processing, spreadsheets, and presentations); all your previously created documents are listed on this page. The leftmost pane helps you organize your documents. You can store files in folders, view documents by type (word processing document or spreadsheet), and display documents shared with specific people.

Collaborating on Databases:

A local database is one in which all the data is stored on an individual computer.

A networked database is one in which the data is stored on a computer or server connected to a network, and accessible by all computers connected to that network.

Finally, an online or web-based database stores data on a cloud of servers somewhere on the Internet, which is accessible by any authorized user with an Internet connection.

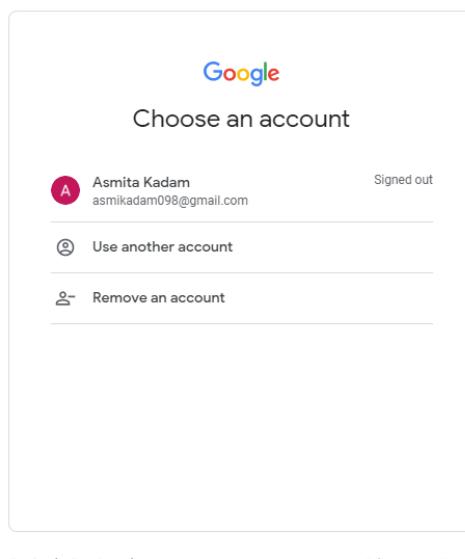
Eg: Cebase

Cebase (www.cebbase.com) lets you create new database applications with a few clicks of your mouse; all you have to do is fill in a few forms and make a few choices from some pull-down lists. Data entry is via web forms, and then your data is displayed in a spreadsheet-like layout. You can then sort, filter, and group your data as you like. Sharing is accomplished by clicking the Share link at the top of any data page. You invite users to share your database via email, and then adjust their permissions after they've accepted your invitation.

SNAPSHOTS

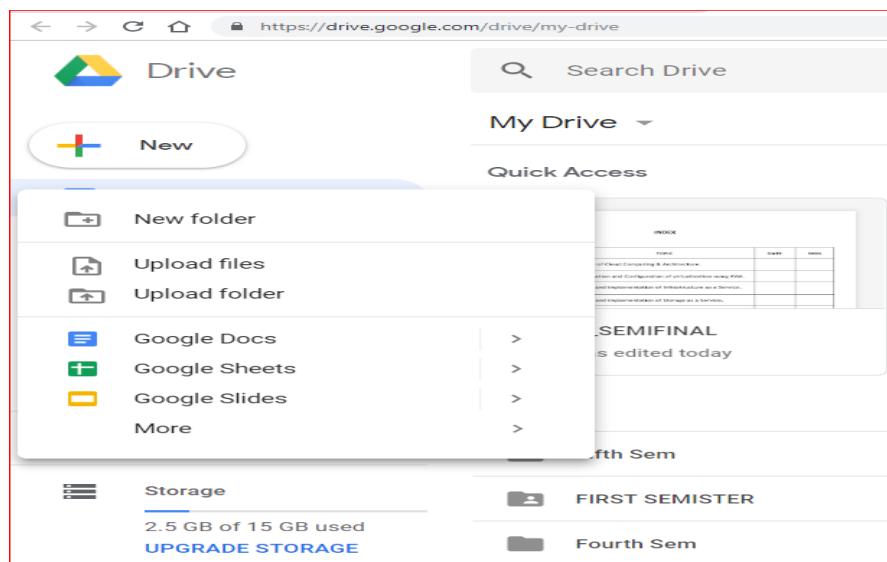
Step 1: Sign into the Google Drive website with your Google account.

If you don't have a Google account, you can create one for free. Google Drive will allow you to store your files in the cloud, as well as create documents and forms through the Google Drive web interface.



Step 2: Add files to your drive.

There are two ways to add files to your drive. You can create Google Drive documents, or you can upload files from your computer. To create a new file, click the CREATE button. To upload a file, click the “Up Arrow” button next to the CREATE button.



Step 3: Change the way your files are displayed.

You can choose to display files by large icons (Grid) or as a list (List). The List mode will show you at a glance the owner of the document and when it was last modified. The Grid mode will show each file as a preview of its first page. You can change the mode by clicking the buttons next to the gear icon in the upper right corner of the page.// List Mode

A screenshot of the Google Drive web interface. The 'Grid view' button in the top right corner is highlighted with a red box. The left sidebar shows navigation links like 'My Drive' (which is selected), 'Shared with me', 'Recent', 'Starred', 'Bin', and 'Backups'. The main area displays a grid of file previews. A specific file, 'Ty sem5', is selected and highlighted with a blue border. Below the grid, a table lists files with columns for Name, Owner, Last modified, and File size. The storage summary at the bottom left shows '9.9 GB of 15 GB used' and a 'UPGRADE STORAGE' link.

Step 4: Use the navigation bar on the left side to browse your files.

“My Drive” is where all of your uploaded files and folders are stored. “Shared with Me” are documents and files that have been shared with you by other Drive users. “Starred” files are files that you have marked as important, and “Recent” files are the ones you have most recently edited.

- You can drag and drop files and folders around your Drive to organize them as you see fit.
- Click the Folder icon with a “+” sign to create a new folder in your Drive. You can create folders inside of other folders to organize your files.

The screenshot shows the Google Drive interface. On the left, there's a sidebar with navigation links like 'New', 'My Drive', 'Shared with me' (which is highlighted in blue), 'Recent', 'Starred', 'Bin', 'Backups', and 'Storage'. The main area is titled 'Shared with me' and lists files and folders. The columns are 'Name', 'Shared by', and 'Share date'. The files listed are: 'Cloud Computing' shared by Sybal Dias on 18 Nov 2019; 'AI' shared by عادل الحور (Ruvaifaa Saiyyid) on 15 Oct 2019; 'Game Programming.zip' shared by عادل الحور (Ruvaifaa Saiyyid) on 14 Oct 2019; 'index.docx' shared by Anjali Raul on 25 Sep 2019; 'nfsClient_p.doc' shared by Kalpana regmi on 24 Sep 2019; 'app-debug.apk' shared by Gauravi Pawar on 22 Sep 2019; 'besffirstsearch' shared by PRIYA JAIN on 20 Sep 2019; 'Game programming' shared by omkar sawant on 17 Sep 2019; '371. Insert, Update, Delete in GridView Asp.Net.txt' shared by Hariti Study Hub - Easy Learn on 3 Sep 2019; and 'Class1.cs' shared by amit andipara on 24 Aug 2019.

Step 5: Search for files.

You can search through your Google Drive documents and folders using the search bar at the top of your page. Google Drive will search through titles, content, and owners. If a file is found with the exact term in the title, it will appear under the search bar as you type so that you can quickly select it.

This screenshot shows the Google Drive interface with a search query 'PDFs' entered into the search bar. The results are displayed in a grid view. The search results include: 'PDFs' (category), 'Documents' (category), 'Spreadsheets' (category), 'Presentations' (category), 'Photos & images' (category), 'Videos' (category), and 'More search tools' (link). Below these categories, a list of files is shown, including 'nfsClient_p.doc' (shared by Kalpana regmi on 24 Sep 2019), 'app-debug.apk' (shared by Gauravi Pawar on 22 Sep 2019), 'besffirstsearch' (shared by PRIYA JAIN on 20 Sep 2019), 'Game programming' (shared by omkar sawant on 17 Sep 2019), '371. Insert, Update, Delete in GridView Asp.Net.txt' (shared by Hariti Study Hub - Easy Learn on 3 Sep 2019), and 'Class1.cs' (shared by amit andipara on 24 Aug 2019).

Step 6: Click the NEW button.

A menu will appear that allows you to choose what type of document you want to create. You have several options by default, and more can be added by clicking the “More” link at the bottom of the menu:

The screenshot shows the Google Drive web interface. On the left, there's a sidebar with options like 'Folder', 'File upload', 'Folder upload', 'Google Docs', 'Google Sheets', 'Google Slides', 'More', and 'Backups'. Below that is the 'Storage' section, which says '9.9 GB of 15 GB used' and has a 'UPGRADE STORAGE' link. The main area shows a list of files. A context menu is open over a file named 'Y.docx'. The menu includes options like 'Google Forms', 'Google Drawings', 'Google My Maps', 'Google Sites', 'Document Viewer for Google Drive', and 'Google Jamboard'. At the bottom of the menu is a '+ Connect more apps' option. The list of files in the main area includes 'Y.docx', 'Result', 'CCPracts_syb_Class.doc...', 'SoftwareArchitecturalSt...', 'Photos', and 'Web_ProgrammingSem3_practicals'.

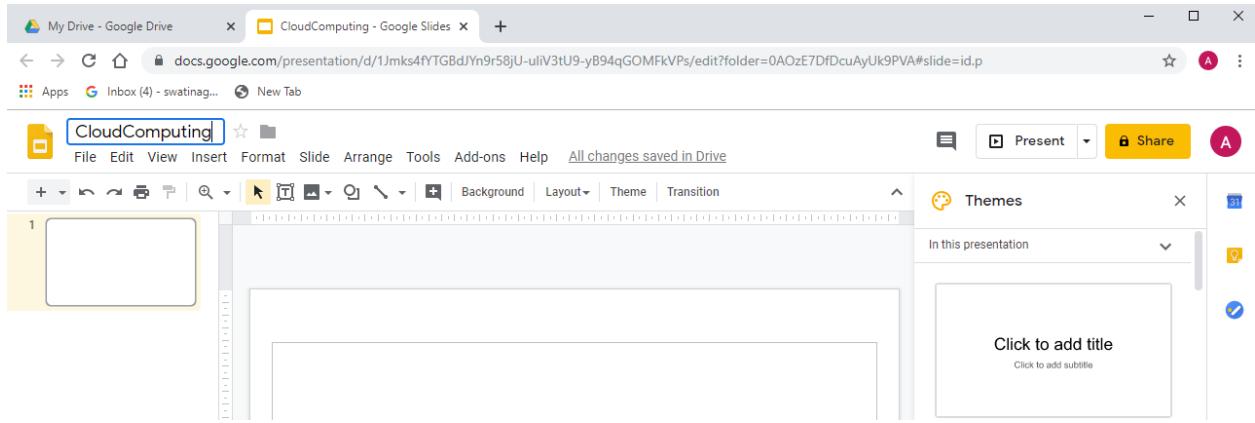
Step 7: Create a new file.

Once you've selected your document type, you will be taken to your blank document. If you chose Google Docs/Sheets/Slides , you will be greeted by a wizard that will help you configure the feel of your document.

The screenshot shows a Google Slides presentation. The slide has a yellow header bar with the title 'Untitled presentation'. The slide itself has a white background with a large text box containing 'Click to add title' and a smaller text box below it containing 'Click to add subtitle'. At the bottom of the slide, there's a text box for 'Click to add speaker notes'. To the right of the slide, there's a 'Themes' sidebar with three theme options: 'Simple Light' (yellow border), 'Simple Dark' (black background), and 'Simple Dark' (light gray background). There's also an 'Import theme' button at the bottom of the sidebar. The top of the screen shows a browser window with the URL 'docs.google.com/presentation/d/1Jmks4fYTGBdJYn9r58JU-uliV3tU9-yB94qGOMFkVPs/edit?folder=0AOzE7DfDcuAyUk9PVA#slide=id.p'.

Step 8: Name the file.

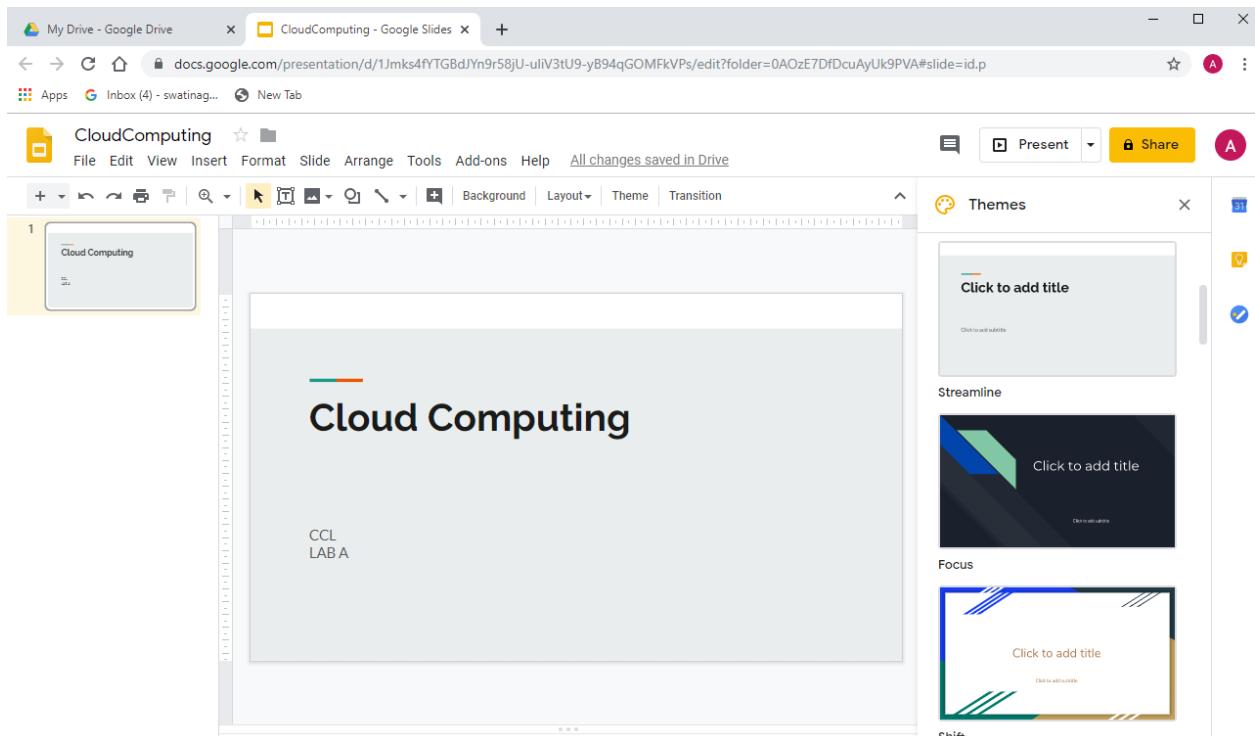
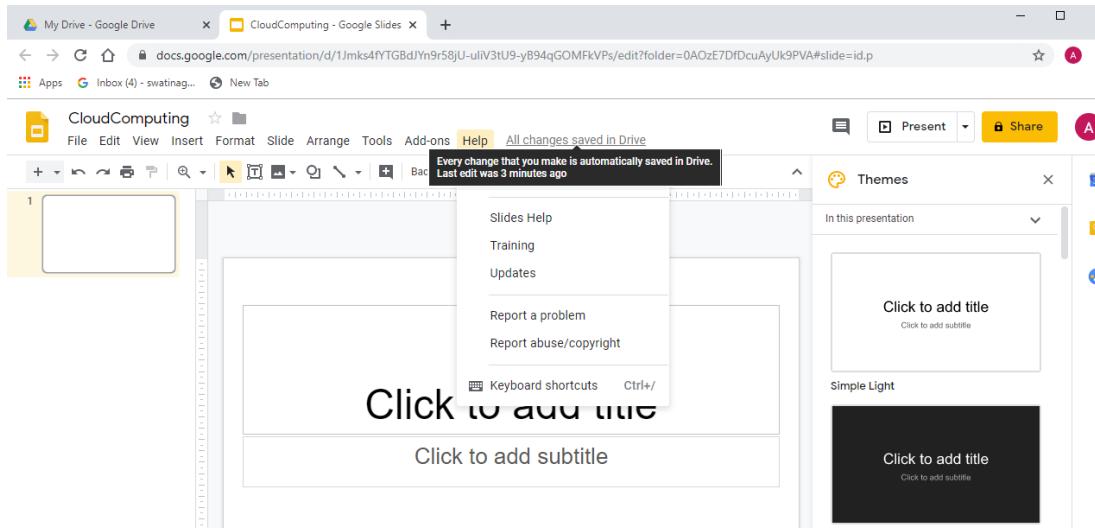
At the top of the page, click the italic gray text that says “Untitled <file type>”. When you click it, the “Rename document” window will appear, allowing you to change the name of your file.



Step 9: Edit your document.

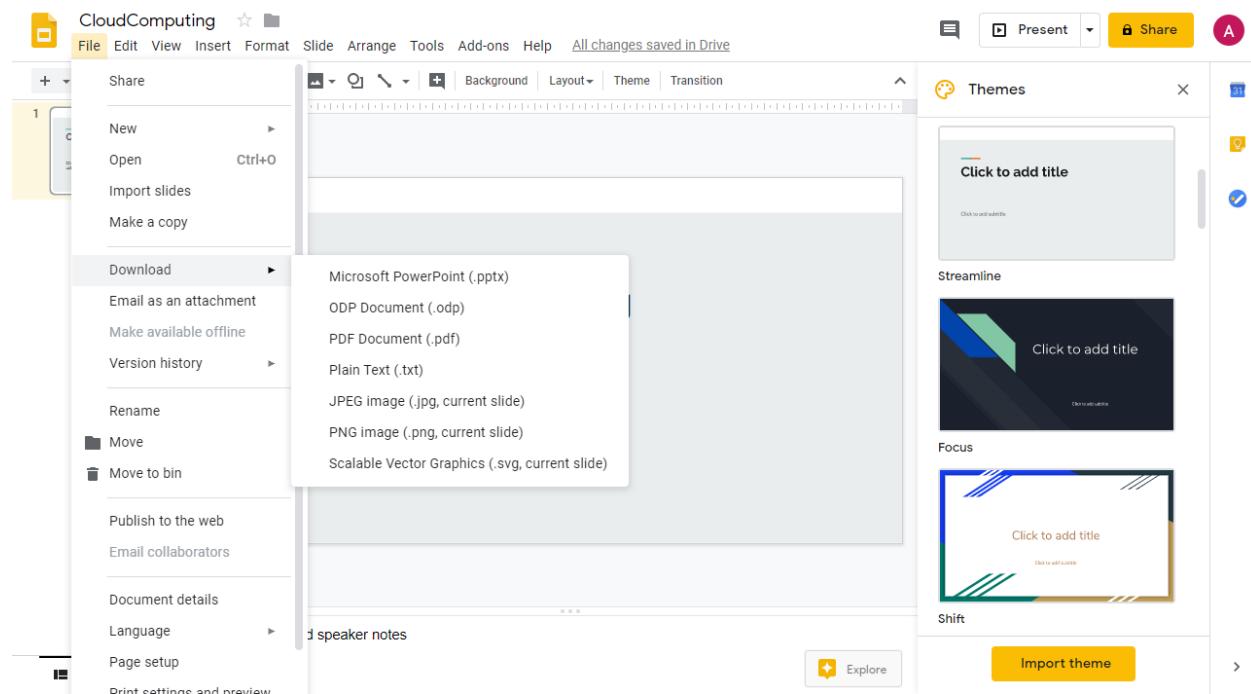
Begin writing your document as you would in its commercially-equivalent. You will most likely find that Google Drive has most of the basic features, but advanced features you may be used to are not available.

1. Your document saves automatically as you work on it.



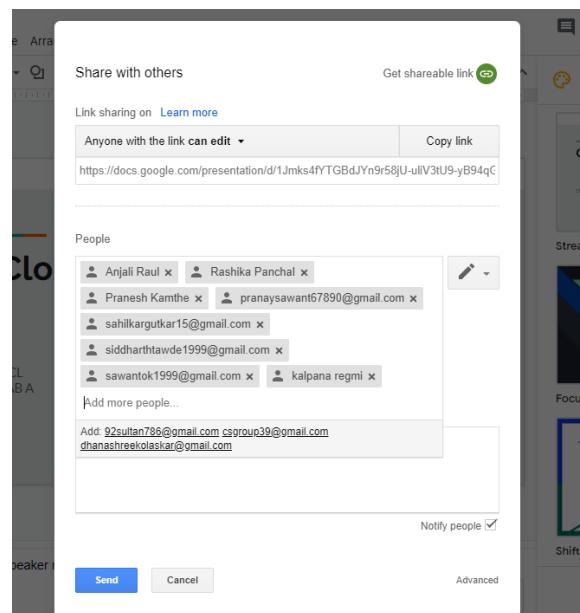
Step 10: Export and convert the file.

If you want to make your file compatible with similar programs, click File and place your cursor over “Download As”. A menu will appear with the available formats. Choose the format that best suits your needs. You will be asked to name the file and select a download location. When the file is downloaded, it will be in the format you chose.

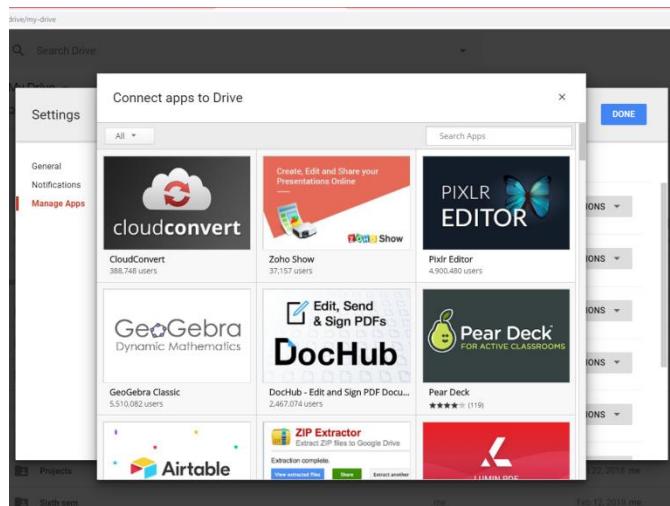


Step 11: Share your document.

Click File and select Share, or click the blue Share button in the upper right corner to open the Sharing settings. You can specify who can see the file as well as who can edit it.



Other Capabilities



1. Edit photos
2. Listen Music
3. Do drawings
4. Merge PDFs

CONCLUSION:

Google Docs provide an efficient way for storage of data. It fits well in Storage as a service (SaaS). It has varied options to create documents, presentations and also spreadsheets. It saves documents automatically after a few seconds and can be shared anywhere on the Internet at the click of a button.

We can demonstrate the same using **ownCloud** (Refer to Practical No 9) [You own private SaaS]

- ownCloud is a self-hosted open source file sync and share server.
- Like "big boys" Dropbox, **Google Drive**, Box, and others, ownCloud lets you access your files, calendar, contacts, and other data.
- You can synchronize everything (or part of it) between your devices and share files with others.
- In 2016, the development of ownCloud was split, and many of the original developers forked the source code to create a competing product, called Nextcloud.

Features	Nextcloud	ownCloud
Files		
File Storage	YesUpload, synch, comments, tags, multiple versions, move files via web interface	YesUpload, synch, comments, tags, multiple versions, move files via web interface
File Sharing	YesShare via user, email, link, social media sites, password protection and expiration date. Can allow user without an account (just email) to edit a document.	YesShare via user, or link, social media sites, password protection and expiration date
Storage Limitation per User	Yes	Yes

Clients	NextCloud	ownCloud
Web Client	Yes	Yes
Desktop Clients	Windows, Mac, Linux	Windows, Mac, Linux
Mobile Clients	Yes Google Play Android client (rated 4 and is free), Apple App store client (rated 4.7 and is free), F-Droid repository Android client and the MS Windows Store has an app still in testing	Yes Windows Mobile client, Google Play Android client (rated 4 and costs \$4.00), Apple App store client (rated 2.9 and costs \$0.99), and Blackberry World has a client
Security	NextCloud	ownCloud
Two Factor Authentication	Yes Multiple methods available, plus enforcement	Yes TOTP available
Scability / Enterprise Support	Yes Enterprise level service is supported and the new Global Scale architecture is under development to expand this support further	Yes ownCloud Enterprise Edition has Enterprise support, but is not open source nor free
Resource Monitoring	Yes	No
Third Party Authentication	Yes	Yes
Role Based Administration	Yes	Yes
Translations	33 languages available	103 languages available

PRACTICAL NO: 5

AIM:To Study Cloud IdentityManagement (AWS)

OBJECTIVE:Secure your AWS account using IAM services

- To understand the security features of Cloud.
- To learn the technique of application security management and its complexity
- To understand the importance of cloud security management from application point of view

Hardware / Software/Web reference Required: <https://www.aws.amazon.com>

Theory:

Identity management is also known as identity and access management.

IAM refers to a framework of policies and technologies for ensuring that the proper people in

an enterprise have the appropriate access to technology resources.

Identity management can involve four basic functions:

1. The pure identity function: Creation, management and deletion of identities without regard to access or entitlements;
2. The user access (log-on) function: For example: a smart card and its associated data used by a customer to log on to a service or services (a traditional view);
3. The service function: A system that delivers personalized, role-based, online, on-demand, multimedia (content), presence-based services to users and their devices.
4. Identity Federation: A system that relies on federated identity to authenticate a user without knowing his or her password.

AWS Identity and Access Management (IAM) enables you to manage access to AWS services and resources securely. Using IAM, you can create and manage AWS users and groups, and use permissions to allow and deny their access to AWS resources. IAM is a feature of your AWS account offered at no additional charge.

PROCEDURE:

Step 1: Go to <https://www.aws.amazon.com> click on “Create an AWS Account” Enter details in the required field click on “Continue”

Create an AWS account

AWS Accounts Include
12 Months of Free Tier Access

Including use of Amazon EC2, Amazon S3, and Amazon DynamoDB
Visit aws.amazon.com/free for full offer terms

Email address

Password

Confirm password

AWS account name

[Sign in to an existing AWS account](#)

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Step 2 : Select the account type and complete the fields below click on “Create Account and continue” Sign out .

NOTE : Do not provide any credit card details on Payment Information .

Please select the account type and complete the fields below with your contact details.

Account type Professional Personal

Full name

Phone number

Country/Region

* If you select India, your country/region selection cannot be changed after creating the account

Address

City

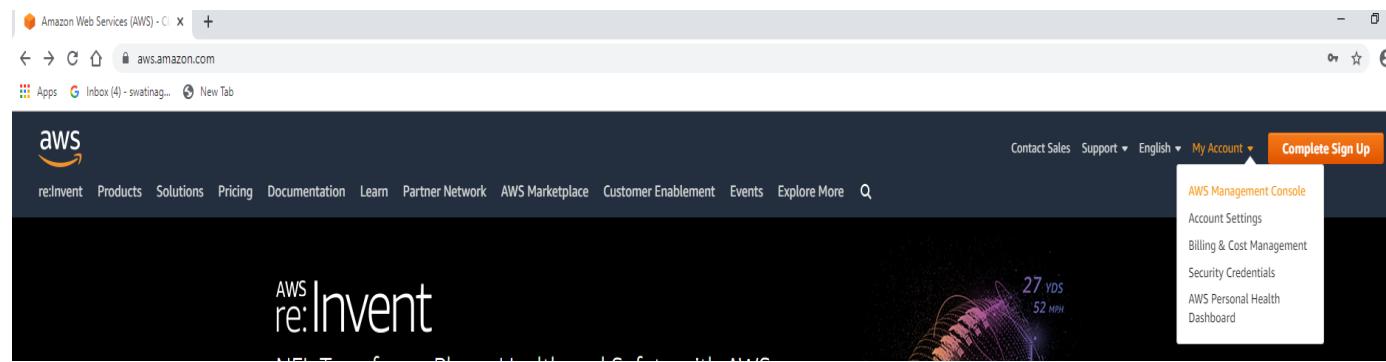
State / Province or region

Postal code

Amazon Internet Services Pvt. Ltd. Customer Agreement
Customers with an India contact address are now required to contract with Amazon Internet Service Private Ltd. (AISPL). AISPL is the local seller for AWS infrastructure services in India.

Check here to indicate that you have read and agree to the terms of the [AISPL Customer Agreement](#)

Step 3: Click on “My Account” and go to “AWS Management Console” □ Sign In with your account as a root user.



Root user sign in ⓘ

Email: asmikadam098@gmail.com

Password [Forgot password?](#)

.....

[Sign in](#)

[Sign in to a different account](#)

[Create a new AWS account](#)

Step 4 : After signing in , the AWS Management Console home page is displayed

Click on All Services □ On Security Identity and compliance click on IAM

https://us-east-2.console.aws.amazon.com/console/home?region=us-east-2#

The screenshot shows the AWS Cloud Services navigation menu. It includes sections for Analytics, Developer Tools, Robotics, Blockchain, Satellite, Security, Identity, & Compliance, and Game Development. Each section lists specific services.

- Analytics**: Athena, EMR, CloudSearch, Elasticsearch Service, Kinesis, QuickSight, Data Pipeline, AWS Glue, MSK.
- Developer Tools**: CodeStar, CodeCommit, CodeBuild, CodeDeploy, CodePipeline, Cloud9, X-Ray.
- Robotics**: AWS RoboMaker.
- Blockchain**: Amazon Managed Blockchain.
- Satellite**: Ground Station.
- Security, Identity, & Compliance**: IAM, Resource Access Manager, Cognito, Secrets Manager, GuardDuty, Inspector, Amazon Macie, AWS Organizations, AWS Single Sign-On, Certificate Manager, Key Management Service, CloudHSM, Directory Service, WAF & Shield, Artifact, Security Hub.
- Game Development**: Amazon GameLift.

Step 5 : Complete all Security status steps

Manage Security Credentials Get Started with IAM Users

Identity and Access Management (IAM)

- Dashboard**
- Access management**
- Access reports**
 - Access analyzer
 - Archive rules
 - Analyzer details
 - Credential report
 - Organization activity
 - Service control policies (SCPs)

Search IAM

AWS account ID: 495662379473

Welcome to Identity and Access Management

IAM users sign-in link: <https://495662379473.signin.aws.amazon.com/console>

| Customize

IAM Resources

Users: 0 Roles: 2 Identity Providers: 0

Customer Managed Policies: 0

Security Status 1 out of 5 complete.

<input checked="" type="checkbox"/> Delete your root access keys	<small>Delete your AWS root account access keys, because they provide unrestricted access to your AWS resources. Instead, use IAM user access keys or temporary security credentials. Learn More</small>
Manage Security Credentials	
Activate MFA on your root account	
Create individual IAM users	
Use groups to assign permissions	
Apply an IAM password policy	

Security Credentials

You are accessing the security credentials page for your AWS account. The account credentials provide unlimited access to your AWS resources.

To help secure your account, follow an [AWS best practice](#) by creating and using AWS Identity and Access Management (IAM) users with limited permissions.

Continue to Security Credentials **Get Started with IAM Users**

Don't show me this message again

Step 6 : click on Add User □ Set User Details □ Next : Permission

The screenshot shows the AWS IAM Management Console interface. At the top, there's a navigation bar with the AWS logo, 'Services', 'Resource Groups', and user information ('Yogesh007', 'Global', 'Support'). Below the navigation is a search bar labeled 'Search IAM'. On the left, a sidebar lists 'Dashboard', 'Groups', 'Users' (which is selected), 'Roles', 'Policies', and 'Identity providers'. The main content area has a title 'Add user' and a progress bar with five steps, where step 1 is highlighted. A sub-section titled 'Set user details' follows, with a note that multiple users can be added at once. It includes a 'User name' field containing 'asmitakadam', a link to 'Add another user', and a section for 'Select AWS access type'. Under 'Access type', two options are checked: 'Programmatic access' (enabling access keys) and 'AWS Management Console access' (enabling password sign-in). Below this, a 'Console password' field is set to 'Custom password' with a masked input field and a 'Show password' checkbox. A 'Require password reset' checkbox is also present. At the bottom, there are 'Cancel' and 'Next: Permissions' buttons.

Step 7: Click on Attach existing policies directly and select Administrator Access and AmazonAPI Gateway □ click on Next till 4th step □ Download the csv file wherein Access key ID and login URL of users is stored.

Add user

1 2 3 4 5

Set permissions

Add user to group

Copy permissions from existing user

Attach existing policies directly

[Create policy](#)



Filter policies ▾		Search	Showing 504 results	
	Policy name ▾	Type	Used as	
<input checked="" type="checkbox"/>	AdministratorAccess	Job function	None	
<input type="checkbox"/>	AlexaForBusinessDeviceSetup	AWS managed	None	
<input type="checkbox"/>	AlexaForBusinessFullAccess	AWS managed	None	
<input type="checkbox"/>	AlexaForBusinessGatewayExecution	AWS managed	None	
<input type="checkbox"/>	AlexaForBusinessPolyDelegatedAccessPolicy	AWS managed	None	
<input type="checkbox"/>	AlexaForBusinessReadOnlyAccess	AWS managed	None	
<input checked="" type="checkbox"/>	AmazonAPIGatewayAdministrator	AWS managed	None	
<input type="checkbox"/>	AmazonAPIGatewayInvokeFullAccess	AWS managed	None	

Set permissions boundary

[Cancel](#)

[Previous](#)

[Next: Tags](#)

Add user

1 2 3 4 5

Review

Review your choices. After you create the user, you can view and download the autogenerated password and access key.

User details

User name	asmikitakadam
AWS access type	Programmatic access and AWS Management Console access
Console password type	Custom
Require password reset	No
Permissions boundary	Permissions boundary is not set

Permissions summary

The following policies will be attached to the user shown above.

Type	Name
Managed policy	AdministratorAccess
Managed policy	AmazonAPIGatewayAdministrator
Managed policy	IAMUserChangePassword

Tags

No tags were added.

[Cancel](#)

[Previous](#)

[Create user](#)

Add user

1 2 3 4 5

Success

You successfully created the users shown below. You can view and download user security credentials. You can also email users instructions for signing in to the AWS Management Console. This is the last time these credentials will be available to download. However, you can create new credentials at any time.

Users with AWS Management Console access can sign-in at: <https://495662379473.signin.aws.amazon.com/console>

 Download .csv

	User	Access key ID	Secret access key	Email login instructions
▶	 asmitakadam	AKIAKGZ6HWHIXW4YTHWB	***** Show	Send email

Step 8: Now login as a user now



Account ID or alias

495662379473

IAM user name

asmitakadam

Password

.....

[Sign In](#)

[Sign-in using root account credentials](#)

[Forgot password?](#)

AWS Management Console

AWS services

Find Services

You can enter names, keywords or acronyms.

 Example: Relational Database Service, database, RDS

▼ Recently visited services

 IAM

▶ All services

Welcome to Identity and Access Management

IAM users sign-in link:
<https://495662379473.signin.aws.amazon.com/console>

| Customize

IAM Resources

Users: 1 Roles: 2
Groups: 0 Identity Providers: 0
Customer Managed Policies: 0

Security Status

2 out of 5 complete.

- ⚠ Activate MFA on your root account
- ✓ Create individual IAM users
- ⚠ Use groups to assign permissions
- ⚠ Apply an IAM password policy
- ✓ Rotate your access keys

Add user

1 2 3 4 5

Set user details

You can add multiple users at once with the same access type and permissions. [Learn more](#)

User name*	anjaliraul	<input type="button" value="X"/>
	rasikapanchal	<input type="button" value="X"/>
+ Add another user		

Select AWS access type

Select how these users will access AWS. Access keys and autogenerated passwords are provided in the last step. [Learn more](#)

Access type*	<input checked="" type="checkbox"/> Programmatic access Enables an access key ID and secret access key for the AWS API, CLI, SDK, and other development tools.
	<input checked="" type="checkbox"/> AWS Management Console access Enables a password that allows users to sign-in to the AWS Management Console.
Console password*	<input type="radio"/> Autogenerated password <input checked="" type="radio"/> Custom password <input type="text" value="*****"/> <input type="checkbox"/> Show password
Require password reset	<input type="checkbox"/> Users must create a new password at next sign-in Users automatically get the IAMUserChangePassword policy to allow them to change their own password.

* Required

Cancel

Next: Permissions

Add user

Review

Review your choices. After you create the users, you can view and download autogenerated passwords and access keys.

User details

User names	anjaliraul and rasikapanchal
AWS access type	Programmatic access and AWS Management Console access
Console password type	Custom
Require password reset	No
Permissions boundary	Permissions boundary is not set

Permissions summary

The following groups and policies will be copied from the selected existing user(s) and attached to the users shown above.

Type	Name
Managed policy	AdministratorAccess
Managed policy	IAMUserChangePassword
Managed policy	AmazonAPIGatewayAdministrator

Tags

No tags were added.

Cancel Previous **Create users**

Feedback English (US)

credentials.csv

Type here to search

9:40 AM 12/7/2019

Amazon Web Services (AWS) - C IAM Management Console

Add user

Success
You successfully created the users shown below. You can view and download user security credentials. You can also email users instructions for signing in to the AWS Management Console. This is the last time these credentials will be available to download. However, you can create new credentials at any time.

Users with AWS Management Console access can sign-in at: <https://495662379473.signin.aws.amazon.com/console>

[Download .csv](#)

User	Access key ID	Secret access key	Email login instructions
anjaliraul	AKIAJGZGHWIHZT3N5WR	***** Show	Send email
raskapanchal	AKIAJGZGHWIQQNRV4FZ	***** Show	Send email

Feedback English (US)

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Show all

Welcome to Identity and Access Management

IAM users sign-in link:
<https://495662379473.signin.aws.amazon.com/console>

IAM Resources

Users: 3 Roles: 2 Identity Providers: 0 Customer Managed Policies: 0

Security Status

- ⚠ Activate MFA on your root account
- ⚠ Create individual IAM users
- ⚠ Use groups to assign permissions
- ⚠ Apply an IAM password policy
- ⚠ Rotate your access keys

2 out of 5 complete.

Feature Spotlight

Introduction to AWS IAM

Additional Information

IAM best practices IAM documentation Web Identity Federation Playground Policy Simulator Videos, IAM release history and additional resources

My security credentials

Account details

User name	anjaliraul (created on 2019-12-07 09:41 UTC+0530)
User ARN	arn:aws:iam::495662379473:user/anjaliraul
AWS account ID	495662379473
Canonical user ID (for Amazon S3)	aa4f9514c997dbb69cb22391017e757bab8e11b049c3e6af5f3eba4b3cb85e8f

AWS IAM credentials AWS CodeCommit credentials Amazon MCS credentials

Password for console access

As an IAM user, you need a password to access the AWS Management Console. We recommend changing your password on a regular basis. Your current password is 0 days old. Learn more

[Change password](#)

Access keys for CLI, SDK, & API access

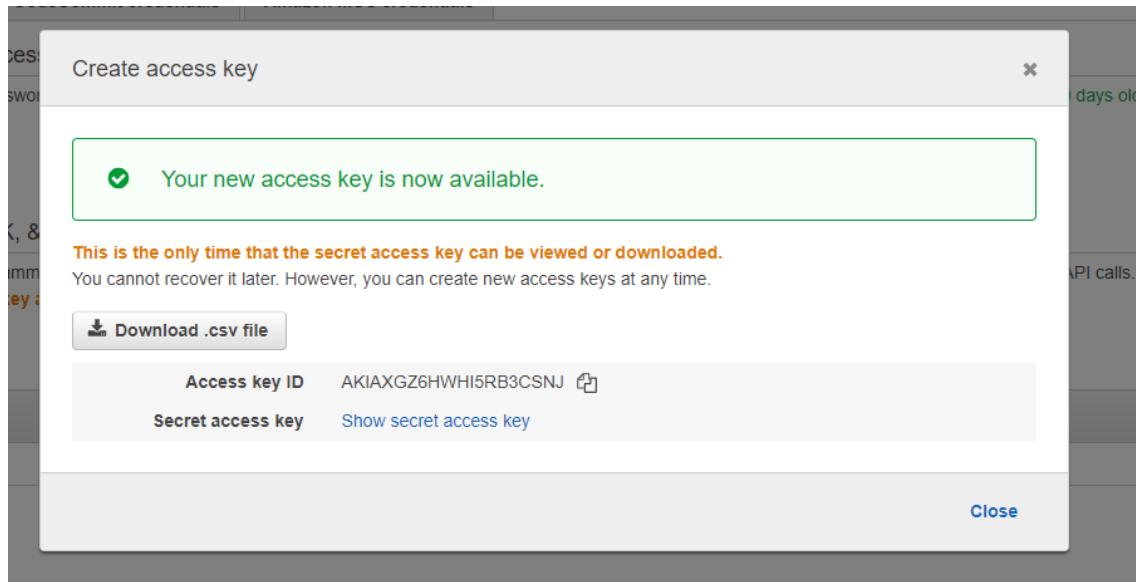
Use access keys to make programmatic calls to AWS from the AWS Command Line Interface (AWS CLI), Tools for Windows PowerShell, the AWS SDKs, or direct AWS API calls. If you lose or forget your secret key, you cannot retrieve it. Instead, create a new access key and make the old key inactive. Learn more

[Create access key](#)

Access key ID	Status	Created	Last used	Actions
AKIAJGZGHWIQUMR3BPD	Active	2019-12-07 09:44 UTC+0530	N/A	Make inactive Delete
AKIAJGZGHWIHZT3N5WR	Active	2019-12-07 09:41 UTC+0530	N/A	Make inactive Delete

Multi-factor authentication (MFA)

For increased security, we recommend configuring MFA to help protect your AWS resources. MFA requires users to type a unique authentication code from an approved authentication device when they sign in to AWS. Learn more



Step 9: Go to My security credentials □ click on Create access key □ Download secret access key .csv file

My security credentials

Account details

User name	Irfan (created on 2019-03-11 10:24 UTC+0530)
User ARN	arn:aws:iam::272214125374:user/Irfan
AWS account ID	272214125374
Canonical user ID (for Amazon S3)	f8663efe8d04b78acc61036dde10311261526b6cd4fa5220add3bd241297e415

AWS IAM credentials AWS CodeCommit credentials

Password for console access

As an IAM user, you need a password to access the AWS Management Console. We recommend changing your password on a regular basis. [Your current pass...](#)

Change password

Access keys for CLI, SDK, & API access

Use access keys to make programmatic calls to AWS from the AWS Command Line Interface (AWS CLI), Tools for Windows PowerShell, the AWS SDKs, or directly from your application. **You cannot retrieve it. Instead, create a new access key and make the old key inactive.** [Learn more](#)

Create access key

Access key ID	Status	Created	Last used	Actions
AKIAJQN443CPDDK5HHJA	Active	2019-03-11 10:24 UTC+0530	N/A	Make inactive Delete

IAM Management Console IAM Management Console

https://console.aws.amazon.com/iam/home?region=us-east-2#/security_credentials

We're scanning your device for updates. McAfee WebAdvisor

cannot retrieve it. Instead, create a new access key and make the old key inactive. [Learn more](#)

Create access key

Your new access key is now available.

This is the only time that the secret access key can be viewed or downloaded. You cannot recover it later. However, you can create new access keys at any time.

Download .csv file

Access key ID: AKIAIVOQESLZXK4RZQNA

Secret access key: Show secret access key

Close

Dashboard Groups Users Roles Policies Identity providers Account settings Credential report Encryption keys

Access keys successfully created. You can now use these access keys to make programmatic calls to AWS. [Learn more](#)

Create access key

Access key ID: AKIAIVOQESLZXK4RZQNA

Secret access key: Show secret access key

Multi-factor authentication

For increased security, we recommend using multi-factor authentication. [Learn more](#)

Assign MFA device

You do not have an assigned MFA device.

X.509 certificate

Use X.509 certificates to make secure SOAP-protocol requests to some AWS services. For your protection, store your private certificate keys securely and do not share them with others. [Learn more](#)

Create new certificate Upload your own certificate

You do not have a certificate.

Feedback English (US) © 2006 - 2019, Amazon Internet Services Private Limited

Step 10: Go to users , the details w.r.t attached policies is displayed here.

The screenshot shows the AWS IAM Management Console interface. On the left, a sidebar menu includes options like Dashboard, Groups, Users (which is selected), Roles, Policies, Identity providers, Account settings, and Credential report. Below this is an 'Encryption keys' section. The main content area is titled 'Summary' for a user named 'Irfan'. It displays the User ARN (arn:aws:iam:272214125374:user/Irfan), Path (/), and Creation time (2019-03-11 10:24 UTC+0530). Below this, there are tabs for Permissions, Groups, Tags, Security credentials, and Access Advisor. The 'Permissions' tab is active, showing 'Permissions policies (3 policies applied)'. A blue button labeled 'Add permissions' is visible. To the right, there's a link to 'Add inline policy'. A table lists the attached policies: 'AdministratorAccess' and 'IAMUserChangePassword' are listed under 'Attached directly' as AWS managed policies, with 'Show 1 more' link below. A note at the bottom says 'Permissions boundary (not set)'. At the top right, there are 'Delete user' and help icons. The bottom of the screen shows the Windows taskbar with various pinned icons and the system tray.

CONCLUSION: Identity management on AWS done. It gives us the ability to attach/detach our own permissions and policies for securing data for our respective accounts.

PRACTICAL NO : 6

AIM:To Study Cloud Security Management (AWS)

OBJECTIVE:Secure your AWS account using IAM services

- To understand the security features of Cloud.
- To learn the technique of application security management and its complexity
- To understand the importance of
- cloud security management from application point of view

HARDWARE / SOFTWARE REQUIRED: <https://www.aws.amazon.com>

THEORY:

Cloud computing security is the set of control-based technologies and policies designed to adhere to regulatory compliance rules and protect information, data applications and infrastructure associated with cloud computing use. Because of the cloud's very nature as a shared resource, identity management, privacy and access control are of concern.

Physical security:

Cloud service providers physically secure the IT hardware (servers, routers, cables etc.) against unauthorized access, interference, theft, fires, floods etc. and ensure that essential supplies (such as electricity) are sufficiently robust to minimize the possibility of disruption. This is normally achieved by serving cloud applications from 'world-class' (i.e. professionally specified, designed, constructed, managed, monitored and maintained) data centers.

Personnel security:

Various information security concerns relating to the IT and other professionals associated with cloud services are typically handled through pre-, para- and post-employment activities such as security screening potential recruits, security awareness and training programs, proactive security monitoring and supervision, disciplinary procedures and contractual obligations embedded in employment contracts, service level agreements, codes of conduct, policies etc.

Application security:

Cloud providers ensure that applications available as a service via the cloud (SaaS) are secure by specifying, designing, implementing, testing and maintaining appropriate application security measures in the production environment.

PROCEDURE:

Step 1: Go to <https://www.aws.amazon.com> click on “Create an AWS Account” Enter details in the required field click on “Continue”

portal.aws.amazon.com/billing/signup?nc2=h_ct&src=header_signup&redirect_url=https%3A%2F%2Faws.amazon.com%2Fregistration-confirmation#/start
 (4) + swatinag... New Tab

Create an AWS account

**AWS Accounts Include
12 Months of Free Tier Access**

Including use of Amazon EC2, Amazon S3, and Amazon DynamoDB
 Visit aws.amazon.com/free for full offer terms

Email address
 asmitadam098@gmail.com

Password
*

Confirm password
*

AWS account name ⓘ
 asmita

Continue

[Sign in to an existing AWS account](#)

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Step 2 : Select the account type and complete the fields below ☐ click on “Create Account and continue” ☐ Sign out .

NOTE : Do not provide any credit card details on Payment Information .

Please select the account type and complete the fields below with your contact details.

Account type ⓘ
 Professional Personal

Full name
 suraj rajbhar

Phone number
*

Country/Region
 India

* If you select India, your country/region selection cannot be changed after creating the account

Address
 Gomes Chawl,Shankarwadi,Jogeshwari(e)

Apartment, suite, unit, building, floor, etc.

City
 mumbai

State / Province or region
 Maharashtra

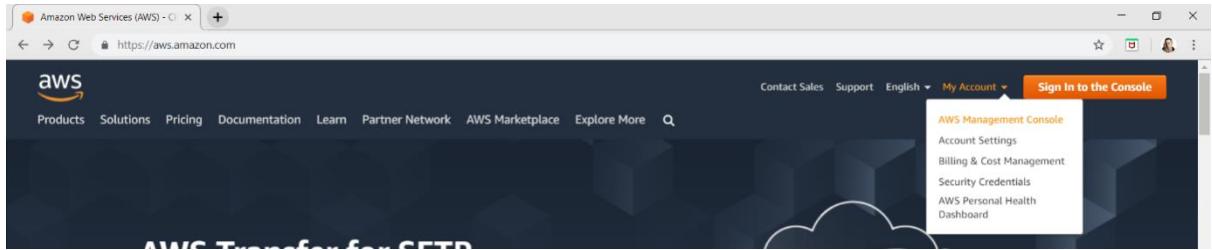
Postal code
 400060

Amazon Internet Services Pvt. Ltd. Customer Agreement
 Customers with an India contact address are now required to contract with Amazon Internet Service Private Ltd. (AISPL). AISPL is the local seller for AWS infrastructure services in India.

Check here to indicate that you have read and agree to the terms of the [AISPL Customer Agreement](#)

Create Account and Continue

Step 3: Click on “My Account” and go to “AWS Management Console” ☐ Sign In with your account as a root user.



Root user sign in

Email: asmikadam098@gmail.com

Password

[Forgot password?](#)

.....

[Sign in](#)

[Sign in to a different account](#)

[Create a new AWS account](#)

Step 4 : After signing in , the AWS Management Console home page is displayed

On Security Identity and compilance click on IAM

Step 5 : Complete all Security status steps

click on Delete your root access Manage Security Credentials Get Started with IAM Users

The screenshot shows the AWS IAM Management Console home page. On the left, there's a navigation sidebar with links like Dashboard, Groups, Users, Roles, Policies, Identity providers, Account settings, Credential report, and Encryption keys. The main area has a heading "Welcome to Identity and Access Management". It displays statistics: Users: 0, Roles: 2, Groups: 0, and Identity Providers: 0. Below this is a "Security Status" section with a progress bar showing "1 out of 5 complete". A prominent callout box at the top right says "Delete your root access keys" with a checked checkbox. Below it is a "Manage Security Credentials" button. A list of security best practices follows, each with a dropdown arrow: "Activate MFA on your root account", "Create individual IAM users", "Use groups to assign permissions", and "Apply an IAM password policy".

This screenshot shows the "Your Security Credentials" page. The sidebar includes links for Dashboard, Groups, Users, Roles, Policies, Identity providers, Account settings, Credential report, and Encryption keys. The main content area has a heading "Your Security Credentials" with a sub-section for "Password". It contains instructions about using email addresses for password recovery and a link to change the password. There are also sections for "Multi-factor authentication", "Access keys", "CloudFront key pairs", "X.509 certificate", and "Account identifiers". At the bottom, there are "Continue to Security Credentials" and "Get Started with IAM Users" buttons, along with a "Don't show me this message again" checkbox.

Step 6 : click on Add User

- Set User Details
- Next : Permission

The screenshot shows the "Users" page in the AWS IAM Management Console. The sidebar has a "Users" link highlighted. The main area features a search bar and two buttons: "Add user" (blue) and "Delete user" (red). Below is a table header with columns: "User name", "Groups", "Access key age", "Password age", "Last activity", and "MFA". A note at the bottom states "Showing 0 results" and "There are no IAM users. Learn more".

Screenshot of the AWS IAM Management Console showing the 'Add user' step 4: Review. The page displays user details, permissions summary, and tags. A CSV file named 'credentials.csv' is visible in the browser's download bar.

Step 7: Click on Attach existing policies directly and select AdministratorAccess and AmazonAPIGateway □ click on Next till 4th step □ Download the csv file wherein Access key ID and login URL of users is stored

Screenshot of the 'Set permissions' step in the 'Add user' wizard. The 'Attach existing policies directly' button is highlighted. A list of policies is shown, with 'AdministratorAccess' and 'AmazonAPIGateway' selected.

Screenshot of the 'Review' step in the 'Add user' wizard. It shows user details, permissions summary, and tags. The 'Create users' button is visible at the bottom right.

Success
You successfully created the users shown below. You can view and download user security credentials. You can also email users instructions for signing in to the AWS Management Console. This is the last time these credentials will be available to download. However, you can create new credentials at any time.

Users with AWS Management Console access can sign-in at: <https://495662379473.signin.aws.amazon.com/console>

User	Access key ID	Secret access key	Email login instructions
anjaliraul	AKIAKGZ6WHIXZ73NSWR	***** Show	Send email
raskapanchal	AKIAKGZ6WHIQQNRV4FZ	***** Show	Send email

Step 8: Now login as a user now



Account ID or alias

495662379473

IAM user name

asmatakadam

Password

.....

Sign In

[Sign-in using root account credentials](#)

[Forgot password?](#)

Step 9: Go to My security credentials click on Create access key Download secret access key .csv file

My security credentials

Account details

User name	Irfan (created on 2019-03-11 10:24 UTC+0530)
User ARN	arn:aws:iam::272214125374:user/Irfan
AWS account ID	272214125374
Canonical user ID (for Amazon S3)	f8663e8d04b78acc61036dde10311261526b6cd4fa5220add3bd241297e415

AWS IAM credentials **AWS CodeCommit credentials**

Password for console access

As an IAM user, you need a password to access the AWS Management Console. We recommend changing your password on a regular basis. Your current pass:

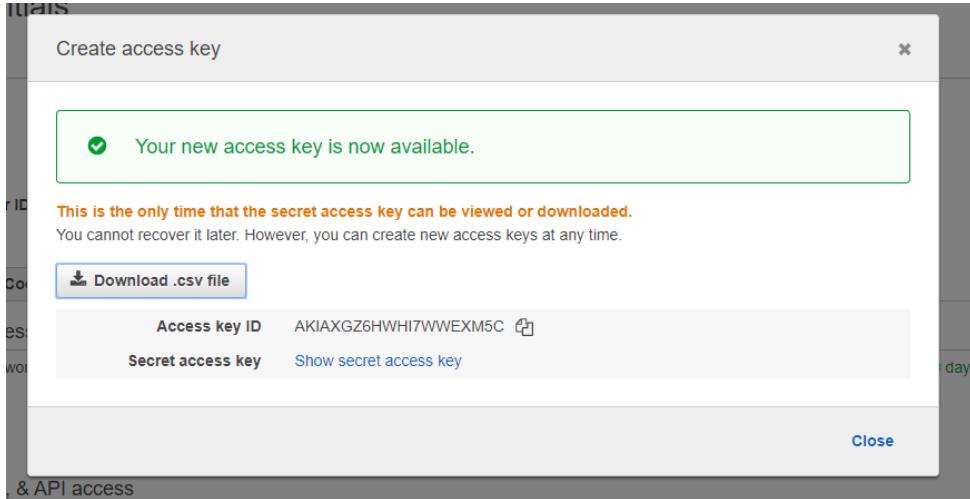
[Change password](#)

Access keys for CLI, SDK, & API access

Use access keys to make programmatic calls to AWS from the AWS Command Line Interface (AWS CLI), Tools for Windows PowerShell, the AWS SDKs, or directly. **cannot retrieve it. Instead, create a new access key and make the old key inactive.** [Learn more](#)

Create access key

Access key ID	Status	Created	Last used	Actions
AKIAJQN443CPDDK6HHJA	Active	2019-03-11 10:24 UTC+0530	N/A	Make inactive Delete



Step 10: Now to assign MFA, click on Assign MFA Device click on Virtual MFA Device click on Show QR Code and scan it via Google Authenticator app from your Mobile phone enter two MFA codes below. Our MFA is assigned

IAM Management Console

Services Resource Groups

cannot retrieve it. Instead, create a new access key and make the old key inactive. Learn more

Access keys successfully deleted

Create access key

Access key ID	Status	Created	Last used	Actions
AKIAIVOQESLZXK4RZQNA	Active	2019-03-11 10:31 UTC+0530	N/A	Make inactive Delete
AKIAJQN443CPDDK6HHJA	Active	2019-03-11 10:24 UTC+0530	N/A	Make inactive Delete

Multi-factor authentication (MFA)

For increased security, we recommend configuring MFA to help protect your AWS resources. MFA requires users to type a unique authentication code from an approved authentication device when they sign in to AWS. Learn more

Assign MFA device

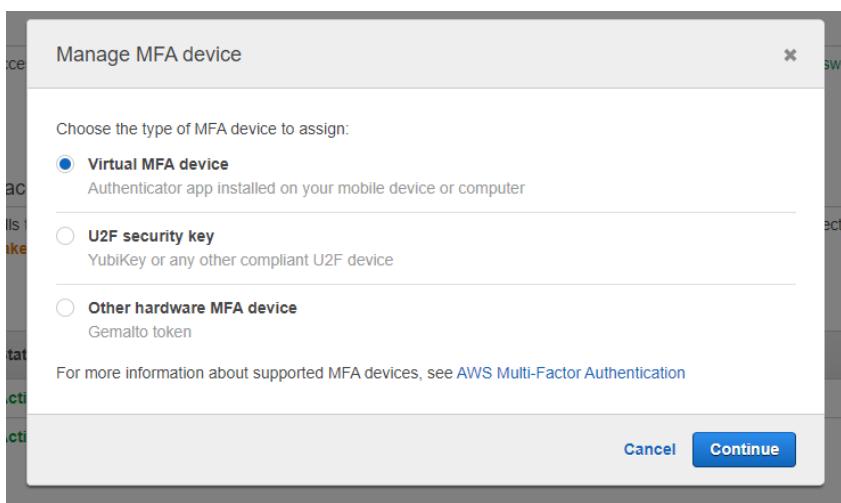
You do not have an assigned MFA device.

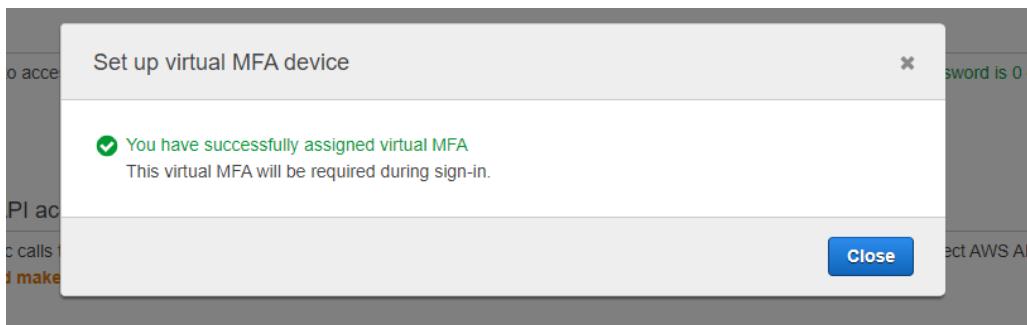
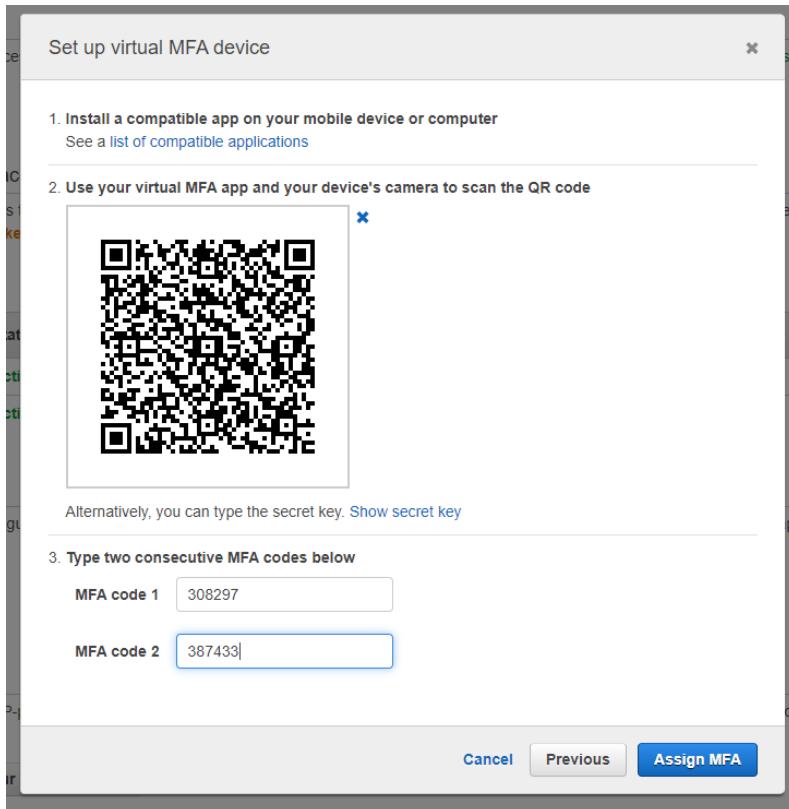
X.509 certificate

Use X.509 certificates to make secure SOAP-protocol requests to some AWS services. For your protection, store your private certificate keys securely and do not share them. AWS recommends that you rotate your certificates periodically. Learn more

Create new certificate Upload your own certificate

You do not have a certificate.





Step 11: Now go to policies and click on AdministratorAccess and on policy action button click on attach.

Identity and Access Management (IAM)

Dashboard

Access management

- Groups
- Users
- Roles
- Policies

Create policy Policy actions ▾

Filter policies Attach Detach

Policy	Type	Used as	Description
AccessAnalyzerServiceRolePolicy	AWS managed	None	Allow Access Analyzer to analyze resource metadata
AdministratorAccess	Job function	Permissions policy (3)	Provides full access to AWS services and resources.
AlexaForBusinessDeviceSetup	AWS managed	None	Provide device setup access to AlexaForBusiness services
AlexaForBusinessFullAccess	AWS managed	None	Grants full access to AlexaForBusiness resources and access to related AWS Services

Step 12: Go to users and open it

User ARN: arn:aws:iam::495662379473:user/asmitakadam

Path: /

Creation time: 2019-12-07 09:32 UTC+0530

Permissions (3 policies applied)

Add permissions

Add inline policy

Policy name	Policy type
AdministratorAccess	AWS managed policy
IAMUserChangePassword	AWS managed policy
Show 1 more	

Permissions boundary (not set)

Search IAM

AWS account ID: 495662379473

CONCLUSION: We have studied how to secure the cloud and its data. Amazon EWS provides the best security with its extended facilities and services like MFA+-device. It also gives you the ability to add your own permissions and policies for securing data more encrypted.

PRACTICAL NO : 7

AIM:Write a program for Web feed.

THEORY:

RSS: Really Simple Syndication.

Concept: Web feed and RSS.

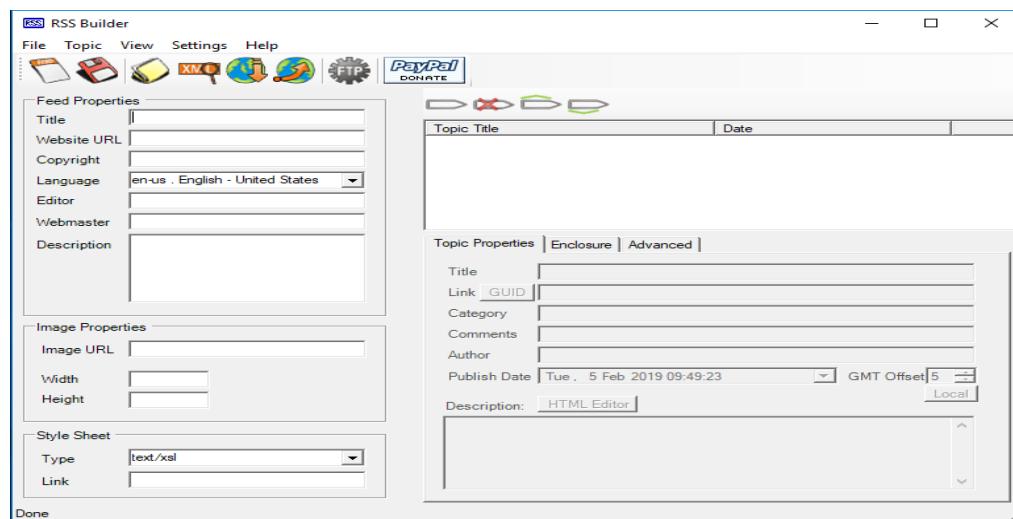
Objective: This lab is to understand the concept of form and control validation.

Scope: Write a program for web feed.

Software: XML / PHP, HTML/Visual Studio 2010.

PROCEDURE:

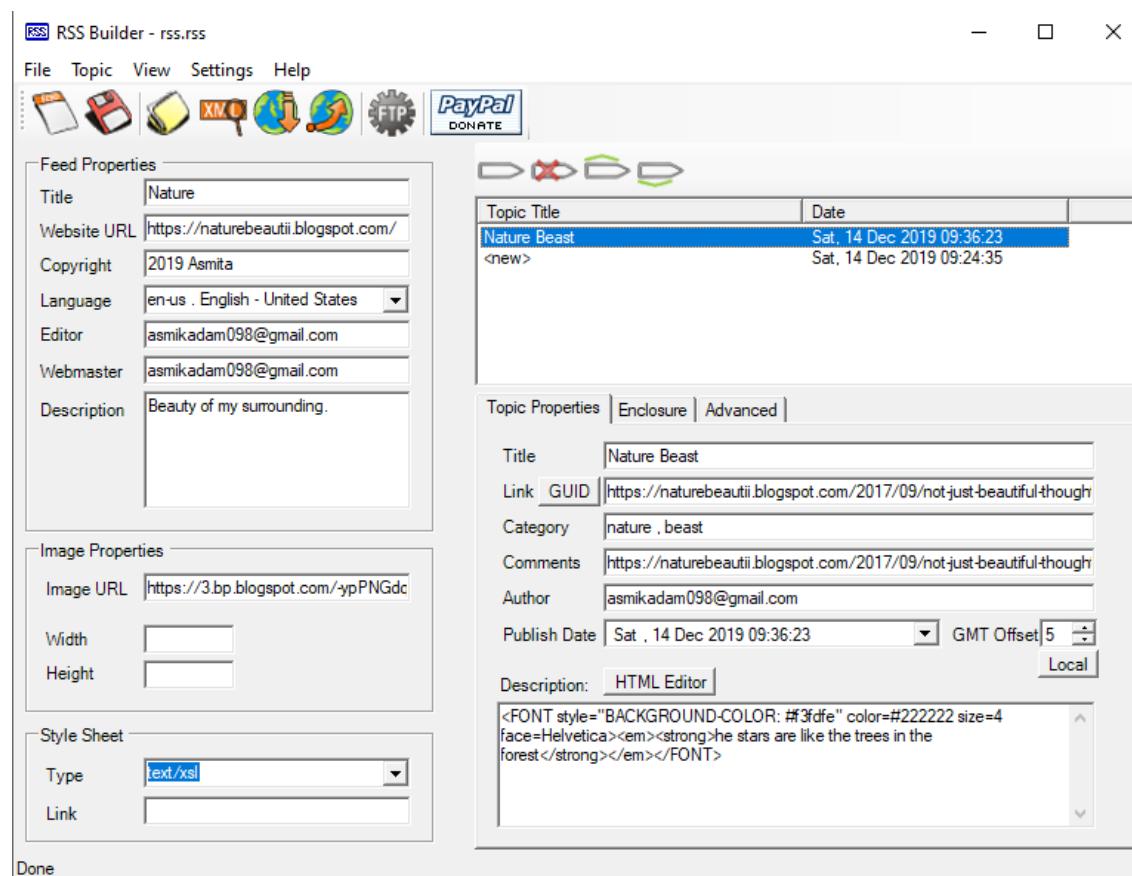
STEP 1: Install the software “RSS Builder”.



OR

- Continue directly with rss code.

STEP 2: Fill it.



OR

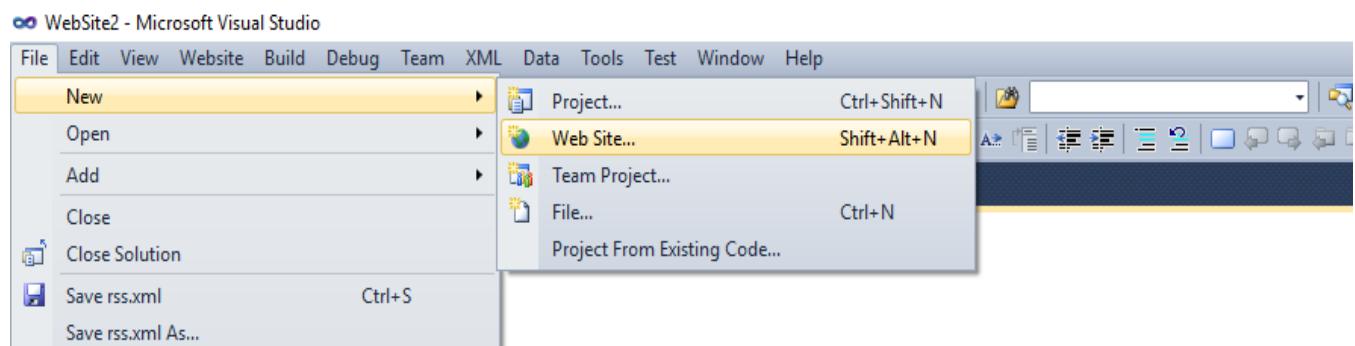
- Save the below code with extension.xml

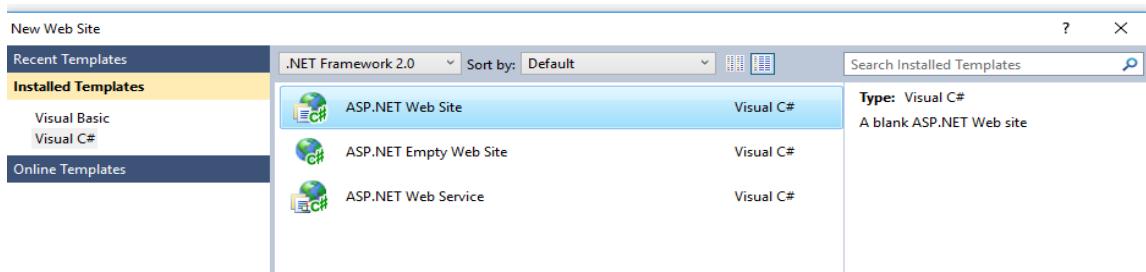
```
<?xml version="1.0" encoding="utf-8"?>
<rss version="2.0">
<channel>
<generator>RSS Builder by B!Soft</generator>
<title>Nature</title>
<link>https://naturebeautii.blogspot.com/</link>
<description>Beauty of my surrounding. </description>
<language>en-us</language>
<managingEditor>[REDACTED]@gmail.com</managingEditor>
<webMaster>asmikadam098@gmail.com</webMaster>
<copyright>2019 Asmita</copyright>
<image>
<title>Nature</title>
<link>https://naturebeautii.blogspot.com/</link>
<url>https://3.bp.blogspot.com/-ypPNGdqse1k/WX6_17S5oEI/AAAAAAAAM/tIDApQW8-rY-N_oET8LJs9GoL6KHcZkpwCLcBGAs/w128-h128-p-k-no-nu/green-earth.jpg</url>
</image>
<item>
<title>Nature Beast</title>
<pubDate>Sat, 14 Dec 2019 09:36:23 +0500</pubDate>
<link>https://naturebeautii.blogspot.com/2017/09/not-just-beautiful-thought-the-stars-are.html</link>
<author>asmikadam098@gmail.com</author>
<comments>https://naturebeautii.blogspot.com/2017/09/not-just-beautiful-thought-the-stars-are.html</comments>
<category>nature , beast</category>
<description><![CDATA[<FONT style="BACKGROUND-COLOR: #f3fdfe" color="#222222 size=4 face=Helvetica><em><strong>he stars are like the trees in the forest</strong></em></FONT>]]></description>
</item>
<item>
<title>&lt;new&gt;</title>
<pubDate>Sat, 14 Dec 2019 09:24:35 +0500</pubDate>
<description><![CDATA[]]></description>
</item>
</channel>
</rss>
```

STEP 3: Open the software Visual studio 2010

Do the following steps:

→ File → New → website → visual C# → ASP.NET website → OK





STEP 4: Now copy that rss file which was saved with .xml extension inside your website folder.

The screenshot shows the 'Solution Explorer' window with a project named 'WebSite2'. A context menu is open over the project folder, with 'Add New Item...' highlighted. The 'Add New Item...' dialog is displayed, showing a list of templates under the 'Online Templates' tab. The 'XML File' template is selected. At the bottom, the 'Name:' field is filled with 'rssxml', and there are checkboxes for 'Place code in separate file' and 'Select master page'. Buttons for 'Add' and 'Cancel' are at the bottom right.

CODE: rss.xml

```
<?xml version="1.0" encoding="utf-8"?>
<rss version="2.0">
<channel>
<generator>RSS Builder by B!Soft</generator>
<title>Nature</title>
<link>https://naturebeautii.blogspot.com/</link>
<description>Beauty of my surrounding. </description>
<language>en-us</language>
<managingEditor>[REDACTED]@gmail.com</managingEditor>
<webMaster>asmikadam098@gmail.com</webMaster>
<copyright>2019 Asmita</copyright>
<image>
<title>Nature</title>
```

```

<link>https://naturebeautii.blogspot.com/</link>
<url>https://3.bp.blogspot.com/-ypPNGdqse1k/WX6_17S5oEI/AAAAAAAAM/tIDApQW8-rY-N_oET8LJs9GoL6KHcZkpwCLcBGAs/w128-h128-p-k-no-nu/green-earth.jpg</url>
</image>
<item>
<title>Nature Beast</title>
<pubDate>Sat, 14 Dec 2019 09:36:23 +0500</pubDate>
<link>https://naturebeautii.blogspot.com/2017/09/not-just-beautiful-thoughtthe-stars-are.html</link>
<author>asmikadam09@gmail.com</author>
<comments>https://naturebeautii.blogspot.com/2017/09/not-just-beautiful-thoughtthe-stars-are.html</comments>
<category>nature , beast</category>
<description><![CDATA[<FONT style="BACKGROUND-COLOR: #f3fdfe" color="#222222 size=4 face=Helvetica><em><strong>he stars are like the trees in the forest</strong></em></FONT>]]></description>
</item>
<item>
<title>&lt;new&gt;</title>
<pubDate>Sat, 14 Dec 2019 09:24:35 +0500</pubDate>
<description><![CDATA[]]></description>
</item>
</channel>
</rss>

```

STEP 5: Add a hyperlink to the rss.xml file Click here for feed



STEP 6: Run the page.

1. Google Chrome:

Title	Nature
Link	http://localhost:51124/WebSite5/rss.xml
Latest posts	
Nature Beast	

PRACTICAL NO 8

AIM: Study and Implementation of SSO

THEORY/NOTES:

Auth0 provides authentication and authorization as a service.

You can connect any application (written in any language or on any stack) to Auth0 and define the identity providers you want to use (how you want your users to log in).

Based on your app's technology, choose one of the SDKs (or call our API), and hook it up to your app. Now each time a user tries to authenticate, Auth0 will verify their identity and send the required information back to your app.

The platform works well for developers and allows them to authenticate APIs and apps with various identity providers on different platforms.

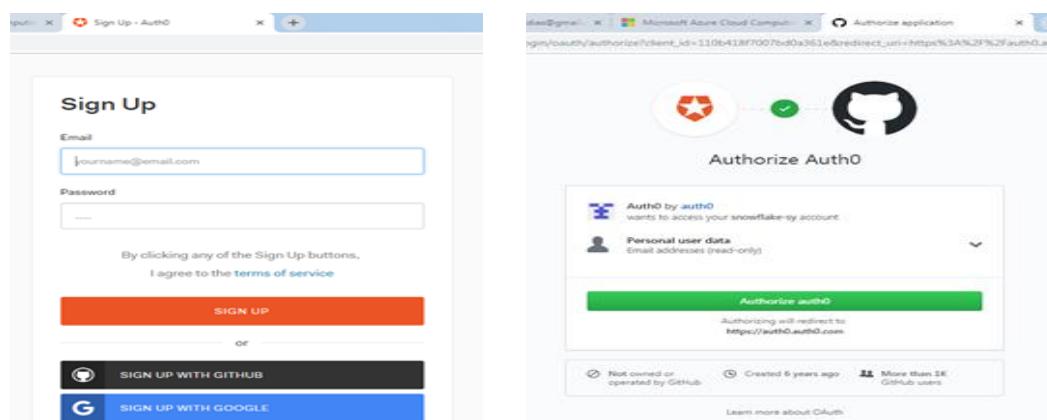
Auth0 helps you to:

- Add authentication with multiple authentication sources, either social like Google, Facebook, Microsoft Account, LinkedIn, GitHub, Twitter, Box, Salesforce, among others, or enterprise identity systems like Windows Azure AD, Google Apps, Active Directory, ADFS or any SAML Identity Provider.
- Add authentication through more traditional username/password databases.
- Add support for linking different user accounts with the same user.
- Support for generating signed Json Web Tokens to call your APIs and flow the user identity securely.
- Analytics of how, when and where users are logging in.
- Pull data from other sources and add it to the user profile, through JavaScript rules.

Procedure:

Step 1: Create a free account in Auth0

1. Go to Auth0 and click Sign Up.
2. Use Google, GitHub or Microsoft Account to login.



TENANT DOMAIN

kfarhan	<input checked="" type="checkbox"/>	.eu.auth0.com
---------	-------------------------------------	---------------

To help you easily explore our product, we've selected a tenant domain name for you. Although you can't rename a tenant, you can always add more tenants to your account (for staging or production environments) later.

REGION



We can host all of your data in any of these regions.

Useful if you need to comply with EU Data Protection Directive

NEXT

Step 2: Create Account: Account type: Personal, Role : Developer, Project type: as required.

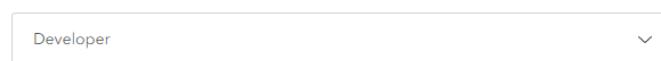
ACCOUNT TYPE

Are you creating this account for yourself or on behalf of a company?



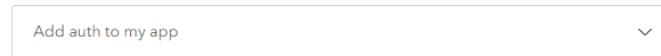
ROLE

Select your most applicable role.



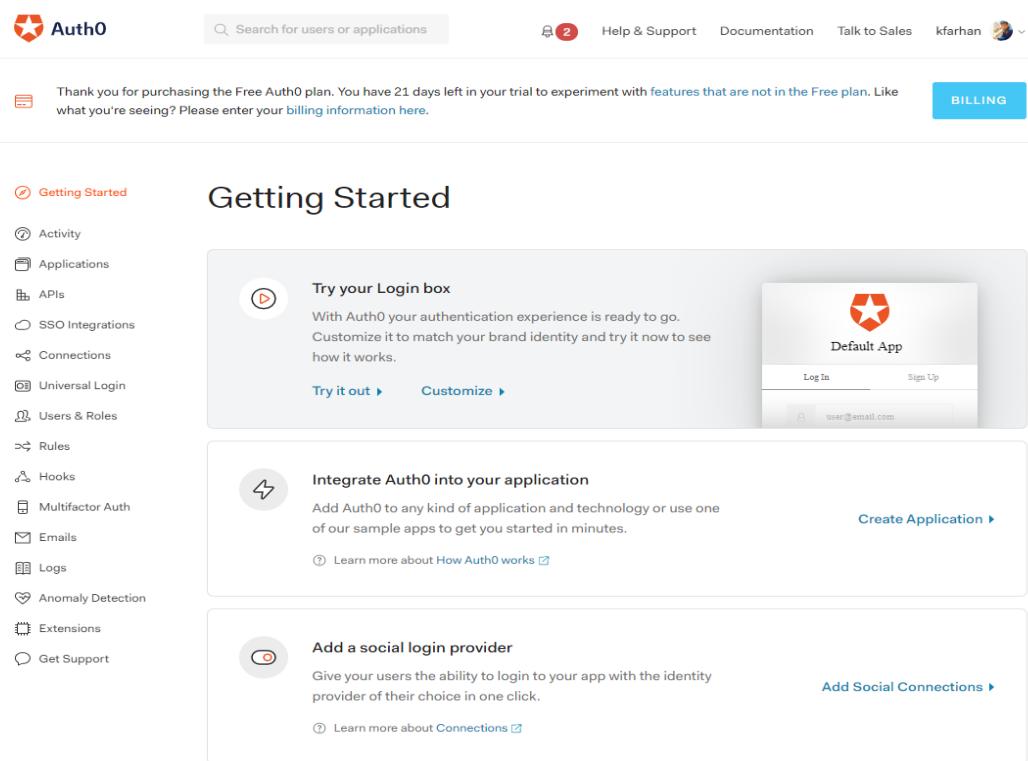
MAIN CHALLENGE

What's the main challenge you need to solve with Auth0?



CREATE ACCOUNT

Step 3: Auth0 account will be created.(below is the dashboard view)



The screenshot shows the Auth0 dashboard. At the top, there is a navigation bar with the Auth0 logo, a search bar, and links for Help & Support, Documentation, Talk to Sales, and a user profile (kfarhan). A notification message says: "Thank you for purchasing the Free Auth0 plan. You have 21 days left in your trial to experiment with features that are not in the Free plan. Like what you're seeing? Please enter your billing information here." Below the notification is a "BILLING" button. The main content area is titled "Getting Started" and contains three cards:

- Try your Login box**: "With Auth0 your authentication experience is ready to go. Customize it to match your brand identity and try it now to see how it works." It includes "Try it out" and "Customize" buttons, and a sample login screen for "Default App" with "Log In" and "Sign Up" buttons.
- Integrate Auth0 into your application**: "Add Auth0 to any kind of application and technology or use one of our sample apps to get you started in minutes." It includes a "Create Application" button and a link to "Learn more about How Auth0 works".
- Add a social login provider**: "Give your users the ability to login to your app with the identity provider of their choice in one click." It includes a "Add Social Connections" button and a link to "Learn more about Connections".

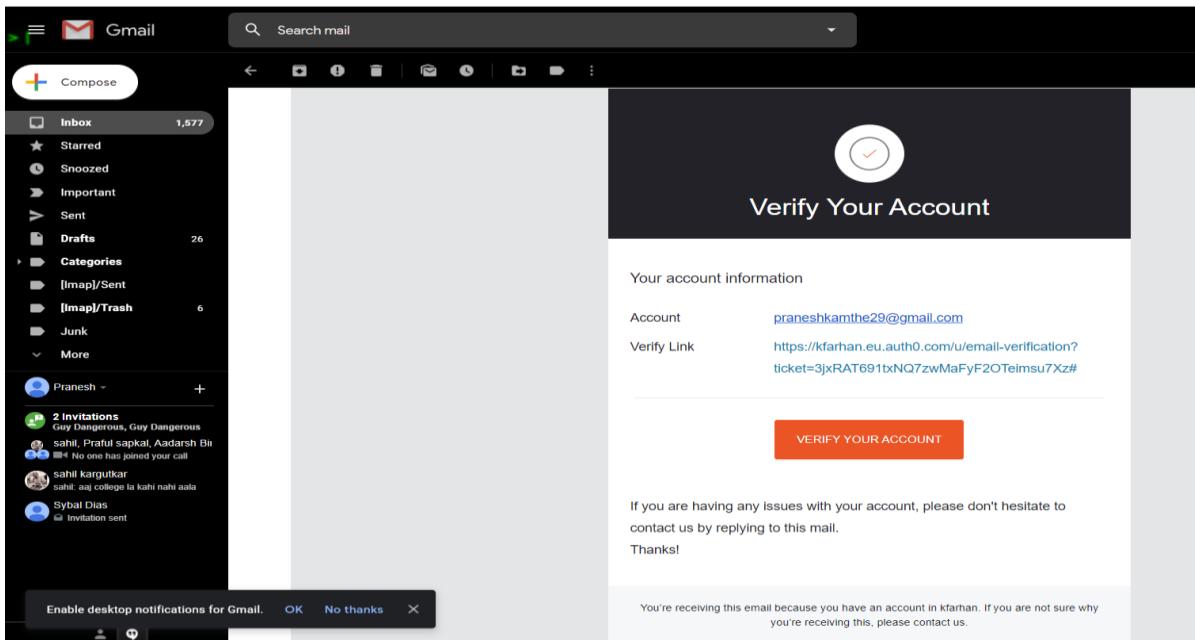
Step 4: Click on create new user.User will be created.

The screenshot shows the Auth0 'Users' dashboard. On the left, there is a sidebar with various navigation links: Getting Started, Activity, Applications, APIs, SSO Integrations, Connections, Universal Login, and a red-highlighted 'Users & Roles' section which contains 'Users' and 'Roles'. The main area is titled 'Users' and features a large blue icon of two people. Below the icon, it says 'No items have been added to this section.' and has a 'Learn More ▶' link. At the bottom right of the main area is a prominent orange button labeled '+ CREATE USER'.

Step 5: Go to Welcome to Auth0 window.Go to Test new user login.Enter your Username and password.

A modal dialog box titled 'Create user' is shown. It contains fields for 'Email' (with a placeholder 'praveen@auth0.com'), 'Password' (with a masked input), 'Repeat Password' (also with a masked input), and 'Connection' (set to 'Username-Password-Authentication'). At the bottom are 'CREATE' and 'CANCEL' buttons.

The screenshot shows a user profile page. The sidebar on the left includes 'Getting Started', 'Activity', 'Applications', 'APIs', 'SSO Integrations', 'Connections', 'Universal Login', and 'Users & Roles' (with 'Users' selected). The main area displays a user profile with a placeholder name 'PR' and email 'praveen@auth0.com'. The 'user_id' is listed as 'auth0|5e34f49b7ccff40e49c088da3'. Below the profile are tabs for 'Details', 'Devices', 'History', 'Raw JSON', 'Authorized Applications', and 'Permissions'. Under 'Details', there are sections for 'NAME' (with an 'Edit' button) and 'EMAIL' (with an 'Edit' button). To the right, it shows 'SIGNED UP' on 'February 1st 2020, 9:16:35 AM'. A 'BLOCKED' status is indicated. A 'BLOCK' button is visible. A 'Send Verification Email' option is highlighted in a dropdown menu under 'ACTIONS'. At the bottom, it lists 'PRIMARY IDENTITY PROVIDER' as 'Database', 'LATEST LOGIN' as 'Never', and 'ACCOUNTS ASSOCIATED' as 'None'. It also shows 'BROWSER' as 'Chrome 79.0.3945 / Windows 10.0.0'.



Users

+ CREATE USER

- Getting Started
- Activity
- Applications
- APIs
- SSO Integrations
- Connections
 - Database
 - Social
 - Enterprise
 - Passwordless
- Universal Login
- Users & Roles
 - Users
 - Roles

An easy to use UI to help administrators manage user identities including password resets, creating and provisioning, blocking and deleting users. [Learn more](#)

Name	Connection	Logins	Latest Login
sahil.singh@kfaran.com	Username-Password-Authen...	0	never
praneshkamthe29@gmail.com	Username-Password-Authen...	0	never

Step 6: Configure social connections

https://manage.auth0.com/#/connections/social

Auth0 Search for applications or features Help & Support Documentation Talk to Sales snowflake-sy

- Dashboard
- Applications
- APIs
- SSO Integrations
- Connections
 - Database
 - Social
 - Enterprise
 - Passwordless
- Universal Login
- Users
- Rules
- Hooks
- Multi-factor Auth
- Emails

Configure social connections like Facebook, Twitter, GitHub and others so that you can let your users login with them. [Learn more](#)

Google <input checked="" type="checkbox"/>	facebook <input type="checkbox"/>	Microsoft <input type="checkbox"/>
LinkedIn <input type="checkbox"/>	GitHub <input type="checkbox"/>	Dropbox <input type="checkbox"/>
Bitbucket <input type="checkbox"/>	PayPal <input type="checkbox"/>	PayPal <input type="checkbox"/>
Twitter <input type="checkbox"/>	amazon <input type="checkbox"/>	VK <input type="checkbox"/>

Continue with thi

Step 7: Go to Connection→social→twitter and enter the details

Facebook

Settings Applications

Name

If you are triggering a login manually, this is the identifier you would use on the connection parameter.

App ID

How to obtain a App ID?

App Secret

Reveal client secret.

User Data

<input checked="" type="checkbox"/> Public Profile ⓘ public_profile	<input type="checkbox"/> Email ⓘ email
<input type="checkbox"/> Group Access Member Info ⓘ groups_access_member_info	<input type="checkbox"/> Publish to Groups ⓘ publish_to_groups
<input type="checkbox"/> Age Range ⓘ user_age_range	<input type="checkbox"/> Birthday ⓘ user_birthday
<input type="checkbox"/> Events ⓘ user_events	<input type="checkbox"/> Friends ⓘ user_friends
<input type="checkbox"/> Gender ⓘ	<input type="checkbox"/> Hometown ⓘ

SAVE

Facebook

Settings Applications

Applications using this connection.

 Default App GENERIC	
--	---

SAVE



Auth0 EU will receive:
your name and profile picture.

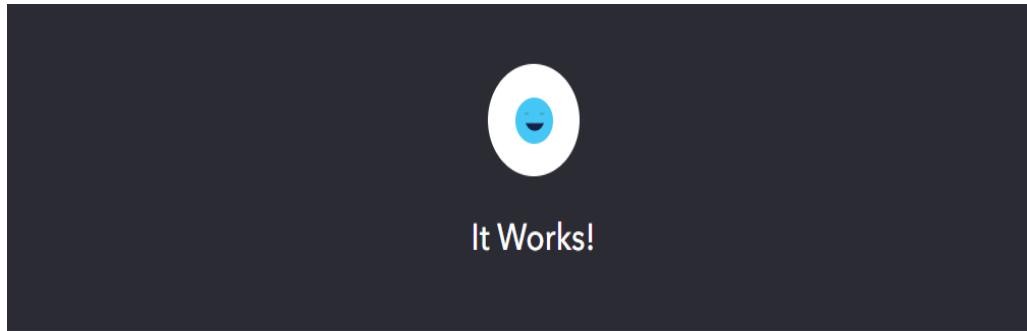
Review the info you provide

Continue as Khan

Cancel

✖ This doesn't let the app post to Facebook

Privacy Policy



If you can see this page, it means that your connection works.

This is the user profile the application will receive:

```
{  
  "sub": "facebook|1427180644117132",  
  "given_name": "Khan",  
  "family_name": "Farhan",  
  "nickname": "Khan_Farhan",  
  "name": "Khan Farhan",  
  "picture": "https://platform-lookaside.fbsbx.com/platform/profilepic/?asid=1427180644117132&height=50&width=50&ext=1",  
  "updated_at": "2020-02-01T04:04:29.307Z"  
}
```

[TAKE ME TO THE DASHBOARD](#)

Step 8: Click on Create Application.--> Regular Web App.--> Select the technology for your web app---> Java(we have selected Java here)

Applications

[+ CREATE APPLICATION](#)

Setup a mobile, web or IoT application to use Auth0 for Authentication. [Learn more](#) →

 Default App GENERIC	Client ID C0eBxZGEK6DQEhkTqOWxdR2YW2i					
--	--	---	---	---	---	---

Create application

Name

You can change the application name later in the application settings.

Choose an application type



Native

Mobile, desktop, CLI and smart device apps running natively.
e.g.: iOS, Electron, Apple TV apps



Single Page Web Applications

A JavaScript front-end app that uses an API.
e.g.: AngularJS + NodeJS



Regular Web Applications

Traditional web app using redirects.
e.g.: Java, ASP.NET



Machine to Machine Applications

CLIs, daemons or services running on your backend.
e.g.: Shell script

CREATE CANCEL

 **Farhan**
REGULAR WEB APPLICATION Client ID YFRWwVLln10FU5dxK6HnkHsH38HntHo0

Quick Start Settings Addons Connections

Regular Web App

What technology are you using for your web app?

Search by technology name

 Apache
 ASP.NET (OWIN)
 ASP.NET Core v2.1
 ASP.NET Core v3.0

 django
 Go
 Java
 Java EE

Step 9: App will be created. Download the sample.

[← Back to Applications](#)

 **Farhan**
REGULAR WEB APPLICATION Client ID YFRWwVLln10FU5dxK6HnkHsH38HntHo0

Quick Start Settings Addons Connections

Java

By Jim Anderson 

This tutorial demonstrates how to add user login to a Java Servlet application.

I want to integrate with my app

15 MINUTES

- ① [Configure Auth0](#)
- ② [Integrate Auth0 in your Application](#)
- ③ [Trigger Authentication](#)
- ④ [Display the Home Page](#)
- ⑤ [Handle Logout](#)
- ⑥ [Run the Sample](#)

I want to explore a sample app

2 MINUTES

Get a sample configured with your account settings or check it out on Github.

or

DOWNLOAD SAMPLE

[VIEW ON GITHUB](#)

Step 10: Go to applications settings and Copy the callback URL.

(application uses HTTP Basic).

Allowed Callback URLs `http://localhost:3000/callback`

After the user authenticates we will only call back to any of these URLs. You can specify multiple valid URLs by comma-separating them (typically to handle different environments like QA or testing). Make sure to specify the protocol (`https://`) otherwise the callback may fail in some cases. With the exception of custom URL schemes for native clients, all callbacks should use protocol `https://`.

Application Login URI `https://myapp.org/login`

In some scenarios, Auth0 will need to redirect to your application's login page. This URI needs to point to a route in your application that should redirect to your tenant's `/authorize` endpoint. [Learn more](#)

Allowed Web Origins

Comma-separated list of allowed origins for use with [Cross-Origin Authentication](#), [Device Flow](#), and [web message response mode](#), in the form of `<scheme> ":" <host> [":" <port>]`, such as `https://login.mydomain.com` or `http://localhost:3000`.

Allowed Logout URLs `http://localhost:3000/login`

Applications TestSY- Settings- Allowed Callback URLs- `http://localhost:3000/callback`

And paste it into Allowed callback URL's

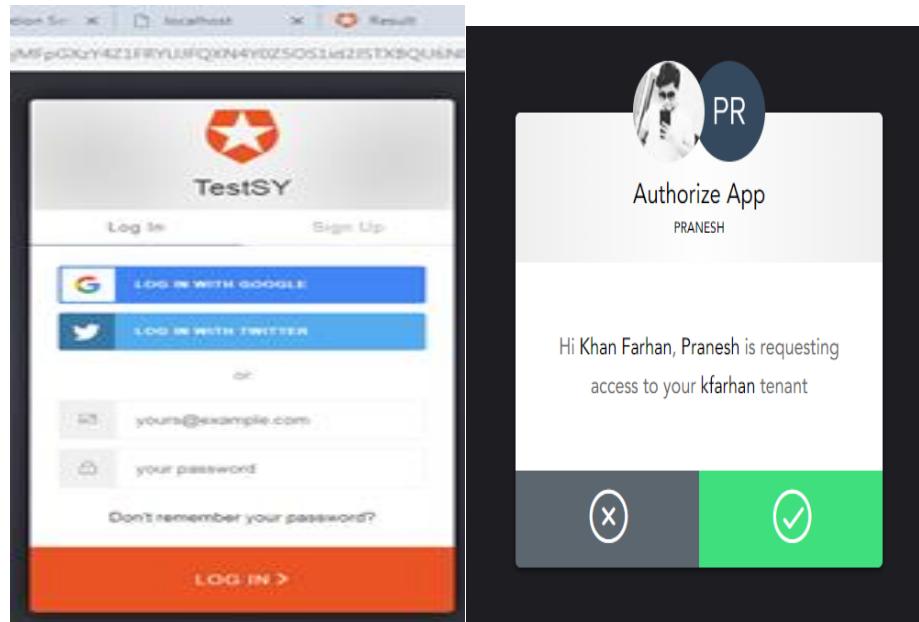
The screenshot shows the Auth0 dashboard with the 'Applications' section selected. On the left sidebar, there are navigation links: Dashboard, Applications (selected), APIs, SSO Integrations, Connections (with sub-options Database, Social, Enterprise, Passwordless), Universal Login, Users, Rules, Hooks, Multi-factor Auth, and Help & Support.

The main content area displays the configuration for the selected application. It includes fields for Token Endpoint Authentication Method (set to 'Post') and Allowed Callback URLs (containing the value `http://localhost:3000/callback`). A note states: "The type of application will determine which settings you can configure from the dashboard."

Below the configuration, a note about Allowed Callback URLs specifies: "After the user authenticates we will only call back to any of these URLs. You can specify multiple valid URLs by comma-separating them (typically to handle different environments like QA or testing). Make sure to specify the protocol, `http://` or `https://`, otherwise the callback may fail in some cases."

Step 11: In command prompt switch to the folder containing the downloaded and extracted folder(01-login)→Open Command prompt:Type gradlew clean appRun command.

Step 12: Type `http://localhost:3000/callback` in the browser.



App.com

[Home](#) [Logout](#)

Hello Rzzz0RAjONUdmzollffuvRJ-xsBcl9y6!

Subheading

Donec id elit non mi porta gravida at eget metus.
Maecenas faucibus mollis interdum.

Subheading

Morbi leo risus, porta ac consectetur ac, vestibulum at eros. Cras mattis consectetur purus sit amet fermentum.

Subheading

Donec id elit non mi porta gravida at eget metus.
Maecenas faucibus mollis interdum.

Subheading

Morbi leo risus, porta ac consectetur ac, vestibulum at eros. Cras mattis consectetur purus sit amet fermentum.

Step 13: Now go to the activity and check the user, logins and new sign-ups.

Activity

Login Activity

USERS	LOGINS	NEW SIGNUPS
3	0	0

Latest Logins

New Signups

Single Sign On (SSO) with Auth0

Single Sign On (SSO) occurs when a user logs in to one application and is then signed in to other applications automatically, regardless of the platform, technology, or domain the user is using.

Auth0 Universal Login

- Auth0's Universal Login is the most secure way to authenticate users for your applications.
- Universal Login centers around your Auth0 login page.
- The login page appearance and behavior are customizable right from the Dashboard. The logo and colors of the login pages can be changed, and in more advanced use cases, the code of each page itself can be modified.
- In the Universal Login flow, the user will click a login button or link in your application, which will redirect to the authorize route at the Auth0. If there is no session detected for the end user, Auth0 will redirect them to the login page, where they will be able to login or signup using the connections you configure, such as databases or social connections.
- Once the user is authenticated (or if they were already signed in) Auth0 will redirect them to your application, along with the requisite credentials.

Implementing Universal Login

In addition to configuring Universal Login for your tenant's applications, you will also need to set up a connection(s) and set up your application in Auth0's dashboard.

You will also need to configure your application's code to call Auth0's /authorize endpoint in order to trigger Universal Login, and then to deal with the response.

The Auth0 dashboard interface. On the left, a sidebar lists various management features: Dashboard, Applications, APIs, SSO Integrations, Connections, Universal Login (which is selected), Users, Rules, Hooks, Multi-factor Auth, Emails, Logs, Anomaly Detection, and Extensions. The main content area is titled 'Settings' under the 'Universal Login' section. It includes fields for 'Company Logo' (with a placeholder image and URL: https://2.bp.blogspot.com/_A5fLRVzvdaB/TJvGYE), 'Primary Color' (#ea5300), and 'Background Color' (#000000). To the right is a preview of a custom login page titled 'TestSY'.

```
D:\Windows\system32\cmd.exe
        at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.
java:1149)
        at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor
.java:624)
        at org.apache.tomcat.util.threads.TaskThread$WrappingRunnable.run(TaskTh
read.java:61)
        at java.lang.Thread.run(Thread.java:748)
> Building 88% > :appRun
Mar 04, 2019 7:01:51 PM org.apache.coyote.AbstractProtocol pause
INFO: Pausing ProtocolHandler ["http-nio-3000"]
Mar 04, 2019 7:01:51 PM org.apache.catalina.core.StandardService stopInternal
INFO: Stopping service Tomcat
Mar 04, 2019 7:01:52 PM org.apache.coyote.AbstractProtocol stop
INFO: Stopping ProtocolHandler ["http-nio-3000"]
Mar 04, 2019 7:01:52 PM org.apache.coyote.AbstractProtocol destroy
INFO: Destroying ProtocolHandler ["http-nio-3000"]

BUILD SUCCESSFUL

Total time: 30 mins 8.693 secs
D:\01-login>
```

PRACTICAL NO :9

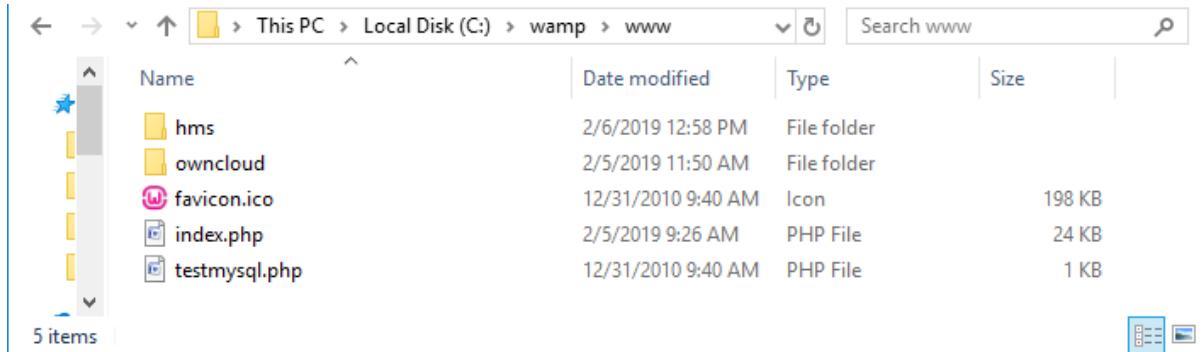
AIM :User Management in cloud. + SaaS

HARDWARE/SOFTWARE REQUIRED: wamp-server 2.5, Owncloud 7.0.15 , OS:Windows 10

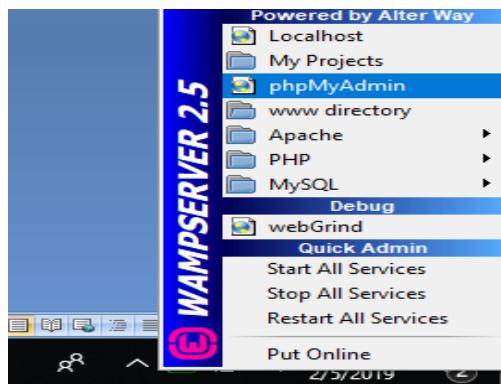
Note: ownCloud Server Does Not Support Windows as Server Platform Natively.
No longer support Microsoft Windows Server as a platform for ownCloud Server 8.1 onwards.

PROCEDURE:

Step 1 : Copy owncloud in C:\wamp\www



Step 2 : Start wamp server and click on phpMyAdmin .



Step 3 :click on Database and create new Database : owncloud.

A screenshot of the phpMyAdmin interface. The left sidebar shows the database structure with 'information_schema', 'mysql', 'performance_schema', and 'test' databases. The main area is titled 'Databases' and shows a 'Create database' form with 'owncloud' entered. A note at the bottom states: 'Note: Enabling the database statistics here might cause heavy traffic between the web and the database.' Below the form, a table lists the current databases with their collation settings and checkboxes for 'Check Privileges' and 'Drop'.

Database	Collation	Check Privileges	Drop
information_schema	utf8_general_ci	<input type="checkbox"/>	<input type="checkbox"/>
mysql	latin1_swedish_ci	<input type="checkbox"/>	<input type="checkbox"/>
performance_schema	utf8_general_ci	<input type="checkbox"/>	<input type="checkbox"/>
test	latin1_swedish_ci	<input type="checkbox"/>	<input type="checkbox"/>
Total: 4	latin1_swedish_ci		

Step 4 : Click on Recently Created Database, then Click on Privilege and “ADD USER”.

Server: mysql wampserver » Database: owncloud

Structure SQL Search Query Export Import Operations Privileges Routines

Users having access to "owncloud"

User	Host	Type	Privileges	Grant	Action
root	127.0.0.1	global	ALL PRIVILEGES	Yes	Edit Privileges
root	::1	global	ALL PRIVILEGES	Yes	Edit Privileges
root	localhost	global	ALL PRIVILEGES	Yes	Edit Privileges

New Add user

Step 5 : Fill required data ,Select Global Privilege and click on “Go”.

Server: mysql wampserver » Database: owncloud

Structure SQL Search Query Export Import Operations Privileges Routines

Add user

Login Information

User name: Use text field: admin

Host: Any host %

Password: Use text field: *****

Re-type: *****

Generate password: [Generate](#)

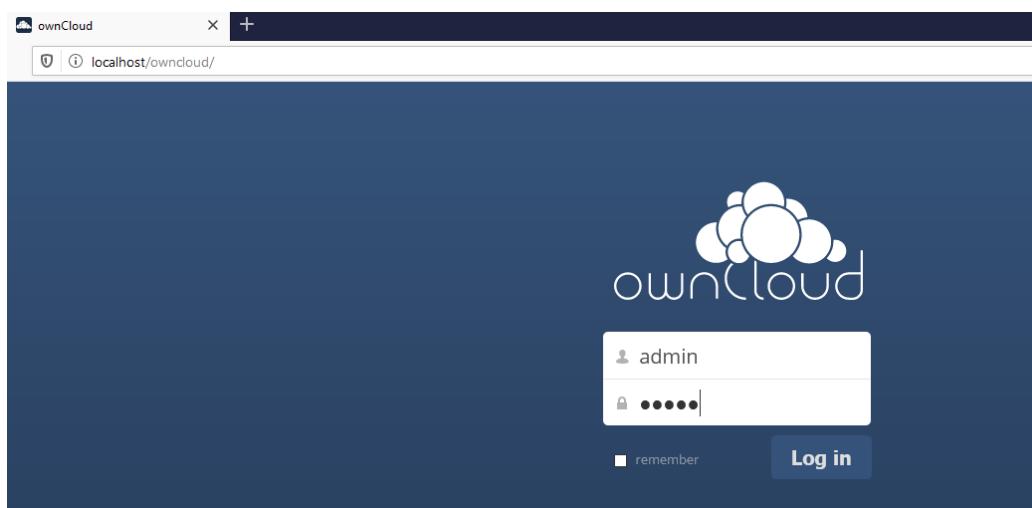
Database for user

Create database with same name and grant all privileges.
 Grant all privileges on wildcard name (username_%).
 Grant all privileges on database "owncloud".

Global privileges Check All

Step 6 : In the URL bar type <http://localhost/owncloud/>

Enter the username , password
click on Finish Setup .



Step 7 : now click on your username an select Users

The screenshot shows the 'ownCloud' interface with the URL 'localhost/owncloud/index.php/settings/users'. The 'Groups' dropdown is selected, showing the 'admin' group assigned to the 'admin' user. Other users listed include 'Everyone' and 'Admins'.

	Username	Full Name	Password	Groups	Group Admin	Quota
1	A admin	admin	*****	admin	Group Admin	Default
1						

Step 8 : Add Users

Assign Groups and Quota

The screenshot shows the 'ownCloud' interface with the URL 'localhost/owncloud/index.php/settings/users'. Multiple users are listed with their assigned groups and quotas. The 'Groups' dropdown is set to 'family, admin' for all users.

	Username	Full Name	Password	Groups	Group Admin	Quota
5	A Anjali	Anjali	*****	admin, family	Group Admin	10 GB
4	A Asmi	Asmi	*****	admin, family	Group Admin	5 GB
4	U user	user	*****	family	Group Admin	1 GB
	U user1	user1	*****	admin, family	Group Admin	Default

Share a File to users

The screenshot shows the 'ownCloud' interface with the URL 'localhost/owncloud/index.php/settings/users'. The sidebar on the left includes 'Files', 'Activity', 'Documents', 'Pictures', 'Calendar', and 'Contacts'. The main area displays the same user list as the previous screenshot, with the 'Groups' dropdown set to different values for each user.

	Username	Full Name	Password	Groups	Group Admin
	A admin	admin	*****	admin	Group Admin
	A Anjali	Anjali	*****	admin, family	Group Admin
	A Asmi	Asmi	*****	admin, family	Group Admin
	U user	user	*****	family	Group Admin
	U user1	user1	*****	admin, family	Group Admin

All files

Shared with you

Shared with others

Shared by link

documents

music

photos

ownCloudUserManual.pdf

3 folders and 1 file

Size Modified

23 kB 15 minutes ago

3.6 MB 15 minutes ago

663 kB 15 minutes ago

1.9 MB 15 minutes ago

6.2 MB

All files

Shared with you

Shared with others

Shared by link

documents

music

photos

collegeLogo.jpg

ownCloudUserManual.pdf

3 folders and 2 files

Size Modified

23 kB 17 minutes ago

3.6 MB 17 minutes ago

663 kB 16 minutes ago

5 kB seconds ago

1.9 MB 16 minutes ago

6.2 MB

Step 9: logout from admin and login as the user you added (logging as Asmi):

admin ▾

Personal

Users

Admin

Help

Log out

Asmi

remember

Log in

All files

Shared with you

Shared with others

Shared by link

documents

music

photos

collegeLogo.jpg

ownCloudUserManual.pdf

Size Modified

23 kB seconds ago

3.6 MB seconds ago

663 kB seconds ago

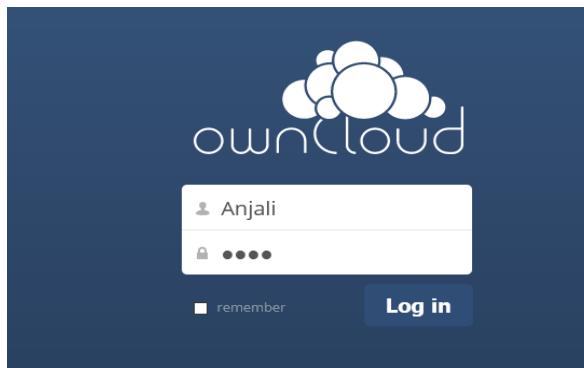
5 kB 3 minutes ago

1.9 MB seconds ago

Step 10: Add a new file and share with any of the other user (here i had shared with Anjali):

The screenshot shows the ownCloud web interface. On the left, there's a sidebar with links for 'All files', 'Shared with you', 'Shared with others', and 'Shared by link'. The main area displays several files and folders: 'documents' (23 kB, seconds ago), 'music' (3.6 MB, seconds ago), 'photos' (663 kB, seconds ago), 'CC_BY.docx' (22.7 MB, seconds ago), 'collegeLogo.jpg' (5 kB, 3 minutes ago), and 'ownCloudUserManual.pdf' (1.9 MB, seconds ago). A modal window is open over the files, titled 'Share with user or group ...'. It shows 'Anjali' selected in the 'User' dropdown. There are checkboxes for 'can share' (checked), 'can edit' (unchecked), and 'Share link' (checked). Below these are fields for 'Password protect' (unchecked) and 'Set expiration date' (set to '20-02-2020'). A 'Send' button is at the bottom right of the modal.

Step 11: logout from Asmi and login as the user you added (logging as Anjali):



The screenshot shows the ownCloud interface after logging in as 'Anjali'. The top navigation bar now has 'Anjali' in the user dropdown. The sidebar on the left remains the same. The main area lists the same files and folders as before, but with different sharing information. 'CC_BY.docx' is shown as shared by 'Asmi' (22.7 MB, 3 minutes ago). 'collegeLogo.jpg' is shown as shared by 'admin' (5 kB, 7 minutes ago). 'ownCloudUserManual.pdf' is shown as shared by 'Asmi' (1.9 MB, seconds ago).

PRACTICAL NO: 10

AIM: Case study on Amazon EC2.

Amazon EC2

What is Amazon EC2 exactly ?

It's an Cloud Computing Platform.

Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) cloud. Using Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.



History of Amazon EC2:

Amazon announced a limited public beta test of EC2 on August 25, 2006, offering access on a first-come, first-served basis. Amazon EC2 was developed mostly by a team in Cape Town, South Africa led by Chris Pinkham.

Operating System : Microsoft Windows, Linux , Free BSD.

Type: Virtual Private Server

License : Proprietary Software

Features:-

Amazon EC2 provides the following features:

Operating System :

Microsoft Windows, Linux , Free BSD. It supports all these Operating Systems.

Persistent storage:

An EC2 instance may be launched with a choice of two types of storage for its boot disk or “rootdevice” The first option is a local “instance-store” disk as a root device (originally the only choice). The second option is to use an EBS volume as a root device.

Elastic IP addresses:

In this sense an Elastic IP Address belongs to the account and not to a virtual machine instance. It exists until it is explicitly removed, and remains associated with the account even while it is associated with no instance.

Amazon CloudWatch:

Amazon CloudWatch is a web service that provides real-time monitoring to Amazon EC2 customers on their resource utilization such as CPU, disk, network and replica lag for RDS Database replicas.

Automated scaling:

Amazon auto-scaling feature of EC2 allows it to automatically adapt computing capacity to site traffic.

Reliability:

To make EC2 more fault-tolerant, Amazon engineered Availability Zones that are designed to be insulated from failures in other availability zones.

How to Get Started with Amazon EC2:

- 1) goto aws.amazon.com
- 2) click on "My Account"
- 3) select "AWS management console" and click on it



- 4) Give Email id in the required field
- 5) if you are registering first time then select "I am a new user" radio button
- 6) click on "sign in using our secure server" button

A screenshot of the AWS sign-in page. It features the AWS logo at the top left and a 'Sign in' button with a question mark icon. Below the button is a text input field labeled 'Email address of your AWS account' with placeholder text 'Or to sign in as an IAM user, enter your account ID or account alias instead.' Below the input field is a blue 'Next' button. Underneath the 'Next' button is a link 'New to AWS?'. At the bottom of the form is a 'Create a new AWS account' button.

Follow the instruction and complete the formalities

(Note: do not provide any credit card details or bank details)

sign out from it and

A screenshot of the 'Create an AWS account' page. The page has a header 'Create an AWS account'. It contains several input fields: 'Email address' (with a red box around it), 'Password' (with a red box around it), 'Confirm password' (with a red box around it), and 'AWS account name' (with a red box around it). Below these fields is a large yellow 'Continue' button. At the bottom of the page, there's a link 'Sign in to an existing AWS account' and small fine print at the very bottom.

7) Again, go to “My Account” select “AWS management console” and click on it. Sign in again by entering the user name and valid password (check “I am returning user and my password is” radio button) Now you are logged in as a Root User

AWS service → All Services tab → EC2

Getting Started with the AWS Management Console

Step 1: Set up and log into your AWS account

Step 2: Launch an Amazon EC2 instance

Step 3: Configure your instance

Step 4: Connect to your instance

Step 5: Terminate Instances

Step 1: Choose an Amazon Machine Image (AMI)

Cancel and Exit

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

Quick Start

Category	Image Name	Description	Select
My AMIs	Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-0cb0e70f44e1a4bb5 (64-bit x86) / ami-06f1fab1ab342f0f7 (64-bit Arm)	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.	Select
AWS Marketplace	Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-02913db388613c3e1	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.	Select 64-bit (x86)
Community AMIs	Red Hat Enterprise Linux 8 (HVM), SSD Volume Type - ami-0a74bfeb190bd404f	Red Hat Enterprise Linux version 8 (HVM), EBS General Purpose (SSD) Volume Type	Select 64-bit (x86)
<input type="checkbox"/> Free tier only			

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 (GB)	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

Cancel Previous Review and Launch Next: Configure Instance Details

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of Instances: 1 Launch into Auto Scaling Group

Purchasing option: Request Spot Instances

Network: vpc-37dae75f (default) Create new VPC

Subnet: No preference (default subnet in any Availability Zone) Create new subnet

Auto-assign Public IP: Use subnet setting (Enable)

Placement group: Add instance to placement group

Capacity Reservation: Open Create new Capacity Reservation

IAM role: None Create new IAM role

Cancel Previous Review and Launch Next: Add Storage

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encryption
Root	/dev/sda1	snap-0443d84c4d094af1a	10	General Purpose SSD (gp2)	100 / 3000	N/A	<input checked="" type="checkbox"/>	Not Encrypted

Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. [Learn more](#) about free usage tier eligibility and usage restrictions.

Cancel **Previous** **Review and Launch** **Next: Add Tags**

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. A copy of a tag can be applied to volumes, instances or both. Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

Key	(128 characters maximum)	Value	(256 characters maximum)	Instances	Volumes
<i>This resource currently has no tags</i>					

Choose the Add tag button or [click](#) to add a Name tag. Make sure your [IAM policy](#) includes permissions to create tags.

Add Tag (Up to 50 tags maximum)

Cancel **Previous** **Review and Launch** **Next: Configure Security Group**

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: Create a new security group Select an existing security group

Security group name: launch-wizard-29

Description: launch-wizard-29 created 2019-09-17T22:42:12.065+05:30

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop

Add Rule

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.

Cancel **Previous** **Review and Launch**

AWS Services Resource Groups 7. Review

Step 7: Review Instance Launch

AMI Details Edit AMI

Red Hat Enterprise Linux 8 (HVM), SSD Volume Type - ami-0a74bfeb190bd404f

Free tier eligible Red Hat Enterprise Linux version 8 (HVM), EBS General Purpose (SSD) Volume Type
Root Device Type: ebs Virtualization type: hvm

Instance Type Edit instance type

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

Security Groups Edit security groups

Security group name launch-wizard-29
Description launch-wizard-29 created 2019-09-17T22:42:12.065+05:30

Cancel Previous Launch

AWS Services Resource Groups 7. Review

Step 7: Review Instance

AMI Details Edit AMI

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Free tier eligible Red Hat Enterprise Linux version 8 (HVM), EBS General Purpose (SSD) Volume Type
Root Device Type: ebs Virtualization type: hvm

Instance Type Edit instance type

Instance Type	ECUs
t2.micro	Variable

Security Groups Edit security groups

Security group name launch-wizard-29
Description launch-wizard-29 created 2019-09-17T22:42:12.065+05:30

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
 Create a new key pair
 Proceed without a key pair

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

Cancel Launch Instances

Cancel Previous Launch

AWS Services Resource Groups 7. Review

Step 7: Review Instance

AMI Details Edit AMI

Red Hat Enterprise Linux 8 (HVM), SSD Volume Type - ami-0a74bfeb190bd404f

Free tier eligible Red Hat Enterprise Linux version 8 (HVM), EBS General Purpose (SSD) Volume Type
Root Device Type: ebs Virtualization type: hvm

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Instance Type	ECUs
t2.micro	Variable

Security Groups Edit security groups

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Description launch-wizard-29 created 2019-09-17T22:42:12.065+05:30

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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](#).

Create a new key pair
Key pair name mithunsoftwaresolutions

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.

Cancel Launch Instances

Cancel Previous Launch

Launch Status

>Your instances are now launching
The following instance launches have been initiated: i-02d475495a4fe9420 [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

[Feedback](#) [English \(US\)](#) © 2008 - 2019, Amazon Internet Services Private Ltd. or its affiliates. All rights reserved. [Privacy Policy](#) [Terms of Use](#)

EC2 Dashboard

Resources

You are using the following Amazon EC2 resources in the Asia Pacific (Mumbai) region:

0 Running Instances	0 Elastic IPs
0 Dedicated Hosts	0 Snapshots
2 Volumes	0 Load Balancers
2 Key Pairs	30 Security Groups
0 Placement Groups	

Create Instance

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

[Launch Instance](#)

Migrate a Machine

Use CloudEndure Migration to simplify, expedite, and automate large-scale migrations from physical, virtual, and cloud-based infrastructure to AWS.

[Get started with CloudEndure Migration](#)

Service Health

Scheduled Events

Account Attributes

Supported Platforms
VPC
Default VPC
vpc-37dae75f
Console experiments
Settings

Additional Information

Getting Started Guide
Documentation
All EC2 Resources
Forums
Pricing
Contact Us

AWS Marketplace

Find free software trial products in the AWS Marketplace from the [EC2 Launch Wizard](#). Or try these popular AMIs:

EC2 Dashboard

Instances

Actions

Connect
Get Windows Password
Create Template From Instance
Launch More Like This

RedHat Server
SonarQube Server

Instance State
Start
Stop
Stop - Hibernate
Reboot
Terminate

Instance: i-02d475495a4fe9420 (RedHat Server) **Public DNS:** ec2-13-232-186-130.ap-south-1.compute.amazonaws.com

Description **Status Checks** **Monitoring** **Tags**

Instance ID	Public DNS (IPv4)
i-02d475495a4fe9420	ec2-13-232-186-130.ap-south-1.compute.amazonaws.com
Instance state	IPv4 Public IP
running	13.232.186.130

Amazon EC2 Instance Types

A1	T3	T3a	T2	M6g	M5	M5a	M5n	M4																																			
Amazon EC2 A1 instances deliver significant cost savings and are ideally suited for scale-out and Arm-based workloads that are supported by the extensive Arm ecosystem. A1 instances are the first EC2 instances powered by AWS Graviton Processors that feature 64-bit Arm Neoverse cores and custom silicon designed by AWS.																																											
Features:																																											
<ul style="list-style-type: none">◦ Custom built AWS Graviton Processor with 64-bit Arm Neoverse cores◦ Support for Enhanced Networking with Up to 10 Gbps of Network bandwidth◦ EBS-optimized by default◦ Powered by the AWS Nitro System, a combination of dedicated hardware and lightweight hypervisor																																											
<table border="1"><thead><tr><th>Instance</th><th>vCPU</th><th>Mem (GiB)</th><th>Storage</th><th>Network Performance (Gbps)</th></tr></thead><tbody><tr><td>a1.medium</td><td>1</td><td>2</td><td>EBS-Only</td><td>Up to 10</td></tr><tr><td>a1.large</td><td>2</td><td>4</td><td>EBS-Only</td><td>Up to 10</td></tr><tr><td>a1.xlarge</td><td>4</td><td>8</td><td>EBS-Only</td><td>Up to 10</td></tr><tr><td>a1.2xlarge</td><td>8</td><td>16</td><td>EBS-Only</td><td>Up to 10</td></tr><tr><td>a1.4xlarge</td><td>16</td><td>32</td><td>EBS-Only</td><td>Up to 10</td></tr><tr><td>a1.metal</td><td>16*</td><td>32</td><td>EBS-Only</td><td>Up to 10</td></tr></tbody></table>									Instance	vCPU	Mem (GiB)	Storage	Network Performance (Gbps)	a1.medium	1	2	EBS-Only	Up to 10	a1.large	2	4	EBS-Only	Up to 10	a1.xlarge	4	8	EBS-Only	Up to 10	a1.2xlarge	8	16	EBS-Only	Up to 10	a1.4xlarge	16	32	EBS-Only	Up to 10	a1.metal	16*	32	EBS-Only	Up to 10
Instance	vCPU	Mem (GiB)	Storage	Network Performance (Gbps)																																							
a1.medium	1	2	EBS-Only	Up to 10																																							
a1.large	2	4	EBS-Only	Up to 10																																							
a1.xlarge	4	8	EBS-Only	Up to 10																																							
a1.2xlarge	8	16	EBS-Only	Up to 10																																							
a1.4xlarge	16	32	EBS-Only	Up to 10																																							
a1.metal	16*	32	EBS-Only	Up to 10																																							
<small>* a1.metal provides 16 physical cores</small>																																											

Pricing :

Amazon EC2 is free to try. There are five ways to pay for Amazon EC2 instances: On-Demand, Savings Plans, Reserved Instances, and Spot Instances. You can also pay for Dedicated Hosts which provide you with EC2 instance capacity on physical servers dedicated for your use

The screenshot shows the AWS Free Tier landing page. It features a sidebar with 'Tier Type' (Featured, 12 Months Free, Always Free, Trials) and 'Product Categories' (Analytics, Application Integration, AI & VR, Business Productivity, Compute, Customer Engagement, Database, Developer tools, End User Computing, Game Tech, Internet of Things, Machine Learning, Management & Governance, Media Services, Mobile, Networking & Content Delivery, Robotics, Security, Identity, & Compliance, Storage). The main content area displays six service tiers in a grid:

- COMPUTE:** Amazon EC2 (750 Hours per month) - Resizable compute capacity in the Cloud.
- STORAGE:** Amazon S3 (5 GB of standard storage) - Secure, durable, and scalable object storage infrastructure.
- DATABASE:** Amazon RDS (750 Hours per month) - Managed Relational Database Service for MySQL, PostgreSQL, MariaDB, Oracle MySQL, or SQL Server.
- DATABASE:** Amazon DynamoDB (25 GB of storage) - Fast and flexible NoSQL database with seamless scalability.
- MACHINE LEARNING:** Amazon SageMaker (250 Hours per month) - Fully managed platform to build, train, and deploy machine learning models.
- COMPUTE:** AWS Lambda (1 Million free requests per month) - Compute service that runs your code in response to events and automatically manages the compute resources.

On-Demand →

With On-Demand instances, you pay for compute capacity by the hour or the second depending on which instances you run. No longer-term commitments or upfront payments are needed. You can increase or decrease your compute capacity depending on the demands of your application and only pay the specified per hourly rates for the instance you use

Spot Instances →

Amazon EC2 Spot instances allow you to request spare Amazon EC2 computing capacity for up to 90% off the On-Demand price.

Savings Plan →

Savings Plans are a flexible pricing model that offer low prices on EC2 and Fargate usage, in exchange for a commitment to a consistent amount of usage (measured in \$/hour) for a 1 or 3 year term.

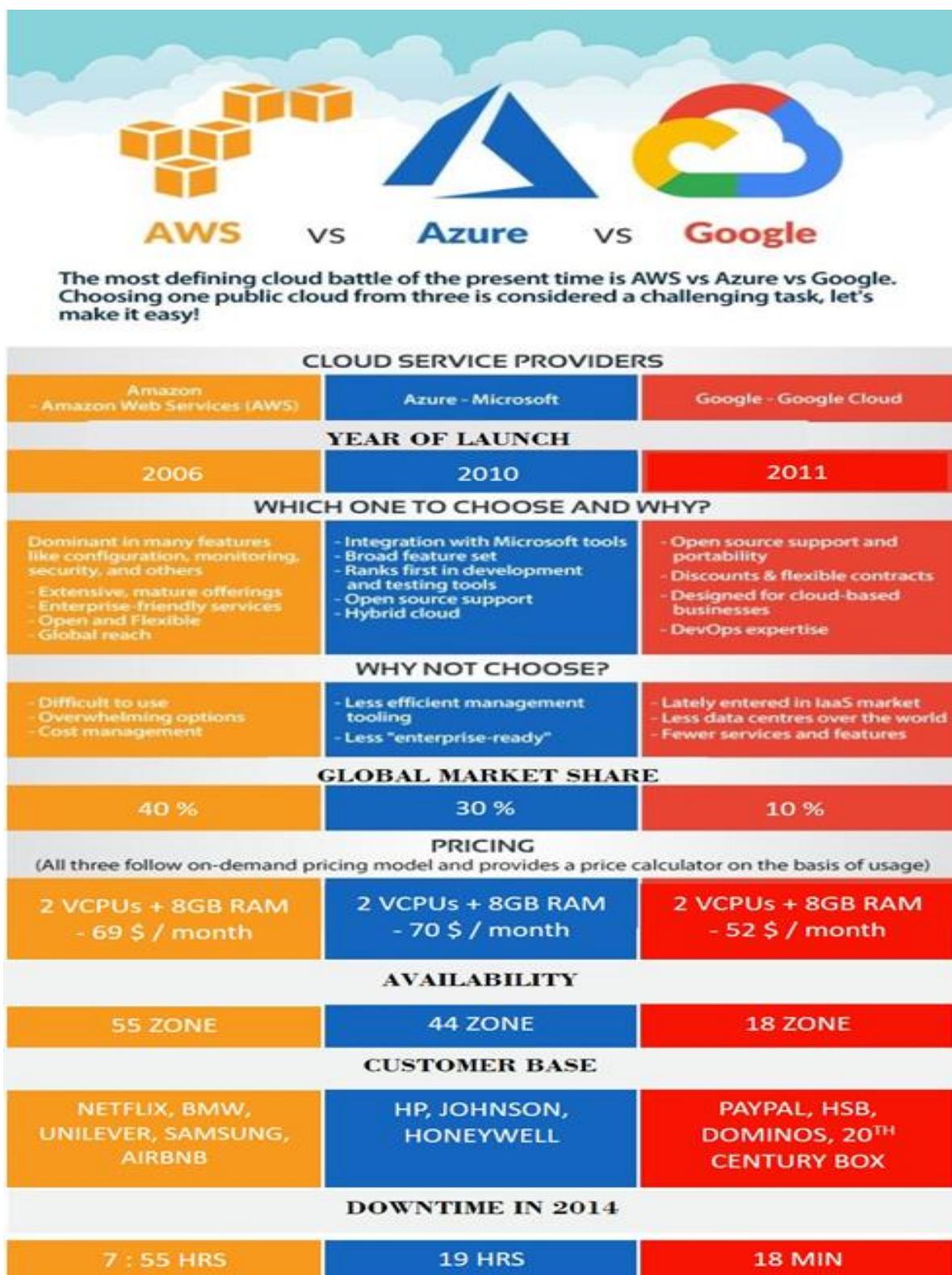
Reserved Instances→

Reserved Instances provide you with a significant discount (up to 75%) compared to On-Demand instance pricing. In addition, when Reserved Instances are assigned to a specific Availability Zone, they provide a capacity reservation, giving you additional confidence in your ability to launch instances when you need them.

Dedicated Host→

A Dedicated Host is a physical EC2 server dedicated for your use. Dedicated Hosts can help you reduce costs by allowing you to use your existing server-bound software licenses, including Windows Server, SQL Server, and SUSE Linux Enterprise Server (subject to your license terms), and can also help you meet compliance requirements.

Comparison Between Amazon EC2, Microsoft Azure and Google Cloud .



Microsoft Azure

What is Microsoft Azure?

The Azure Service Platform is a big part of Microsoft's cloud computing initiatives. It is designed specifically for the cloud.

Microsoft Azure is a platform as a service (PaaS) solution for building and hosting solutions using Microsoft's products and in their data centres. It is a comprehensive suite of cloud products that allow users to create enterprise-class applications without having to build out their own infrastructure.

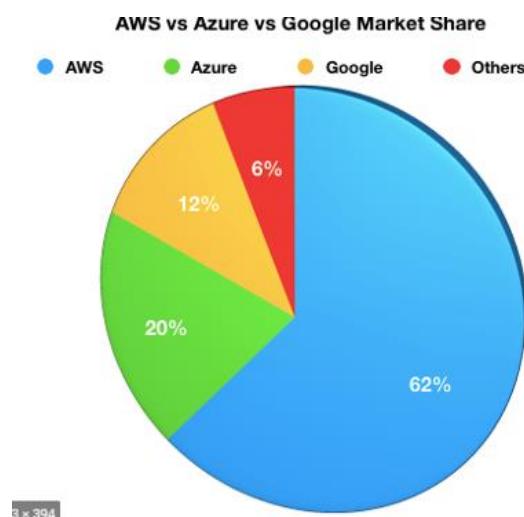
The Azure Service Platform is comprised of three cloud centric products: Windows Azure, SQL Azure and Azure App Fabric controller. These are in addition to the application hosting infrastructure facility.

Windows Azure Platform



The two giant cloud platforms i.e.: AWS and Azure

Market shares:



AWS Compute Instance

2VCPU+8GB RAMS (Cost ~0.0928 USD/hour)

Azure Compute Instance

2VCPU + 8GB RAMS (Cost ~0.096 USD/hour)

AWS provide significance number of services.

Free Tier fall under 2 catogeries:

Service that will remain free for ever

>20 free service offered

Example: Amazon SQS SNS Cloud Watch.

Other that are valid for 1 year.

20 services offered

Example: Amazon S3, EC2, Elastic Cache etc.

Both type of service have limit on their usage (example : storage, no of request, Compute time etc), but users are charged for using services that fall under the 'valid for a year' categories after the year of experience

Azure provides a free tier as well it also provide service that belong to the categories of Always free

25+services offered

Example: AppService, Function, Container Service, Active Directory etc.

Valid for a year

8 services offered

Example: Linux/windows, virtual machine, Blob Storage, SQL database etc.

Azure also provides user with 200 USD credits to access all their services for 30 days After which they can use the services that fall under the free for a year and always free category.

The largest instance that AWS offers

256 GB RAM +16vCPUS

The largest instance that Azure offers

224 GB RAM +16 vCPUS

KEY DIFFERENCES.

Both Azure and AWS supports hybrid cloud but Azure supports hybrid cloud better.

Azure offers express routes while AWS offers direct connection.

Azure provides security by offering permissions on the whole account whereas AWS security is provided using defined roles with permission control feature.

Azure machines are grouped into cloud service and respond to the same domain name with various ports whereas the AWS machine can be accessed separately.

Azure has a virtual network cloud whereas AWS has Virtual Private Cloud.

Azure has 140 availability zone whereas AWS has 61 availability zone.

How Azure works?

Microsoft Azure is a private and public cloud platform. You may be familiar with Azure services. But, how does it work?

Azure uses a technology known as virtualization, a priori, nothing new up to this point.

Virtualization separates the close coupling between a computer's CPU or server and its operating system by means of an abstraction layer called a hypervisor. The hypervisor emulates all the functions of a real computer or server and its CPU in a virtual machine. You can run multiple virtual machines at the same time and each virtual machine can run any compatible operating system such as Windows or Linux.

Azure takes this virtualization technology and rethinks it on a massive scale in Microsoft data centres around the world.

Therefore, the cloud is a set of physical servers in one or several data centres that run virtualized hardware on behalf of clients.

To understand it, let's take a look at the hardware architecture of the data centre.

In each data centre there is a collection of servers located in server racks. Each server rack contains many Blade servers, as well as a network switch that provides network connectivity and a power distribution unit (PDU) that supplies the power. Sometimes, the racks are grouped together into larger units that are known as clusters.

MICROSOFT AZURE SIGN IN/UP PAGE

Azure user authentication

Azure - Sign up

<https://signup.azure.com/signup?offer=ms-azr-0044p&appId=102&ref=azureplat-generic&redirectURL=https%3A%2F%2Fazure.microsoft.com%2Fen-in%2Fget-started%2Fwelcome-to-azure%2F&correlationId=2DE3A1D4BCCC6E06250EA9ABC606F878&lang=en-IN>

1 About you

Country/Region

Choose the location that matches your billing address. **You cannot change this selection later.** If your country is not listed, the offer is not available in your region. [Learn More](#)

First name

Last name

Email address

Phone

Organization

PAN ID

What's included

- 12 months of free products**
Get free access to popular products like **virtual machines, storage, and databases** in your first 30 days, and for 12 months after you upgrade your account to pay-as-you-go pricing.
- ₹13,300 credit**
Use your ₹13,300 credit to experiment with any Azure service in your first 30 days—beyond the free product amounts.
- 25+ always-free products**
Take advantage of more than 25 products, including **serverless, containers, and artificial intelligence**, that are always free. Get these in your first 30 days, and always—once you choose to upgrade.
- No automatic charges**
You won't be charged unless you choose to upgrade. Before the end of your first 30 days, you'll be notified and have the chance to upgrade and start paying only for the resources you use beyond the free amounts.

Next

2 Identity verification by phone

3 Identity verification by card

Chat with Sales

Microsoft azure dashboard

Home - Microsoft Azure | How To Insert Image Into Another | Gmail | Downloads | New Tab

Microsoft Azure | portal.azure.com/#home

Search resources, services, and docs (G+ /)

Azure services

- [Create a resource](#)
- [Virtual machines](#)
- [App Services](#)
- [Storage accounts](#)
- [SQL databases](#)
- [Azure Database for PostgreSQL](#)
- [Azure Cosmos DB](#)
- [Kubernetes services](#)
- [Function App](#)
- [More services](#)

Navigate

- [Subscriptions](#)
- [Resource groups](#)
- [All resources](#)
- [Dashboard](#)

Tools

- [Microsoft Learn](#)
- [Cost Management](#)

Welcome to Microsoft Azure

Let's show you around before you get started.

[Start tour](#) [Maybe later](#)

Useful links

- [Technical Documentation](#)
- [Azure Migration Tools](#)
- [Azure Services](#)
- [Recent Azure Updates](#)
- [Quickstart Center](#)

Azure mobile app

[Available on the App Store](#) [GET IT ON Google Play](#)

How to create a virtual machine

The screenshot shows the 'Create a virtual machine' wizard on the 'Basics' tab. The left sidebar lists various Azure services. The main area shows the 'Project details' section where 'Subscription' is set to 'Pay-As-You-Go' and 'Resource group' is set to '(New) amarmathrao-test-group'. The 'Instance details' section includes fields for 'Virtual machine name' (left blank), 'Region' (set to '(Asia Pacific) South India'), 'Availability options' (set to 'No infrastructure redundancy required'), 'Image' (set to 'Ubuntu Server 18.04 LTS'), and 'Size' (set to 'Standard D2s v3'). The 'Administrator account' section shows 'Authentication type' as 'SSH public key' selected, with 'Username' left blank. At the bottom are 'Review + create' and 'Next : Disks >' buttons.

Select the platform which you want to run as a virtual machine.

This screenshot is identical to the one above, but the 'Image' dropdown in the 'Instance details' section is open, displaying a list of available operating systems. The list includes: Ubuntu Server 18.04 LTS, Ubuntu Server 18.04 LTS, Red Hat Enterprise Linux 7.6, SUSE Linux Enterprise Server (SLES) 15, CentOS-based 7.5, Debian 9 'Stretch' with backports kernel, Ubuntu Server 16.04 LTS, Windows Server 2019 Datacenter, Windows Server 2016 Datacenter, Windows Server 2012 R2 Datacenter, Windows 10 Pro, Version 1809, and Windows 10 Pro, Version 1803. The 'Ubuntu Server 18.04 LTS' option is currently selected.

Select the Size of the virtual machine which you want.

Create a virtual machine

Complete the Basics tab then Review + create to provision a virtual machine with default parameter customization. Looking for classic VMs? Create VM from Azure Marketplace.

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like fold your resources.

Subscription

- Pay-As-You-Go
- (New) manjunath-test-rg
- Create new

Instance details

Virtual machine name: testwindows1

Region: (Asia Pacific) South India

Availability options: No infrastructure redundancy required

Image: Windows Server 2012 R2 Datacenter

Size: Standard DS1 v2

Administrator account

Username:

Password:

Confirm password:

INBOUND PORT RULES

Select which virtual machine network ports are accessible from the public internet. You can specify network access on the Networking tab.

Review + create < Previous Next : Disks >

Select 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 costs. View Azure pricing calculator. Final charges will appear in your local currency in cost analysis and billing views.

Select the disk type and the size of the disk.

Create a virtual machine

Basics **Disks** **Networking** **Management** **Advanced** **Tags** **Review + create**

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. [Learn more](#)

Disk options

OS disk type: Premium SSD

Enable Ultra SSD compatibility (Preview)

LUN	Name	Size (GB)	Disk Type	Host Caching

Data disks

You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also comes with a temporary disk.

Create and attach a new disk **Attach an existing disk**

Advanced

Networking

Create a virtual machine

Basics **Disks** **Networking** **Management** **Advanced** **Tags** **Review + create**

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution. [Learn more](#)

Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network: (new) manjunath-test-rg-vnet

Subnet: (new) default (10.0.0.0/24)

Public IP: (new) testwindows1-ip

NIC network security group: None Basic Advanced

Public inbound ports: None Allow selected ports

Select inbound ports: Select one or more ports

Accelerated networking: On Off

The selected VM size does not support accelerated networking.

Load balancing

You can place this virtual machine in the backend pool of an existing Azure load balancing solution. [Learn more](#)

Place this virtual machine behind an existing load balancing solution? Yes No

Review + create < Previous Next : Management >

Management

The screenshot shows the Microsoft Azure portal interface. On the left is a sidebar with various service icons like Home, Dashboard, All services, Resource groups, App Services, Virtual machines (classic), SQL databases, Cloud services (classic), Security Center, Subscriptions, Azure Active Directory, Monitor, Cost Management + Billing, Help + support, Advisor, Service Health, and Container instances. The main area is titled 'Create a virtual machine' under 'Virtual machines'. The 'Management' tab is selected. It contains sections for 'Azure Security Center' (with a note about basic plan protection), 'Monitoring' (with options for Boot diagnostics, OS guest diagnostics, and a dropdown for Diagnostics storage account), 'Identity' (with options for System assigned managed identity and Azure Active Directory), 'Azure Active Directory' (with Auto-shutdown settings), and 'Backup' (with Enable backup settings). At the bottom are 'Review + create', '< Previous', and 'Next : Advanced >' buttons.

What services are available in AZURE?

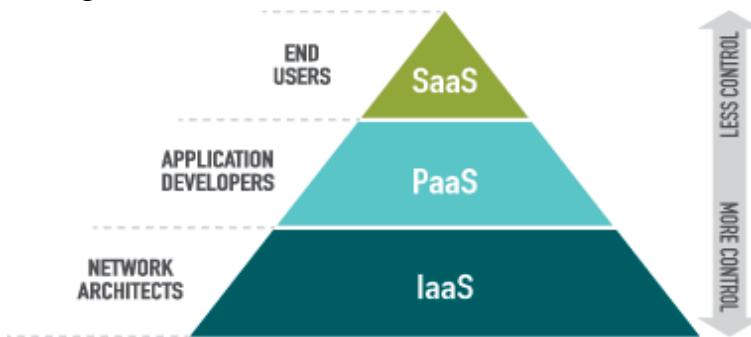
Microsoft Azure offers a wide range of services such as software as a service (SaaS), platform as a service (PaaS) and Infrastructure as a service (IaaS) , Microsoft Azure is a good choice when it comes to cloud based platform applications.

Microsoft Azure Services

- Computer services

Virtual machines, infrastructure as a service (IaaS) allowing users to launch general-purpose Microsoft Windows and Linux virtual machines, as well as preconfigured machine images for popular software package

App services, platform as a service (PaaS) environment letting developers easily publish and manage websites.

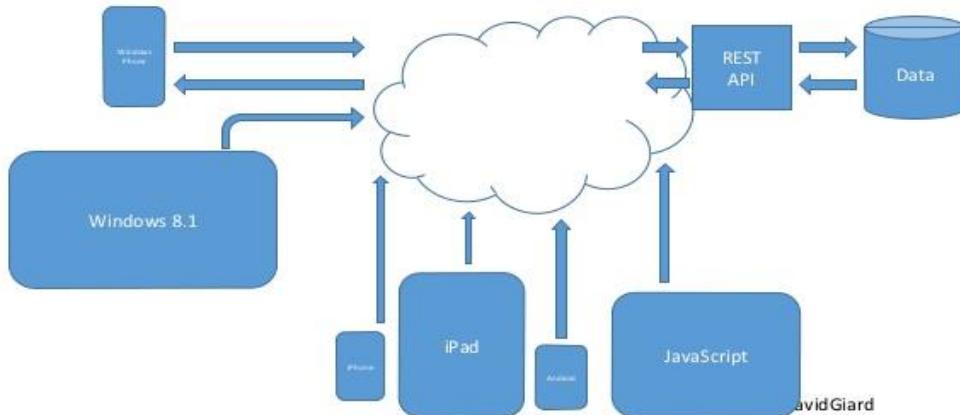


- Mobile services

Mobile Engagement collects real-time analytics that highlight users' behavior. It also provides push notifications to mobile devices.[9]

HockeyApp can be used to develop, distribute, and beta-test mobile apps.

Mobile Architecture

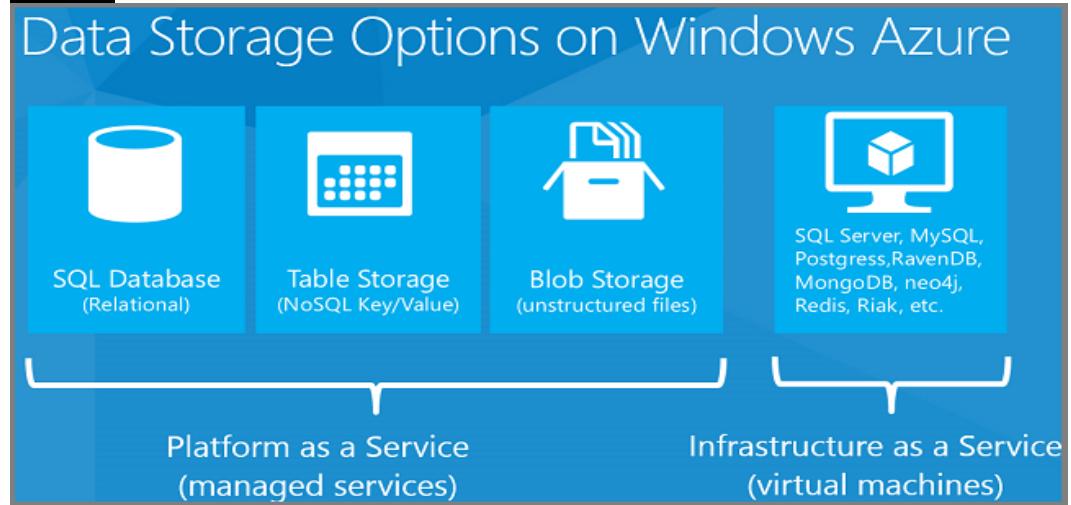


- **Storage services**

Storage Services provides REST and SDK APIs for storing and accessing data on the cloud.

Queue Service lets programs communicate asynchronously by message using queues.

File Service allows storing and access of data on the cloud using the REST APIs or the SMB protocol

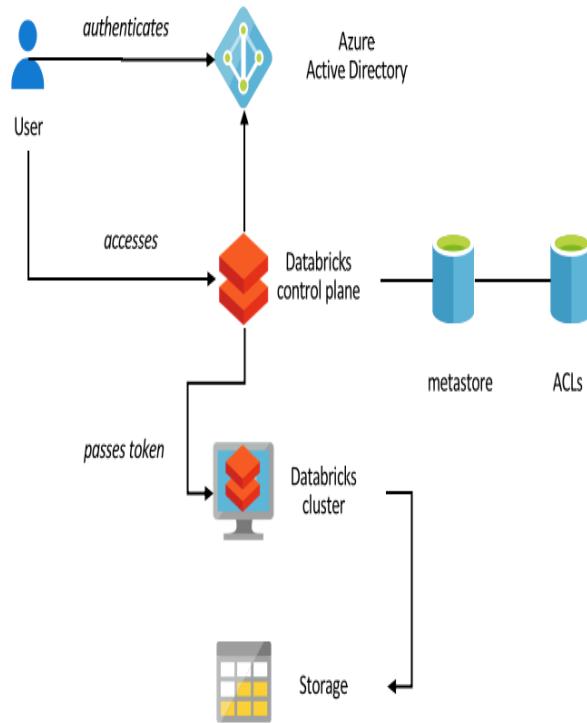


- **Data management**

SQL Database, formerly known as SQL Azure Database, works to create, scale and extend applications into the cloud using Microsoft SQL Server technology. It also integrates with Active Directory and Microsoft System Center.

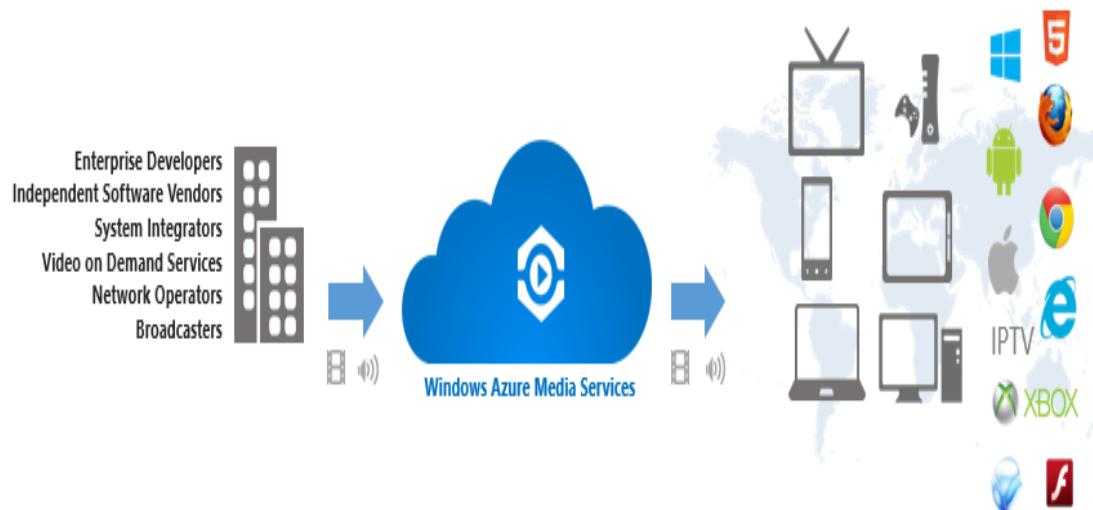
Azure Managed Disks is a way to simplifies disk management for VMs by managing the storage accounts associated with the VM disks. You only need to specify the type (Premium or Standard) and the size of disk you need, and Azure creates and manages the disk for you.

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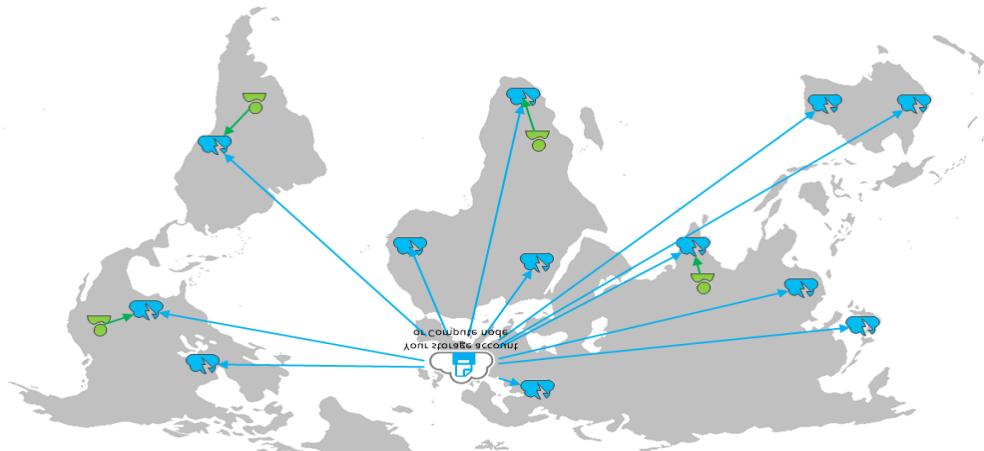
- **Media services**

A PaaS offering that can be used for encoding, content protection, streaming, or analytics



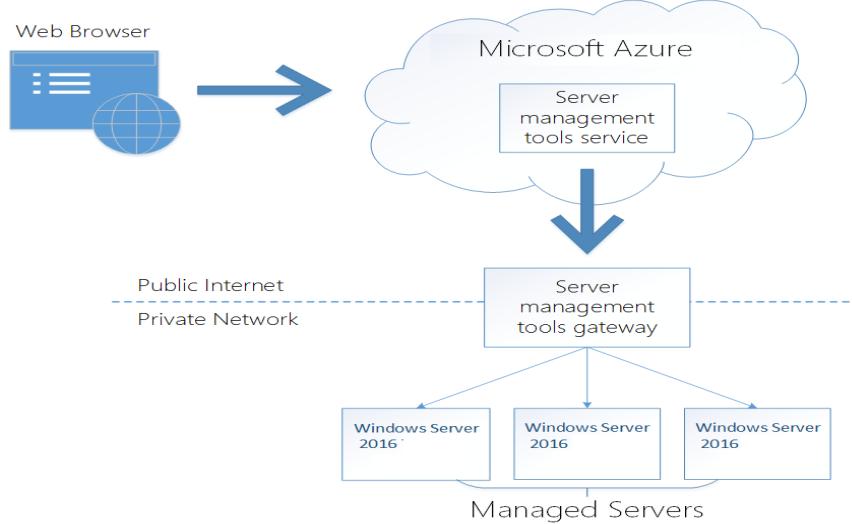
CDN

A global content delivery network (CDN) for audio, video, applications, images, and other static files. It can be used to cache static assets of websites geographically closer to users to increase performance. The network can be managed by a REST based HTTP API



- **Management**

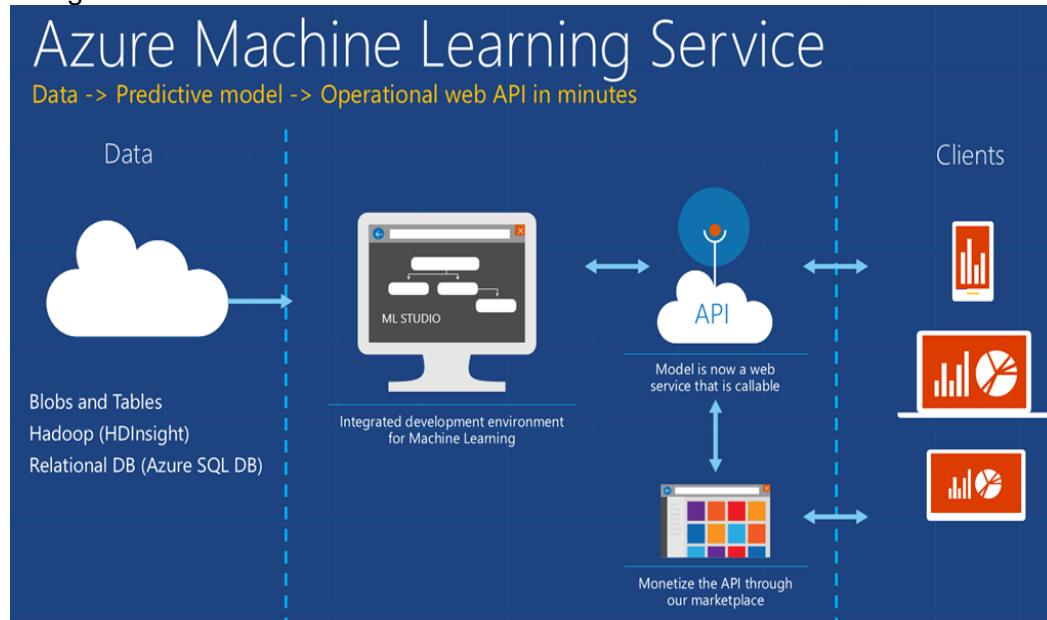
Azure Automation, provides a way for users to automate the manual, long-running, error-prone, and frequently repeated tasks that are commonly performed in a cloud and enterprise environment. It saves time and increases the reliability of regular administrative tasks and even schedules them to be automatically performed at regular intervals. You can automate processes using runbooks or automate configuration management using Desired State Configuration.



- **Machine learning**

Microsoft Azure Machine Learning (Azure ML) service is part of Cortana Intelligence Suite that enables predictive analytics and interaction with data using natural language and speech through Cortana.^[22]

Cognitive Services (formerly Project Oxford) are a set of APIs, SDKs and services available to developers to make their applications more intelligent, engaging and discoverable. The services include face recognition and verification, celebrity recognition, visual feature tagging, and clipart recognition



Google Cloud Platform

What is Google Cloud Platform ?

Google Cloud (public cloud-based Platform) launched in 2011, is a provider of computing resources for deploying and operating applications on the web. Its specialty is providing a place for individuals and enterprises to build and run software, and it uses the web to connect to the users of that software.

When to use GCP?

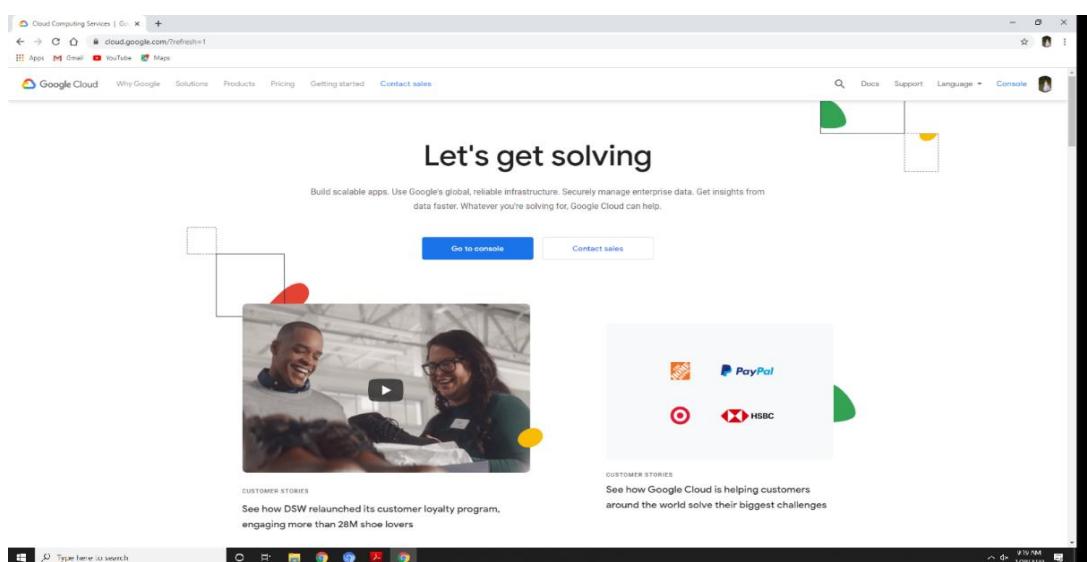
You use a cloud platform such as GCP when you want to build and run an application that can leverage the power of hyperscale data centers in some way i.e. to reach users worldwide, or to borrow sophisticated analytics and AI functions, to utilize massive data storage, and/or Processing Power ,to take advantage of cost efficiencies. You pay not for the machine but only for the resources the machine or Your App (or Whatever Your ?) uses.

Why GCP?

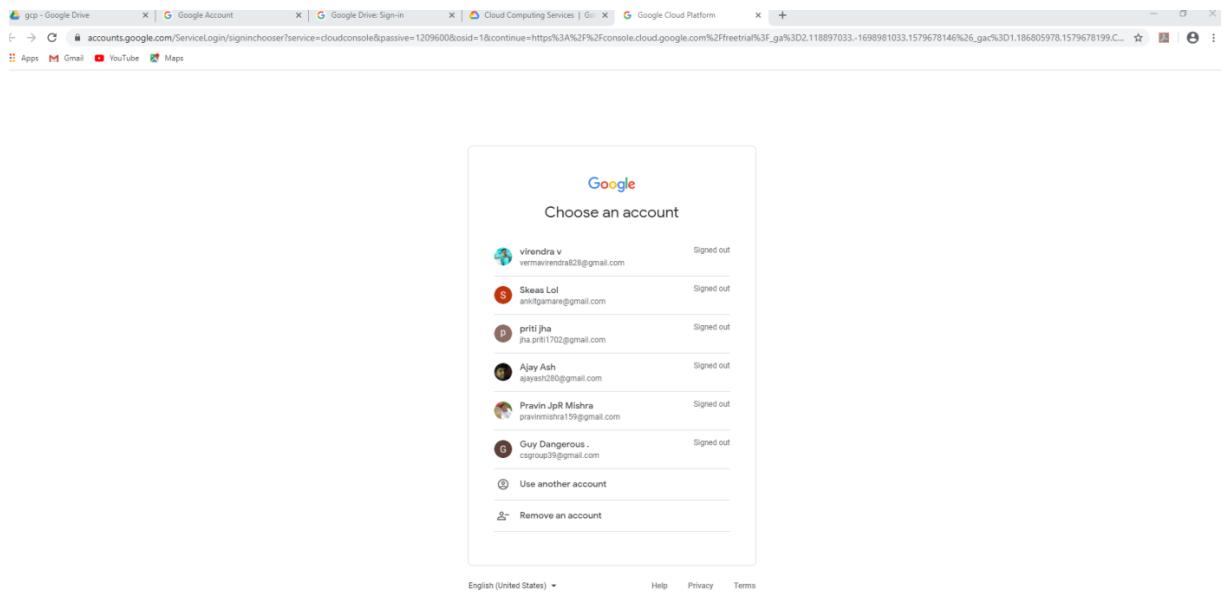


Steps to Create a Google Cloud Platform Account

- 1) Visit <https://cloud.google.com/>:



- 2) Click On Get started for Free ,You Have to Sign In With Google Account , SO sign In with Your Google Account



3) Fill in the Details and Agree to the Terms and Conditions

Try Google Cloud Platform for free

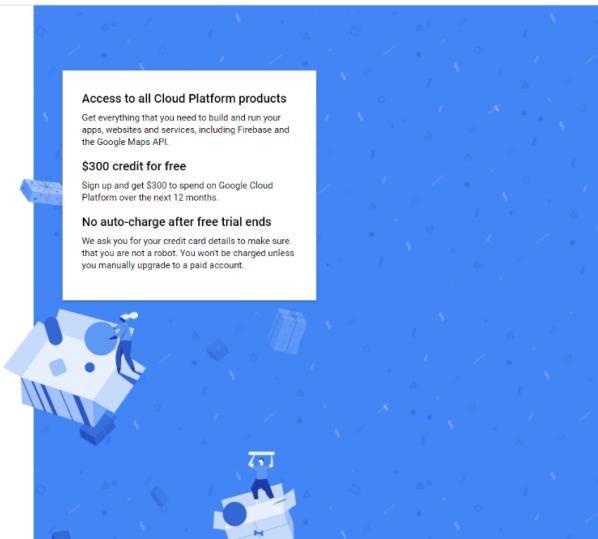
Step 1 of 2

Country
India

Terms of Service
 I agree to the [Google Cloud Platform Terms of Service](#), and the terms of service of [any applicable services and APIs](#). I have also read and agree to the [Google Cloud Platform Free Trial Terms of Service](#).

Required to continue

CONTINUE


 Access to all Cloud Platform products
 Get everything that you need to build and run your apps, websites and services, including Firebase and the Google Maps API.
\$300 credit for free
 Sign up and get \$300 to spend on Google Cloud Platform over the next 12 months.
No auto-charge after free trial ends
 We ask you for your credit card details to make sure that you are not a robot. You won't be charged unless you manually upgrade to a paid account.

[Privacy policy | FAQ](#)

Step 2 of 2 – Free Trial – Google

Account type Individual

Tax information
Tax status

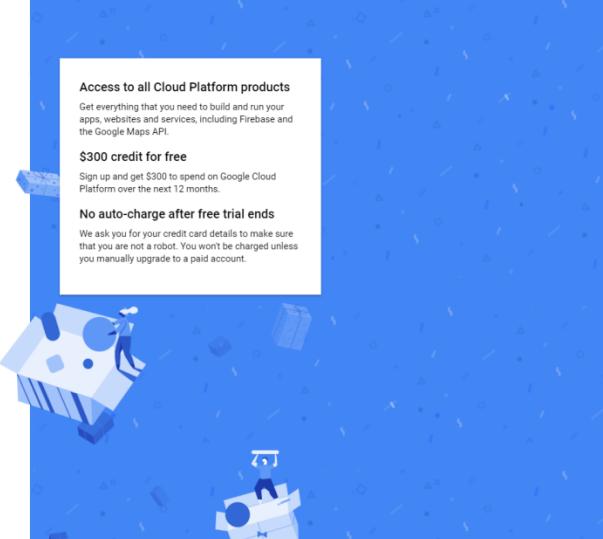
Name and address
Khan Irfan Ahmed Jumman
Raghavendra Mandir Road
R5
Mumbai, Maharashtra 400102
India

How you pay
Monthly automatic payments
You pay for this service on a regular monthly basis, via an automatic charge when your payment is due.

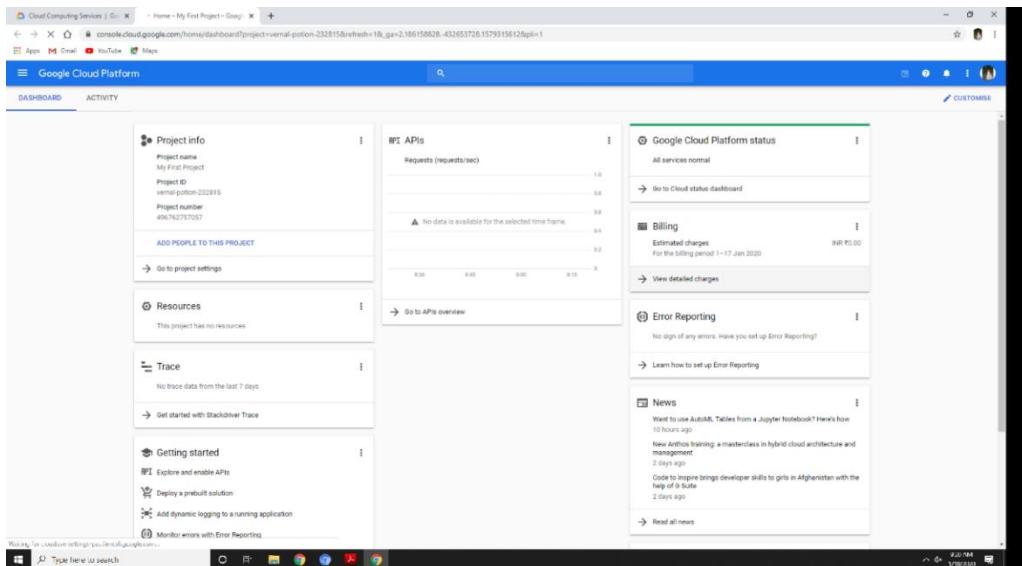
Payment method
Card details

The personal information that you provide here will be added to your payments profile. It will be stored securely and treated in accordance with the [Google Privacy Policy](#).

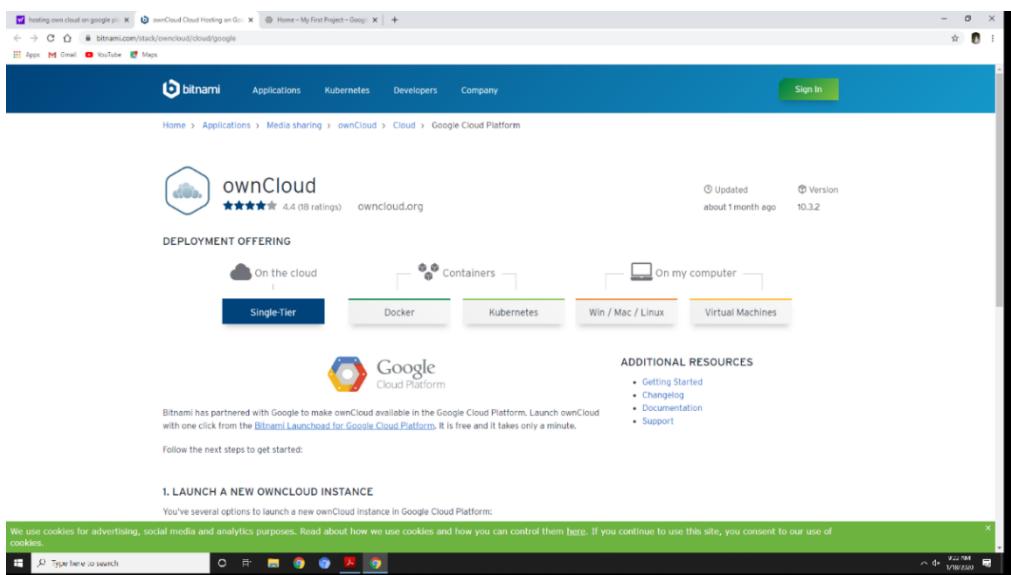
START MY FREE TRIAL


 Access to all Cloud Platform products
 Get everything that you need to build and run your apps, websites and services, including Firebase and the Google Maps API.
\$300 credit for free
 Sign up and get \$300 to spend on Google Cloud Platform over the next 12 months.
No auto-charge after free trial ends
 We ask you for your credit card details to make sure that you are not a robot. You won't be charged unless you manually upgrade to a paid account.

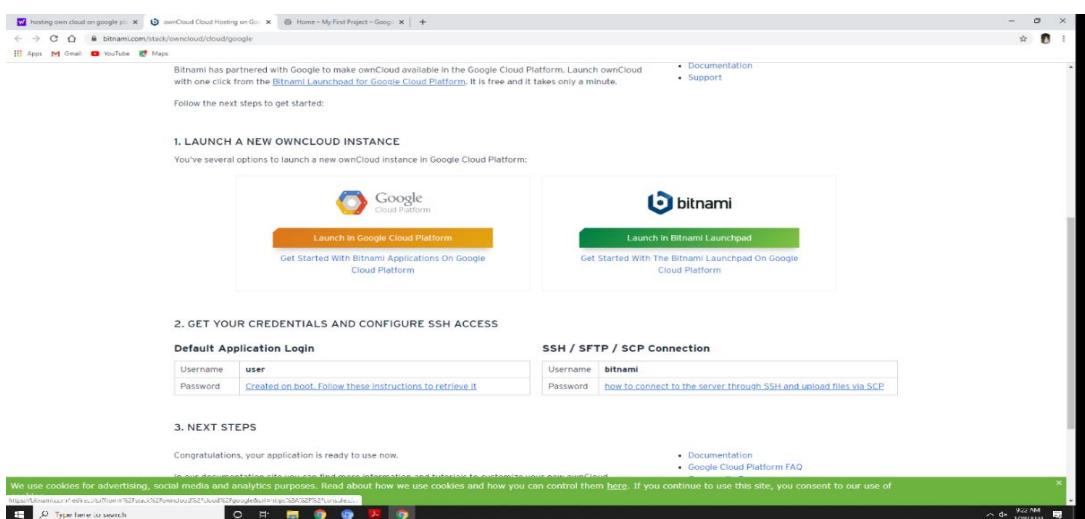
- 4) After You Have Entered Correct Details You will be Successfully Signed In as a Google Cloud Platform Customer with your gmail As Your Identity ! The Following Screen Appears



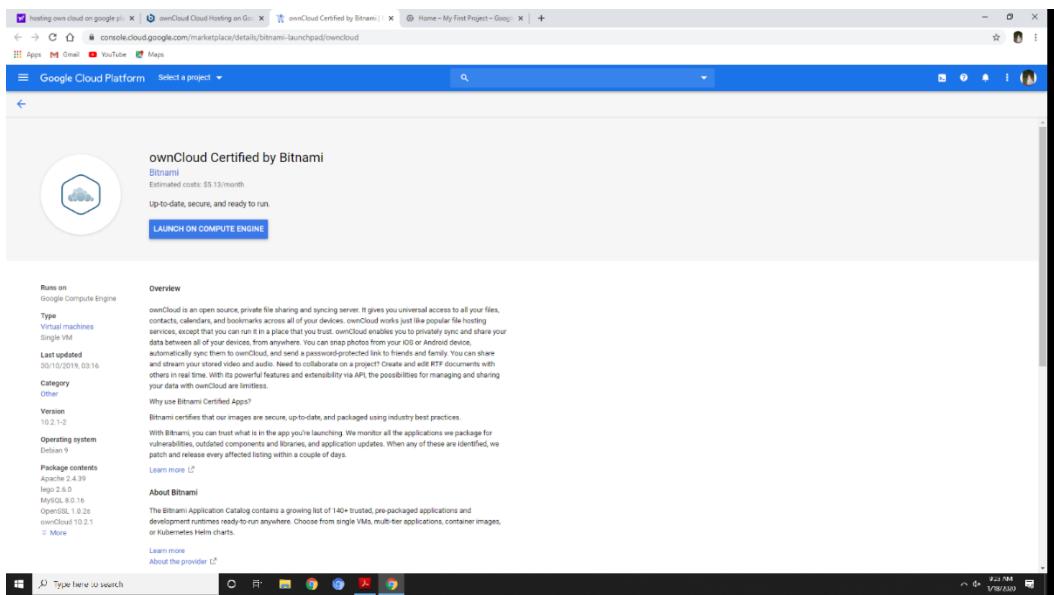
- 5) Make a New Application with owncloud Instance Using Bitnami by a) Visit the website : bitnami.com/stack/owncloud/cloud/google(Make Sure You are Logged in With Your GCP Account)



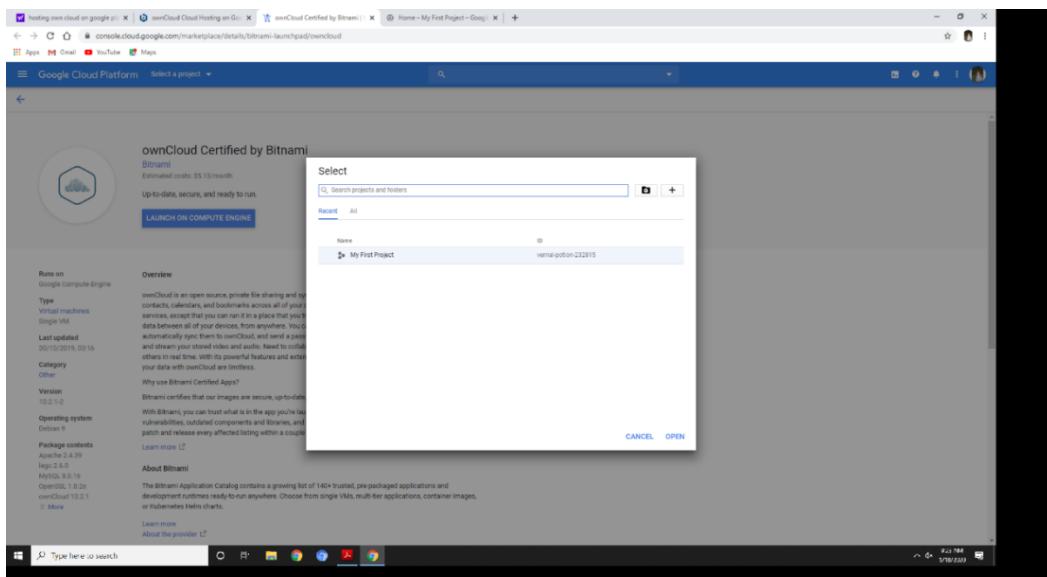
The above Web Page Appears , Scroll down
b) Click on 'Launch in Google Cloud Platform'



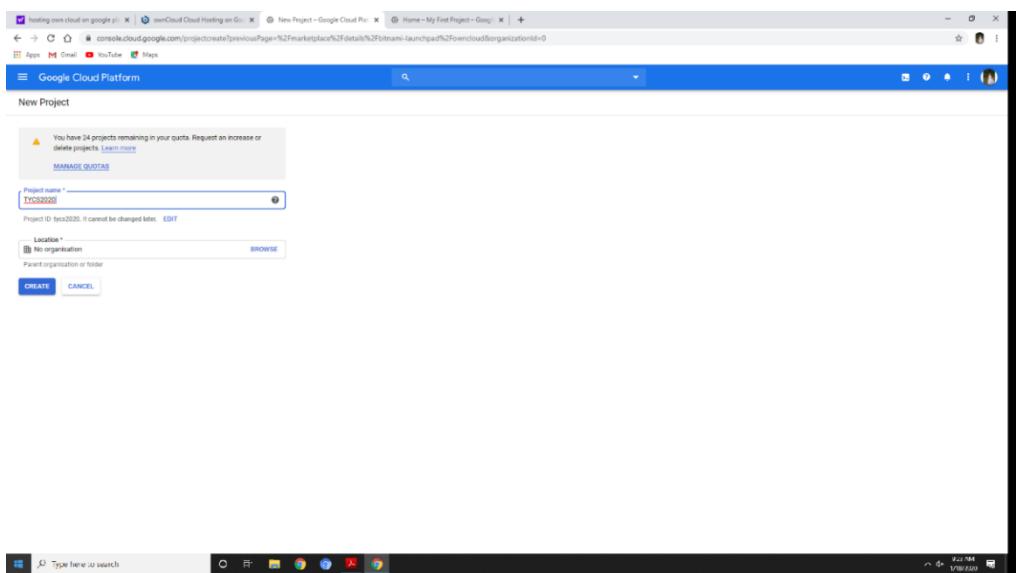
c) Then On the Web Page Click on ‘Launch in Compute Engine’



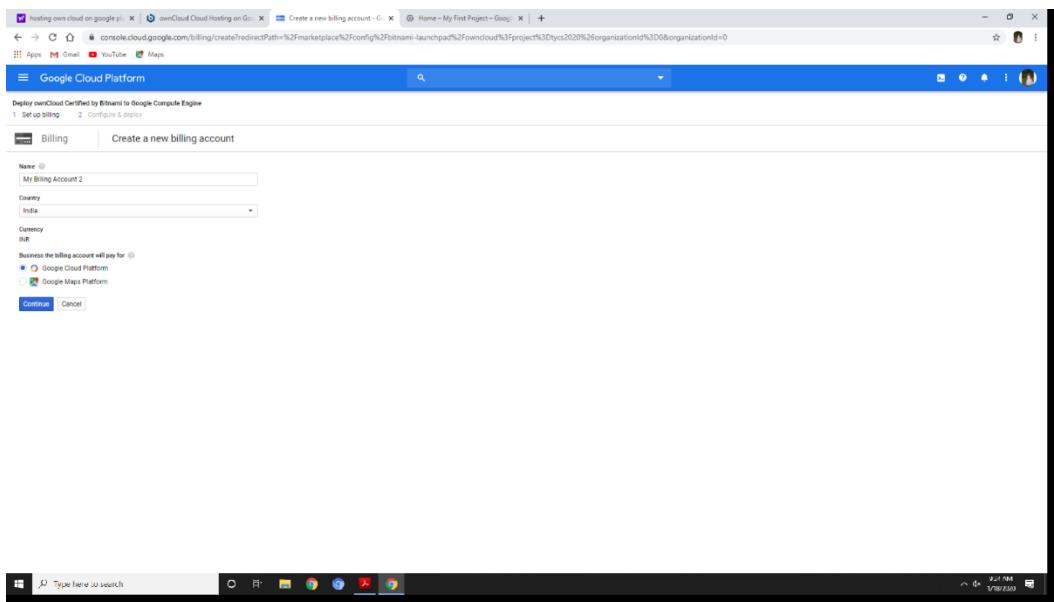
d) Select a Project Or Create A New Project by Clicking the Appropriate Button



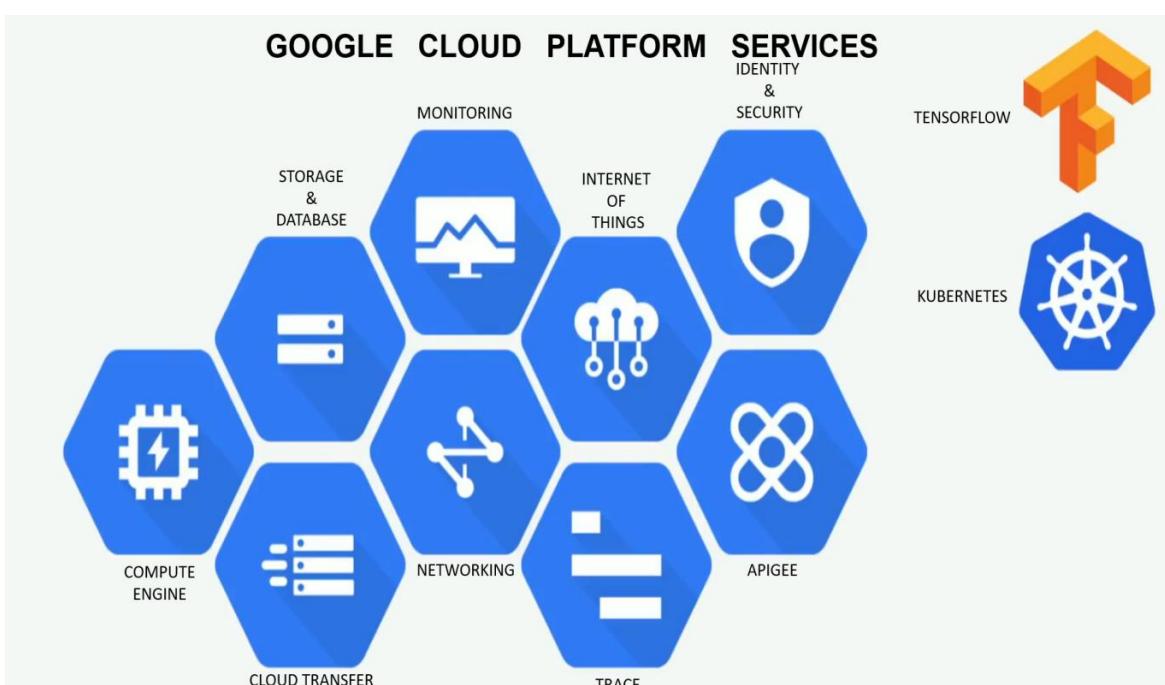
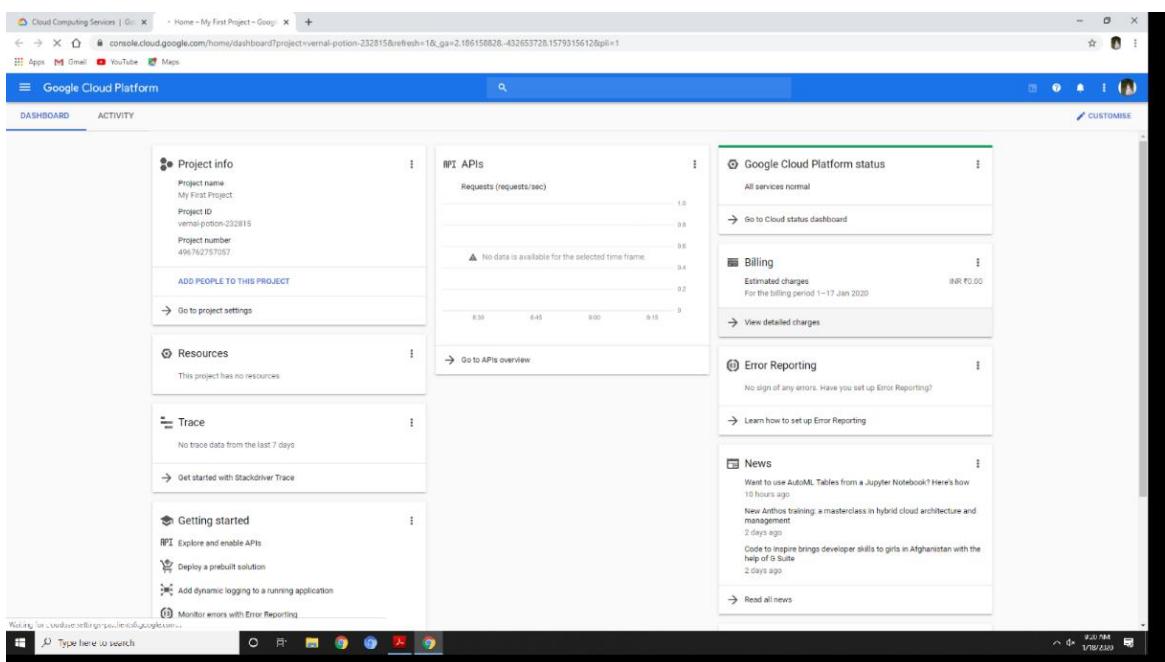
Here We Are Creating A new Project



e) Then You Have to Enter Your Billing Details , Enter It



The App will Be Shown In Your GCP dashboard .i.e. on this Page



Google Compute Engine (GCE)

- competes directly against the service that put Amazon Web Services on the map:
- used for hosting virtual machines (VMs, servers that exist entirely as software).

Google Kubernetes Engine (GKE, formerly Google Container Engine)

- is a platform for a more modern form of *containerized application* (called "Docker containers")
- which is engineered for deployment on cloud platforms.

Google App Engine

- provides software developers with tools and languages such as Python, PHP, Microsoft's .NET languages,
- for building and deploying a web application directly on Google's cloud.
- This is different from building the application locally and deploying it remotely on the cloud;
- this is "cloud-native" development: building, deploying, and evolving the application all remotely.

Google Cloud Storage

- is GCP's *object data store*, meaning it accepts any quantity of data and represents that data to its user in–
- for example, as files, a database, a data stream, an unordered list of data, or as multimedia.

Nearline

- is a way to utilize Google Cloud Storage for backup and archival data –
- a attractive option for purposes as system backups.

BigQuery : is a data warehousing system using Google Cloud Storage designed for very large quantities of highly distributed data, enabling SQL queries to be executed across multiple databases of varying structure levels. BigQuery utilizes a [columnar storage system](#) in which components of records are stacked onto one another and streamed to a parallel storage system. Such an organization proves useful in analytics applications, which collect broad statistics on simple, often general, relationships between data elements.

Cloud SQL : (not yet ready for public consumption) hosts much more traditional, relational database tables and indexes, using a GCE instance that scales itself up to meet the database's performance demands.

Cloud AutoML : is a suite of services geared to enable applications to leverage machine learning -- to detect perceptible patterns throughout large quantities of data, and utilize those patterns within a program.

Cloud Run : is a newly announced service enabling software developers to stage and deploy their applications to Google's cloud using the so-called *serverless* model -- building and running programs with the appearance of being hosted locally instead of in the cloud.

Advantages of Google Cloud Platform

1. **Pricing** : Google Cloud Platform provides 12-month free trial service. After this period, a user can quit all the services if not required or can update if he/she wants to change the current plan. But in other platforms, Pricing is a bit high. They don't allow the users to switch to other plans available in the platform.
2. **Database** : Google Cloud Storage supports all kinds of databases for e.g. MYSQL and also supports Big Data. Other platforms like Amazon Web Services and Microsoft Azure don't support both Structured and Relational Databases.
3. **Live Migration** : Google Cloud Hosting allows users to migrate their Virtual machines while others don't.
4. **Automating the deployment of modern applications** : Google is the originator of Kubernetes, which is an orchestrator for applications comprised of many components. Early on, Google took a proactive approach to automating the deployment of these multifaceted apps to the cloud: for example, opening itself to Kubo, an automation platform originally created to help developers using Cloud Foundry to deploy their applications from dev platforms to the cloud.

Disadvantages of Google Cloud Platform

1. Lack of elastic search
2. Support fee is quite hefty: around 150 USD per month for the most basic service (Silver class)
3. Downloading data from Google Cloud Storage is expensive. 0.12 USD per GB, more than other cloud providers !
4. SDK APIs seem less stable than the Amazon S3 ones.
5. It has a complex pricing schema : similar to AWS S3, so it's easy to get unexpected costs (e.g. number of requests, transfers, etc ...)
6. Small components, difficult to start
7. Out of Free Tier, everything costs.
8. Lacks features compared to AWS.

Comparison between Amazon EC2, Microsoft Azure and Google Cloud.

CLOUD SERVICE PROVIDERS		
Amazon	Azure-Microsoft	Google
- Amazon Web Services(AWS)		-Google Cloud platform
Year of launch		
2006	2010	2011
WHICH ONE TO CHOOSE AND WHY?		
Dominant in many features like configuration, monitoring security, and others	-Integration with Microsoft tools Broad feature set -Ranks first in development and testing tools	-Open source support and Portability -Discounts and flexible contracts -Designed for cloud-based businesses - DevOps expertise
-Extensive, mature offerings -Enterprise-friendly services -Open and flexible -Global search	-Open source support -Hybrid cloud	
WHY NOT CHOOSE?		
-Difficult to use -Overwhelming options -cost management	-Less efficient management tooling -Less "enterprise-ready"	-Lately entered in IaaS market -Less data centres over the world -Fewer services and features
MARKET SHARE		
40%	30%	10%
PRICING		
2VCPU+8GB RAM - 69\$/month	2VCPU+8GB RAM - 70\$/month	2VCPU+8GB RAM - 52\$/month
Availability		
55 zone	44 zone	18 zone
Downtime in 2014		
7:55 Hrs	19 Hrs	18 Min

