# Government College of Engineering (GCOEJ), JALGAON


# LAB REPORT & ASSIGNMENTS

(ACADEMIC YEAR 2021-22)

COURSE NAME: **Cloud Computing Lab**

COURSE CODE: **CO456U**

DEPARTMENT: **Computer Engineering**

FACULTY NAME: **Mr. Mohan Patil**

**SUBMITTED BY**

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PRN NUMBER: **1841053**

CLASS: **L.Y. Computer**

SEMESTER: **VIII**

DATE OF SUBMISSION: **23/05/2022**

## Government College of Engineering (GCOEJ), JALGAON


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Class: **L.Y. Computer Engineering** Semester: **VIII**

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This is certified to be the bonafide work of student in **Cloud Computing Lab** during the academic year 2021-22.

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*Year and Program:* L.Y. B. Tech (Computer.) *Academic Year:* 2021-22 *Sem-VIII*
*Course Code and Course Name:* CO456U Cloud Computing lab

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**CERTIFICATE**

This is to certify that Mr. /Miss Abhishek Rupchand Thanage PRN 1841053 of L.Y. B.Tech.(Computer Engineering) has satisfactorily completed the experiments/work/ assignments specified for Internal Continuous Assessment of CO456U/Cloud Computing lab as specified in syllabus of this Institute for the academic year2021-22

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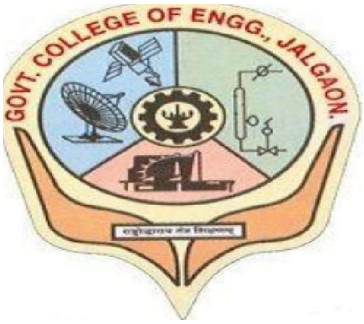


(Academic Year 2021-22)

# LAB 1

## Installation and configuration of own cloud

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**Batch** – LY3

**Course Code** – CO456U

**Course Name** - CCL

**Aim:** Installation and configuration of own Cloud.

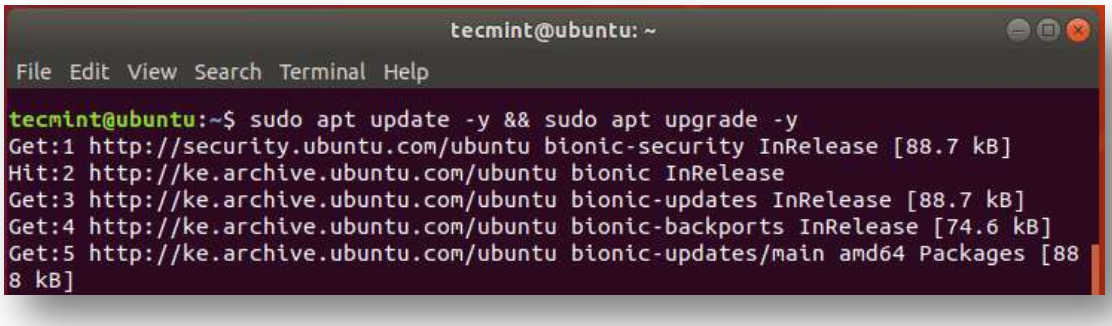
## Theory

ownCloud is a file server that enables secure storage, collaboration and sharing. It is convenient to store files in the cloud, so they are available on any device and can be shared with a few clicks. There are a lot of popular providers like Google, Apple, Facebook, Twitter and Dropbox. With a lot of these vendors, files are stored and processed beyond users control. With U.S. firms, files are subject to the Cloud Act and thus to government snooping. ownCloud helps users regain their digital sovereignty. It provides lots of convenient features, too, but also stores files securely and efficiently. There are no backdoors, you can check, it's open source. Users can install ownCloud themselves or rent a managed instance. You want to use ownCloud to benefit from the upsides of the public clouds while being in control of your data.
OwnCloud is open-source software, first developed in 2010, that allows you to run a personal cloud file storage service. It has features that are comparable to other cloud storage services such as Dropbox. The OwnCloud server software can be installed free of charge on Linux, and the client software can be installed on computers running Windows, OS X, or Linux. Mobile apps are also available for Android and iOS.

## Installation OwnCloud on Ubuntu 18.04

**Step 1:** Update Ubuntu System Packages

$ sudo apt update -y && sudo apt upgrade -y




**Step 2:** Install Apache and PHP 7.2 in Ubuntu

```
$ sudo apt install apache2 libapache2-mod-php7.2 openssl php-imagick php7.2-common php7.2-curl php7.2-gd php7.2-imap php7.2-intl php7.2-json php7.2-ldap php7.2-mbstring php7.2-mysql php7.2-pgsql php-smbclient php-ssh2 php7.2-sqlite3 php7.2-xml php7.2-zip
```

```
[tecmint@tecmint:~]$ sudo apt install apache2 libapache2-mod-php7.4 openssl php-imagick php7.
p7.4-mysql php7.4-pgsql php-ssh2 php7.4-sqlite3 php7.4-xml php7.4-zip
Reading package lists... Done
Building dependency tree
Reading state information... Done
apache2 is already the newest version (2.4.41-4ubuntu3.1).
openssl is already the newest version (1.1.1i-1+ubuntu20.04.1+deb.sury.org+4).
openssl set to manually installed.
The following packages were automatically installed and are no longer required:
  libtidy5deb1 libxmlrpc-epi0 libzip4
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  fonts-droid-fallback fonts-noto-mono fonts-urw-base35 ghostscript gsfonts imagemagick-6-com
  libjbig2dec0 liblqr-1-0 libmagickcore-6.q16-6 libmagickwand-6.q16-6 libopenjp2-7 libpaper-u
  php7.4-readline poppler-data ttf-dejavu-core
Suggested packages:
  fonts-noto fonts-freefont-otf | fonts-freefont-ttf fonts-texgyre ghostscript-x php-pear uw-
  fonts-japanese-mincho | fonts-ipafont-mincho fonts-japanese-gothic | fonts-ipafont-gothic f
The following NEW packages will be installed:
  fonts-droid-fallback fonts-noto-mono fonts-urw-base35 ghostscript gsfonts imagemagick-6-com
  libidn11 libijs-0.35 libjbig2dec0 liblqr-1-0 libmagickcore-6.q16-6 libmagickwand-6.q16-6 li
  php-imagick php-ssh2 php7.4-cli php7.4-common php7.4-curl php7.4-gd php7.4-imap php7.4-intl
  php7.4-readline php7.4-sqlite3 php7.4-xml php7.4-zip poppler-data ttf-dejavu-core
0 upgraded, 47 newly installed, 0 to remove and 0 not upgraded.
Need to get 24.8 MB of archives.
After this operation, 93.0 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Once the installation is complete you can verify if Apache is installed by running the dpkg command.

$ sudo dpkg -l apache2

```
tecmint@ubuntu: ~
File  Edit  View  Search  Terminal  Help
tecmint@ubuntu:~$ sudo dpkg -l apache2
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pend
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)
||/ Name           Version      Architecture Description
+++-==============-============-============-=================================
ii  apache2        2.4.29-1ubun amd64        Apache HTTP Server
tecmint@ubuntu:~$
```

To start and enable Apache to run on boot, run the commands.

```
$ sudo systemctl start apache2
$ sudo systemctl enable apache2
```

Now head over to your browser and type in your server's IP address in the URL bar as shown:

http://server-IP


To check if **PHP** is installed.

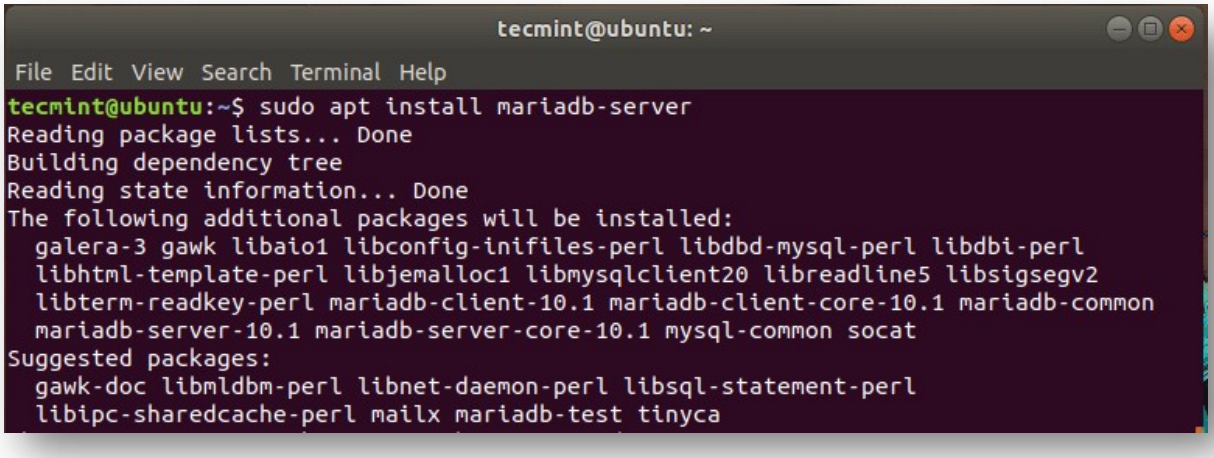
```
[tecmint@tecmint:~]$ php -v
PHP 7.4.3 (cli) (built: Oct  6 2020 15:47:56) ( NTS )
Copyright (c) The PHP Group
Zend Engine v3.4.0, Copyright (c) Zend Technologies
    with Zend OPcache v7.4.3, Copyright (c), by Zend Technologies
[tecmint@tecmint:~]$
```

**Step 3:** Install MariaDB in Ubuntu

MariaDB is a popular open-source database server that is widely used by developers, database enthusiasts, and also in production environments. It's a fork of MySQL and has been preferred to MySQL since the takeover of MySQL by Oracle.

To install the MariaDB run.

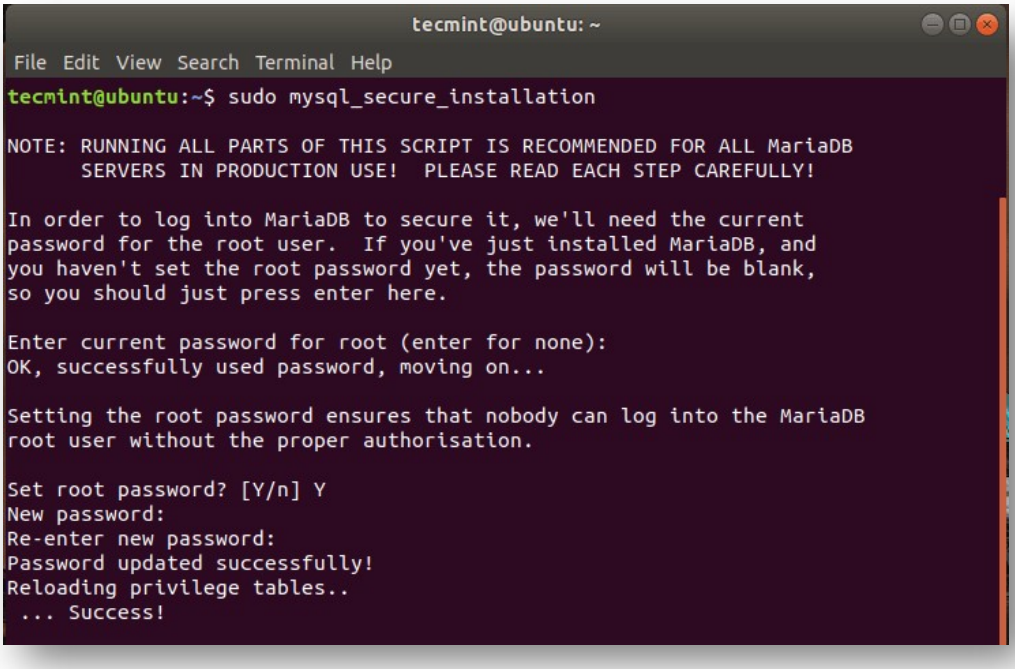
$ sudo apt install mariadb-server

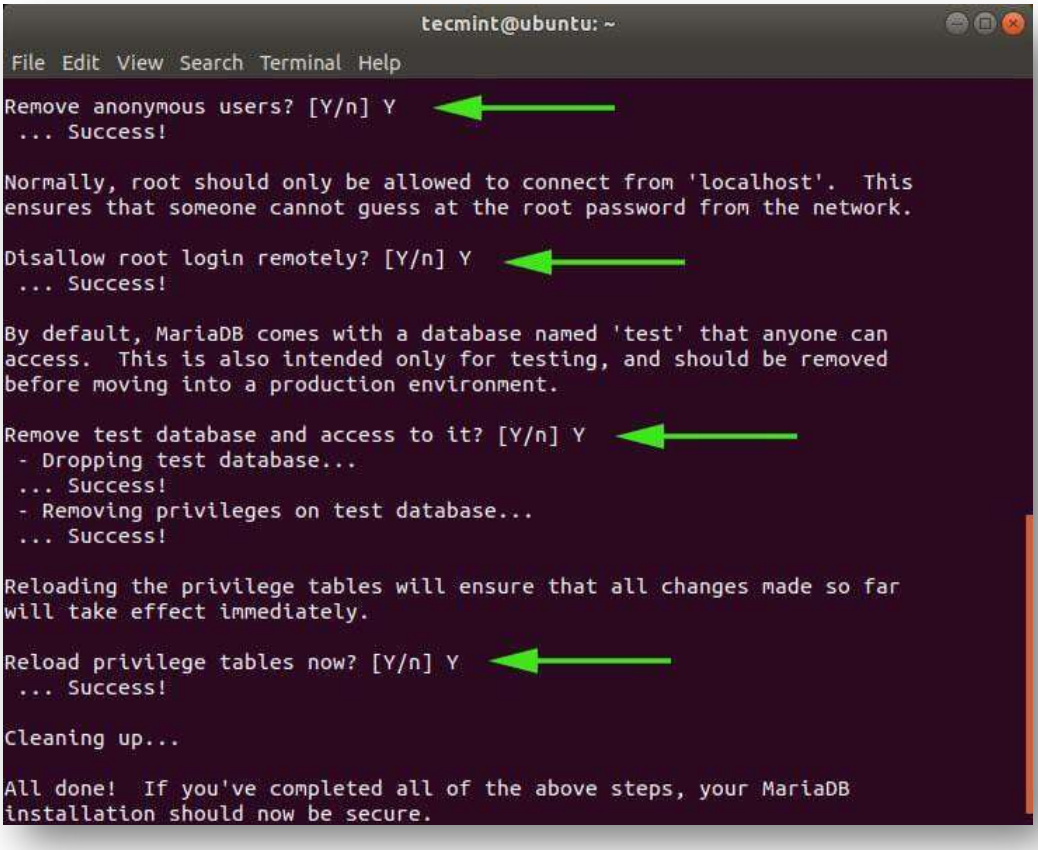



By default, MariaDB is not secured and is prone to security breaches. We, therefore, need to perform additional steps to harden the MariaDB server.

To get started with securing your MySQL server, run the command:

$ sudo mysql_secure_installation






**Step 4:** Create an OwnCloud Database

We need to create a database for Owncloud to store files during and after installation. So log in to MariaDB.

```
$ sudo mysql -u root -p
```

Run the commands below:

```
MariaDB [(none)]> CREATE DATABASE owncloud_db;
MariaDB [(none)]> GRANT ALL ON owncloud_db.* TO 'owncloud_user'@'localhost'
IDENTIFIED BY 'StrongP@ssword';
MariaDB [(none)]> FLUSH PRIVILEGES;
MariaDB [(none)]> EXIT;
```


**Step 5:** Download OwnCloud in Ubuntu

After creating the database, now download the OwnCloud zipped file using the following wget command.

```
$ sudo wget https://download.owncloud.org/community/owncloud-10.4.0.zip
```

Once downloaded, unzip the zipped package to the /var/www/ directory.

```
$ sudo unzip owncloud-10.4.0.zip -d /var/www/
```

Then, set permissions.

```
$ sudo chown -R www-data:www-data /var/www/owncloud/
$ sudo chmod -R 755 /var/www/owncloud/
```

**Step 6:** Configure Apache for OwnCloud

In this step, we are going to configure Apache to serve OwnCloud's files. To do that, we are going to create a configuration file for Owncloud as shown.

```
$ sudo vim /etc/apache2/conf-available/owncloud.conf
```

Add the configuration below.

```
Alias /owncloud "/var/www/owncloud/"
<Directory /var/www/owncloud/>
  Options +FollowSymlinks
  AllowOverride All
 <IfModule mod_dav.c>
  Dav off
 </IfModule>
```

```
 SetEnv HOME /var/www/owncloud
 SetEnv HTTP_HOME /var/www/owncloud
</Directory>
```

Save and close the file.

Next, you need to enable all the required Apache modules and the newly added configuration by running the commands below:

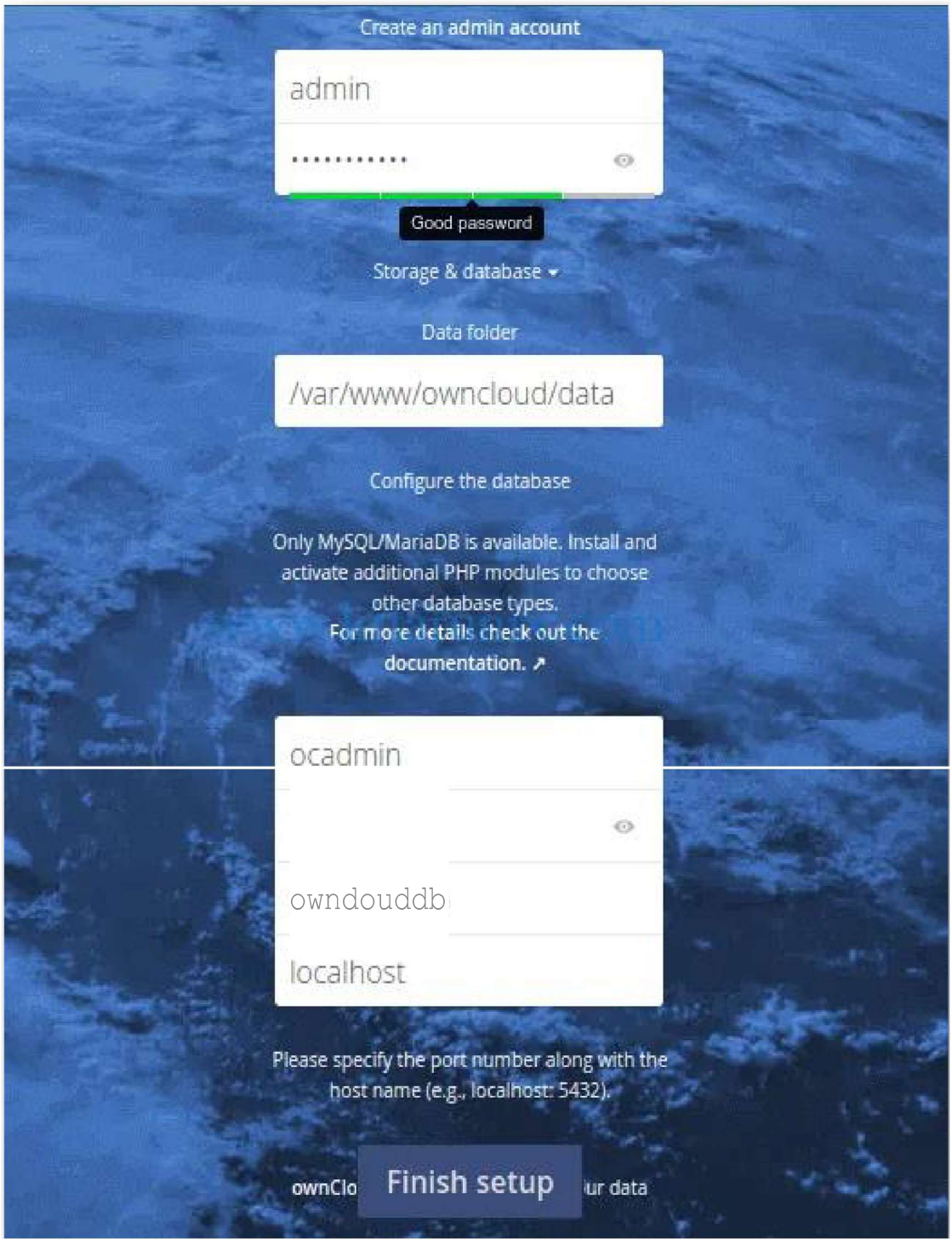
```
$ sudo a2enconf owncloud
$ sudo a2enmod rewrite
$ sudo a2enmod headers
$ sudo a2enmod env
$ sudo a2enmod dir
$ sudo a2enmod mime
```

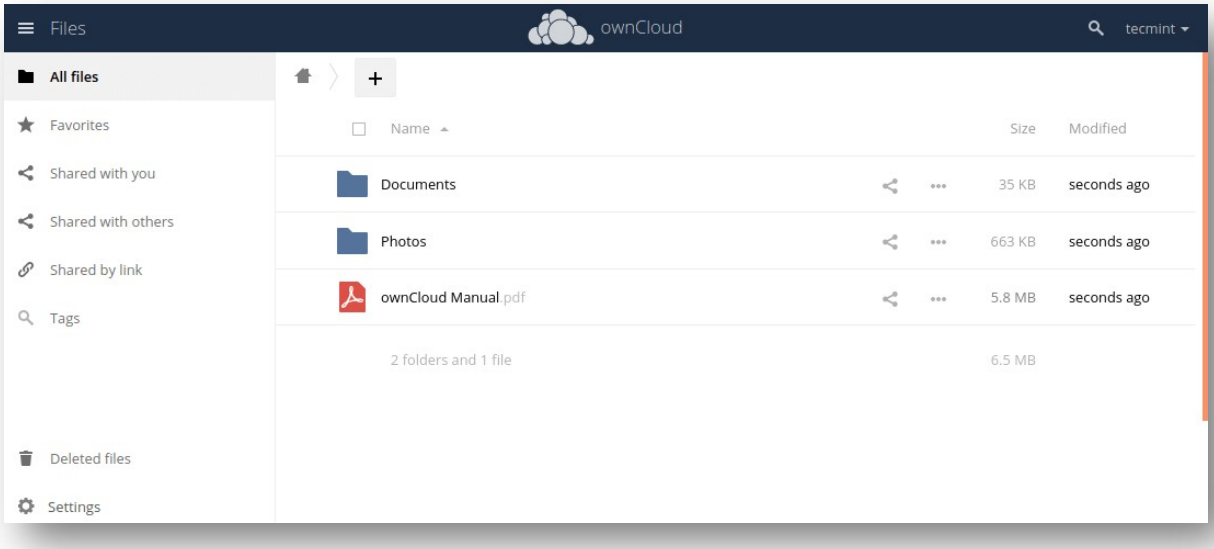
For the changes to come into effect restart the Apache webserver.

```
$ sudo systemctl restart apache2
```

**Step 7:** Finalizing the OwnCloud Installation in Ubuntu
With all the necessary configurations finalized, the only part remaining is to install OwnCloud on a browser. So head out to your browser and type in your server's address followed by the /owncloud suffix.

```
http://server-IP/owncloud
```


Create an admin account
admin
Good password
Storage & database
Data folder
/var/www/owncloud/data
Configure the database
Only MySQL/MariaDB is available. Install and activate additional PHP modules to choose other database types.
For more details check out the documentation. ↗
ocadmin
owndouddb
localhost
Please specify the port number along with the host name (e.g., localhost:5432).
ownClo
Finish setup
ur data


**Conclusion**: Successfully installed the OwnCloud file sharing platform on Ubuntu 18.04.

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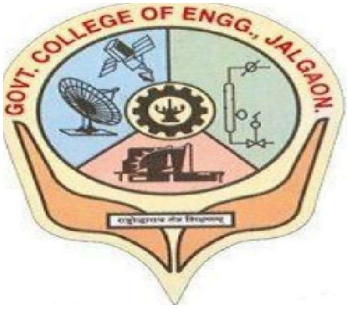


(Academic Year 2021-22)

# LAB 2

## Implementation of virtualization in cloud computing to learn virtualization basics benefits of virtualization in cloud using open source operating system

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**Class** – L.Y. B-Tech (Computer)

**Batch** – LY3

**Course Code** – CO456U

**Course Name** - CCL

**Aim:** Implementation of Virtualization in Cloud Computing to Learn Virtualization Basics, Benefits of Virtualization in Cloud using Open-Source Operating System.

## Theory

### Virtualization in Cloud Computing

The last session was all about **Community Cloud**. Here, we come up with a new concept called Virtualization in Cloud Computing, in which we will explore it's working. Along with this, we will learn the types and advantages of Virtualization.

So, let's begin the Cloud Virtualization Tutorial.

What is Virtualization in Cloud Computing?

Virtualization in Cloud Computing is making a virtual platform of server operating system and **storage** devices. This will help the user by providing multiple machines at the same time it also allows sharing a single physical instance of resource or an application to multiple users.

Cloud Virtualizations also manage the workload by transforming traditional computing and make it more scalable, economical and efficient.

Virtualizations in Cloud Computing rapidly integrating the fundamental way of computing. One of the important features of virtualization is that it allows sharing of applications to multiple customers and companies.

Cloud Computing can also be known as services and application delivered to help the virtualized environment. This environment can be either **public** or **private**. With the help of virtualization, the customer can maximize the resources and reduces the physical system which is in need.

### The Five Levels of Implementing Virtualization

Virtualization is not that easy to implement. A computer runs an OS that is configured to that particular hardware. Running a different OS on the same hardware is not exactly feasible.

To tackle this, there exists a hypervisor. What hypervisor does is, it acts as a bridge between virtual OS and hardware to enable its smooth functioning of the instance.

There are five levels of virtualizations available that are most commonly used in the industry. These are as follows:

### Instruction Set Architecture Level (ISA)

In ISA, virtualization works through an ISA emulation. This is helpful to run heaps of legacy code which was originally written for different hardware configurations.

These codes can be run on the virtual machine through an ISA.

A binary code that might need additional layers to run can now run on an x86 machine or with some tweaking, even on x64 machines. ISA helps make this a hardware-agnostic virtual machine.

The basic emulation, though, requires an interpreter. This interpreter interprets the source code and converts it to a hardware readable format for processing.

**Hardware Abstraction Level (HAL)**

As the name suggests, this level helps perform virtualization at the hardware level. It uses a bare hypervisor for its functioning.

This level helps form the virtual machine and manages the hardware through virtualization.

It enables virtualization of each hardware component such as I/O devices, processors, memory, etc.

This way multiple users can use the same hardware with numerous instances of virtualization at the same time.

IBM had first implemented this on the IBM VM/370 back in 1960. It is more usable for cloud-based infrastructure.

Thus, it is no surprise that currently, Xen hypervisors are using HAL to run Linux and other OS on x86 based machines.

**Operating System Level**

At the operating system level, the virtualization model creates an abstract layer between the applications and the OS.

It is like an isolated container on the physical server and operating system that utilizes hardware and software. Each of these containers functions like servers.

When the number of users is high, and no one is willing to share hardware, this level of virtualization comes in handy.

Here, every user gets their own virtual environment with dedicated virtual hardware resources. This way, no conflicts arise.

**Library Level**

OS system calls are lengthy and cumbersome. Which is why applications opt for APIs from user-level libraries.

Most of the APIs provided by systems are rather well documented. Hence, library level virtualization is preferred in such scenarios.

Library interfacing virtualization is made possible by API hooks. These API hooks control the communication link from the system to the applications.

Some tools available today, such as vCUDA and WINE, have successfully demonstrated this technique.

**Application Level**

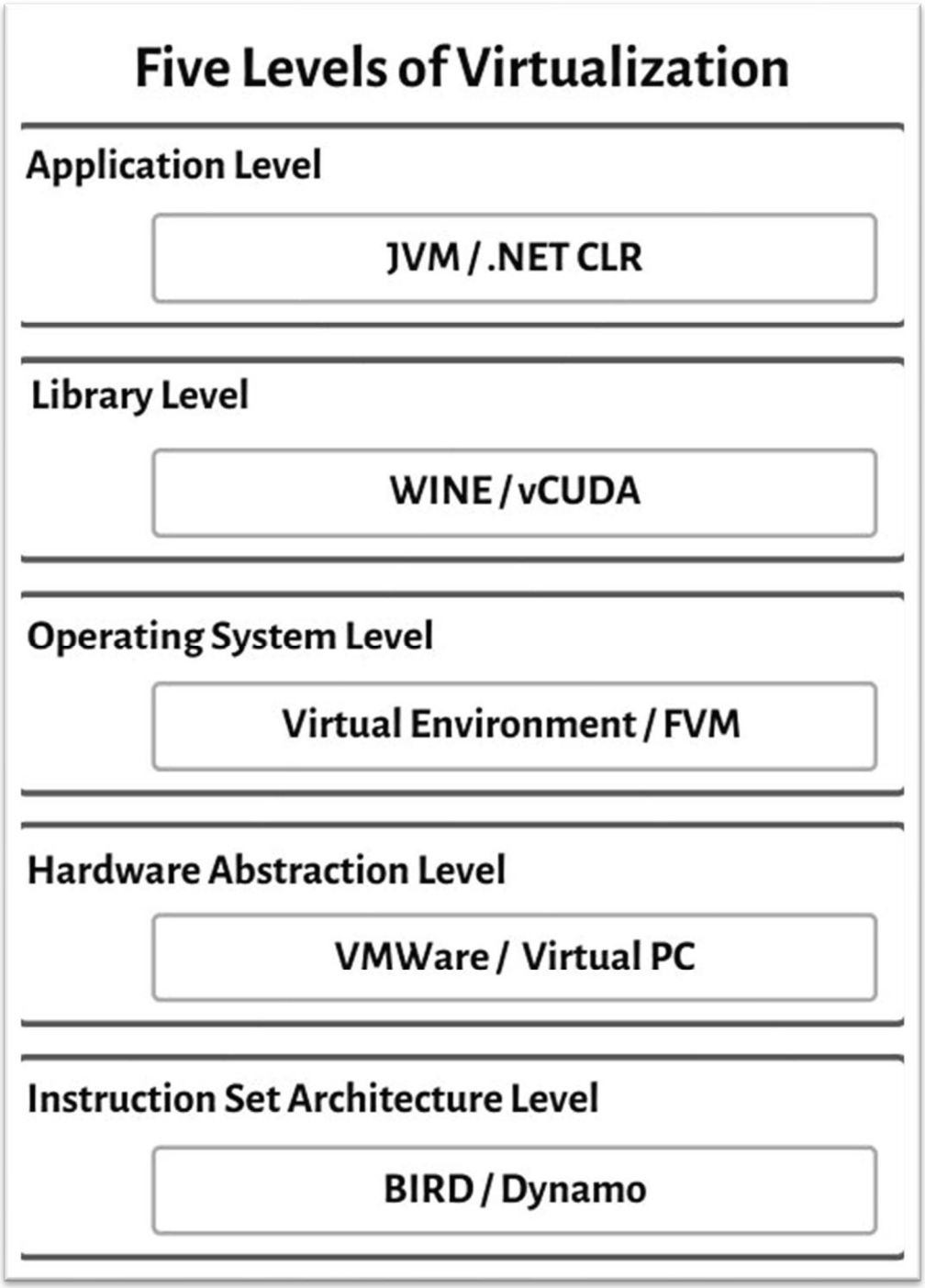
Application-level virtualization comes handy when you wish to virtualize only an application. It does not virtualize an entire platform or environment.

On an operating system, applications work as one process. Hence it is also known as process-level virtualization.

It is generally useful when running virtual machines with high-level languages. Here, the application sits on top of the virtualization layer, which is above the application program.

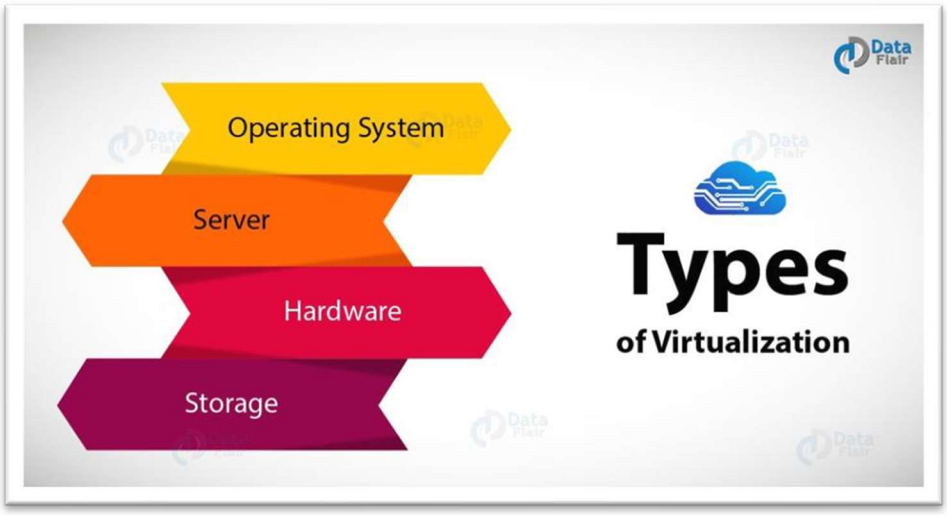
The application program is, in turn, residing in the operating system.

Programs written in high-level languages and compiled for an application-level virtual machine can run fluently here.



**Types of Virtualizations in Cloud Computing**

- Operating System Virtualization
- Hardware Virtualization
- Server Virtualization
- Storage Virtualization




**a. Operating System Virtualization**

In operating system virtualization in Cloud Computing, the virtual machine software installs in the operating system of the host rather than directly on the hardware system.

The most important use of operating system virtualization is for testing the application on different platforms or operating system. Here, the software is present in the hardware, which allows different applications to run.

**b. Server Virtualization**

In server virtualization in Cloud Computing, the software directly installs on the server system and use for a single physical server can divide into many servers on the demand basis and balance the load.

It can be also stated that the server virtualization is masking of the server resources which consists of number and identity. With the help of software, the server administrator divides one physical server into multiple servers.

**c. Hardware Virtualization**

Hardware virtualization in Cloud Computing, used in server platform as it is flexible to use Virtual Machine rather than physical machines. In hardware virtualizations, virtual machine software installs in the hardware system and then it is known as hardware virtualization.

It consists of a hypervisor which use to control and monitor the process, memory, and other hardware resources. After the completion of hardware virtualization process, the user can install the different operating system in it and with this platform different application can use.

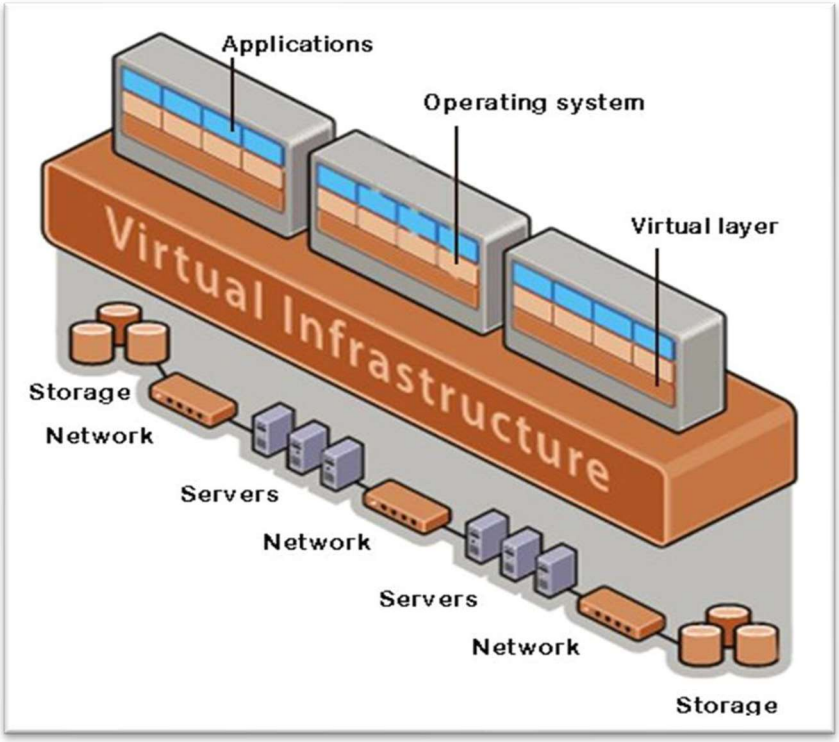
**d. Storage Virtualization**

In storage virtualization in Cloud Computing, a grouping is done of physical storage which is from multiple network storage devices this is done so it looks like a single storage device.
It can implement with the help of software applications and storage virtualization is done for the backup and recovery process. It is a sharing of the physical storage from multiple storage devices.

**How Virtualization Works?**

Virtualization in Cloud Computing is a process in which the user of cloud shares the data present in the cloud which can be application software etc. It provides a virtual environment in the cloud which can be software hardware or any other thing.
In virtualization, the server and the software application which are required by the **cloud providers** maintain by the third party and in this, the cloud provider please some amount to the third party. It is done because it will be costly if a new version of an application is released and it has to be introduced to the customers.
It can be also explained in a way that with the help of Hypervisor which is software the cloud customer can access server. A hypervisor is connectivity between the server and the virtual environment and distributes the resources between different virtual environments.

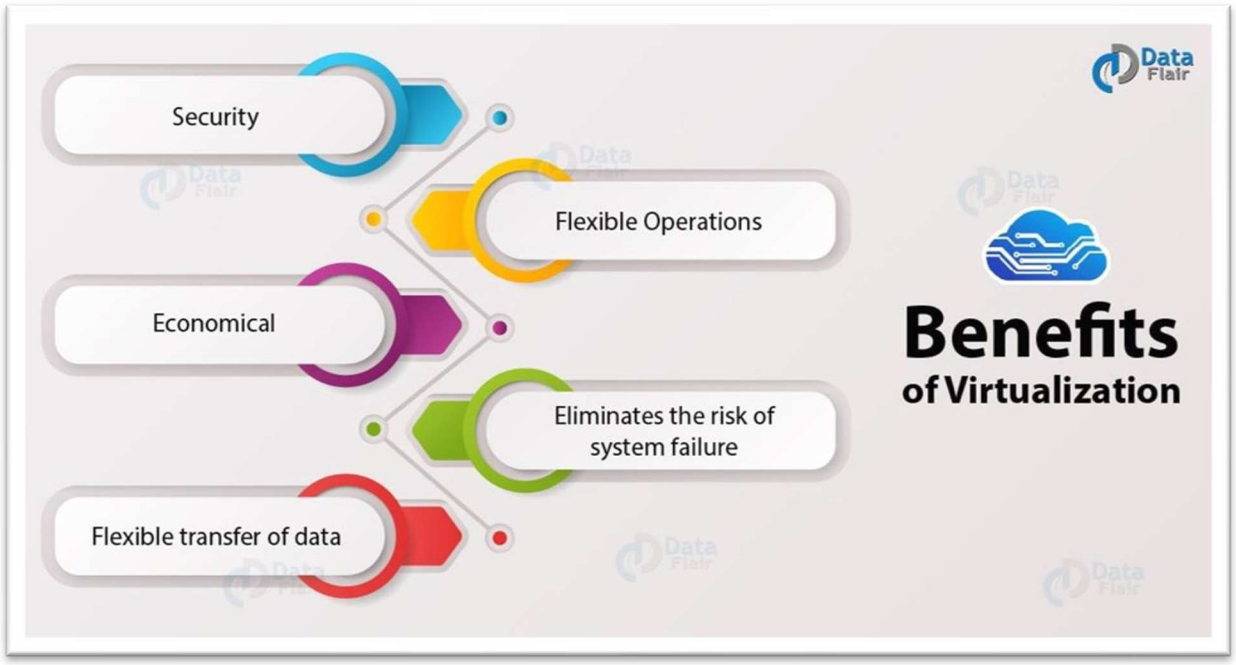
*Traditional*




*Traditional Architecture Vs Virtual Architecture*

**Benefits of Virtualization**

Virtualizations in **Cloud Computing has numerous benefits**, let's discuss them one by one:




*Benefits of Virtualization in Cloud Computing*

**i. Security**

During the process of virtualization **security** is one of the important concerns. The security can be provided with the help of firewalls, which will help to prevent unauthorized access and will keep the data confidential.

Moreover, with the help of firewall and security, the data can protect from harmful viruses malware and other cyber threats. Encryption process also takes place with protocols which will protect the data from other threads.

So, the customer can virtualize all the data store and can create a backup on a server in which the data can store.

**ii. Flexible operations**

With the help of a virtual network, the work of it professional is becoming more efficient and agile. The network switch implement today is very easy to use, flexible and saves time.

With the help of virtualization in Cloud Computing, technical problems can solve in physical systems. It eliminates the problem of recovering the data from crashed or corrupted devices and hence saves time.

**iii. Economical**

Virtualization in **Cloud Computing**, save the cost for a physical system such as hardware and servers. It stores all the data in the virtual server, which are quite economical.

It reduces the wastage, decreases the electricity bills along with the maintenance cost. Due to this, the business can run multiple operating system and apps in a particular server.

iv. Eliminates the risk of system failure

While performing some task there are chances that the system might crash down at the wrong time. This failure can cause damage to the company but the virtualizations help you to perform the same task in multiple devices at the same time.
The data can store in the cloud it can retrieve anytime and with the help of any device. Moreover, there is two working server side by side which makes the data accessible every time. Even if a server crashes with the help of the second server the customer can access the data.

**v. Flexible transfer of data**

The data can transfer to the virtual server and retrieve anytime. The customers or cloud provider don't have to waste time finding out hard drives to find data. With the help of virtualization, it will very easy to locate the required data and transfer them to the allotted authorities.
This transfer of data has no limit and can transfer to a long distance with the minimum charge possible. Additional storage can also provide and the cost will be as low as possible.
So, this was all about Cloud Virtualization Tutorial. Hope you like our explanation.

**Conclusion**

With the help of Virtualization in Cloud Computing, companies can implement cloud computing. This article proves that virtualization in Cloud Computing is an important aspect in cloud computing and can maintain and secure the data.

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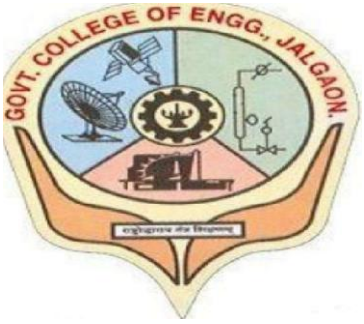


(Academic Year 2021-22)

# LAB 3

**Study and Implementations of infrastructure as service using Openstack.**

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Class: L.Y COMP Semester: VIII

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**Name** – Abhishek R. Thakare
**PRN** – 1841053
**Class** – L.Y. B-Tech (Computer)
**Batch** – LY3
**Course Code** – CO456U
**Course Name** - CCL

**Aim:** Study and Implementations of infrastructure as service using Openstack**.**

## Infrastructure as-a-service (IaaS)

IaaS includes the delivery of computing infrastructure such as a virtual machine, disk image library, raw block storage, object storage, firewalls, load balancers, IP addresses, virtual local area networks and other features on-demand from a large pool of resources installed in data centres. Cloud providers bill for the IaaS services on a utility computing basis; the cost is based on the amount of resources allocated and consumed.

## OpenStack: a free and open source cloud computing platform

OpenStack is a free and open source, cloud computing software platform that is widely used in the deployment of infrastructure-as-a-Service (IaaS) solutions. The core technology with OpenStack comprises a set of interrelated projects that control the overall layers of processing, storage and networking resources through a data centre that is managed by the users using a Web-based dashboard, command-line tools, or by using the RESTful API.

Currently, OpenStack is maintained by the OpenStack Foundation, which is a nonprofit corporate organisation established in September 2012 to promote OpenStack software as well as its community. Many corporate giants have joined the project, including GoDaddy, Hewlett Packard, IBM, Intel, Mellanox, Mirantis, NEC, NetApp, Nexenta, Oracle, Red Hat, SUSE Linux, VMware, Arista Networks, AT&T, AMD, Avaya, Canonical, Cisco, Dell, EMC, Ericsson, Yahoo!, etc.

OpenStack users

| | |
|---|---|
| • AT&T | • Purdue University |
| • Stockholm University | • Red Hat |
| • SUSE | • CERN |
| • Deutsche Telekom | • HP Converged Cloud |
| • HP Public Cloud | • Intel |
| • KT (formerly Korea Telecom) | • NASA |
| • NSA | • PayPal |
| • Disney | • Sony |
| • Rackspace Cloud | • SUSE Cloud Solution |
| • Wikimedia Labs | • Yahoo! |
| • Walmart | • Opera Software |

| OpenStack releases with the components included |
| --- |
| **OpenStack Austin -** Nova, Swift |
| **OpenStack Bexar -** Nova, Glance, Swift |
| **OpenStack Cactus -** Nova, Glance, Swift |
| **OpenStack Diablo -** Nova, Glance, Swift |
| **OpenStack Essex -** Nova, Glance, Swift, Horizon, Keystone |
| **OpenStack Folsom -** Nova, Glance, Swift, Horizon, Keystone, Quantum, Cinder |
| **OpenStack Grizzly -** Nova, Glance, Swift, Horizon, Keystone, Quantum, Cinder |
| **OpenStack Havana -** Nova, Glance, Swift, Horizon, Keystone, Neutron, Cinder, Heat, Ceilometer |
| **OpenStack Icehouse -** Nova, Glance, Swift, Horizon, Keystone, Neutron, Cinder, Heat, Ceilometer, Trove |

**OpenStack computing components**

OpenStack has a modular architecture that controls large pools of compute, storage and networking resources.

**Compute (Nova):** OpenStack Compute (Nova) is the fabric controller, a major component of Infrastructure as a Service (IaaS), and has been developed to manage and automate pools of computer resources. It works in association with a range of virtualisation technologies. It is written in Python and uses many external libraries such as Eventlet, Kombu and SQLAlchemy.

**Object storage (Swift):** It is a scalable redundant storage system, using which objects and files are placed on multiple disks throughout servers in the data centre, with the OpenStack software responsible for ensuring data replication and integrity across the cluster. OpenStack Swift replicates the content from other active nodes to new locations in the cluster in case of server or disk failure.

**Block storage (Cinder):** OpenStack block storage (Cinder) is used to incorporate continual block-level storage devices for usage with OpenStack compute instances. The block storage system of OpenStack is used to manage the creation, mounting and unmounting of the block devices to servers. Block storage is integrated for performance-aware scenarios including database storage, expandable file systems or providing a server with access to raw block level storage. Snapshot management in OpenStack provides the authoritative functions and modules for the back-up of data on block storage volumes. The snapshots can be restored and used again to create a new block storage volume.

**Networking (Neutron):** Formerly known as Quantum, Neutron is a specialised component of OpenStack for managing networks as well as network IP addresses. OpenStack networking makes sure that the network does not face bottlenecks or any complexity issues in cloud deployment. It provides the users continuous self-service capabilities in the network' s infrastructure. The floating IP addresses allow traffic to be dynamically routed again to any resources in the IT infrastructure, and therefore the users can redirect traffic during maintenance or in case of any failure. Cloud users can create their own networks and control traffic along with the connection of servers

and devices to one or more networks. With this component, OpenStack delivers the extension framework that can be implemented for managing additional network services including intrusion detection systems (IDS), load balancing, firewalls, virtual private networks (VPN) and many others.

Figure 1: OpenStack

**Dashboard (Horizon):** The OpenStack dashboard (Horizon) provides the GUI (Graphical User Interface) for the access, provision and automation of cloud-based resources. It embeds various third party products and services including advance monitoring, billing and various management tools.

**Identity services (Keystone):** Keystone provides a central directory of the users, which is mapped to the OpenStack services they are allowed to access. It refers and acts as the centralised authentication system across the cloud operating system and can be integrated with directory services like LDAP. Keystone supports various authentication types including classical username and password credentials, tokenbased systems and other log-in management systems.

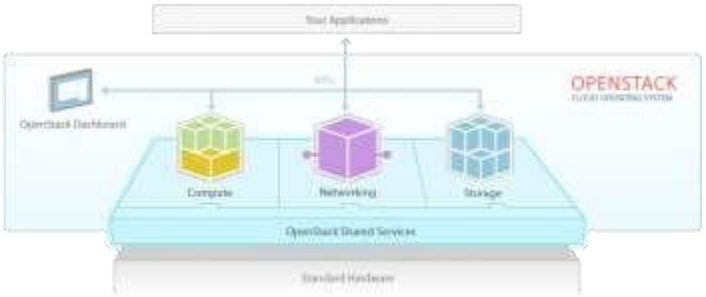
**Image services (Glance):** OpenStack Image Service (Glance) integrates the registration, discovery and delivery services for disk and server images. These stored images can be used as templates. It can also be used to store and catalogue an unlimited number of backups. Glance can store disk and server images in different types and varieties of back-ends, including Object Storage.

**Telemetry (Ceilometer):** OpenStack telemetry services (Ceilometer) include a single point of contact for the billing systems. These provide all the counters needed to integrate customer billing across all current and future OpenStack components.

**Orchestration (Heat):** Heat organises a number of cloud applications using templates with the help of the OpenStack-native REST API and a CloudFormationcompatible Query API.

**Database (Trove):** Trove is used as database-as-a-service (DaaS), which integrates and provisions relational and non-relational database engines.

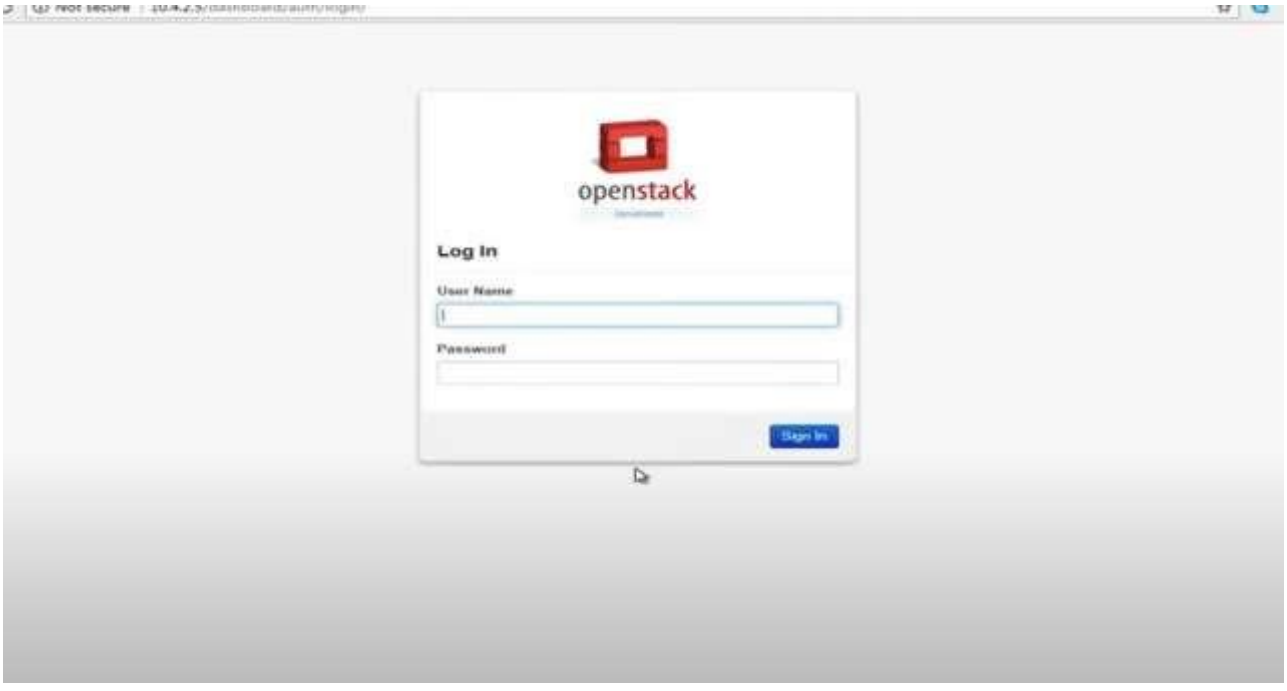
**Elastic Map Reduce (Sahara):** Sahara is the specialised service that enables data processing on OpenStack-managed resources, including the processing with Apache Hadoop.

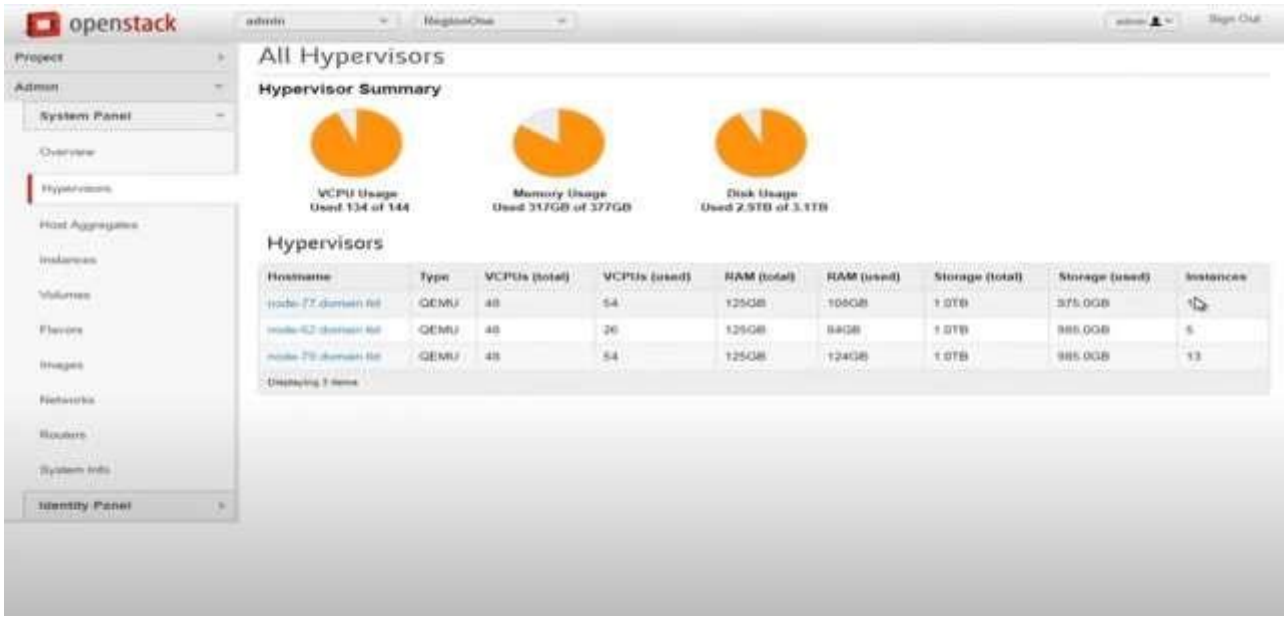



**Deployment of OpenStack using DevStack**

DevStack is used to quickly create an OpenStack development environment. It is also used to demonstrate the starting and running of OpenStack services, and provide examples of using them from the command line. DevStack has evolved to support a large number of configuration options and alternative platforms and support services. It can be considered as the set of scripts which install all the essential OpenStack services in the computer without any additional software or configuration. To implement DevStack, first download all the essential packages, pull in the OpenStack code from various OpenStack projects, and set everything for the deployment. To install OpenStack using DevStack, any Linux-based distribution with 2GB RAM can be used to start the implementation of IaaS.

**Screenshot:**




openstack
admin
RegionOne
Sign Out
Project
Admin
System Panel
Overview
Hypervisors
Host Aggregates
Instances
Volumes
Flavors
Images
Networks
Routers
System Info
Identity Panel
All Hypervisors
Hypervisor Summary
VCPU Usage
Used 134 of 144
Memory Usage
Used 317GB of 377GB
Disk Usage
Used 2.5TB of 3.1TB
Hypervisors
Hostname
Type
VCPUs (total)
VCPUs (used)
RAM (total)
RAM (used)
Storage (total)
Storage (used)
Instances
QEMU
48
54
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108GB
1.0TB
375.0GB
QEMU
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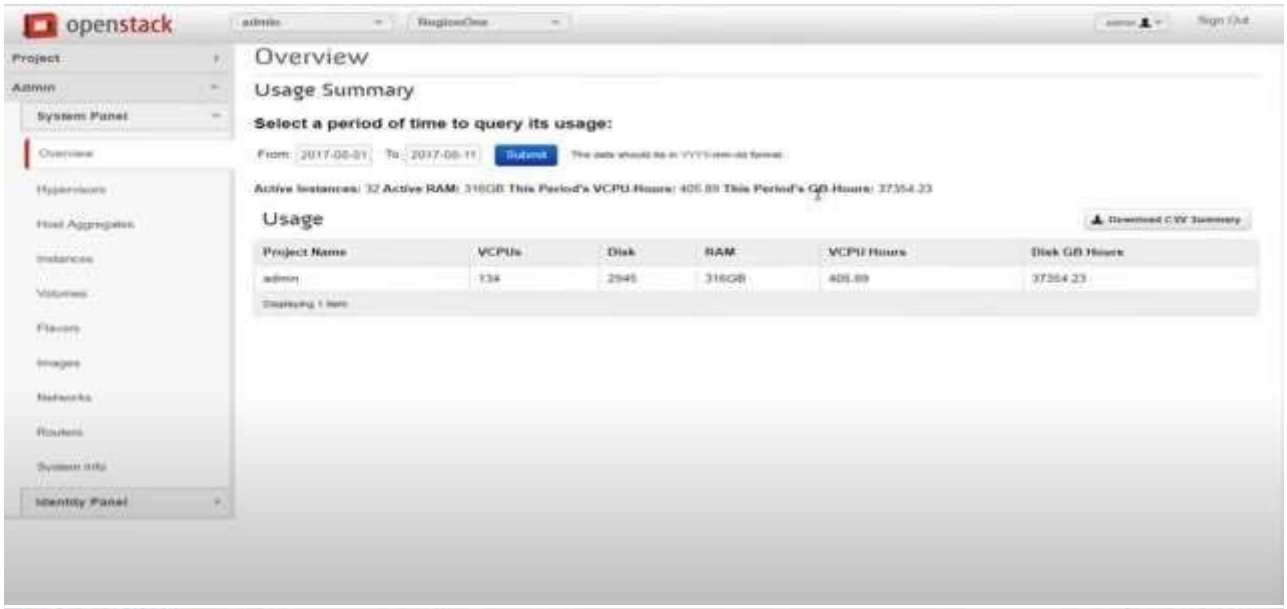
985.0GB
13


openstack
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RegionOne
Sign Out
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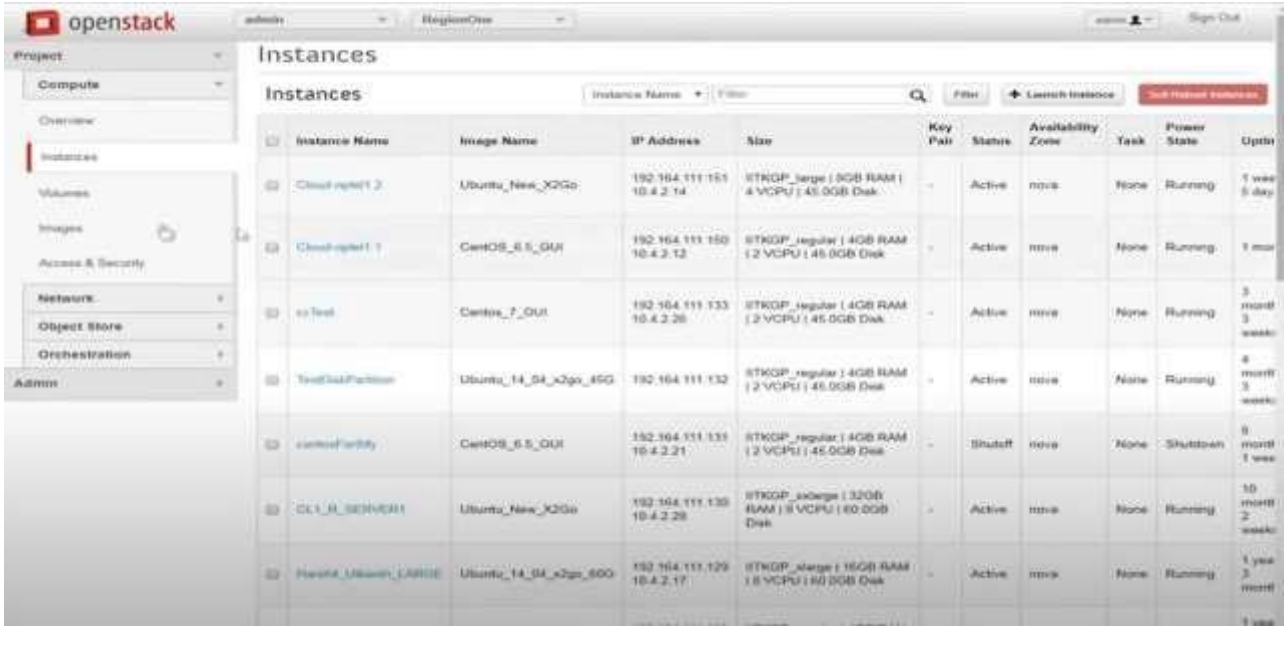
Admin
System Panel
Overview
Hypervisors
Host Aggregates
Instances
Volumes
Flavors
Images
Networks
Routers
System Info
Identity Panel
Overview
Usage Summary
Select a period of time to query its usage:
From: 2017-08-01
To: 2017-08-11
Submit
Active Instances: 32 Active RAM: 316GB This Period's VCPU Hours: 405.89 This Period's GB Hours: 37354.23
Usage
Download CSV Summary
Project Name
VCPUs
Disk
RAM
VCPU Hours
Disk GB Hours
admin
134
2945
316GB
405.89
37354.23
Displaying 1 item


openstack
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RegionOne
Sign Out
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Compute
Overview
Instances
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Images
Access & Security
Network
Object Store
Orchestration
Admin
Instances
Instances
Instance Name
Filter
Launch Instance
Instance Name
Image Name
IP Address
Size
Key Pair
Status
Availability Zone
Task
Power State
Uptime
Active
nova
None
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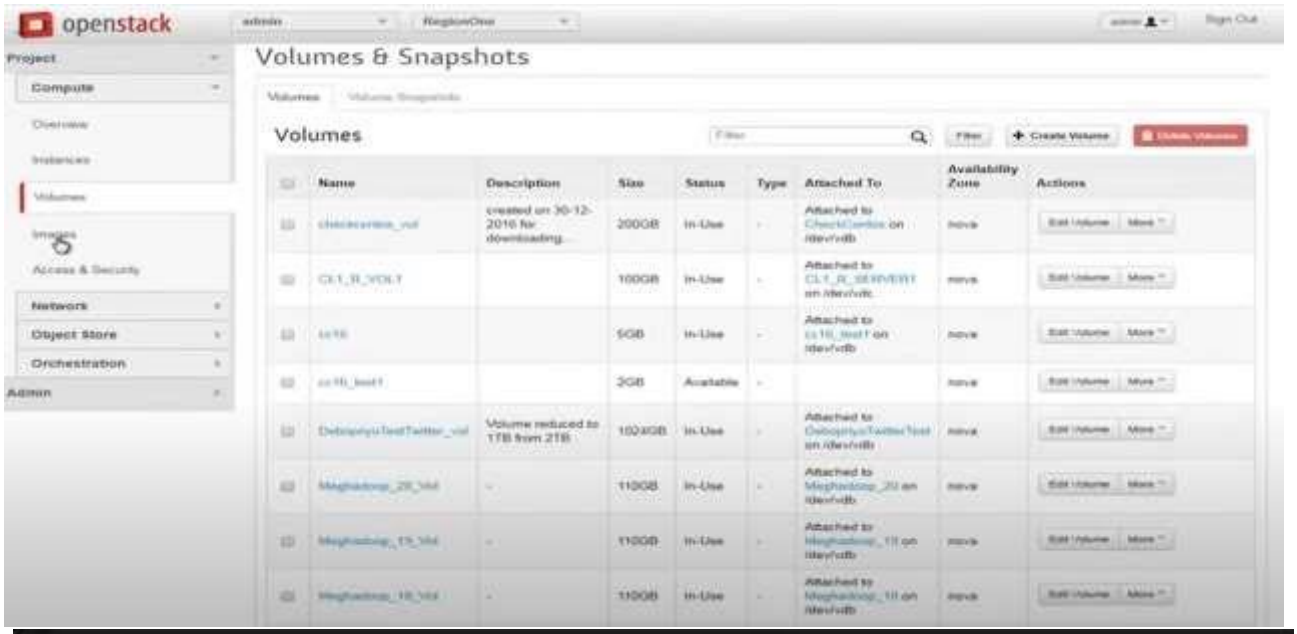
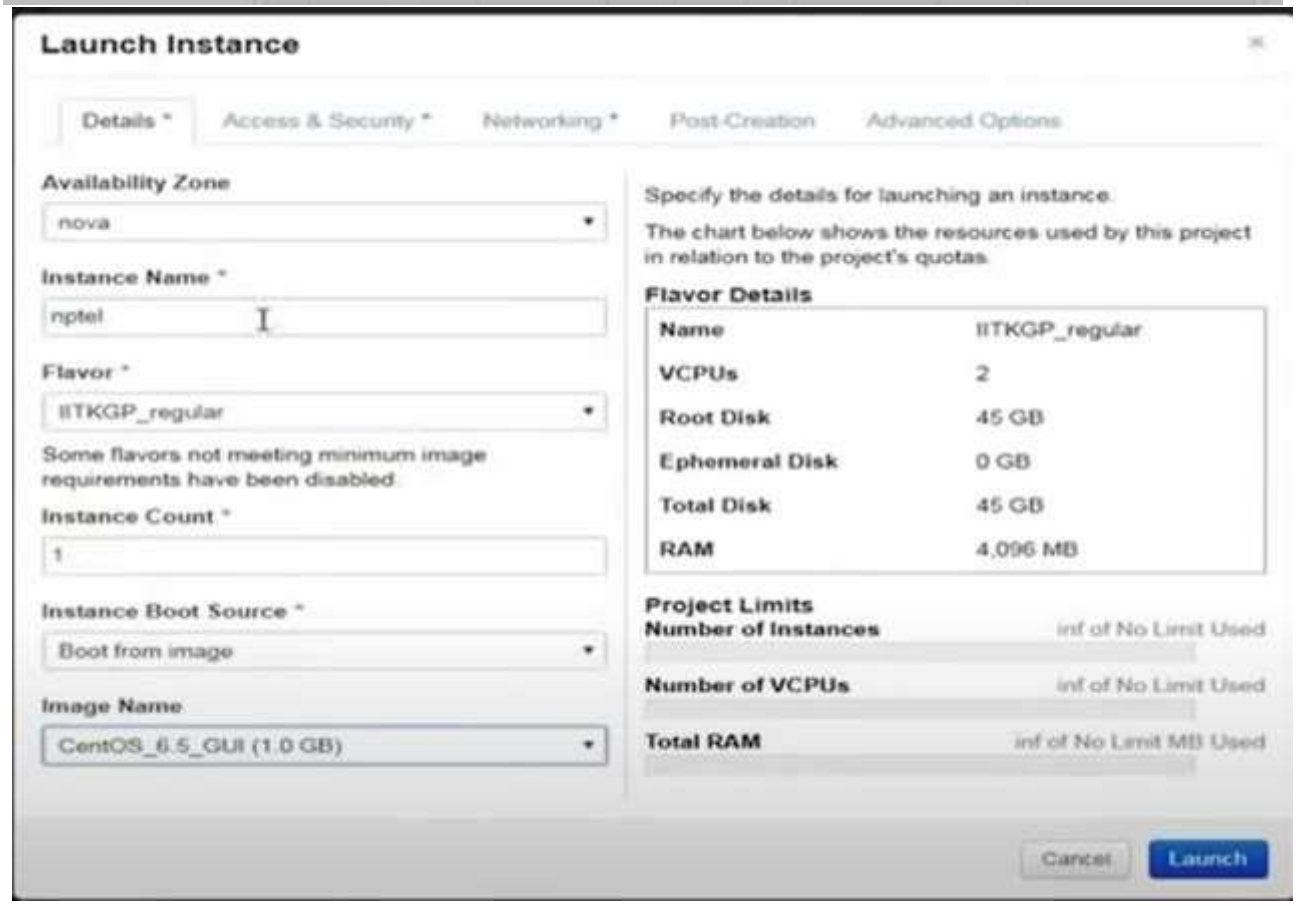
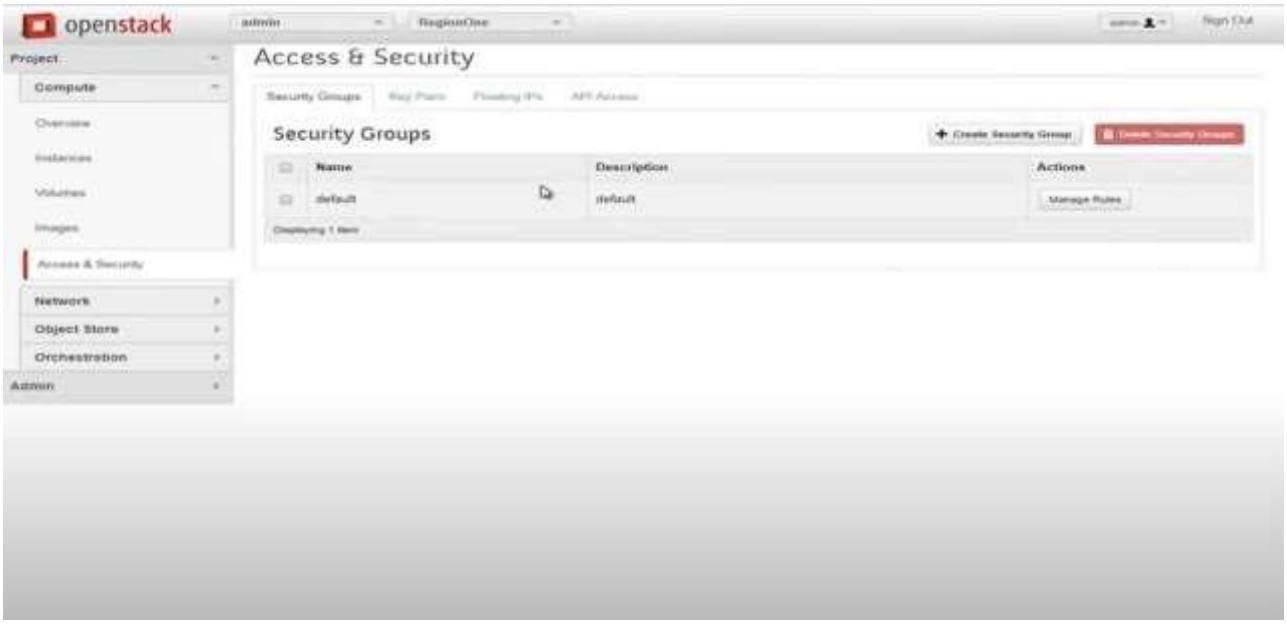

openstack
admin
RegionOne
Project
Compute
Overview
Instances
Volumes
Images
Access & Security
Network
Object Store
Orchestration
Admin
Volumes & Snapshots
Volumes
Create Volume
Name
Description
Size
Status
Type
Attached To
Availability Zone
Actions


Launch Instance
Details *
Access & Security *
Networking *
Post-Creation
Advanced Options
Availability Zone
nova
Instance Name *
nptel
Flavor *
IITKGP_regular
Some flavors not meeting minimum image requirements have been disabled.
Instance Count *
1
Instance Boot Source *
Boot from image
Image Name
CentOS_6.5_GUI (1.0 GB)
Specify the details for launching an instance.
The chart below shows the resources used by this project in relation to the project's quotas.
Flavor Details
Name
IITKGP_regular
VCPUs
2
Root Disk
45 GB
Ephemeral Disk
0 GB
Total Disk
45 GB
RAM
4,096 MB
Project Limits
Number of Instances
inf of No Limit Used
Number of VCPUs
inf of No Limit Used
Total RAM
inf of No Limit MB Used
Cancel
Launch




Conclusion: There are lots of functions and features available with OpenStack related to cloud deployment. Depending upon the type of implementation, including load balancing, energy optimisation, security and others, the cloud computing framework OpenStack can be explored a lot.

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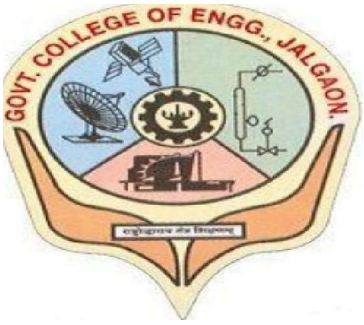



(Academic Year 2021-22)

# LAB 4

**Write a program for web feed using PHP and HTML**

Student Name: ABHISHEK RUPCHAND THAKARE

Class: L.Y COMP Semester: VIII

PRN Number: 1841053

Course Faculty In-charge

Department Of Computer

GCOEJ

**Name** –Abhishek R. Thakare **PRN** – 1841053

**Class** – L.Y. B-Tech (Computer) **Batch** – LY3

**Course Code** – CO456U **Course Name** - CCL

## Practical No. 04

**Aim:** Write a program for Web feed using PHP and HTML.

### Requirements:

1. Ubuntu 20.04
2. Python3
3. Xampp Server

### Theory:

RSS is simply an XML text file. It's created by a website publisher and contains a running list of articles or other content published by the site, with the newest entry always at the top of the list. Each entry contains details like the article's title, description, and link to the content. RSS feeds are published and updated in real time, so if you subscribe to a site's RSS feed, you'll always have access to the newest published content. That can be handy for news sites and podcasts that are frequently updated. RSS feed is a text file that contains a stream of article descriptions and links, it isn't designed to be read or used directly by you. Instead, users rely on a program called an RSS reader. This is a simple program that reads the RSS feed and displays the list of articles in a way that makes them easy to browse.

Many RSS readers can display a single unified view that aggregates content from all the websites you have subscribed to in chronological order - sort of like the way a unified inbox shows email from multiple accounts at once - or you can browse each website individually. RSS readers are used to aggregate news. Users can subscribe to RSS feeds from the websites and sources of interest to them, and use an RSS reader to scan headlines and read articles from a variety of sources. This is less common today because many people tend to use social media to aggregate

news, though it's less efficient because social media platforms use proprietary algorithms to determine what headlines users see. With RSS, you see everything that's published by the sources you subscribe to. There are quite a number of RSS reader programs to choose from. Some are free, while others are paid programs that you need to purchase or subscribe to.

## Code:

**rss.xml**

```
<?xml version='1.0' encoding='UTF-8'?>
<rss version='2.0'>
<channel>
<title>Title of Webpage</title>
<link>Webpage URL</link>
<description>About Webpage</description>
<language>en-us</language>
<item>
  <title>DS</title>
  <link>UMM</link>
  <description>Article Content</description>
</item>
</channel>
</rss>
```

rss.php

```
<?php
// Create connection
 $con=mysqli_connect("localhost:3306","root","","demo");
// Check connection
```

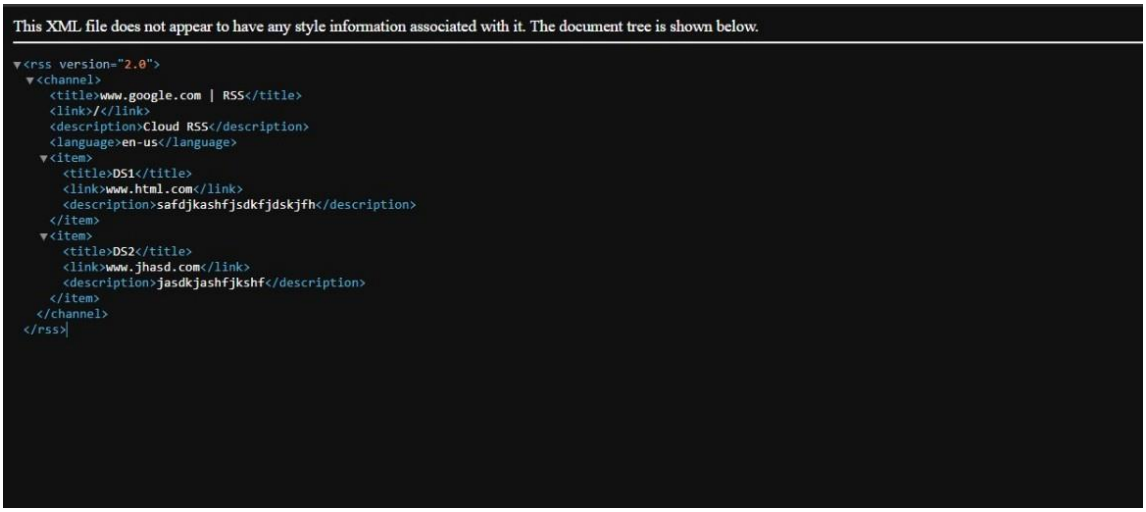
```
 if (mysqli_connect_errno($con)) {
  echo "Database connection failed!: " . mysqli_connect_error();
 }
//  $sql = "SELECT * FROM rss_info ORDER BY id DESC LIMIT 20";
 $sql = "SELECT * FROM rss_info ";
 $query = mysqli_query($con,$sql);
 header( "Content-type: text/xml");
 echo "<?xml version='1.0' encoding='UTF-8'?>
 <rss version='2.0'>
 <channel>
 <title>www.google.com | RSS</title>
 <link>/</link>
 <description>Cloud RSS</description>
 <language>en-us</language>";
 if (!$query) {
  printf("Error: %s\n", mysqli_error($con));
  exit();
}else{
  while($row = mysqli_fetch_array($query)){
    $title=$row["title"];
    $link=$row["link"];
    $description=$row["description"];
    echo "<item>
    <title>$title</title>
    <link>$link</link>
```

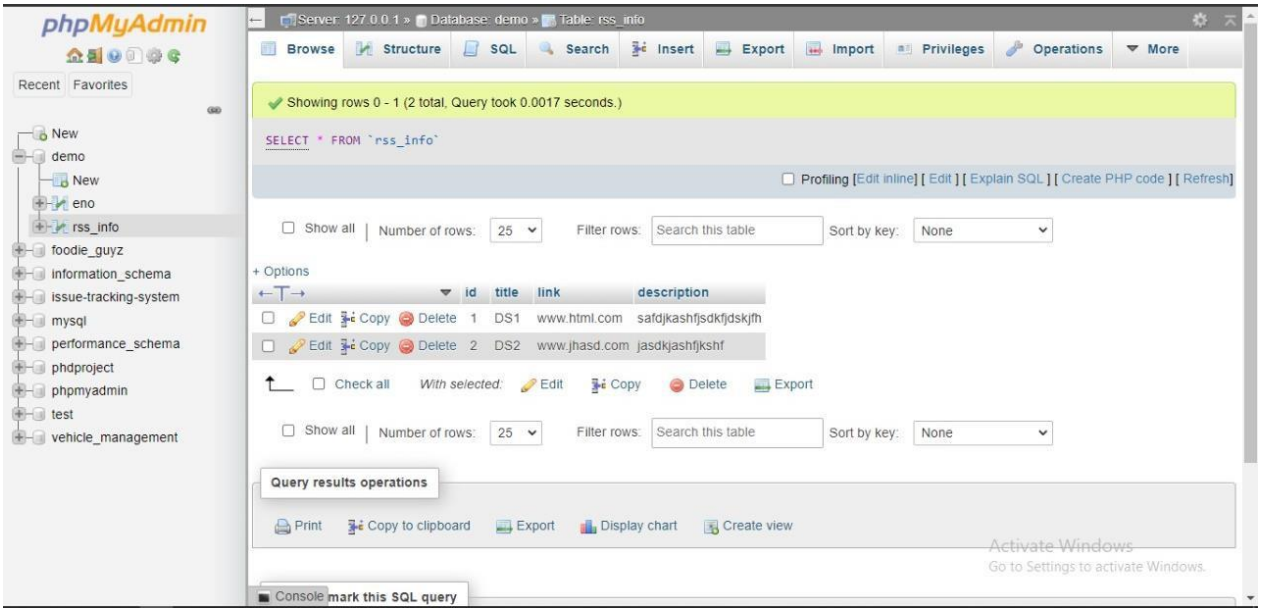
```
   <description>$description</description>
   </item>";
  }
 }
echo "</channel></rss>";
?>
```

**client.php**

```
<?php
 $domOBJ = new DOMDocument();
 $domOBJ->load("rss.xml");//XML  page  URL
 $content = $domOBJ->getElementsByTagName("item");
 foreach( $content as $data )
 {
  $title = $data->getElementsByTagName("title")->item(0)->nodeValue;
  $link = $data->getElementsByTagName("link")->item(0)->nodeValue;
  echo "$title :: $link";
 }
?>
```

## Output:




## Conclusion:

Thus using xml format to fetch the data and php to edit the data in order to create RSS feed.

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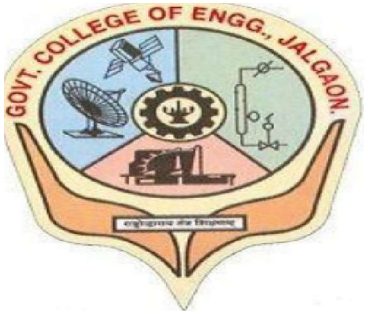


(Academic Year 2021-22)

# LAB 5

## Write a program to create manage and group users accounts in your own cloud by installing administration features

Student Name: ABHISHEK RUPCHAND THAKARE

Class: L.Y COMP Semester: VIII

PRN Number: 1841053

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Department Of Computer
GCOEJ

**Name –** Abhishek R. Thakare

**PRN** – 1841053

**Class** – L.Y. B-Tech (Computer)

**Batch** – LY3

**Course Code** – CO456U

**Course Name** - CCL

**Aim:** Write a Program to Create, Manage and group User accounts in your Own Cloud by Installing Administration features.

## Theory

### OwnCloud Roles

**Anonymous**

- Is not a regular user.
- Has access to specific content made available via public links.
    - Can be password-protected (optional, enforced, policy-enforced).
    - Can have an expiration date (optional, enforced, enforced dependent on password).
- Has no personal space
- Has no file ownership (ownership of uploaded/created files is directed to sharer).
- Has no use of clients?
- Quota is that of the sharer.
- Permissions are those granted by the sharer for specific content, e.g., *view-only*, *edit*, and *File Drop*.
- Can only use file and viewer apps, such as PDF Viewer and Collabora Online.

**Guest**

- The Guest's app is available on the ownCloud Marketplace. You must install and enable it first.
- Is a regular user with restricted permissions, identified via e-mail address.
- Has no personal space.
- Has no file ownership (ownership of uploaded/created files is directed to sharer).
- Has access to shared space. The permissions are granted by the sharer.
- Is not bound to the inviting user.
    - Can log in as long as shares are available.
    - Becomes deactivated when no shares are left; this is the shared with guests filter.
    - Reactivated when a share is received.
    - Administrators will be able to automate user clean-up ("disabled for x days").
- Can use all clients.

- Fully auditable in the enterprise edition.
- Can be promoted to group administrator or administrator, but will still have no personal space.
- Apps are specified by the admin (whitelist).

**Standard User**

- Is a regular user (from LDAP, ownCloud user backend, or another backend)
- Has personal space. Permissions are granted by the administrator.
- Shared space: Permissions as granted by sharer.
- Apps: All enabled, might be restricted by group membership.

**Federated User**

- Is not an internal user.
- Can trust a federated system.
- Has access to shared space through users on the considered ownCloud system.
- Can share data with the considered system (accept-/rejectable).

**ownCloud Group Administrator**

- Is a regular user, such as from LDAP, an ownCloud user backend, or another backend.
- Can manage users in their groups, such as adding and removing them, and changing quota of users in the group.
- Can add new users to their groups and can manage guests.
- Can enable and disable users.
- Can impersonate users in their groups.
- Custom group creation may be restricted to group admins.

## ownCloud Administrator

- Is a regular user (from LDAP, ownCloud user backend, or another backend).
- Can configure ownCloud features via the UI, such as sharing settings, app-specific configurations, and external storages for users.
- Can manage users, such as adding and removing, enabling and disabling, quota and group management.
- Can restrict app usage to groups, where applicable.
- Configurable access to log files.

- Mounting of external shares and local shares (of external filesystems) is disabled by default.

**System Administrator**

- Is not an ownCloud user.
- Has access to ownCloud code (e.g., config.php and apps folders) and command-line tool (occ occ).
- Configures and maintains the ownCloud environment (*PHP*, *Webserver*, *DB*, *Storage*, *Redis*, *Firewall*, *Cron*, and *LDAP*, etc.).
- Maintains ownCloud, such as updates, backups, and installs extensions.
- Can manage users and groups, such as via occ.
- Has access to the master key when storage encryption is used.
- Storage admin: Encryption at rest, which prevents the storage administrator from having access to data stored in ownCloud.
- DB admin: Calendar/Contacts etc. DB entries not encrypted.

**Auditor**

- Is not an ownCloud user.
- Conducts usage and compliance audits in enterprise scenarios.
- App logs (especially Auditlog) can be separated from ownCloud log. This separates the Auditor and Sysadmin roles. An audit.log file can be enabled, which the Sysadmin can’t access.
- Best practice: parse separated log to an external analyzing tool.

Creating user in own cloud using program.

**Code:**

```
sudo -u www-data php occ user:add \
  --display-name="Anuja Nemade" \
  --group="users" \
  --group="db-admins" \
  --email=anujanemade546@gmail.com Anuja
```

**Output:**

```
 Enter password:
 Confirm password:
 The user "anuja" was created successfully
 Display name set to "Anuja Nemade"
 Email address set to "anujanemade546@gmail.com"
 User "anuja" added to group "users"
  User "anuja" added to group "db-admins"
```

**Deleting A User**

```
sudo -u www-data php occ user:delete saurabh
```

**Disable Users**

```
sudo -u www-data php occ user:disable saurabh
```

**Enable Users**

```
sudo -u www-data php occ user:enable saurabh
```

## Conclusion

Executed a program to Create, Manage and group User accounts in your Own Cloud by Installing Administration features.

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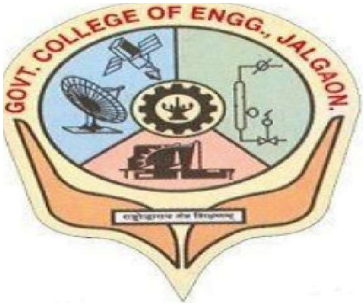


(Academic Year 2021-22)

# LAB 6

**Case study on Amazon EC2 to learn about Amazon EC2,Amazon Elastic Compute Cloud is a central part of Amazon.corn's cloud computing platform, Amazon Web Services. EC2 allows users to torrent virtual computers on which to run their own computer applications.**

Student Name: ABHISHEK RUPCHAND THAKARE

Class: L.Y COMP Semester: VIII

PRN Number: 1841053

Course Faculty In-charge
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**Name –** Abhishek R. Thakare

**PRN** – 1841053

**Class** – L.Y. B-Tech (Computer)

**Batch** – LY3

**Course Code** – CO456U

**Course Name** - CCL

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**Aim:** Case Study on Amazon EC2 to learn about Amazon EC2, Amazon Elastic Compute Cloud is a central part of Amazon.com's cloud computing platform, Amazon Web Services, EC2 allows users to torrent virtual computers on which to run their own computer applications.

## Requirements:

1. Amazon Web Service account

## Theory:

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud. It is designed to make web-scale computing easier for developers. Amazon EC2's simple web service interface allows you to obtain and configure capacity with minimal friction. It provides you with complete control of your computing resources and lets you run on Amazon's proven computing environment. Amazon EC2 reduces the time required to obtain and boot new server instances to minutes, allowing you to quickly scale capacity, both up and down, as your computing requirements change. Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use. Amazon EC2 provides developers the tools to build failure resilient applications and isolate themselves from common failure scenarios.

**BENEFITS**

**A) ELASTIC WEB-SCALE COMPUTING**

Amazon EC2 enables you to increase or decrease capacity within minutes, not hours or days. You can commission one, hundreds or even thousands of server instances simultaneously. Of course, because this is all controlled with web service APIs, your application can automatically scale itself up and down depending on its needs.

B) **COMPLETELY CONTROLLED**

You have complete control of your instances. You have root access to each one, and you can interact with them as you would any machine. You can stop your instance

while retaining the data on your boot partition and then subsequently restart the same instance using web service APIs. Instances can be rebooted remotely using web service APIs. You also have access to console output of your instances.

C) **FLEXIBLE CLOUD HOSTING SERVICES**

You have the choice of multiple instance types, operating systems, and software packages. Amazon EC2 allows you to select a configuration of memory, CPU, instance storage, and the boot partition size that is optimal for your choice of operating system and application. For example, your choice of operating systems includes numerous Linux distributions, and Microsoft Windows Server.

D) **DESIGNED FOR USE WITH OTHER AMAZON WEB SERVICES**

Amazon EC2 works in conjunction with Amazon Simple Storage Service (Amazon S3), Amazon Relational Database Service (Amazon RDS) and Amazon Simple Queue Service (Amazon SQS) to provide a complete solution for computing, query processing and storage across a wide range of applications.

E) **RELIABLE**

Amazon EC2 offers a highly reliable environment where replacement instances can be rapidly and predictably commissioned. The service runs within Amazon's proven network infrastructure and datacenters.

F) **SECURE**

Amazon EC2 works in conjunction with Amazon VPC to provide security and robust networking functionality for your compute resources. Your compute instances are located in a Virtual Private Cloud (VPC) with an IP range that you specify. You decide which instances are exposed to the Internet and which remain private.

G) **INEXPENSIVE**

Amazon EC2 passes on to you the financial benefits of Amazon's scale. You pay a very low rate for the compute capacity you actually consume.

H) **EASY TO START**

Quickly get started with Amazon EC2 by visiting the Amazon Web Services Management Console to choose preconfigured software on Amazon Machine Images (AMIs). You can quickly deploy this software to EC2 via the EC2 console.

**CHALLENGES**

Resource utilization -- developers must manage the number of instances they have to avoid costly large, long-running instances.

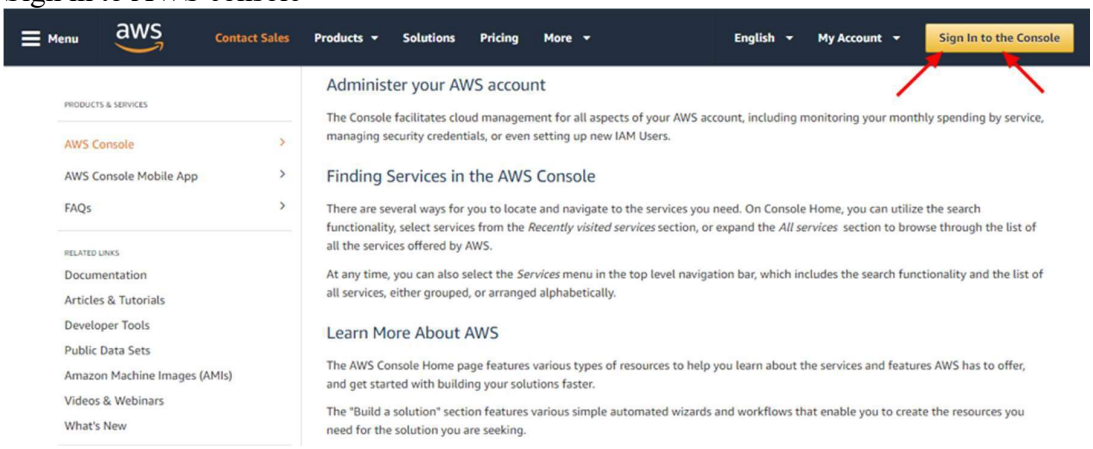
**Security** - developers must make sure that public facing instances are running securely. Deploying at scale -- running a multitude of instances can result in cluttered environments that are difficult to manage.

**Management of AMI lifecycle** -- developers often begin by using default Amazon Machine Images. As computing needs change, custom configurations will likely be required.

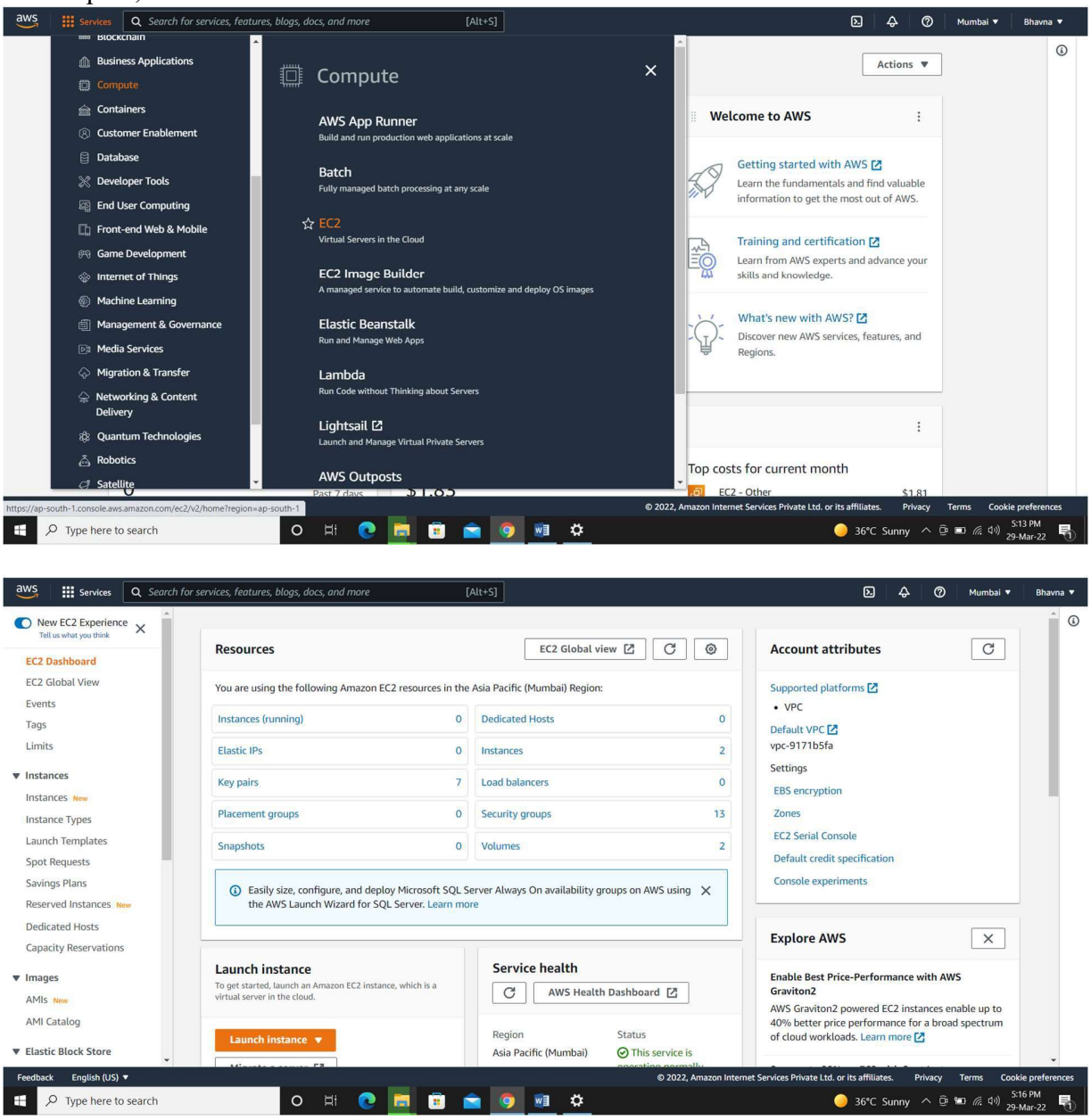
**Ongoing maintenance** -- Amazon EC2 instances are virtual machines that run in Amazon's cloud. However, they ultimately run on physical hardware which can fail. AWS alerts developers when an instance must be moved due to hardware maintenance. This requires ongoing monitoring.

## Steps & Outputs:

1. Sign in to AWS console



2. In Compute, select EC2 service

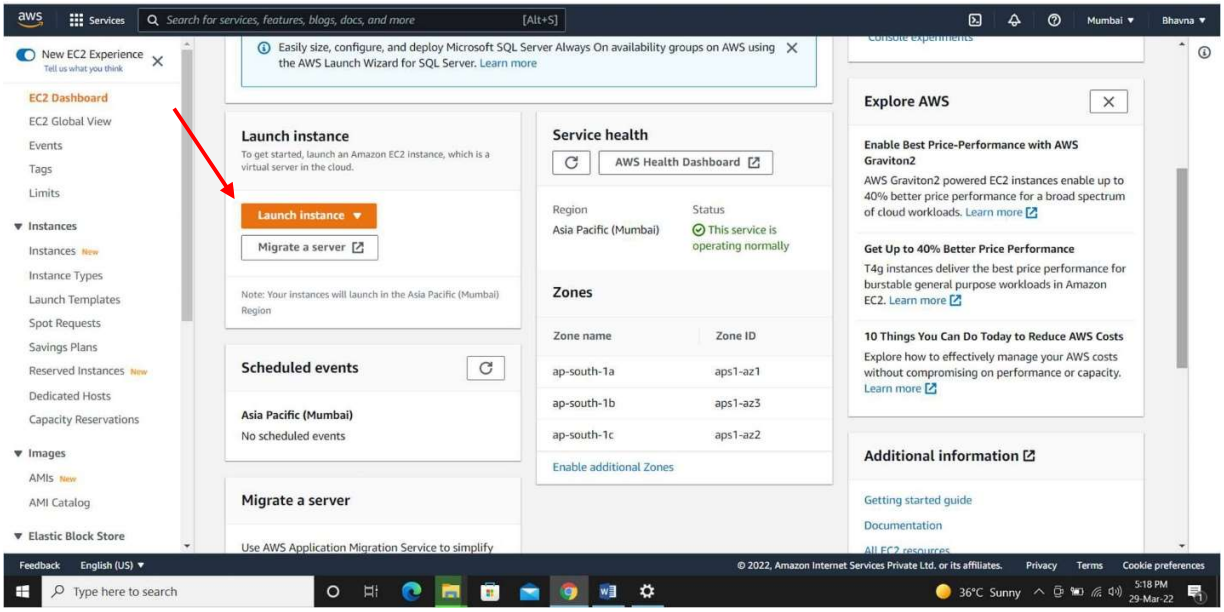




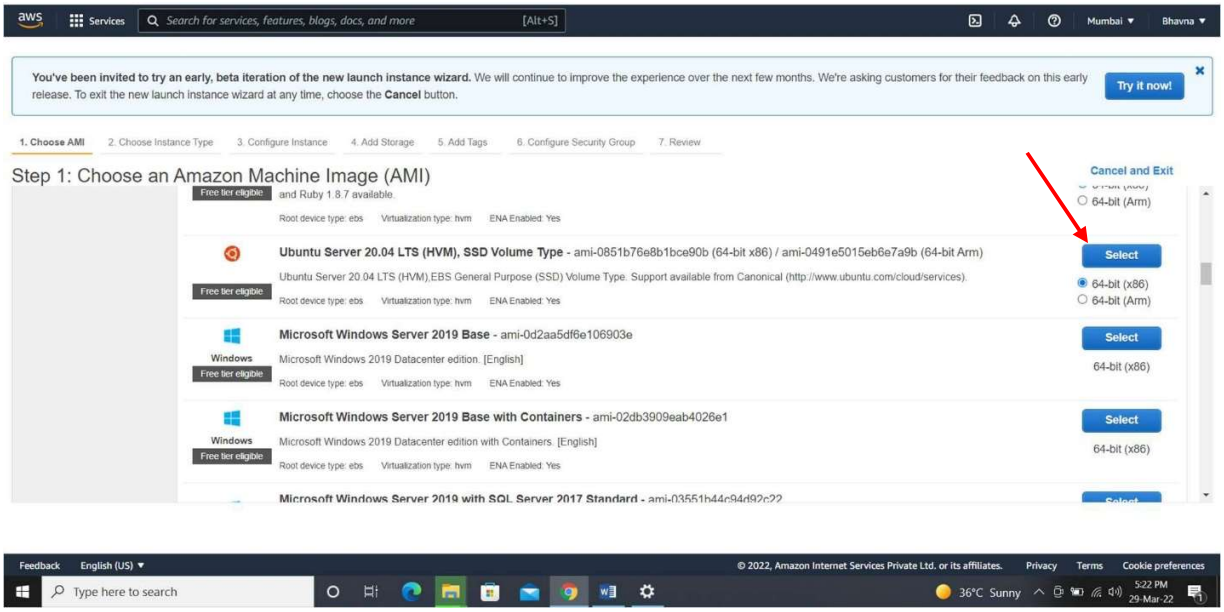


EC2 dashboard

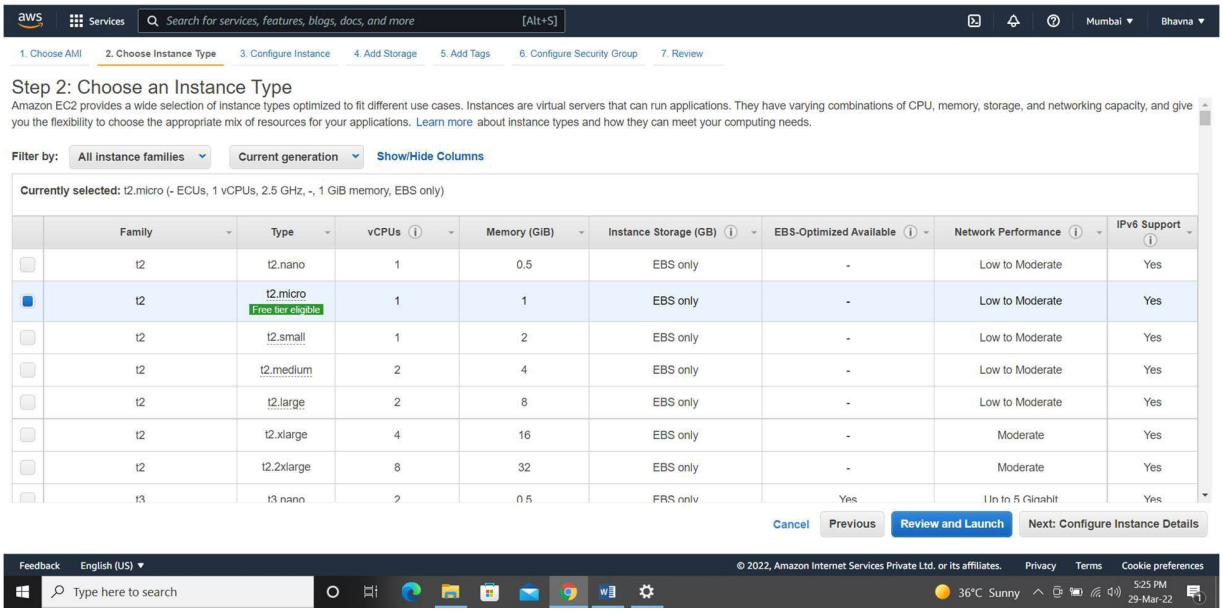
3. Click on “Launch instance”



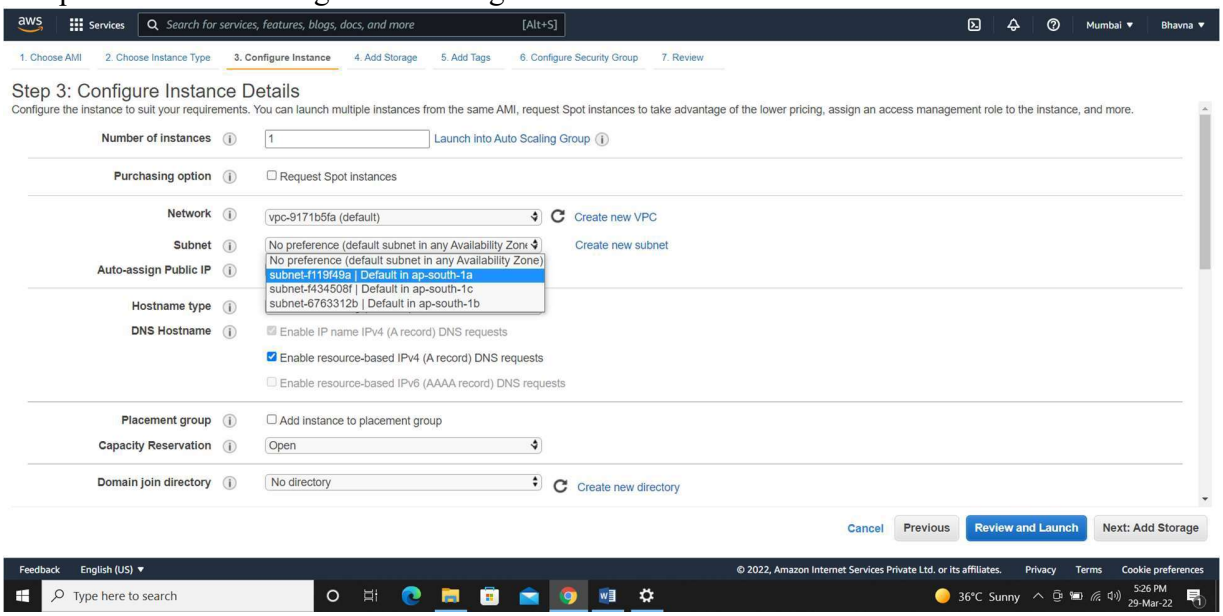

4. A list of AMI instances will appear. Select an instance as per your choice. Here, we choose Ubuntu Server 20.04 LTS (HVM)
Click on “Select” button.



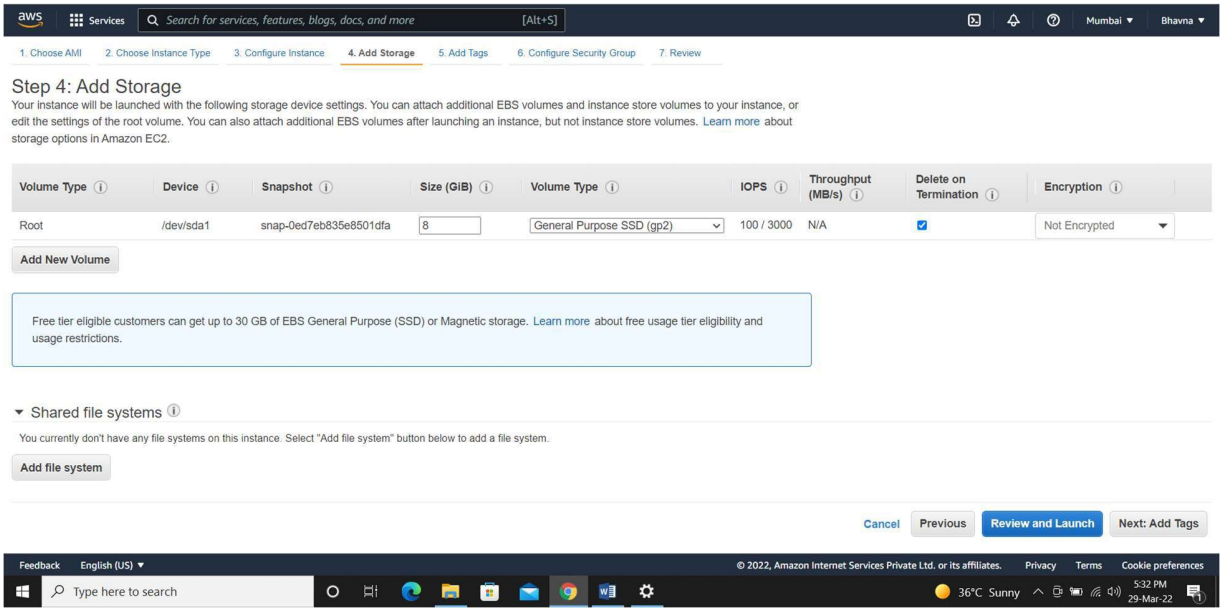
5. Select Instance type as per your requirement.
   Then click on “Next”



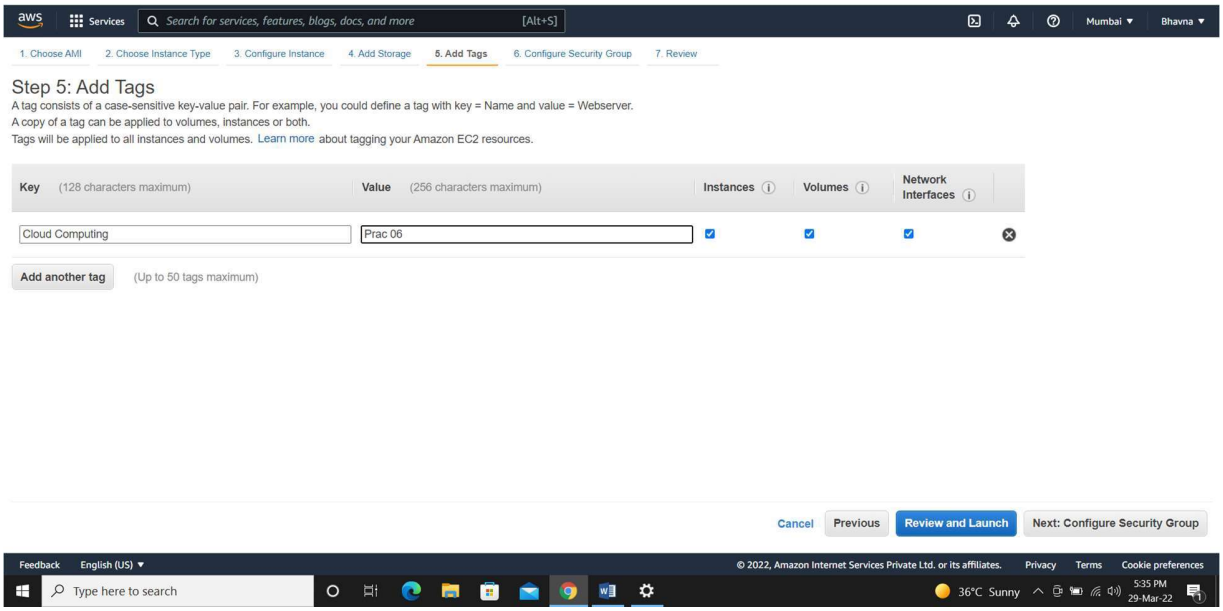

6. Setup the instance. Configure the settings. Click on “Next”.



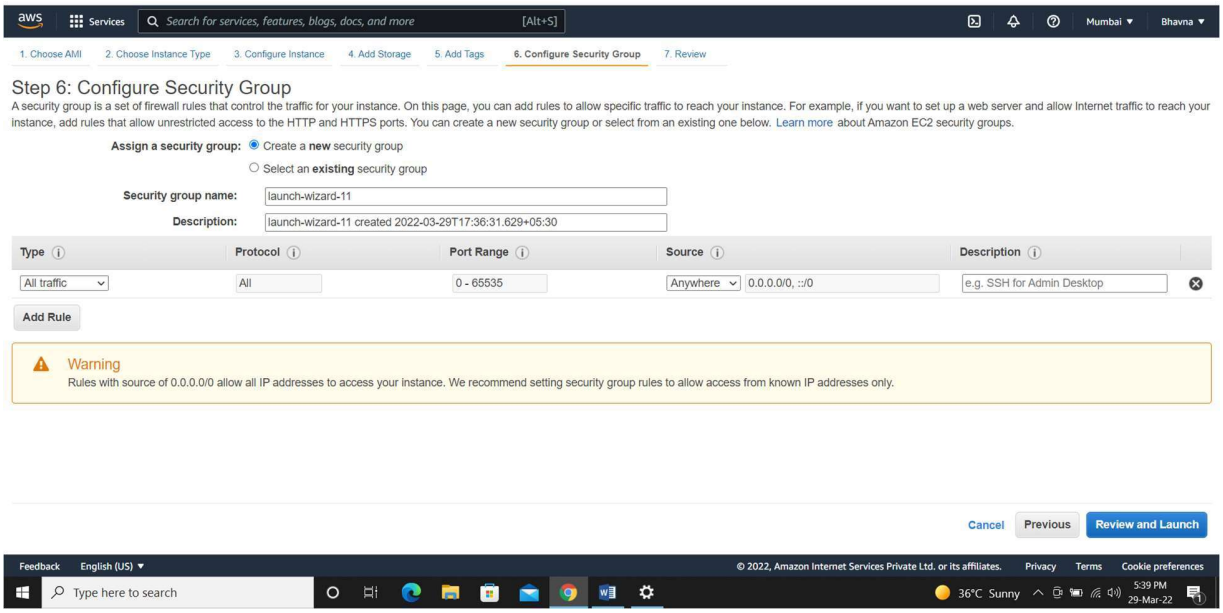

7. Add the required amount of GB that the hard disk is required for the instance.




8. Add tag to your instance. This step is optional.
   Click “Next”

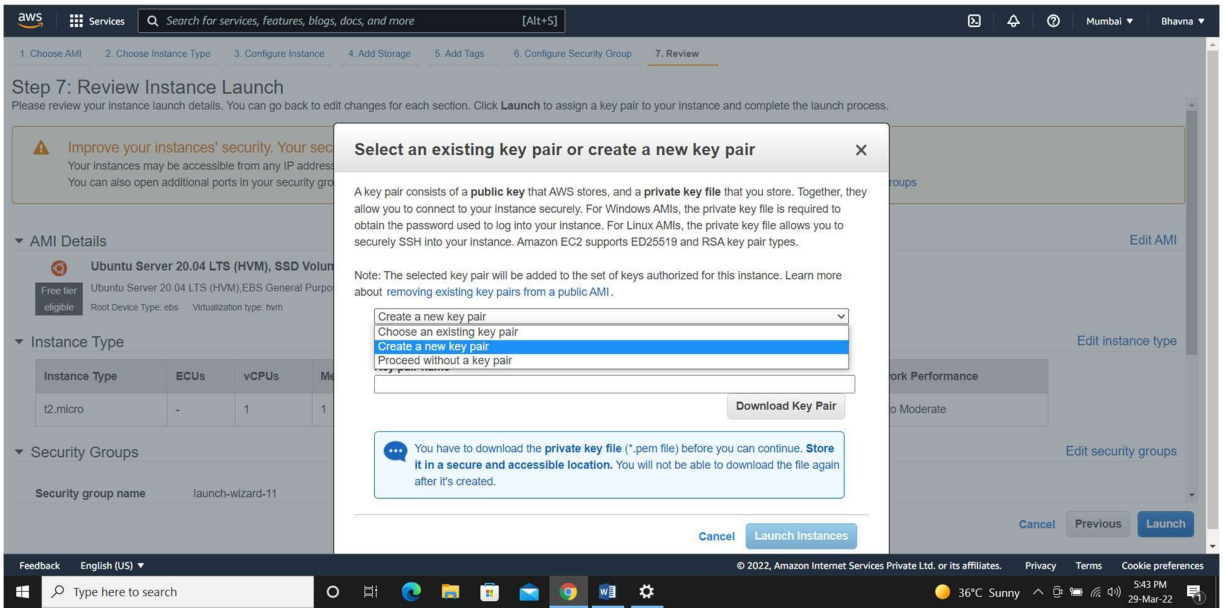


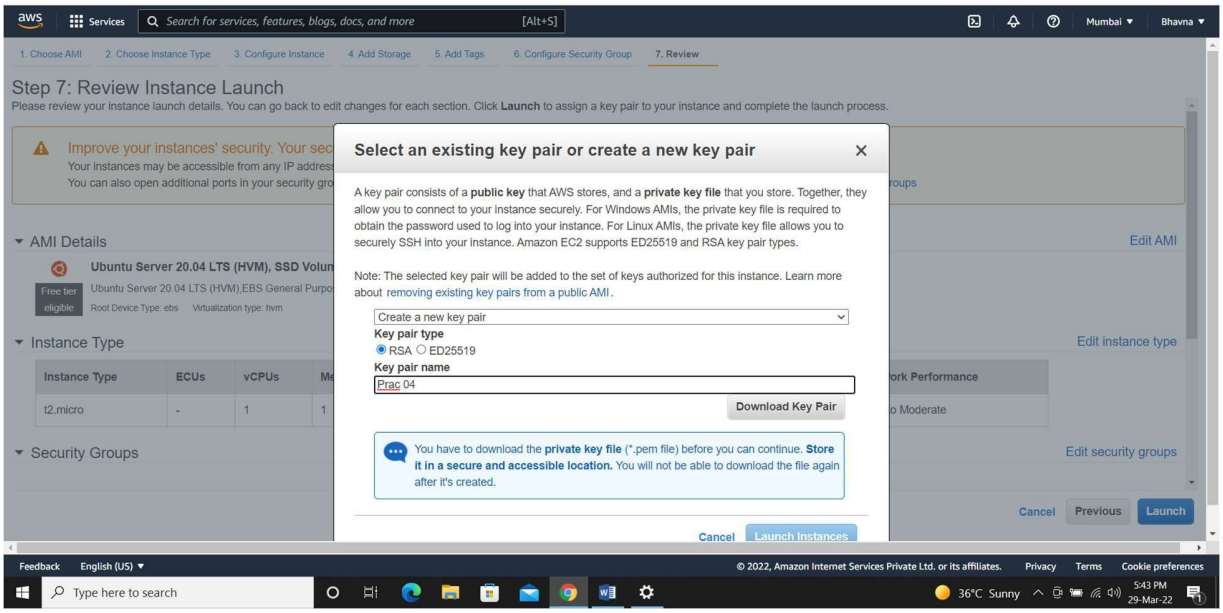

9. Setup the Security Group. Add the type, Protocol, port range and source.
   Here, we are selecting “All traffic” as type and “Anywhere” as source.
   Click Review and Launch.



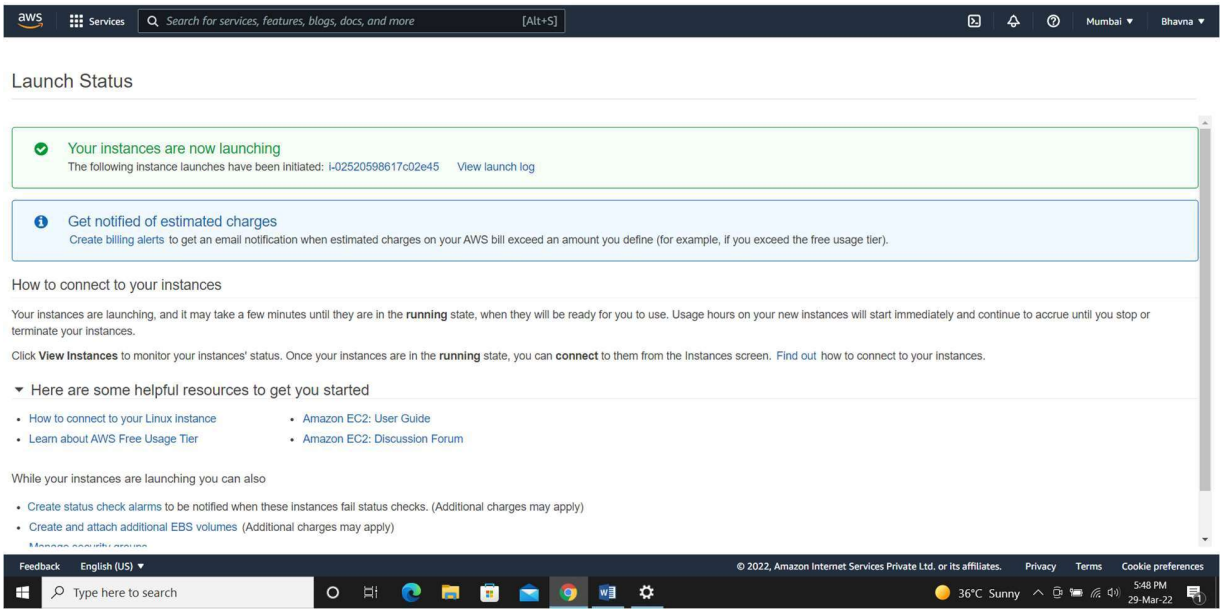

10. Review the settings of the instance you are launching. Once you are confirmed about it to launch click “Launch”.

    Meanwhile, you will get a message regarding key pair. If you are having an additional key pair then select it or else you have to make a new key pair.

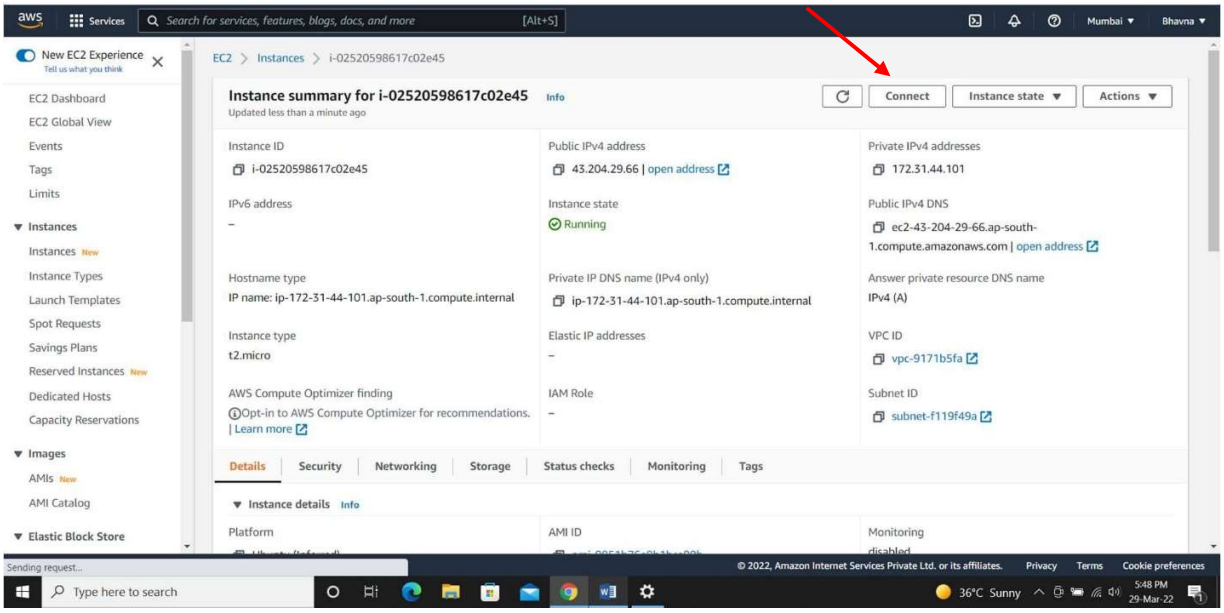




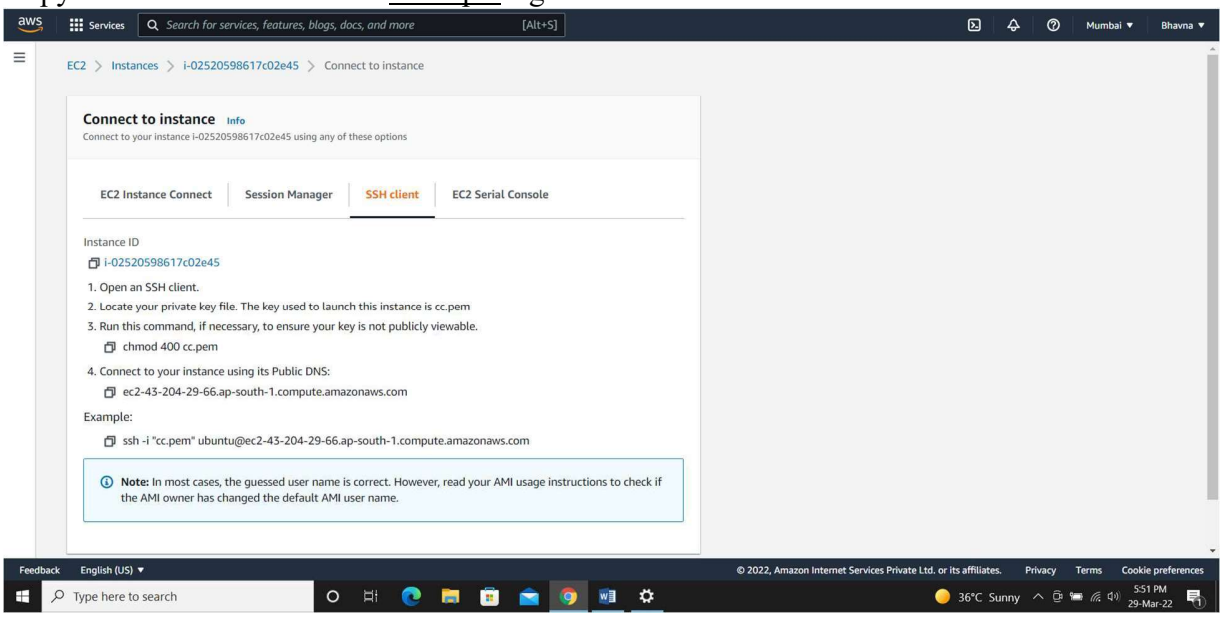

11. The instance takes few seconds to launch. You can see the launch logs.



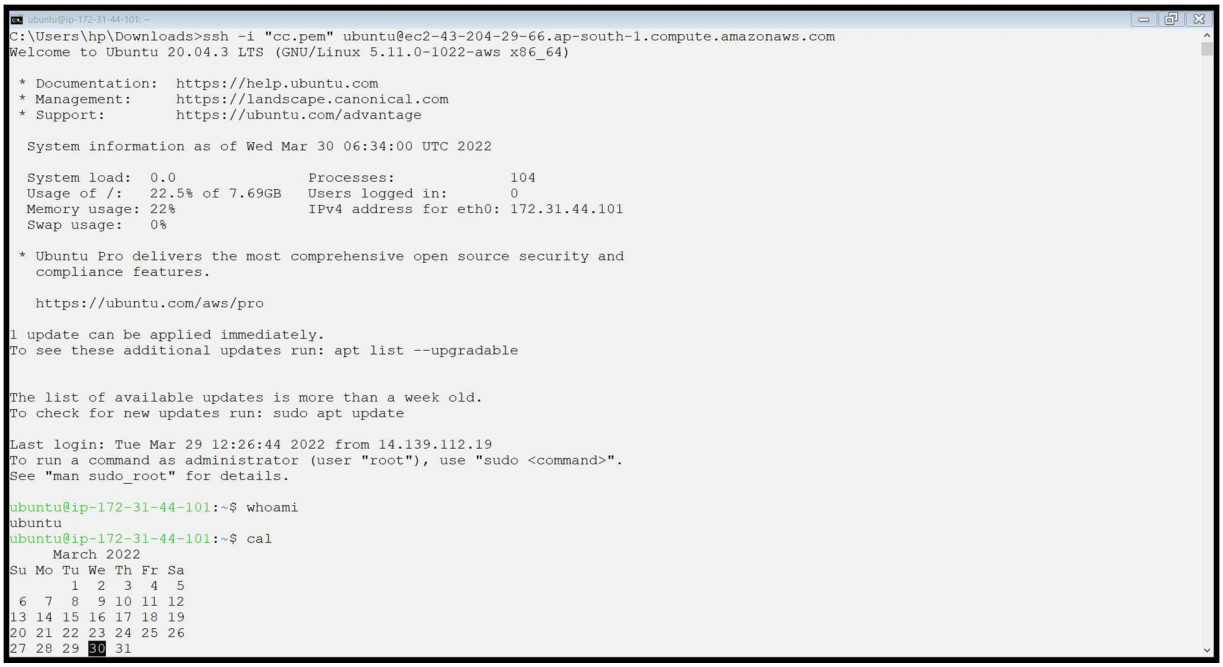
Instance is launched. Click on “Connect”.




Copy the URL avaialble under Example tag.




Paste the link in your Command Prompt.




## Conclusion:

EC2 reduces the time required to obtain and boot new server instances to minutes, allowing you to quickly scale capacity. Amazon EC2 changes the economics of computing by allowing you to pay only for capacity that you actually use.

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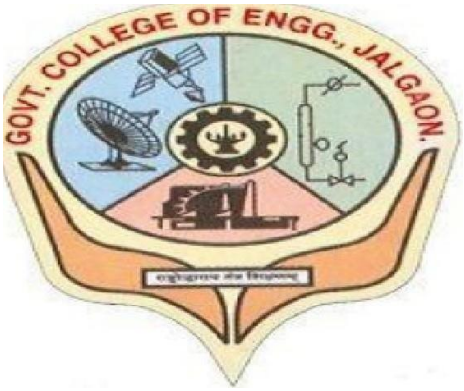


(Academic Year 2021-22)

**LAB B1**

**Case Study on Microsoft Azure to learn about Microsoft Azure is a cloud computing platform and infrastructure, created by Microsoft, forbuilding, deploying and managing applications and services through a global network of Microsoft-managed datacenters. How it works, different services provided by it.**

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z

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**Class** – L.Y. B-Tech (Computer) **Batch –** LY3

**Course Code** – CO456U **Course Name** - CCL

# Practical No. 1

**Aim:** Case Study on Microsoft Azure to learn about Microsoft Azure is a cloud computing platform and infrastructure, created by Microsoft, forbuilding, deploying and managing applications and services through a global network of Microsoft-managed datacenters. How it works, different services provided by it.

## Theory:

Microsoft Azure is a cloud computing platform, that provides a wide variety of services you can use without buying and provisioning your own hardware. Azure empowers the agile development of solutions and presents the resources to perform tasks that may not be achievable in an on-premises environment. With Azure, businesses can easily implement the three cloud service models and gain unlimited access to storage, network, and application services allowing them to focus on building great solutions without the need to worry about how the physical infrastructure is assembled.

### Types of Azure Clouds:

**Azure as IaaS**

IaaS(Infrastructure as a Service) is the foundational cloud platform layer. This Azure service is used by IT administrators for processing, storage, networks or any other fundamental computer operations. It is one of the Azure topics to learn that allows users to run arbitrary software.

**Azure as PaaS**

PaaS is a computing platform which includes an operating system, programming language execution environment, database or web services. This Azure service is used by developers and application providers.

As its name suggests, this platform is provided to the client to develop and deploy software. It is one of the Azure basic concepts which allows the client to focus on application development instead of worrying about hardware and infrastructure. It also takes care of operating systems, networking and servers issues.

**Azure As SaaS**

SaaS (Software as a Service) is software which is centrally hosted and managed. It is a single version of the application is used for all customers. You can scale out to multiple instances. This helps you to ensure the best performance in all locations. The software is licensed through a monthly or annual subscription. MS Exchange, Office, Dynamics are offered as a SaaS

**Azure key Concepts**

| Concept Name | Description |
|---|---|
| **Regions** | Azure is a global cloud platform which is available across various regions around the world. When you request a service, application, or VM in Azure, you are first asked to specify a region. The selected region represents datacenter where your application runs. |
| **Datacenter** | In Azure, you can deploy your applications into a variety of data centers around the globe. So, it is advisable to select a region which is closer to most of your customers.<br>It helps you to reduce latency in network requests. |
| **Azure portal** | The Azure portal is a web-based application which can be used to create, manage and remove Azure resource and services. It is located at https://portal.azure.com. |
| **Resources** | Azure resource is an individual computer, networking data or app hosting services which charged individually. Some common resources are virtual machines( VM), storage account, or SQL databases. |
| **Resource groups** | An Azure resource group is a container which holds related resource for an Azure solution. It may include every resource or just resource which you wants to manage. |
| **Resource Manager templates** | It is a JSON which defines one or more resource to deploy to a resource group. It also establishes dependencies between deployed resources. |
| **Automation** | Azure allows you to automate the process of creating, managing and deleting resource by using PowerShell or the Azure command-line Interface(CLI). |
| **Azure PowerShell** | PowerShell is a set of modules that offer cmdlets to manage Azure. In most cases, you are allowed to use, the cmdlets command for the same tasks which you are performing in the Azure portal. |
| **Azure command-line interface(CLI)** | The Azure CLI is a tool that you can use to create, manage, and remove Azure resources from the command line. |
| **REST APIs** | Azure is built on a set of REST APIs help you perform the same operation that you do in Azure portal Ul. It allows your Azure resources and apps to be manipulated via any third party software application. |

## Azure Domains (Components)

### Compute

It offers computing operations like app hosting, development, and deployment in Azure Platform. It has the following components:

- Virtual Machine: Allows you to deploy any language, workload in any operating system
- Virtual Machine Scale Sets: Allows you to create thousands of similar virtual machines in minutes
- Azure Container Service: Create a container hosting solution which is optimized for Azure. You scale and arrange applications using Kube, DC/OS, Swarm or Docker
- Azure Container Registry: This service store and manage container images across all types of Azure deployments
- Functions: Let's you write code regardless of infrastructure and provisioning of servers. In the situation when your functions call rate scales up.
- Batch: Batch processing helps you scale to tens, hundreds or thousands of virtual machines and execute computer pipelines.
- Service Fabric: Simplify microservice-based application development and lifecycle management. It supports Java, PHP, Node.js, Python, and Ruby.

### Storage

Azure store is a cloud storage solution for modern applications. It is designed to meet the needs of their customer's demand for scalability. It allows you to store and process hundreds of terabytes of data. It has the following components:

- Blob Storage: Azure Blob storage is a service which stores unstructured data in the cloud as objects/blobs. You can store any type of text or binary data, such as a document, media file, or application installer.
- Queue Storage: It provides cloud messaging between application components. It delivers asynchronous messaging to establish communication between application components.
- File Storage: Using Azure File storage, you can migrate legacy applications. It relies on file shares to Azure quickly and without costly rewrites.
- Table Storage: Azure Table storage stores semi-structured NoSQL data in the cloud. It provides a key/attribute store with a schema-less design

### Database

This category includes Database as a Service (DBaaS) which offers SQL and NoSQL tools. It also includes databases like Azure Cosmos DB and Azure Database for PostgreSQL. It has the following components:

- SQL Database: It is a relational database service in the Microsoft cloud based on the market-leading Microsoft SQL Server engine.
- DocumentDB: It is a fully managed NoSQL database service which is It built for fast and predictable performance and ease of development.
- Redis Cache: It is a secure and highly advanced key-value store. It stores data structures like strings, hashes, lists, etc.

**Content Delivery Network**

Content Delivery Network (CDN) caches static web content at strategically placed locations. This helps you to offer speed for delivering content to users. It has the following components:

- VPN Gateway: VPN Gateway sends encrypted traffic across a public connection.
- Traffic Manager: It helps you to control and allows you to do the distribution of user traffic for services like WebApps, VM, Azure, and cloud services in different Datacenters
- Express Route: Helps you to extend your on-premises networks into the Microsoft cloud over a dedicated private connection to Microsoft Azure, Office 365, and CRM Online.

**Security + Identify sevices**

It provides capabilities to identify and respond to cloud security threats. It also helps you to manage encryption keys and other sensitive assets. It has the following components:

- Key Vault: Azure Key Vault allows you to safeguard cryptographic keys and helps you to create secrets used by cloud applications and services.
- Azure Active Directory: Azure Active Directory and identity management service. This includes multi-factor authentication, device registration, etc.
- Azure AD B2C: Azure AD B2C is a cloud identity management solution for your consumer-facing web and mobile applications. It allows you to scales hundreds of millions of consumer identities.

**Enterprise Integration Services:**

- Service Bus: Service Bus is an information delivery service which works on the third-party communication system.
- SQL Server Stretch Database: This service helps you migrates any cold data securely and transparently to the Microsoft Azure cloud
- Azure AD Domain Services: It offers managed domain services like domain join, group policy, LDAP, etc. This authentication which is compatible with Windows Server Active Directory.
- Multi-Factor Authentication: Azure Multi-Factor Authentication (MFA) is two-step verification. It helps you to access data and applications to offers a simple sign-in process.

**Monitoring + Management Services**

These services allow easy management of Azure deployment.

- Azure Resource Manager: It makes it easy for you to manage and visualize resource in your app. You can even control who is your organization can act on the resources.
- Automation: Microsoft Azure Automation is a way to automate the manual, long-running, error-free, and constantly repeated tasks. These tasks are commonly performed in a cloud and enterprise environment.

**Azure Networking**

- Virtual Network: Perform Network isolation and segmentation. It offers filter and Route network traffic.
- Load Balancer: Offers high availability and network performance of any application. Load balance information Internet traffic to Virtual machines.
- Application Gateway: It is a dedicated virtual appliance that offers an Application Delivery Controller (ADC) as a service.
- Azure DNS: Azure DNS hosting service offers name resolution using Microsoft Azure infrastructure.

**Web and Mobile Services**

- Web Apps: Web Apps allows you to build and host websites in the programming language of your choice without the need to manage its infrastructure.
- Mobile Apps: Mobile Apps Service offers a highly scalable, globally available mobile app development platform for users.
- API Apps: API apps make it easier to develop, host and consume APIs in the cloud and on-premises.
- Logic Apps: Logic Apps helps you to simplify and implement scalable integrations

**Workflows in the cloud:**

It provides a visual designer to create and automate your process as a series of steps known as a workflow

- Notification Hubs: Azure Notification Hubs offers an easy-to-use, multi-platform, scaled-out push engine
- Event Hubs: Azure Event Hubs is data streaming platform which can manage millions of events per second. Data sent to an event hub can be transformed and stored using any real-time analytics offers batching/storage adapters.
- Azure Search: It is a cloud search-as-a-service solution which offers server and infrastructure management. It offers ready-to-use service that you can populate with your data. This can be used to add search to your web or mobile application.

**Migration:**

Migration tools help an organization estimate workload migration costs. It also helps to perform the migration of workloads from your local data centers to the Azure cloud.

Microsoft Azure is used in a broad spectrum of applications like:

- Infrastructure Services
- Mobile Apps
- Web Applications
- Cloud Services
- Storage, Backup, and Recovery

- Data Management
- Media Services

**Advantages of Azure:**

- Azure infrastructure will cost-effectively enhance your business continuity strategy
- It allows you to access the application without buying a license for the individual machine
- Windows Azure offers the best solution for your data needs, from SQL database to blobs to tables
- Offers scalability, flexibility, and cost-effectiveness
- Helps you to maintain consistency across clouds with familiar tools and resources
- Allows you to extend data center with a consistent management toolset and familiar development and identity solutions.
- You can deploy premium virtual machines in minutes which also include Linux and Windows servers
- Helps you to scale your IT resources up and down based on your needs
- You are not required to run the high-powered and high-priced computer to run cloud computing's web-based applications.
- You will not require processing power or hard disk space if you are using Azure
- Cloud computing offers virtually limitless storage
- If your personal computer or laptop crashes, all your data is still out there in the cloud, and it is still accessible
- Sharing documents leads directly to better collaboration
- If you change your device your computers, applications and documents follow you through the cloud

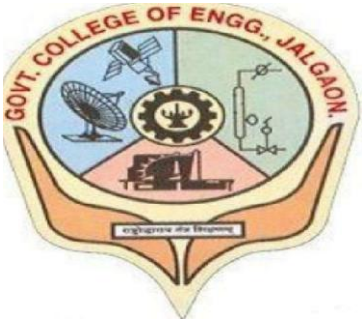
**Disadvantages of Azure:**

- Cloud computing is not possible if you can't connect to the Internet
- Azure is a web-based application which requires a lot of bandwidth to download, as do large documents
- Web-based applications can sometimes be slower compared to accessing a similar software program on your desktop PC

## Conclusion:

With more than 200 services and numerous benefits, Microsoft Azure is undoubtedly the fastest-growing cloud computing platform being adopted by businesses. In fact, Microsoft Azure's total revenue is expected to surpass $19 billion by 2020. This growth in the implementation of Azure by businesses is creating various opportunities for professionals well-versed in this technology.

Government College of Engineering, Jalgaon




(Academic Year 2021-22)

# LAB B2

**Design and develop custom Application (Mini Project) using Salesforce Cloud.**

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**PRN** – 1841053

**Class** – L.Y. B-Tech (Computer)

**Batch** – LY3

**Course Code** – CO456U

**Course Name** - CCL

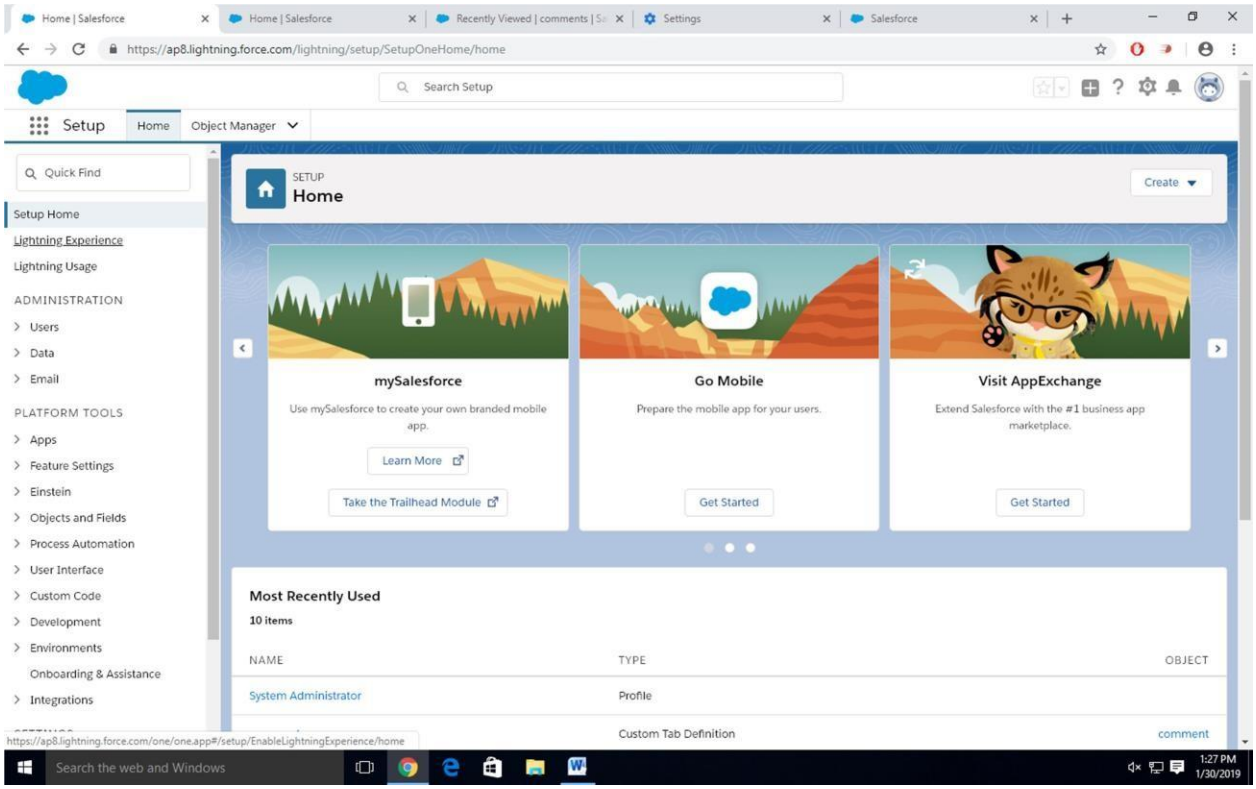
**Aim:** Design and develop custom Application (Mini Project) using Salesforce Cloud.

**Theory:**

Step-1: Click on Lightning Experience

Step-2: Click on Setup and select Setup for current App.

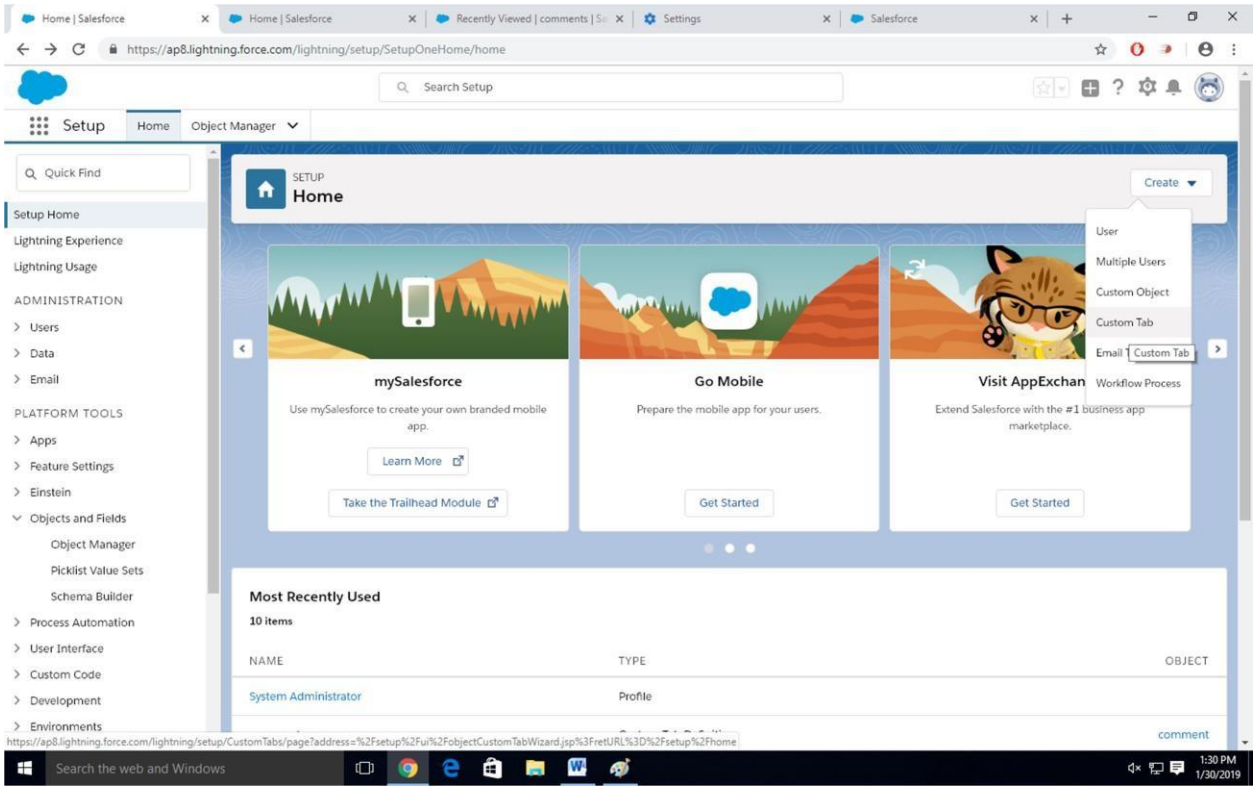
Step-3:




Click on Create an Object

So Click on Object Manager Tab next to Home Tab

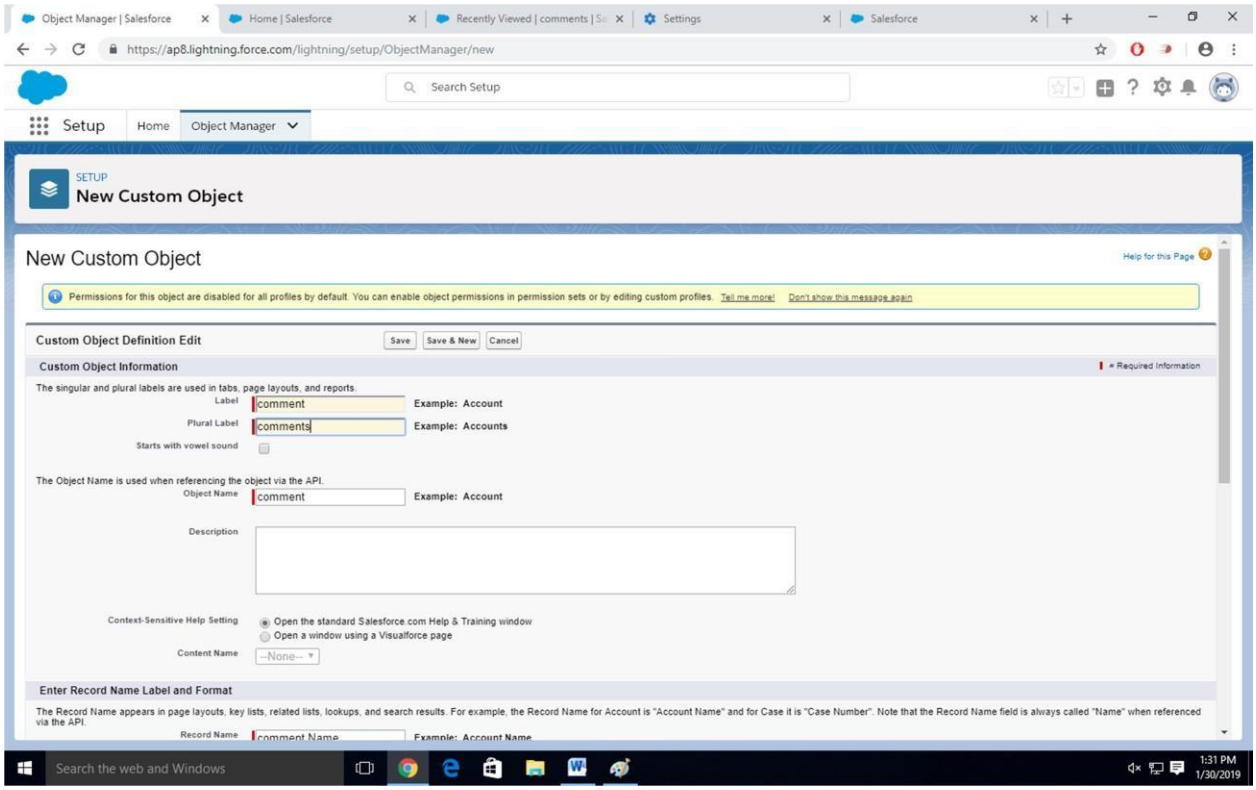
Click on Create –Custom Object




Step-4 New custom object page Open

Label as a-Comment

Plural label- comments

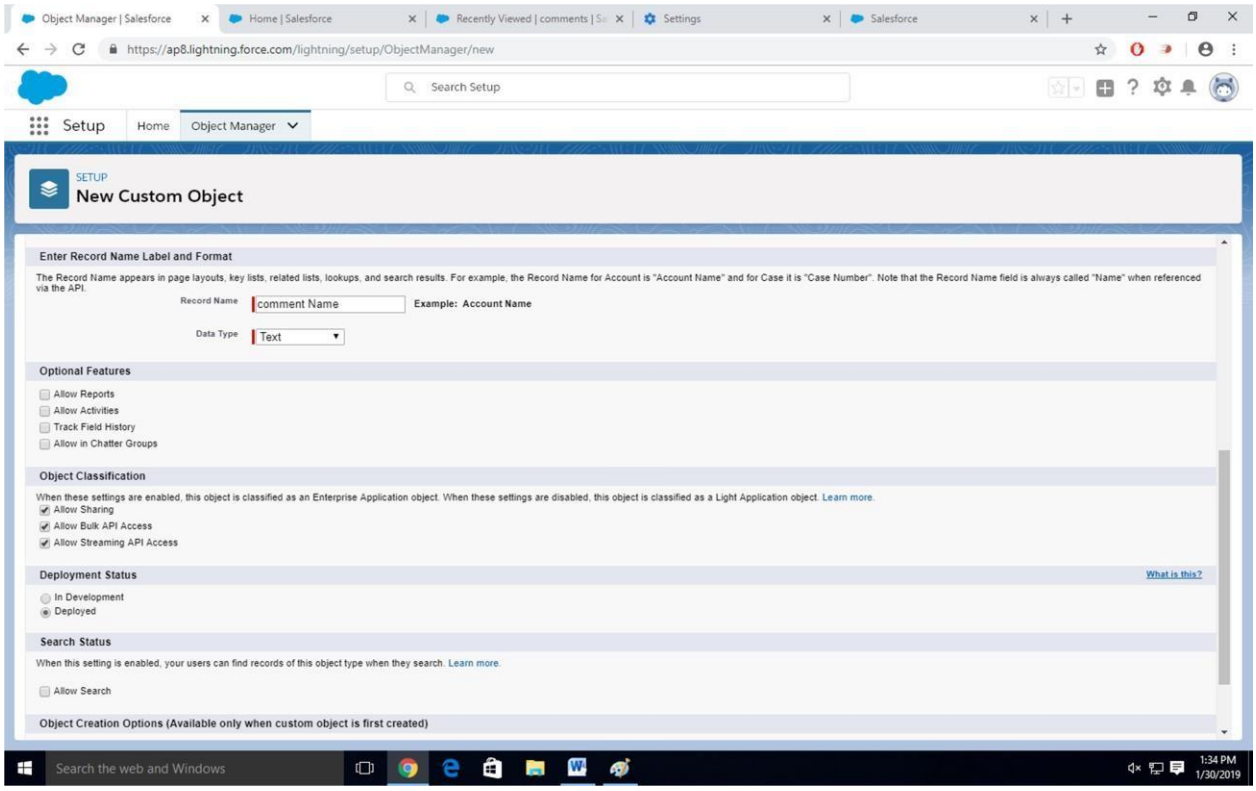



Give Record Name as –comment name

Data type- text

Select Allow Reports Check Box

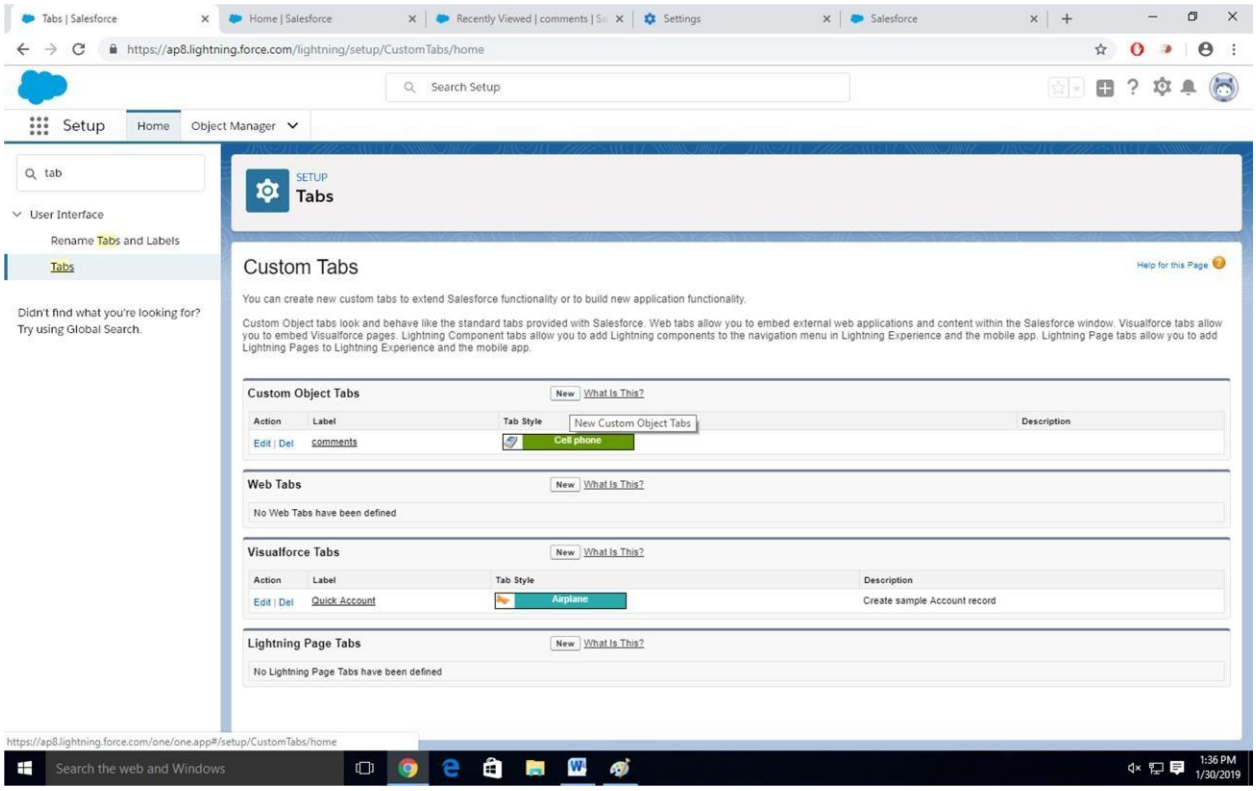
Click on Save




Step-5

Click on Home-Search Tabs in Quick search

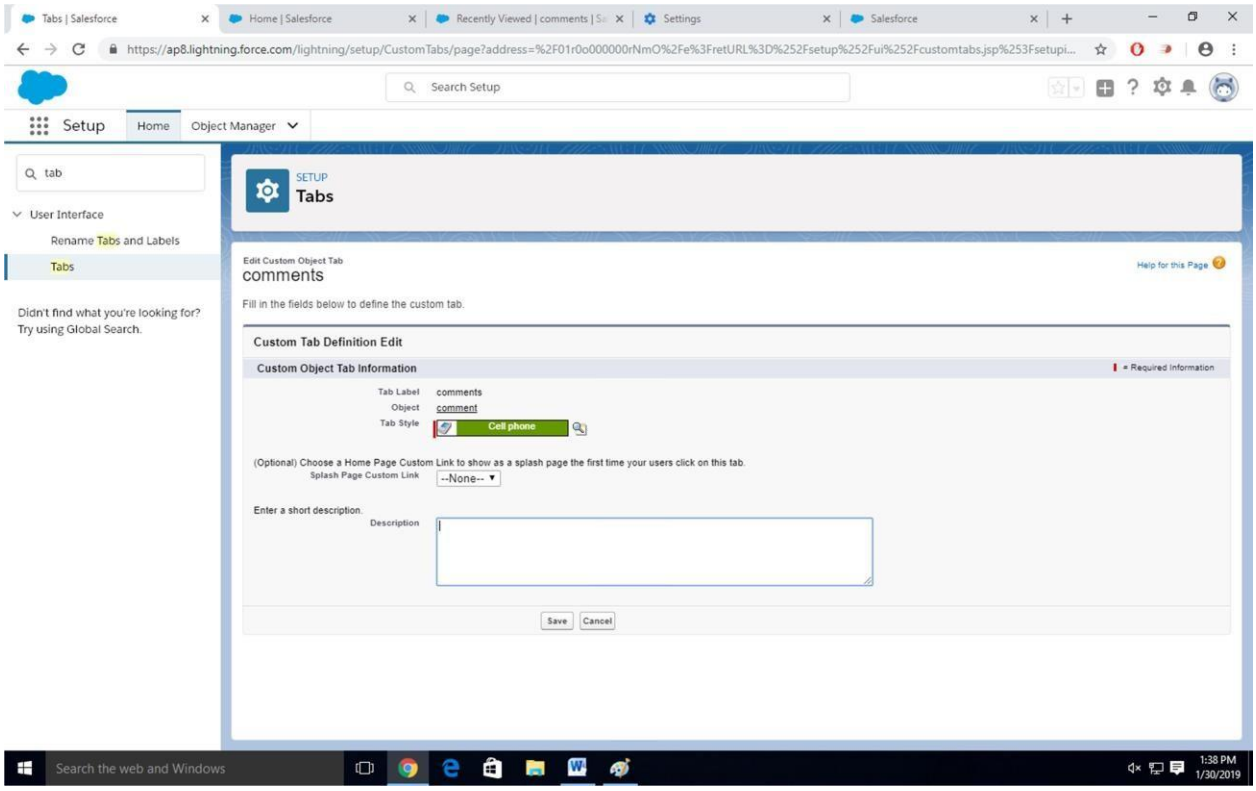
Select Custom Object-Click on New




Step-6

For Object Select Comment

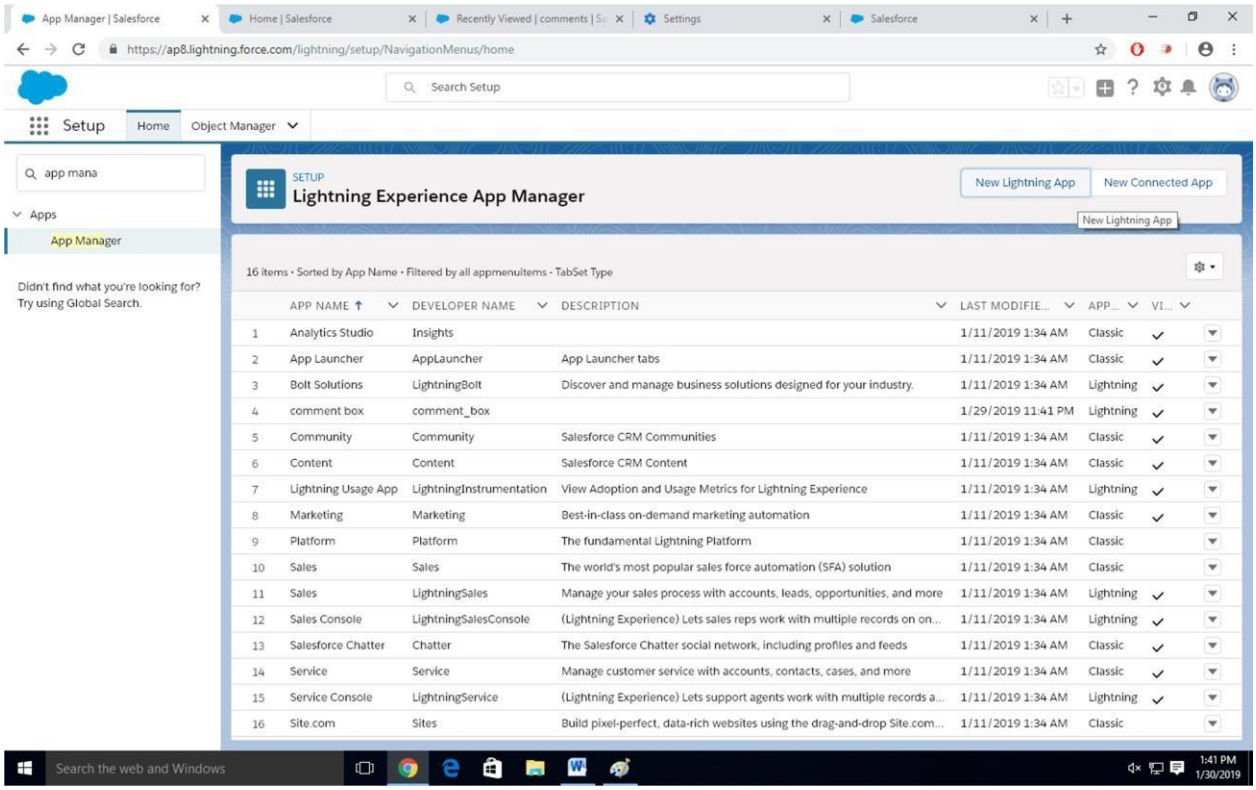
For Tab Style Select Any Icon



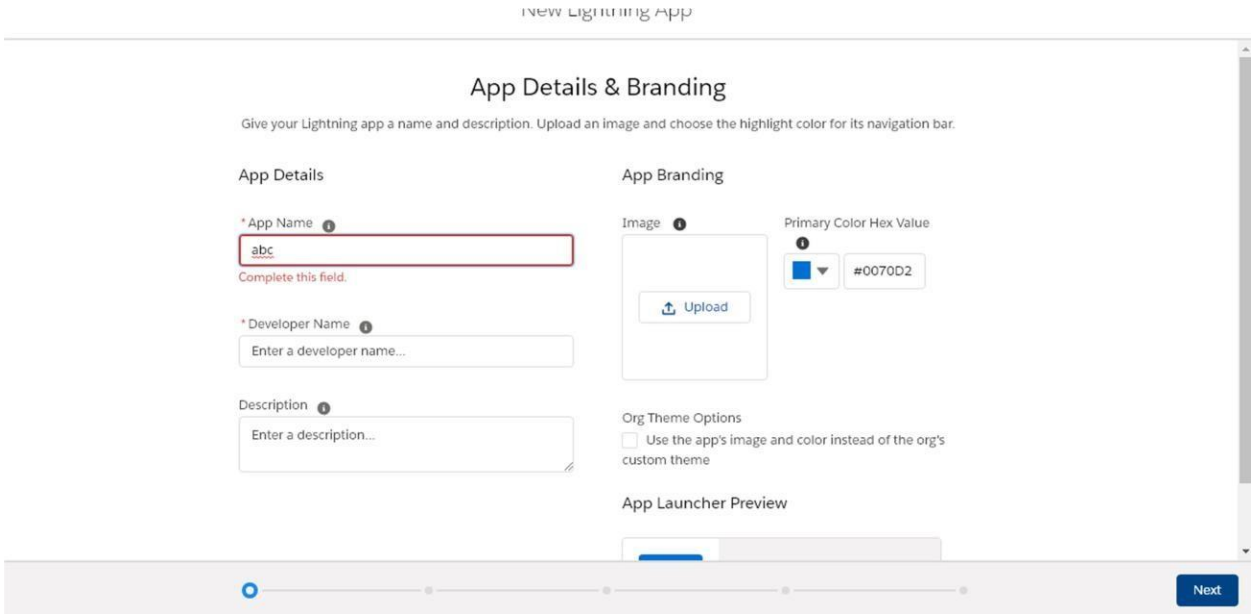

Click-Next-Next-Save

Step-7

Search App Manager in Quick Search and select app manager



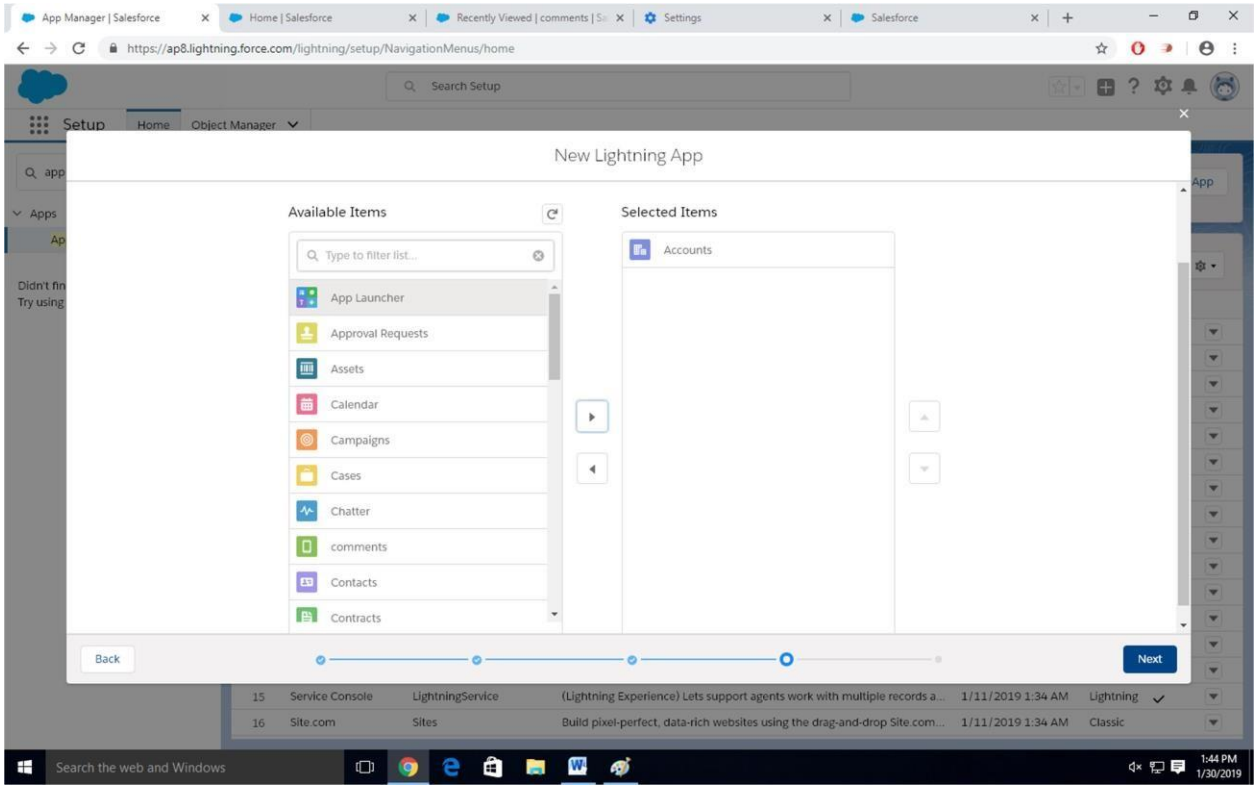

Enter name to app name




Click on Next-Next-Next.

Select Items (Contacts,Comment)

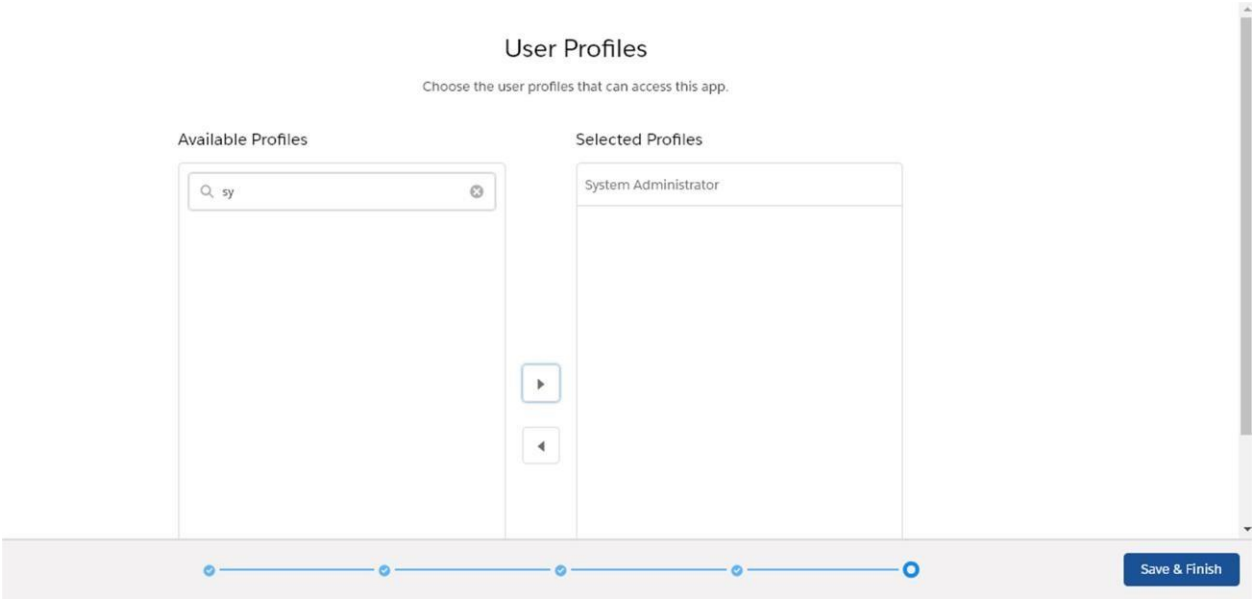
Click on Next




Step-8

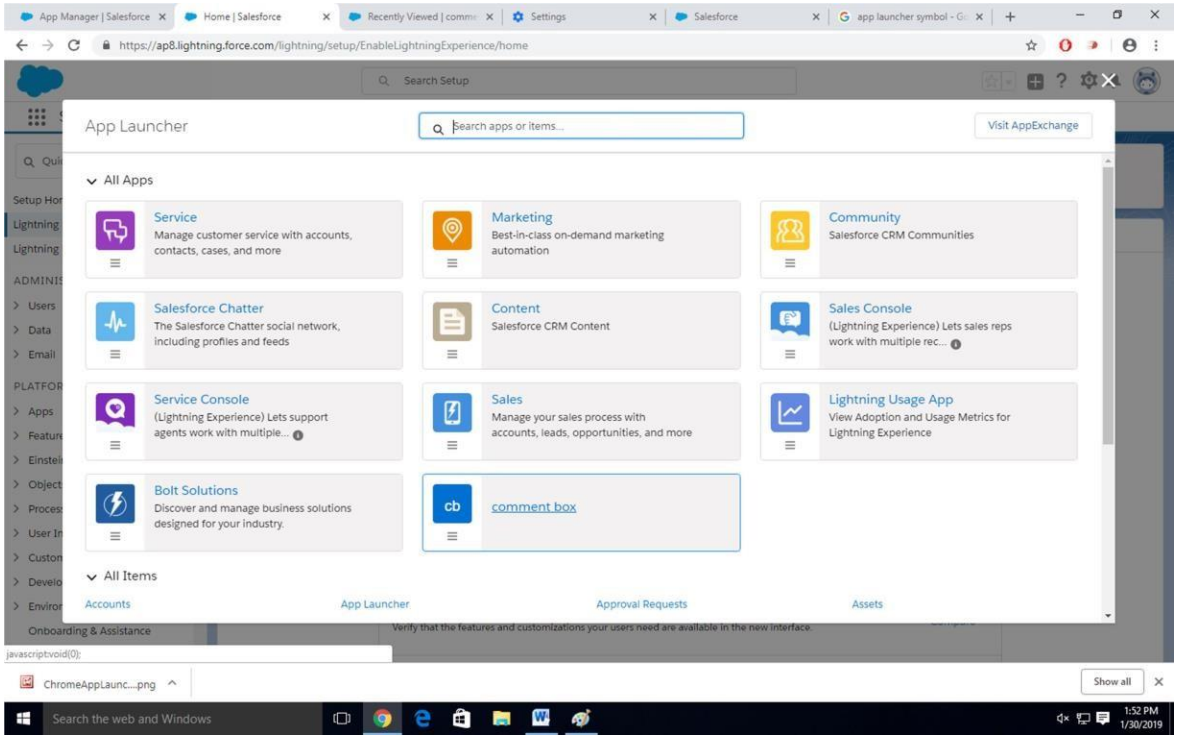
Select Profiles ( System Administrator) and move to selected profile.

Click on Save and Finish.



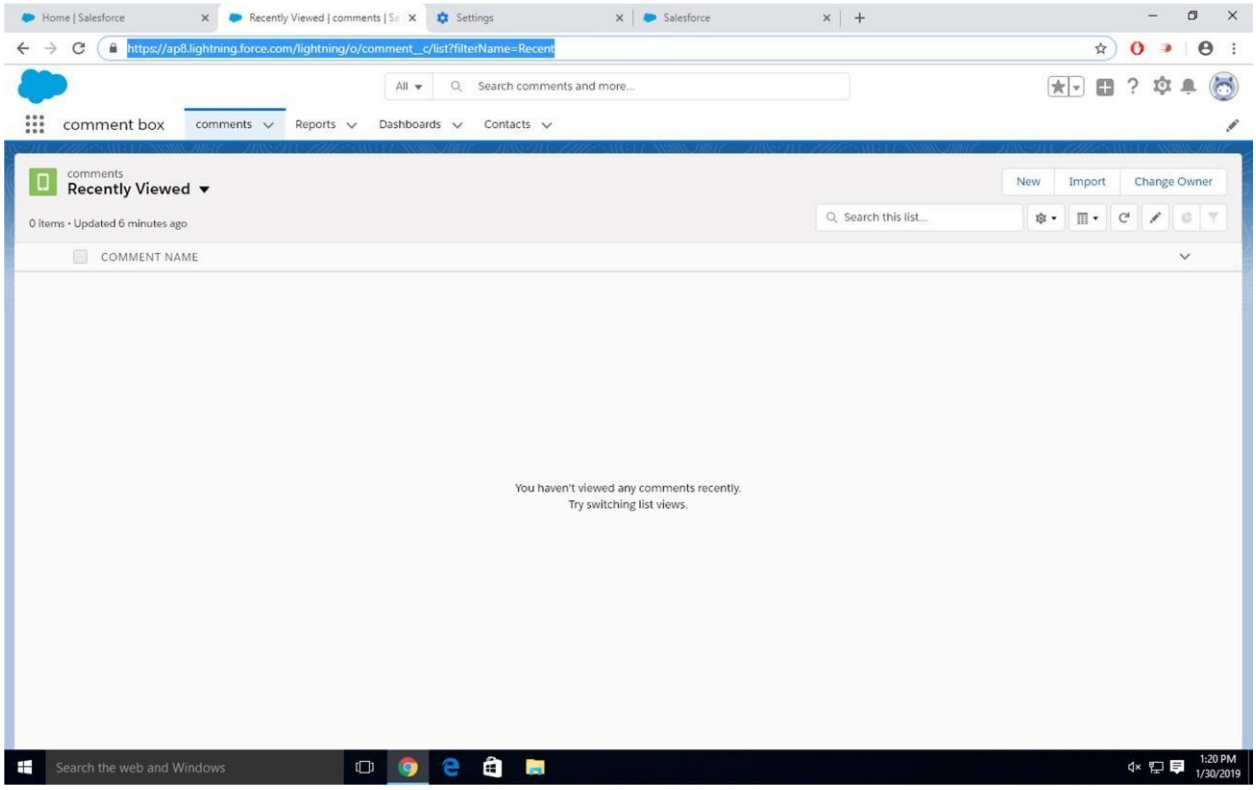

Step-9

Click on App Launcher  Symbol and Select Comment Box App



Step-11 Tour

the app



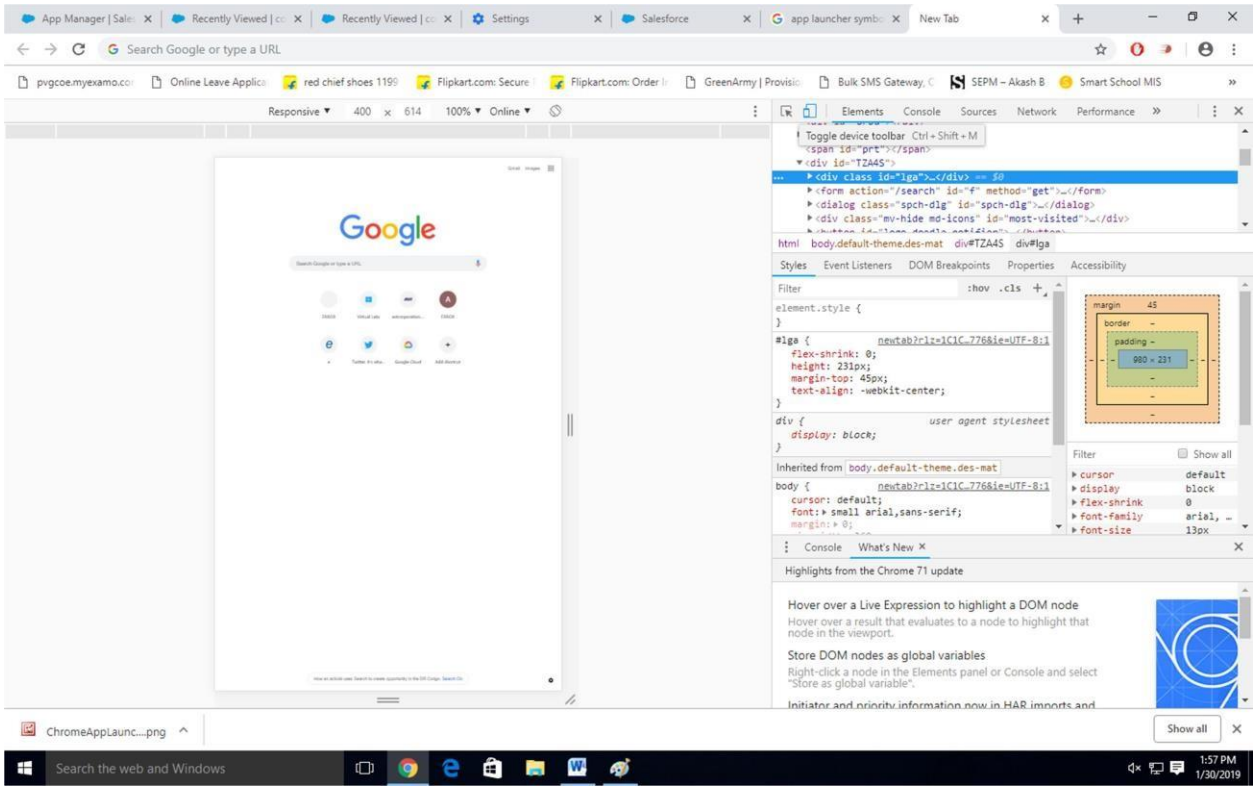

Step-12

Try out mobile app

-Select Chrome developer tools

-Open Chrome-Right Click on Chrome page- Select Inspect

-Click Toggle Device Mode Button to simulate your browser as a mobile device



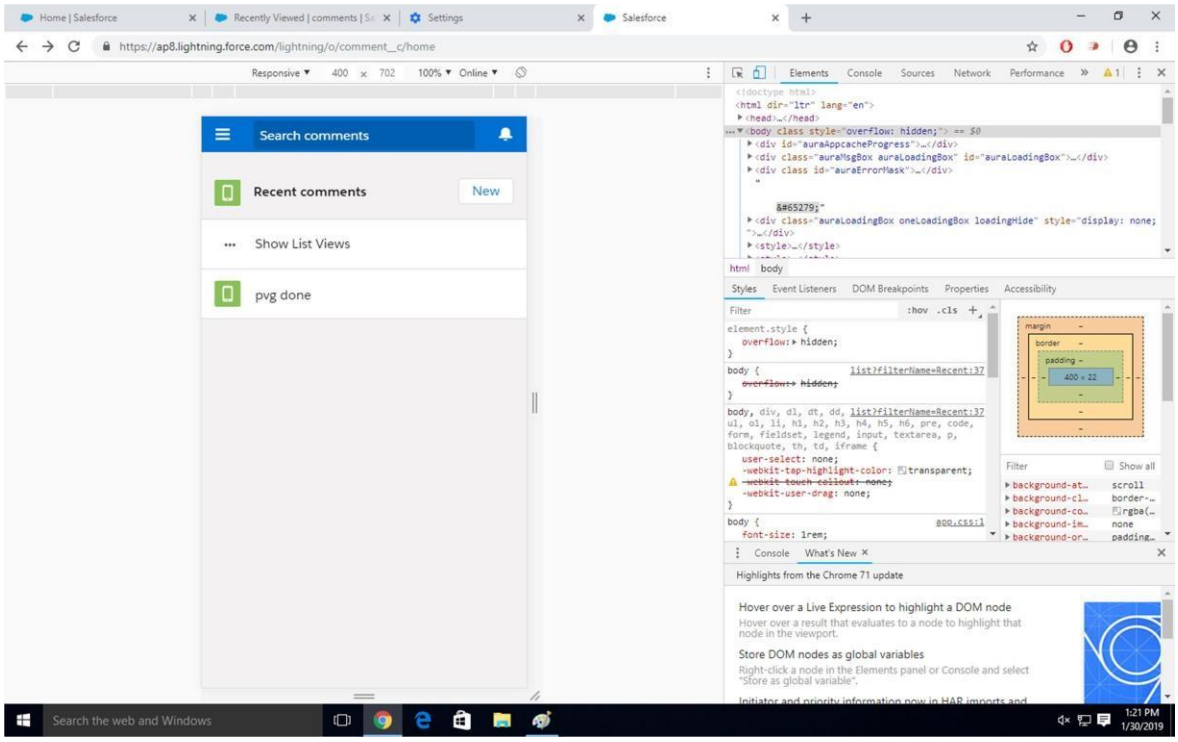

Step-13

To simulate the sales force mobile app in your browser, copy and paste in urlfrom previous tab.Delete the part of the url immediately.

-Click on Left navigation bar

-Find comment object under recent and click on it

-Click new to create a comment




## Conclusion :-

Hence we have designed a custom Application (Mini Project) using Salesforce Cloud.

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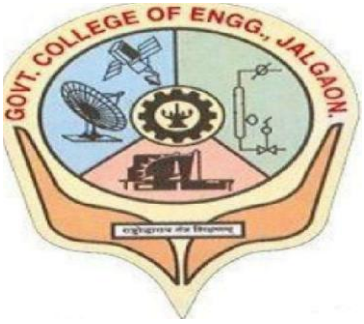



(Academic Year 2021-22)

# LAB B3

**To install and configure google cloud app engine.**

Student Name: ABHISHEK RUPCHAND THAKARE

Class: L.Y COMP Semester: VIII

PRN Number: 1841053

Course Faculty In-charge

Department Of Computer

GCOEJ

**Name** – Abhishek R. Thakare

**PRN** – 1841053

**Class** – L.Y. B-Tech (Computer)

**Batch** – LY3

**Course Code** – CO456U

**Course Name** - CCL

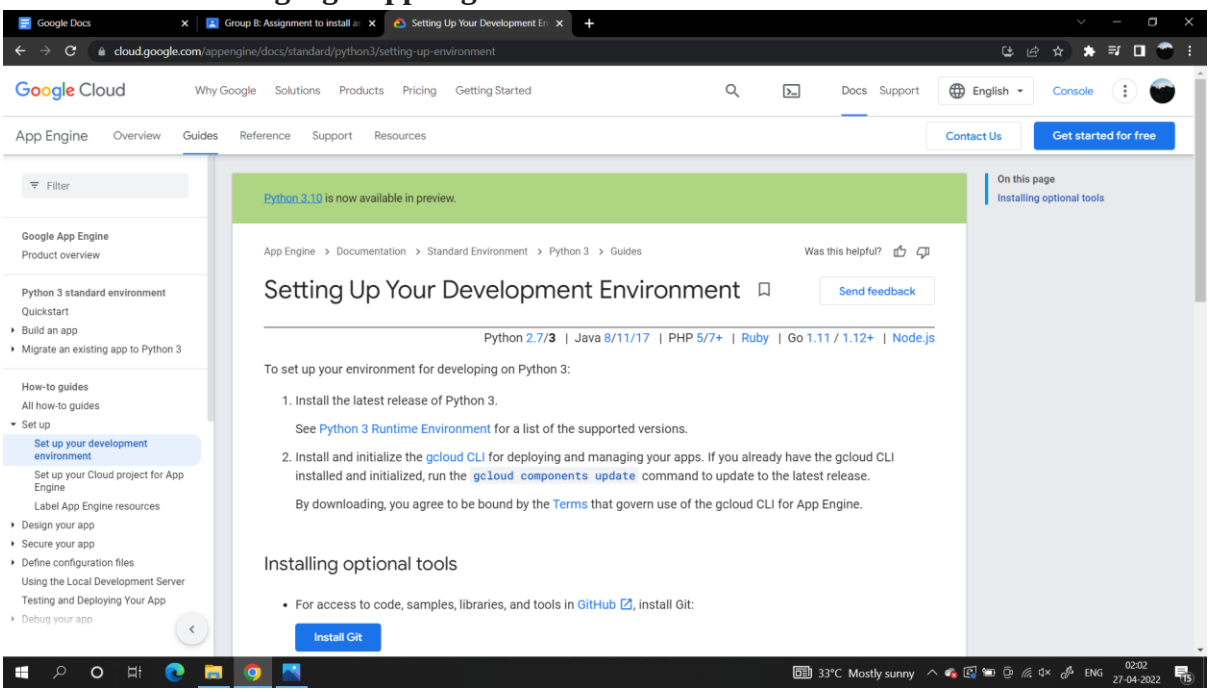
**Aim:** To install and configure google cloud app engine.

## Theory:

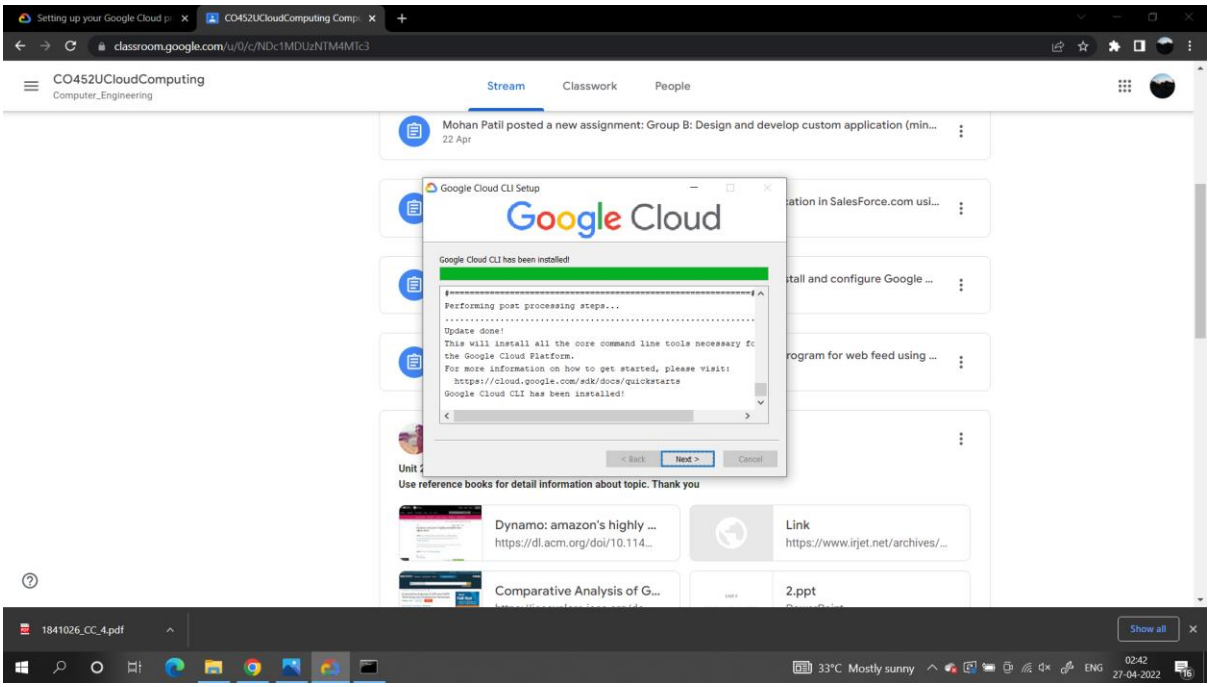
App Engine is a fully managed, serverless platform for developing and hosting web applications at scale. You can choose from several popular languages, libraries, and frameworks to develop your apps, and then let App Engine take care of provisioning servers and scaling your app instances based on demand.

**Steps:**

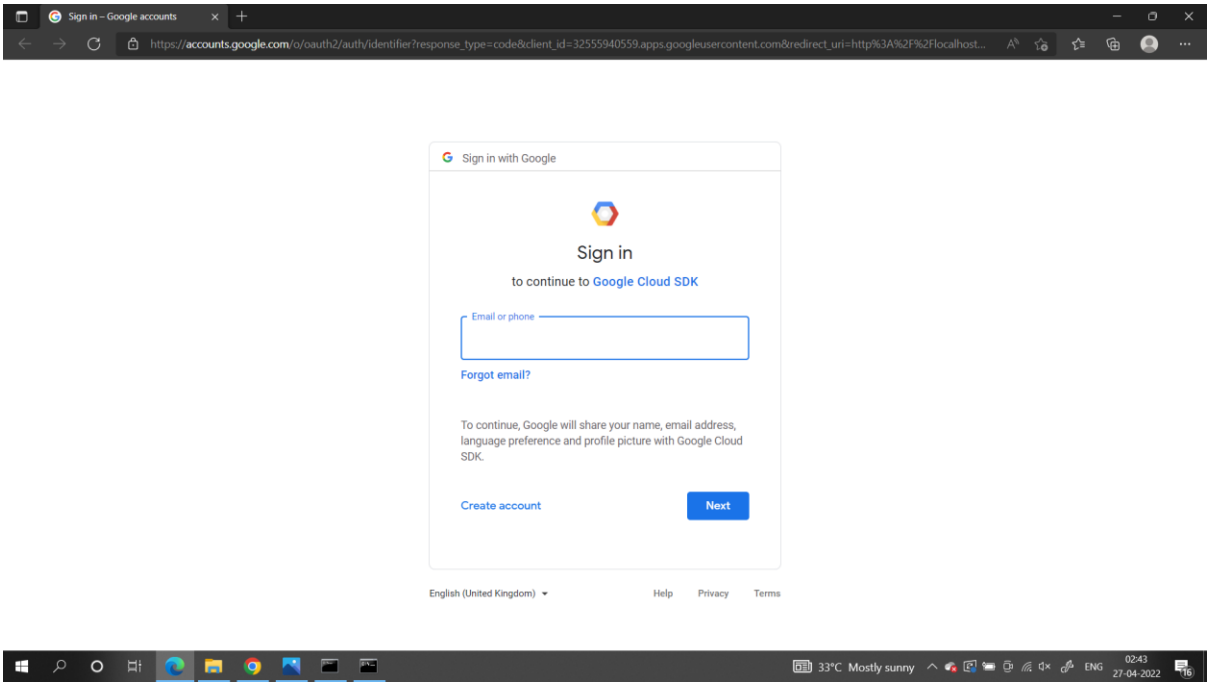
1) **Download the SDK google app engine and install it.**



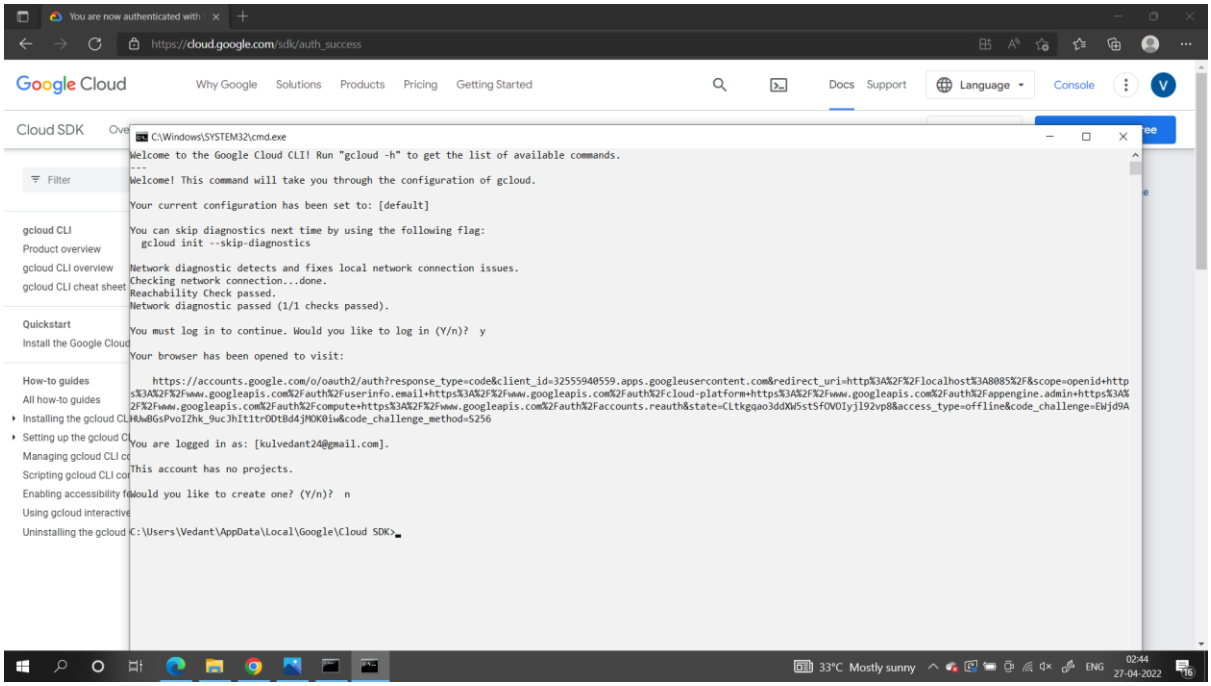
## 2) Download and CLI for Google App Engine:




## 3) Run the command to check if installed properly and authenticate the user:



## 4) Create and project and deploy:




## Conclusion:

As a result we have installed the Google APP engine CLI and now can create apps in Python/ Core java/ Go etc. and deploy it.

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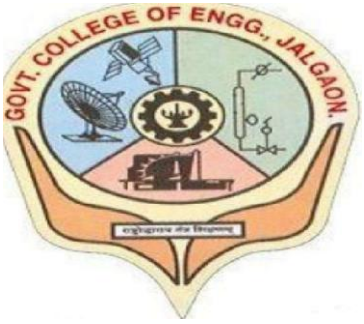


(Academic Year 2021-22)

# LAB B5

## Creating an Application in SalesForce.com using Apex programming Language.

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**Batch** – LY3

**Course Code** – CO456U

**Course Name** - CCL

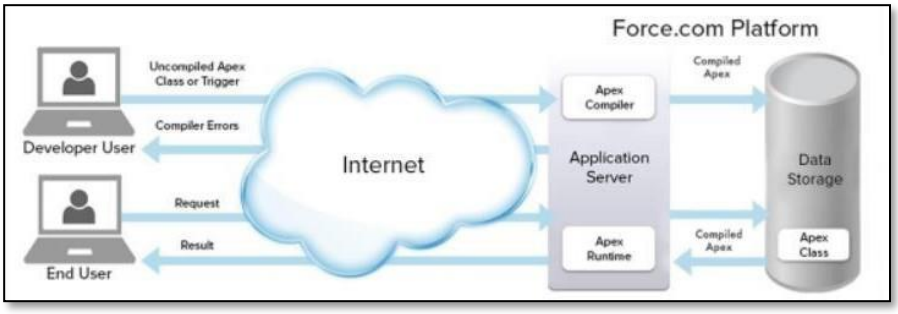
Aim: Creating an application in SalesForce.com using Apex Programming Language.

**Requirements:**

1. Salesforce account
2. Force.com IDE

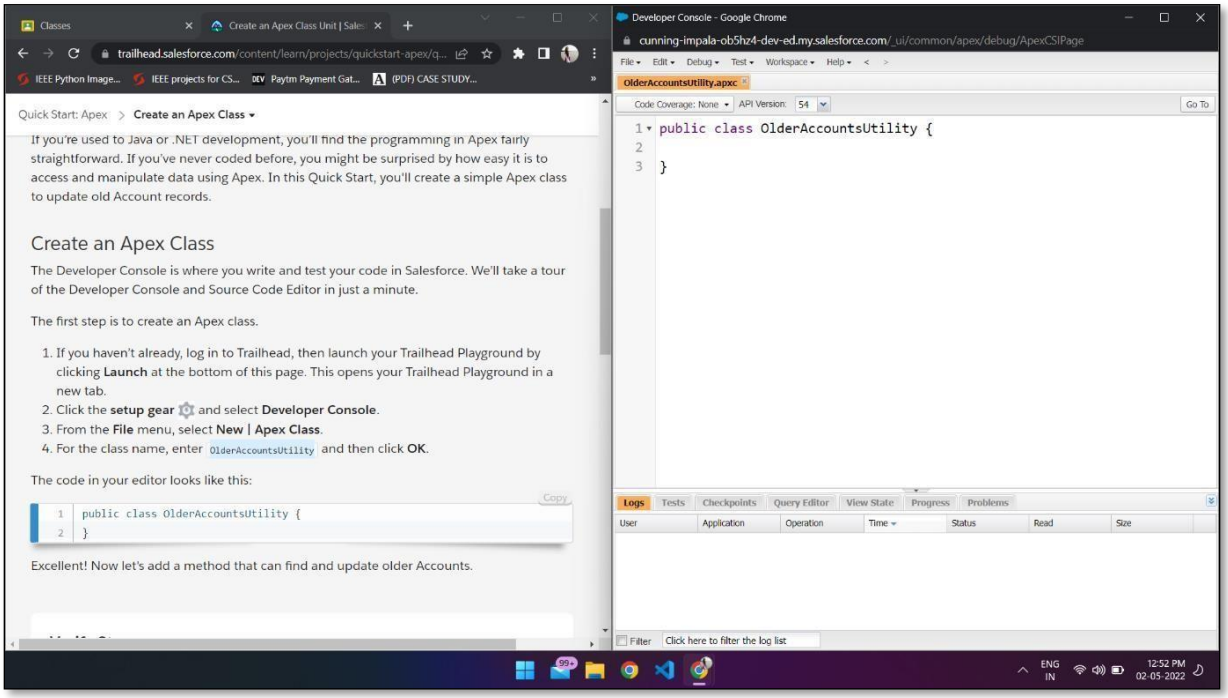
**Theory:**

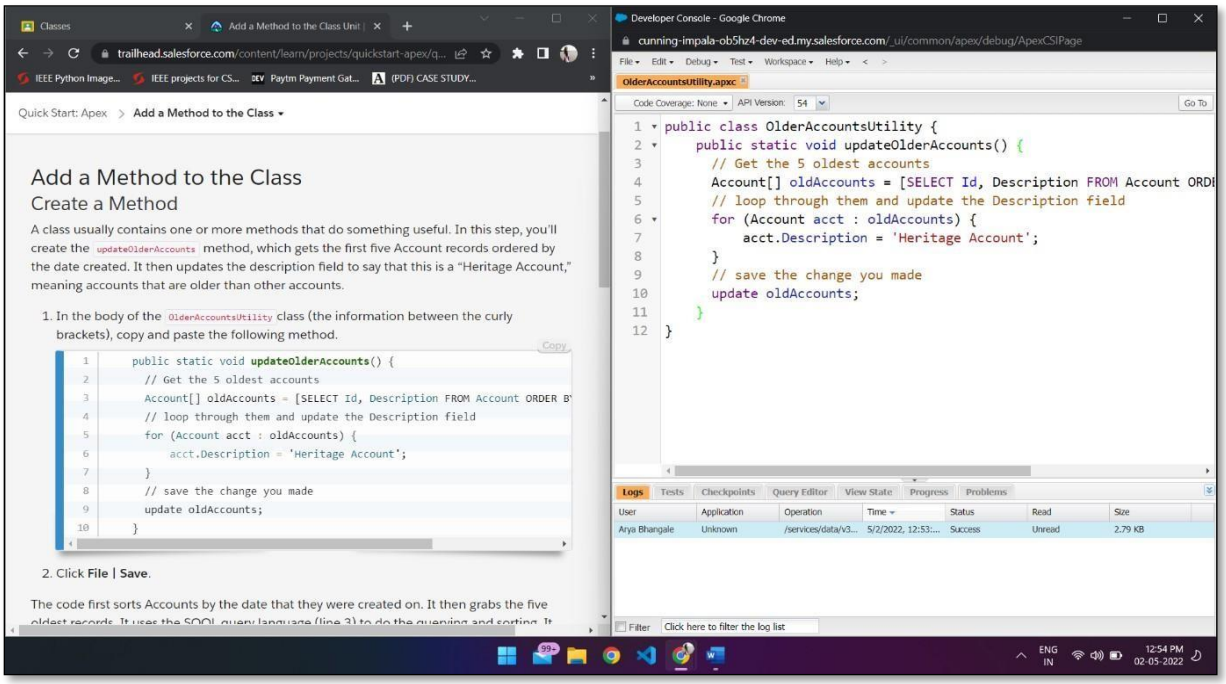
Apex is an object-oriented and strongly typed programming language developed by Salesforce for building Software as a Service (SaaS) and Customer Relationship Management (CRM). Salesforce Apex is designed to process large amounts of data to add business logic to applications and to write Controller in the MVC architecture. Apex is an object-oriented language similar to C# and Java that allows to implement complex business requirements and transactions on the force.com platform.

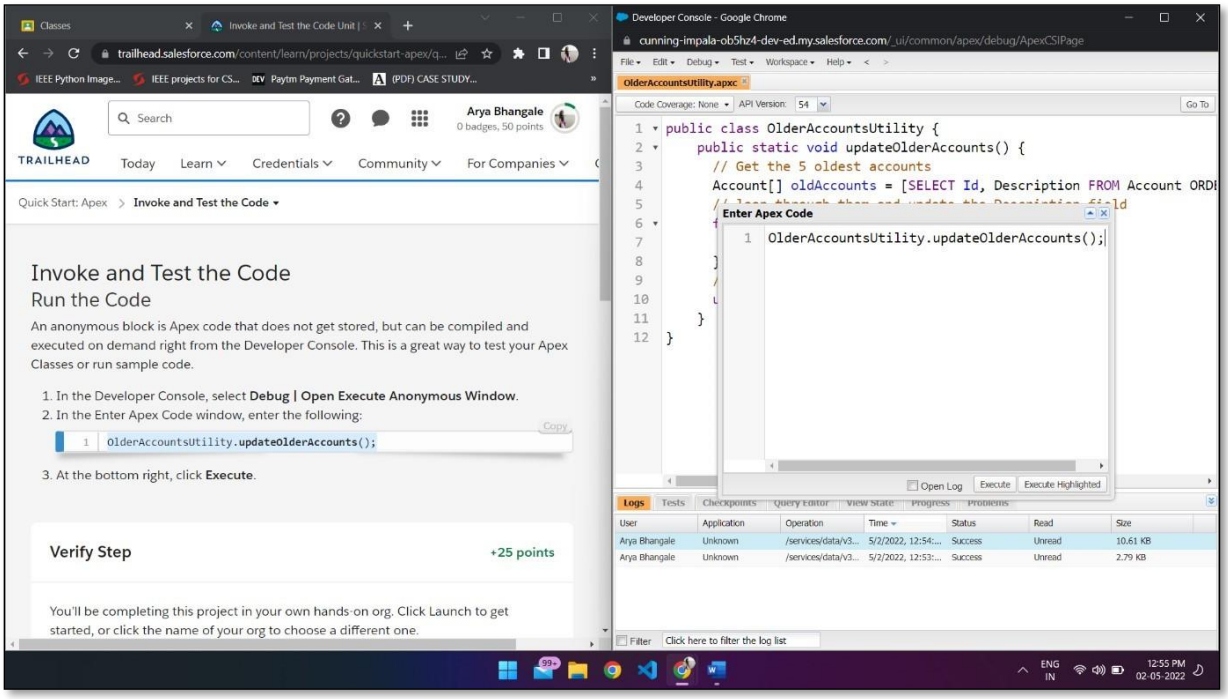


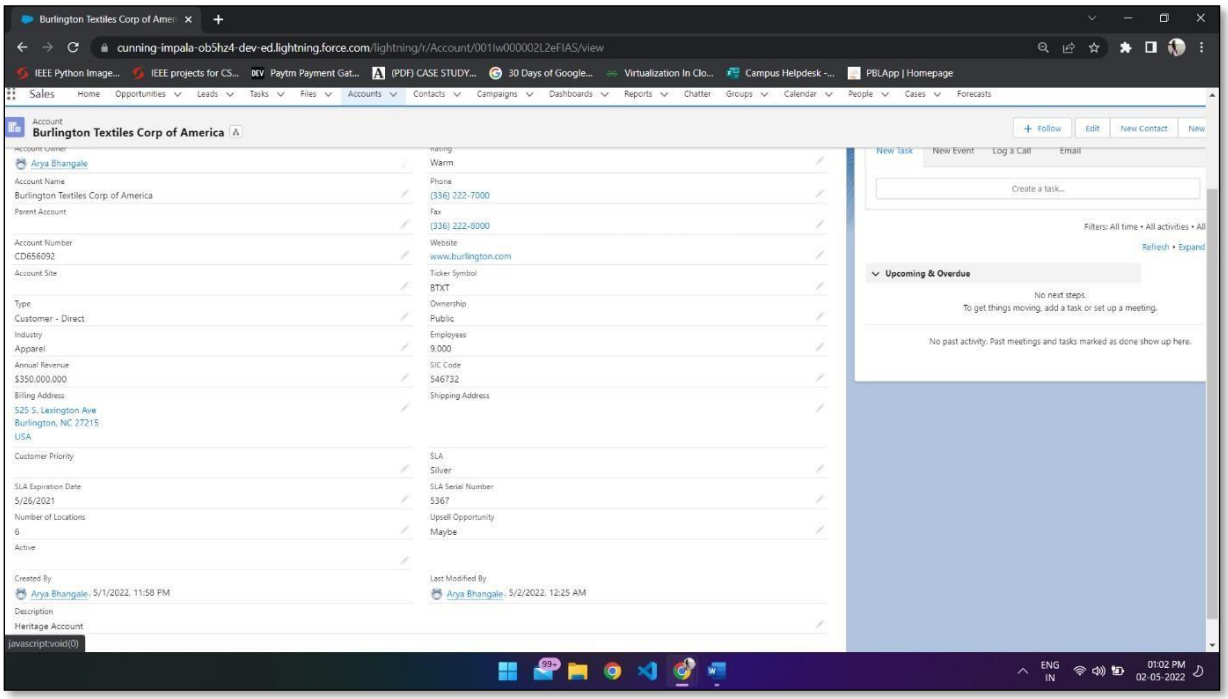

Apex is a strongly typed, object-oriented programming language that allows developers to execute flow and transaction control statements on the Lightning platform server in conjunction with calls to the Lightning Platform API. Using syntax that looks like Java and acts like database stored, Apex enables developers to add business logic to most system events, including button clicks, related record updates, and Visualforce pages.

**Output:**


Create an Apex Class Unit | Sale
trailhead.salesforce.com/content/learn/projects/quickstart-apex/q...
Quick Start: Apex > Create an Apex Class
If you're used to Java or .NET development, you'll find the programming in Apex fairly straightforward. If you've never coded before, you might be surprised by how easy it is to access and manipulate data using Apex. In this Quick Start, you'll create a simple Apex class to update old Account records.
Create an Apex Class
The Developer Console is where you write and test your code in Salesforce. We'll take a tour of the Developer Console and Source Code Editor in just a minute.
The first step is to create an Apex class.
1. If you haven't already, log in to Trailhead, then launch your Trailhead Playground by clicking Launch at the bottom of this page. This opens your Trailhead Playground in a new tab.
2. Click the setup gear and select Developer Console.
3. From the File menu, select New | Apex Class.
4. For the class name, enter OlderAccountsUtility and then click OK.
The code in your editor looks like this:
public class OlderAccountsUtility {
}
Excellent! Now let's add a method that can find and update older Accounts.
Developer Console - Google Chrome
cunning-impala-ob5hz4-dev-ed.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
OlderAccountsUtility.apxc
public class OlderAccountsUtility {
}
Logs Tests Checkpoints Query Editor View State Progress Problems
User Application Operation Time Status Read Size
Filter Click here to filter the log list
12:52 PM 02-05-2022


Add a Method to the Class Unit |
trailhead.salesforce.com/content/learn/projects/quickstart-apex/q...
Quick Start: Apex > Add a Method to the Class
Add a Method to the Class
Create a Method
A class usually contains one or more methods that do something useful. In this step, you'll create the updateOlderAccounts method, which gets the first five Account records ordered by the date created. It then updates the description field to say that this is a "Heritage Account," meaning accounts that are older than other accounts.
1. In the body of the OlderAccountsUtility class (the information between the curly brackets), copy and paste the following method.
public static void updateOlderAccounts() {
// Get the 5 oldest accounts
Account[] oldAccounts = [SELECT Id, Description FROM Account ORDER B
// loop through them and update the Description field
for (Account acct : oldAccounts) {
acct.Description = 'Heritage Account';
}
// save the change you made
update oldAccounts;
}
2. Click File | Save.
The code first sorts Accounts by the date that they were created on. It then grabs the five
Developer Console - Google Chrome
cunning-impala-ob5hz4-dev-ed.my.salesforce.com/_ui/common/apex/debug/ApexCSIPage
OlderAccountsUtility.apxc
public class OlderAccountsUtility {
public static void updateOlderAccounts() {
// Get the 5 oldest accounts
Account[] oldAccounts = [SELECT Id, Description FROM Account ORDE
// loop through them and update the Description field
for (Account acct : oldAccounts) {
acct.Description = 'Heritage Account';
}
// save the change you made
update oldAccounts;
}
}
Logs Tests Checkpoints Query Editor View State Progress Problems
User Application Operation Time Status Read Size
Arya Bhangale Unknown /services/data/v3... 5/2/2022, 12:53:... Success Unread 2.79 KB
Filter Click here to filter the log list
12:54 PM 02-05-2022




**Conclusion:**

Apex is designed to process large amounts of data to add business logic to applications and to write Controller in the MVC architecture.