

USCS602: Cloud Computing

1. Study and implementation of Infrastructure as a Service.

Study of Cloud Computing & Architecture

2. Installation and Configuration of virtualization using KVM.
3. Study and implementation of Infrastructure as a Service
4. Study and implementation of Storage as a Service
5. Study and implementation of identity management
6. Study Cloud Security management
7. Write a program for web feed.
8. Study and implementation of Single-Sign-On.
9. User Management in Cloud.
10. Case study on Amazon EC2/Microsoft Azure/Google Cloud Platform

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Ex 1: Study of Cloud Computing & Architecture

1. **Aim:** To study cloud architecture and cloud computing model.
2. **Objectives:** From this experiment, the student will be able to
 - provide an overview of concepts of Cloud Computing .
 - To encourage students to indulge into research in Cloud Computing.
3. **Outcomes:** The learner will be able to
 - understand and appreciate cloud architecture.
 - analyze the local and global impact of computing on individuals, organizations, and society.
 - recognize the need for, and an ability to engage in life-long learning.
4. **Hardware / Software Required:** Ubuntu operating system, Internet
5. **Theory:**

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.

Cloud computing services can be [Private](#), [Public](#) or [Hybrid](#).

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 is a combination of public cloud services and on-premises private cloud – with orchestration and automation between the two.

Companies can run mission-critical workloads or sensitive applications on the private cloud while using the public cloud for workloads that must scale on-demand. The goal of hybrid cloud is to create a unified, automated, scalable environment which takes advantage of all that a public cloud infrastructure can provide, while still maintaining control over mission-critical data.

Types of cloud computing:

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 and disadvantages of cloud computing

Advantages: The pros of cloud computing are obvious and compelling. If your business is selling books or repairing shoes, why get involved in the nitty gritty of buying and maintaining a complex computer system? If you run an insurance office, do you really want your sales agents wasting time running anti-virus software, upgrading word-processors, or worrying about hard-drive crashes? Do you really want them cluttering your expensive computers with their personal emails, illegally shared [MP3](#) files, and naughty YouTube videos—when you could leave that responsibility to someone else? Cloud computing allows you to buy in only the services you want, when you want them, cutting the upfront capital costs of computers and peripherals. You avoid equipment going out of date and other

familiar IT problems like ensuring system security and reliability. You can add extra services (or take them away) at a moment's notice as your business needs change. It's really quick and easy to add new applications or services to your business without waiting weeks or months for the new computer (and its software) to arrive.

Disadvantages: Instant convenience comes at a price. 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. That's something we take for granted in countries such as the United States, but it's much more of an issue in developing countries or rural areas where broadband is unavailable.

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. (Google, for example, upset many users when it [announced](#) in September 2012 that its cloud-based Google Docs would drop support for old but de facto standard Microsoft Office file formats such as .DOC, .XLS, and .PPT, giving a mere one week's notice of the change—although, after public pressure, it later extended the deadline by three months.) Critics charge that cloud-computing is a return to the bad-old days of mainframes and proprietary systems, where businesses are locked into unsuitable, long-term arrangements with big, inflexible companies. 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. Good for convenience and security, perhaps, but what will you lose in flexibility? And is such a restrained approach good for the future of the Internet as a whole? (To see why it may not be, take a look at Jonathan Zittrain's eloquent book [The Future of the Internet—And How to Stop It.](#))

6. 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.

Ex 2. Installation and Configuration of virtualization using KVM.

- 1. Aim:** Installation and Configuration of virtualization using KVM
- 2. Objectives:** From this experiment, the student will be able to,
 - Understand the concepts of virtualization.
 - Understand KVM architecture and its configuration.
- 3. Outcomes:** The learner will be able,
 - To analyze user models and develop user centric interfaces
 - To analyze the local and global impact of computing on individuals, organizations, and society.
 - To engage in life-long learning development and higher studies.
 - To understand, identify, analyze and design the problem, implement and validate the solution including both hardware and software.
- 4. Hardware / Software Required:** Ubuntu operating system, open source software KVM, Internet.
- 5. 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.

Virtualization makes servers, workstations, storage and other systems independent of the physical hardware layer. This is done by installing a Hypervisor on top of the hardware layer, where the systems are then installed. There are three areas of IT where virtualization is making headroads, 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. The idea is that virtualization disguises the true complexity of the network by separating it into manageable parts, much like your partitioned hard drive makes it easier to manage your files.
- 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. The intention is to spare the user from having to understand and manage complicated details of server resources while increasing resource sharing and utilization and maintaining the capacity to expand later.

Virtualization can be viewed as part of an overall trend in enterprise IT that includes autonomic computing, a scenario in which the IT environment will be able to manage itself based on perceived activity, and utility computing, in which computer processing power is seen as a utility that clients can pay for only as needed. The usual goal of virtualization is to centralize administrative tasks while improving scalability and work loads.

6. Procedure:

Installation Steps :

1. `#sudo grep -c "svm\|vmx" /proc/cpuinfo`
2. `#sudo apt-get install qemu-kvm libvirt-bin bridge-utils virt-manager`
3. `#sudo adduser rait`
`#sudo adduser rait libvirt`

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

4. Run following command after logging back in as rait and you should see an empty list of virtual machines. This indicates that everything is working correctly.
`#virsh -c qemu:///system list`
5. Open Virtual Machine Manager application and Create Virtual Machine
`#virt-manager`

7. Result:

_____SNAPSHOTS_____

Step 1 : `#sudo grep -c "svm\|vmx" /proc/cpuinfo`



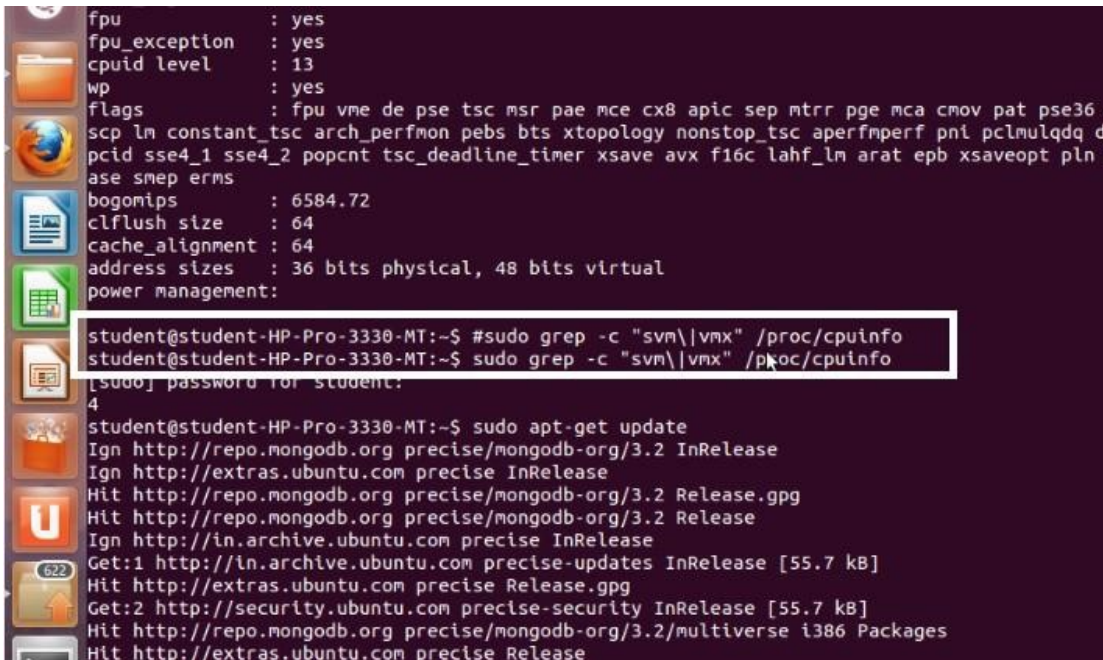
```

student@student-HP-Pro-3330-MT: ~
student@student-HP-Pro-3330-MT:~$ #sudo grep -c "svm\|vmx" /proc/cpuinfo
student@student-HP-Pro-3330-MT:~$ clear

student@student-HP-Pro-3330-MT:~$ cat /proc/cpuinfo
processor       : 0
vendor_id      : GenuineIntel
cpu family     : 6
model          : 58
model name     : Intel(R) Core(TM) i3-3220 CPU @ 3.30GHz
stepping       : 9
microcode      : 0x19
cpu MHz        : 1600.000
cache size     : 3072 KB
physical id    : 0
siblings       : 4
core id        : 0
cpu cores      : 2

```


Step 2 : #sudo apt-get install qemu-kvm libvirt-bin bridge-utils virt-manager

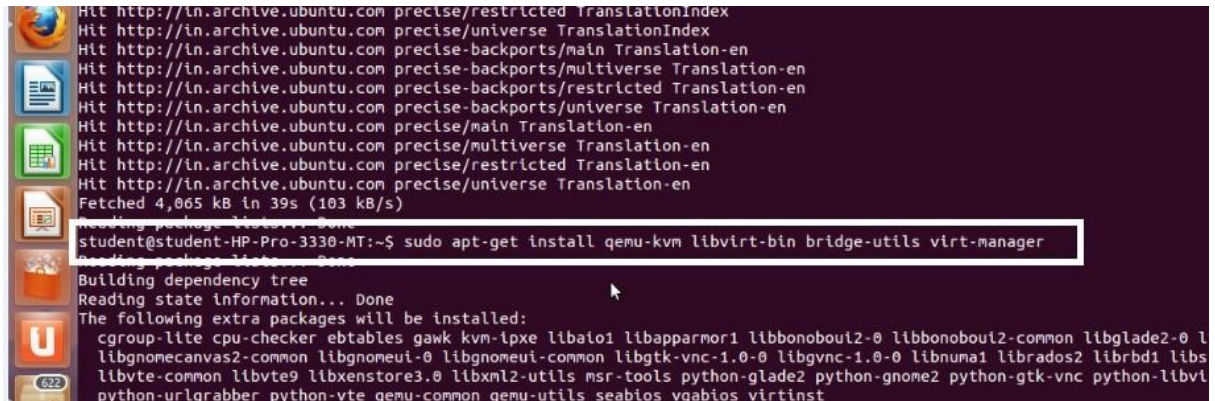


```
fpu : yes
fpu_exception : yes
cpuid level : 13
wp : yes
flags : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush
scp lm constant_tsc arch_perfmon pebs bts xtopology nonstop_tsc aperfmperf pni pclmulqdq d
pcid sse4_1 sse4_2 popcnt tsc_deadline_timer xsave avx f16c lahf_lm arat epb xsaveopt pln
ase smep erms
bogomips : 6584.72
clflush size : 64
cache_alignment : 64
address sizes : 36 bits physical, 48 bits virtual
power management:

student@student-HP-Pro-3330-MT:~$ #sudo grep -c "svm|vmx" /proc/cpuinfo
student@student-HP-Pro-3330-MT:~$ sudo grep -c "svm|vmx" /proc/cpuinfo
[sudo] password for student:
4
student@student-HP-Pro-3330-MT:~$ sudo apt-get update
Ign http://repo.mongodb.org precise/mongodb-org/3.2 InRelease
Ign http://extras.ubuntu.com precise InRelease
Hit http://repo.mongodb.org precise/mongodb-org/3.2 Release.gpg
Hit http://repo.mongodb.org precise/mongodb-org/3.2 Release
Ign http://in.archive.ubuntu.com precise InRelease
Get:1 http://in.archive.ubuntu.com precise-updates InRelease [55.7 kB]
Hit http://extras.ubuntu.com precise Release.gpg
Get:2 http://security.ubuntu.com precise-security InRelease [55.7 kB]
Hit http://repo.mongodb.org precise/mongodb-org/3.2/multiverse i386 Packages
Hit http://extras.ubuntu.com precise Release
```

Step 3 : #sudoaddusererrait

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

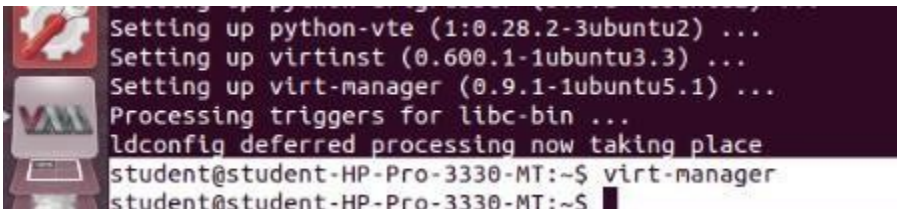


```
Hit http://in.archive.ubuntu.com precise/restricted TranslationIndex
Hit http://in.archive.ubuntu.com precise/universe TranslationIndex
Hit http://in.archive.ubuntu.com precise-backports/main Translation-en
Hit http://in.archive.ubuntu.com precise-backports/multiverse Translation-en
Hit http://in.archive.ubuntu.com precise-backports/restricted Translation-en
Hit http://in.archive.ubuntu.com precise-backports/universe Translation-en
Hit http://in.archive.ubuntu.com precise/main Translation-en
Hit http://in.archive.ubuntu.com precise/multiverse Translation-en
Hit http://in.archive.ubuntu.com precise/restricted Translation-en
Hit http://in.archive.ubuntu.com precise/universe Translation-en
Fetched 4,065 kB in 39s (103 kB/s)
Reading package lists... Done
student@student-HP-Pro-3330-MT:~$ sudo apt-get install qemu-kvm libvirt-bin bridge-utils virt-manager
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  cgroup-lite cpu-checker ebttables gawk kvm-pxe libaio1 libapparmor1 libbonoboui2-0 libbonoboui2-common libglade2-0 l
  libgnomecanvas2-common libgnomeui-0 libgnomeui-common libgtk-vnc-1.0-0 libgvnc-1.0-0 libnuma1 librados2 librbd1 lib
  libvte-common libvte9 libxenstore3.0 libxml2-utils msr-tools python-glade2 python-gnome2 python-gtk-vnc python-libv
  python-urlgrabber python-vte qemu-common qemu-utils seabios vgabios virtinst

```

Step 4 : #sudoaddusererraitlibvirtd

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



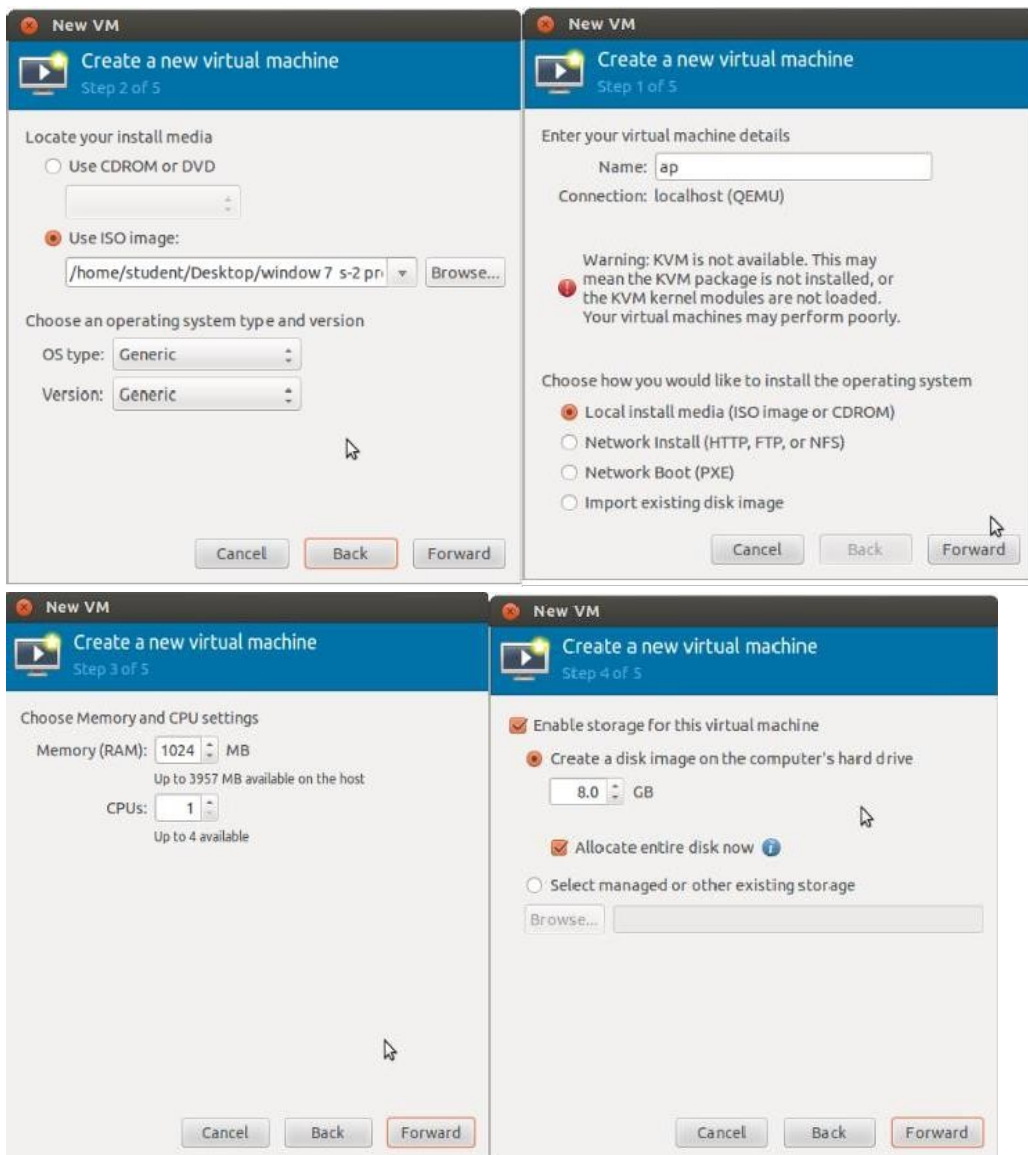
```
Setting up python-vte (1:0.28.2-3ubuntu2) ...
Setting up virtinst (0.600.1-1ubuntu3.3) ...
Setting up virt-manager (0.9.1-1ubuntu5.1) ...
Processing triggers for libc-bin ...
ldconfig deferred processing now taking place
student@student-HP-Pro-3330-MT:~$ virt-manager
student@student-HP-Pro-3330-MT:~$
```

Step 5 : Open Virtual Machine Manager application and Create Virtual Machine

#virt-manager as shown below

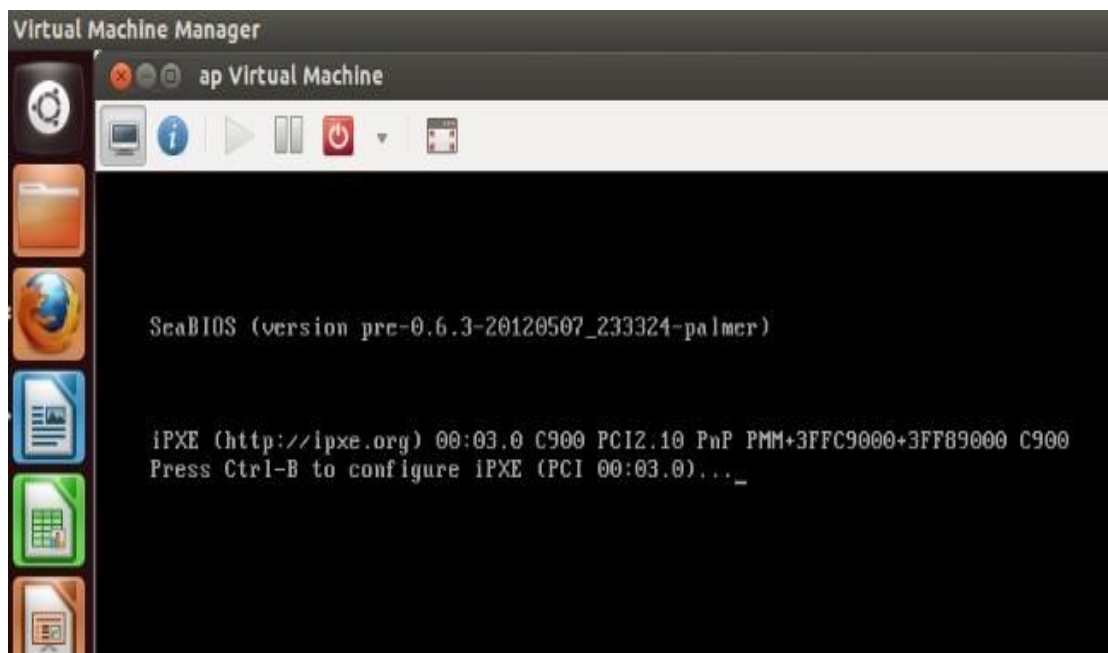


Step 6 : Create a new virtual machine as shown below

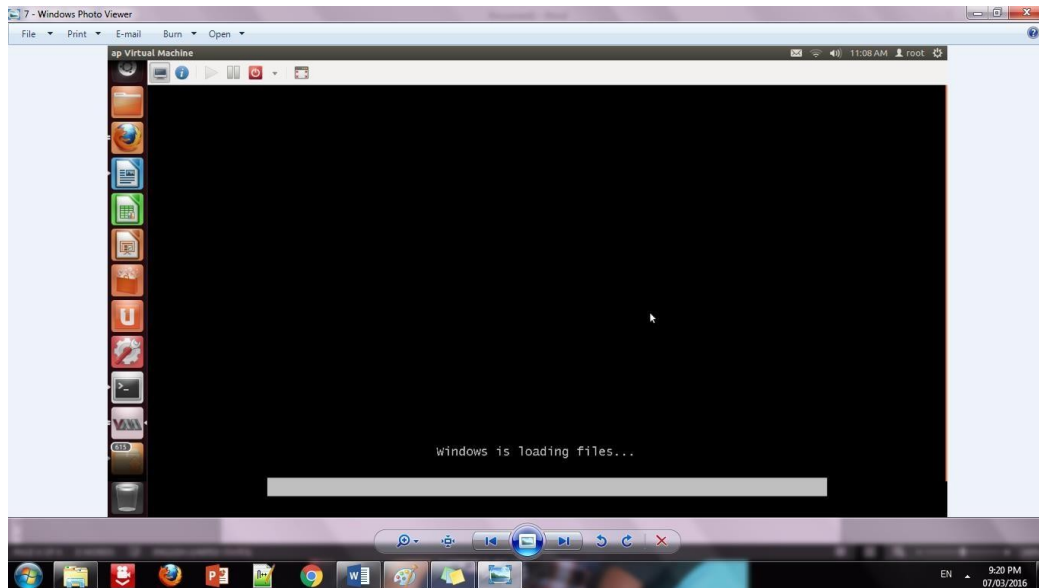




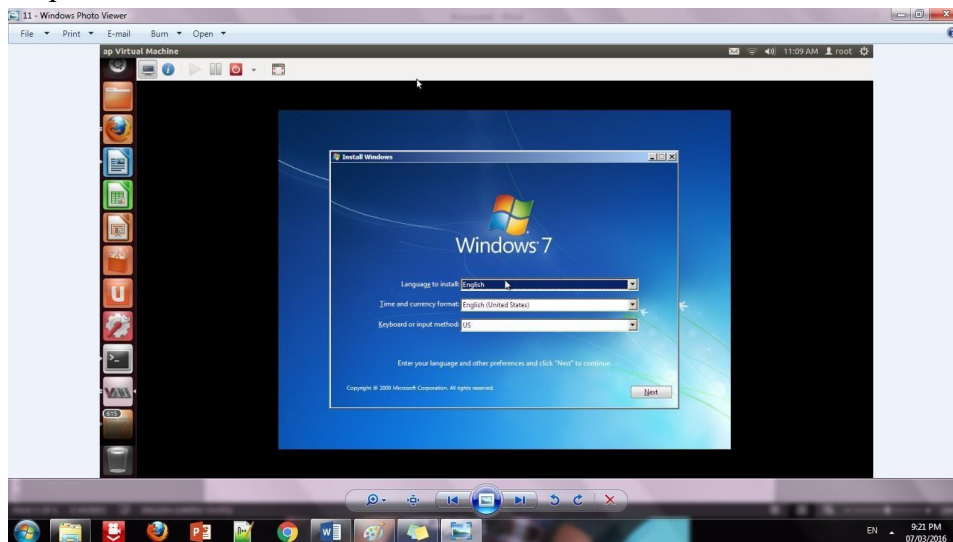
Step 7 : Install windows operating system on virtual machine



Step 8: Installation of windows on virtual machine

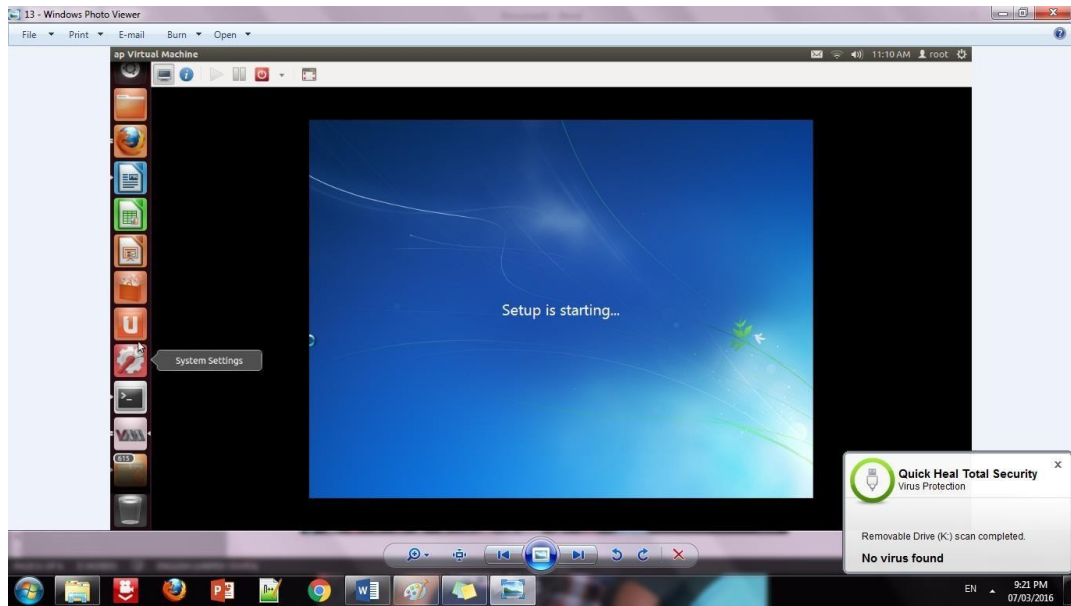


Step 9: Installation of windows 7 on virtual machine



Step 10: Initialization of windows on virtual machine

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8. 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 windows onto it.

Ex 3. Study and implementation of Infrastructure as a Service

1. **Aim:** To study and implementation of Infrastructure as a Service
2. **Objectives:** From this experiment, the student will be able to,
 - Understand concepts of virtualization and to use cloud as Infrastructure as a services.
 - Learn the technique and its complexity
 - Understand the importance of this technique from application point of view
3. **Outcomes:** The learner will be able,
 - To match the industry requirements in the domains of Database management, Programming and Networking with limited infrastructure.
 - To analyze the local and global impact of computing on individuals, organizations, and society.
 - To use current techniques, skills, and tools necessary for computing practice.
4. **Hardware / Software Required:** Ubuntu operating system, Virtual machine, WAMP/ZAMP server, Any tool or technology can be used for implementation of web application e.g., JAVA, PHP, etc.
5. **Theory:**
6. **Procedure:**

Installation Steps: (<https://docs.openstack.org/devstack/latest/guides/single-machine.html>)

Add user

```
useradd -s /bin/bash -d /opt/stack -m stack
```

```
apt-get install sudo -y
```

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

login as stack user

Download DevStack

```
sudo apt-get install git || sudo yum install git
```

```
git clone http://git.openstack.org/openstack-dev/devstack
```

```
cd devstack
```

Run DevStack

Now to configure **stack.sh**. DevStack includes a sample in **devstack/samples/local.conf**. Create **local.conf** as shown below to do the following:

- Set **FLOATING_RANGE** to a range not used on the local network, i.e. 192.168.1.224/27. This configures IP addresses ending in 225-254 to be used as floating IPs.
- Set **FIXED_RANGE** and **FIXED_NETWORK_SIZE** to configure the internal address space used by the instances.
- Set **FLAT_INTERFACE** to the Ethernet interface that connects the host to your local network. This is the interface that should be configured with the static IP address mentioned above.
- Set the administrative password. This password is used for the **admin** and **demo** accounts set up as OpenStack users.
- Set the MySQL administrative password. The default here is a random hex string which is inconvenient if you need to look at the database directly for anything.
- Set the RabbitMQ password.
- Set the service password. This is used by the OpenStack services (Nova, Glance, etc) to authenticate with Keystone.

local.conf should look something like this:

```
[[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=supersecret

DATABASE_PASSWORD=iheartdatabases

RABBIT_PASSWORD=flopsymopsy

SERVICE_PASSWORD=iheartksl
```

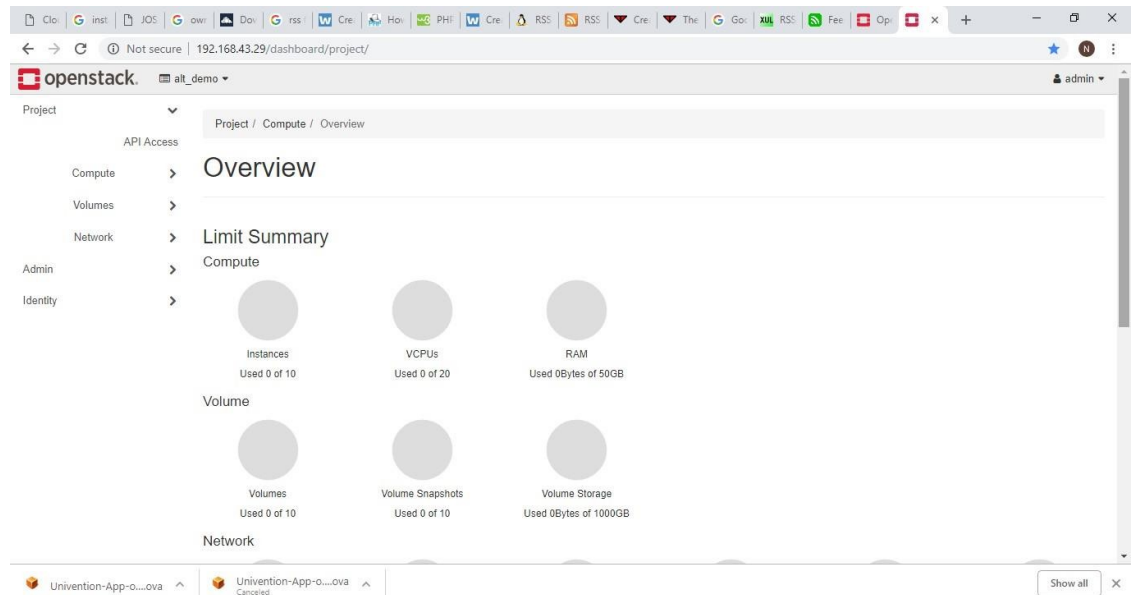
Run DevStack:

```
./stack.sh
```

A seemingly endless stream of activity ensues. When complete you will see a summary of **stack.sh**'s work, including the relevant URLs, accounts and passwords to poke at your shiny new OpenStack.

Using OpenStack

At this point you should be able to access the dashboard from other computers on the local network. In this example that would be `http://192.168.43.29/` for the dashboard (aka Horizon). Launch VMs and if you give them floating IPs and security group access those VMs will be accessible from other machines on your network.



7. Conclusion:

We have installed Ubuntu/Xen as bare metal hypervisor and implemented it. It provides access to computing resources in a virtual environment. With the help of Infrastructure as a service we can build our own IT platform. We can install Windows Operating System on Ubuntu and vice versa.

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Ex 4: Study and implementation of Storage as a Service

1. **Aim:** To study and implementation of Storage as a Service

2. **Objectives:** From this experiment, the student will be able to

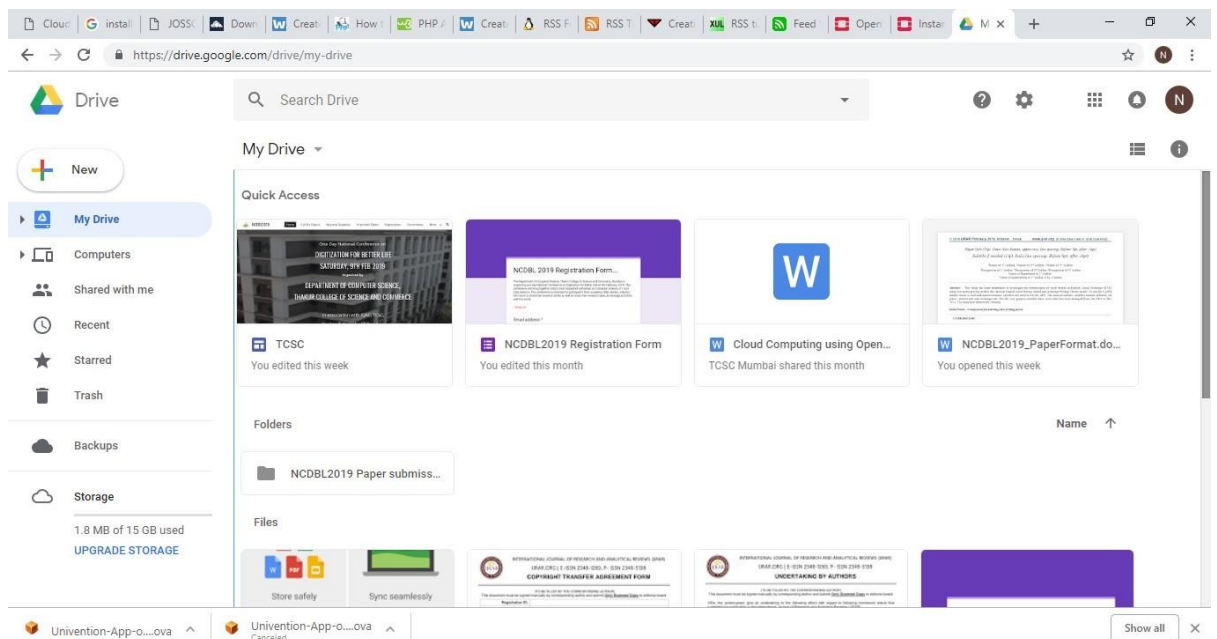
- To make the students understand use of cloud as Platform, Storage as a services.
- To learn the efficient tools to implement the technique

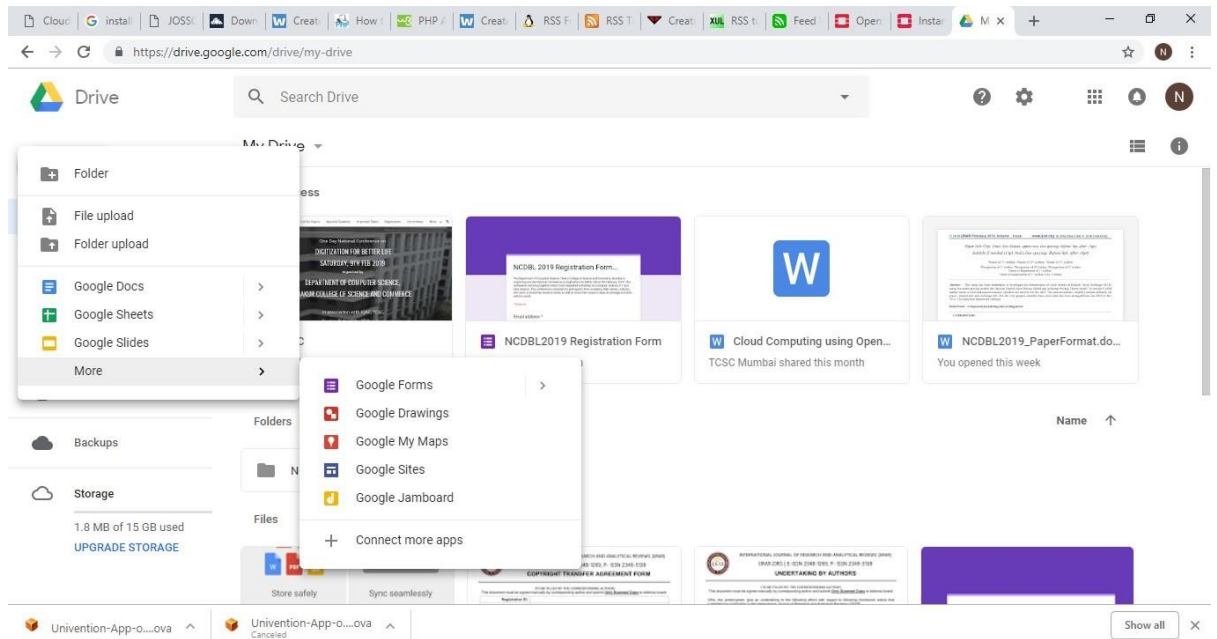
3. **Outcomes:** The learner will be able to

4. **Hardware / Software Required:**

5. **Theory:**

6. **Result:**





7. 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.

Ex 5: Study and implementation of identity management

- 1. Aim:** To study and implementation of identity management
- 2. Objectives:** From this experiment, the student will be able to,
 - Understand concepts of virtualization and to use cloud as Infrastructure as a services.
 - Learn the technique and its complexity
 - Understand the importance of this technique from application point of view
- 3. Outcomes:**
- 4. Hardware / Software Required:**
- 5. Theory:**

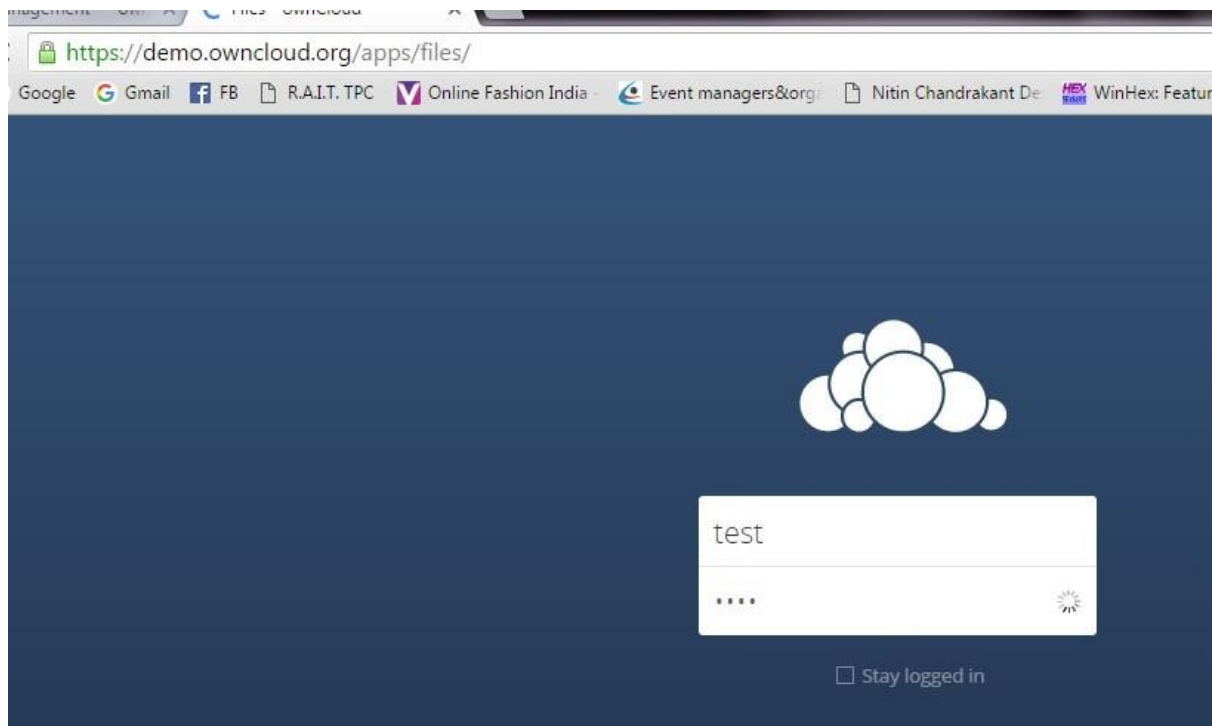
Identity Management

- 6. Procedure:**

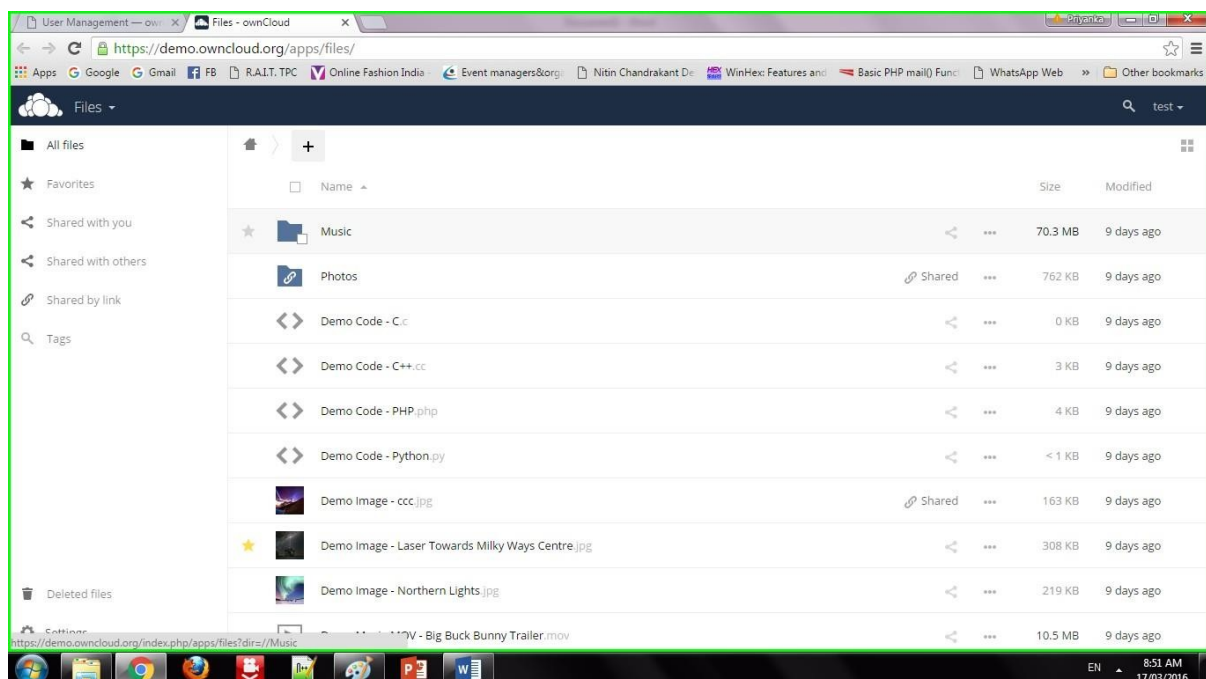
- 7. Result:**

SNAPSHOTS

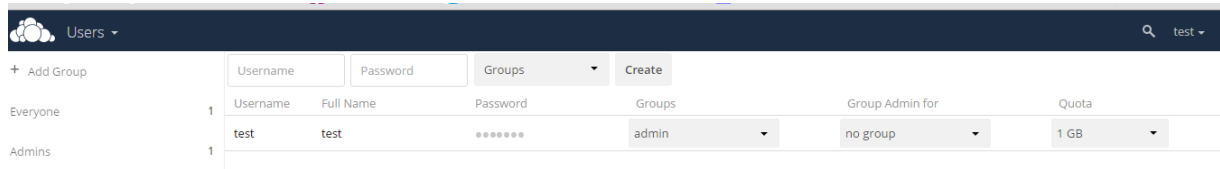
OwnCloud is open source file sync and share software for everyone from individuals operating the free ownCloud Server edition, to large enterprises and service providers operating the ownCloud Enterprise Subscription. ownCloud provides a safe, secure, and compliant file synchronization and sharing solution on servers that you control. You can share one or more files and folders on your computer, and synchronize them with your ownCloud server.



Step 2 : By default, the ownCloud Web interface opens to your Files page. You can add, remove, and share files, and make changes based on the access privileges set by you (if you are administering the server) or by your server administrator. You can access your ownCloud files with the ownCloud web interface and create, preview, edit, delete, share, and re-share files. Your ownCloud administrator has the option to disable these features, so if any of them are missing on your system ask your server administrator.

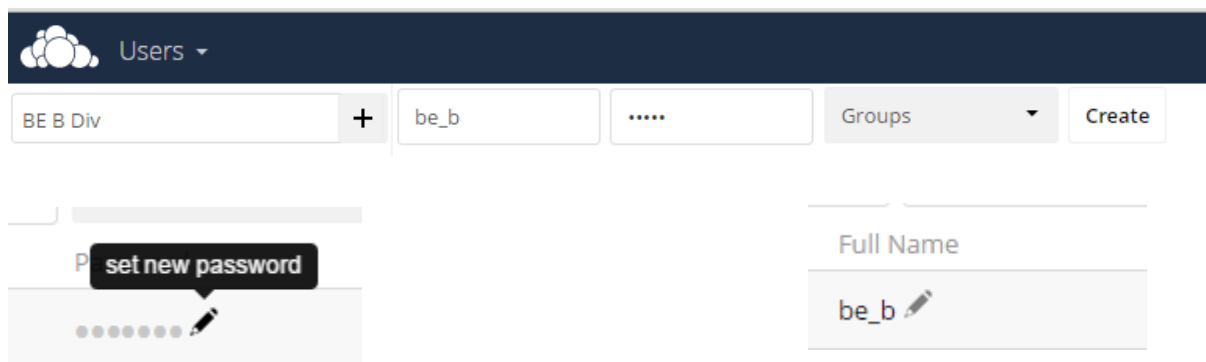


Step 3: Apps Selection Menu: Located in the upper left corner, click the arrow to open a dropdown menu to navigate to your various available apps. **Apps Information field:** Located in the left sidebar, this provides filters and tasks associated with your selected app. **Application View:** The main central field in the ownCloud user interface. This field displays the contents or user features of your selected app.



The screenshot shows the 'Users' management page in ownCloud. At the top, there's a header with the 'Users' menu and a search bar. Below the header, there's a 'Create' button and a table of users. The table has columns for Username, Full Name, Password, Groups, Group Admin for, and Quota. A user named 'test' is listed with a full name of 'test', a password of '*****', a group of 'admin', and a quota of '1 GB'.

Username	Full Name	Password	Groups	Group Admin for	Quota
test	test	*****	admin	no group	1 GB



The screenshot shows the 'Create' form for a new user. It includes fields for 'BE B Div', 'be_b', and a password field with a 'set new password' button. There's also a 'Groups' dropdown and a 'Create' button. Below the form, there's a 'Full Name' field with the value 'be_b' and a pencil icon for editing.

Step 4: Share the file or folder with a group or other users, and create public shares with hyperlinks. You can also see who you have shared with already, and revoke shares by clicking the trash can icon. If username auto-completion is enabled, when you start typing the user or group name ownCloud will automatically complete it for you. If your administrator has enabled email notifications, you can send an email notification of the new share from the sharing screen.

Sharing

☒ Allow apps to use the Share API

☒ Allow users to share via link

☒ Enforce password protection

☒ Allow public uploads

☒ Set default expiration date

Expire after days ☒ Enforce expiration date

☒ Allow resharing

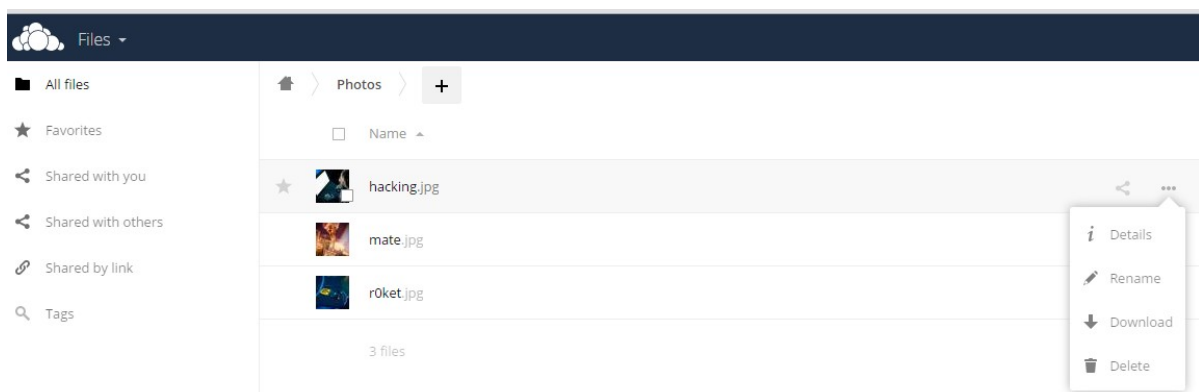
☒ Restrict users to only share with users in their groups

☒ Allow users to send mail notification for shared files

☒ Exclude groups from sharing

Groups ▼

These groups will still be able to receive shares, but not to initiate them.





hacking.jpg

★ 228 KB, 9 days ago

Collaborative tags

Activities Comments **Sharing** Versions

Share with users or groups ...

☒ Share link

<https://demo.owncloud.org/s/T0GPHlNNpC5vIVp>

☐ Password protect

☐ Set expiration date

Activities Comments **Sharing**

Share with users or groups ...

admin (group) ☒ can share ☒ can edit



admin

Step 5: Five Share permissions are :

Can share; allows the users you share with to re-share.

Can edit; allows the users you share with to edit your shared files, and to collaborate using the Documents app.

Create; allows the users you share with to create new files and add them to the share.

Change; allows uploading a new version of a shared file and replacing it.

Delete; allows the users you share with to delete shared files.

+	Username	Password	Groups	Create		
2	Username	Full Name	Password	Groups	Group Admin for	Quota
1	my_circle	my_circle	users, be_b div	be_b div	5 GB

8. Conclusion:

We have studied how to use ownCloud for ensuring identity management of the users. We can create multiple groups and provide privileges to view or modify data as per defined permissions. It also enables simplified look and feel to be used by anyone.

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Ex 6: Study Cloud Security management

1. Aim: To Study Cloud Security management

2. Objectives: From this experiment, the student will be able,

- 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

3. Outcomes: The learner will be able to

- Student can study and implement single-sign-on.
- To use current techniques, skills, and tools necessary for computing practice.
- To match the industry requirements in the domains of Database management, Programming and Networking with the required management skills.

4. Hardware / Software Required: Ubuntu operating system, Virtual machine, WAMP/ZAMP server, Any tool or technology can be used for implementation of web application e.g., JAVA, PHP, etc.

5. 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 particular concern. With more organizations using cloud computing and associated cloud providers for data operations, proper security in these and other potentially vulnerable areas have become a priority for organizations contracting with a cloud computing provider.

Cloud computing security processes should address the security controls the cloud provider will incorporate to maintain the customer's data security, privacy and compliance with necessary regulations. The processes will also likely include a business continuity and databackup plan in the case of a cloud security breach.

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. Note that - as with any commercial software - the controls they implement may not necessarily fully mitigate all the risks they have identified, and that they may not necessarily have identified all the risks that are of concern to customers. Consequently, customers may also need to assure themselves that cloud applications are adequately secured for their specific purposes, including their compliance obligations.

6. Procedure:

Security using MFA(Multi Factor Authentication) device code:

- 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

if you are registering first time then select "I am a new user" radio button

5) click on "sign in using our secure server" button

6) follow the instruction and complete the formalities

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

sign out from

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

All AWS project can be viewed by you, but you cant make any changes in it or you cant create new thing as you are not paying any charges to amazon (for reason refer step:6)

To create the user in a root user follow the steps mentioned below:

1) click on "Identity and Access Management" in security and identity project

2) click in "Users" from dashboard

It will take you to "Create New Users"

click on create new user button

enter the "User Name"

(select "Generate and access key for each user" checkbox, it will create a user with a specific key)

click on "Create" button at right bottom

3) once the user is created click on it

4) go to security credentials tab

5) click on "Create Access Key", it will create an access key for user.

6) click on "Manage MFA device" it will give you one QR code displayed on the screen

you need to scan that QR code on your mobile phone using barcode scanner (install it in mobile phone)you also need to install "Google Authenticator" in your mobile phone to generate the MFA code

7) Google authenticator will keep on generating a new MFA code after every 60 seconds

that code you will have to enter while logging as a user.

Hence, the security is maintained by MFA device code...

one can not use your AWS account even if it may have your user name and password, because MFA code is on your MFA device (mobile phone in this case) and it is getting changed after every 60 seconds.

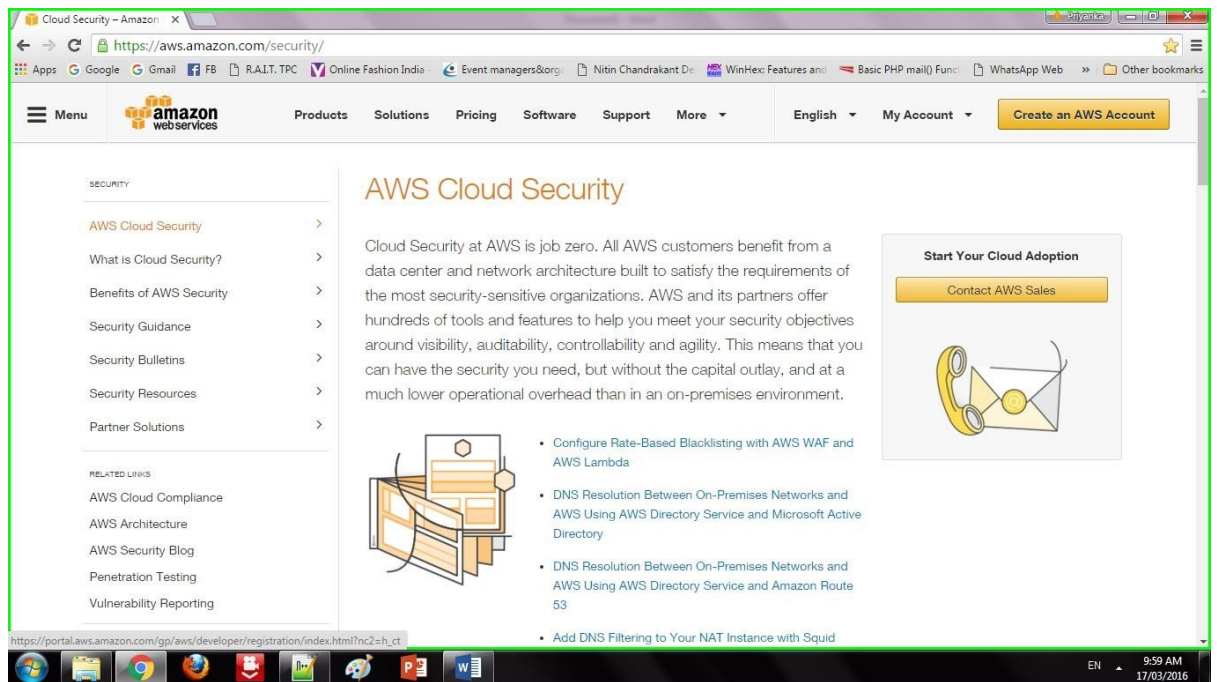
Permissions in user account:

After creating the user by following above mentioned steps; you can give certain permissions to specific user

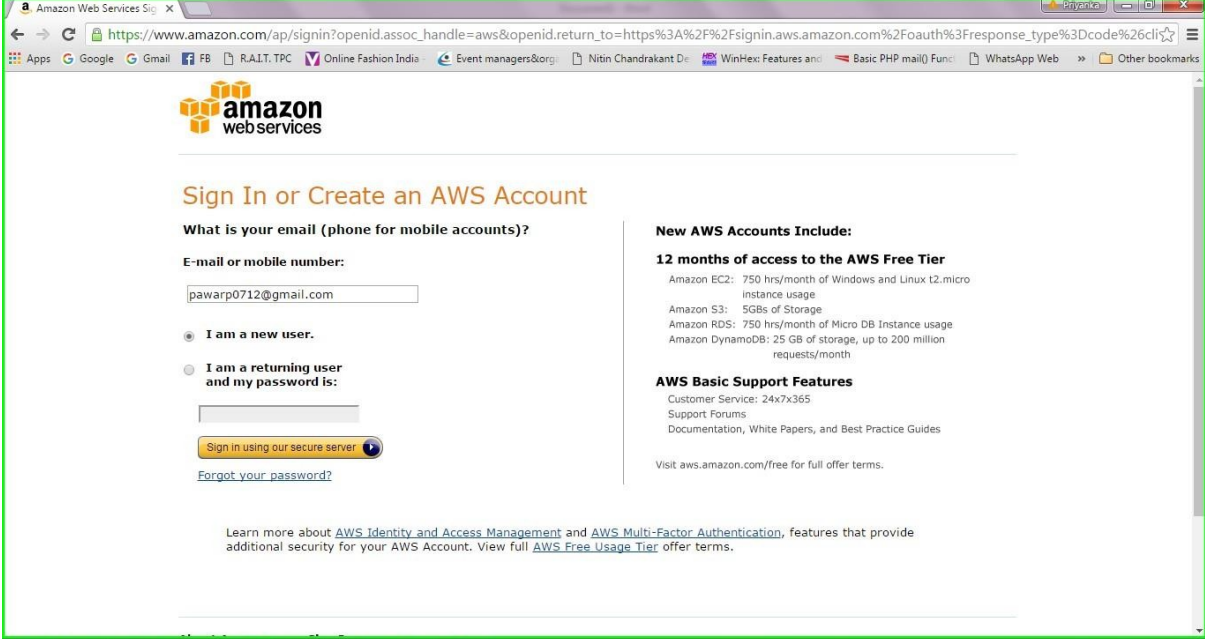
- 1) click on created user
- 2) goto "Permissions" tab
- 3) click on "Attach Policy" button
- 4) select the needed policy from given list and click on apply.

7. Result:

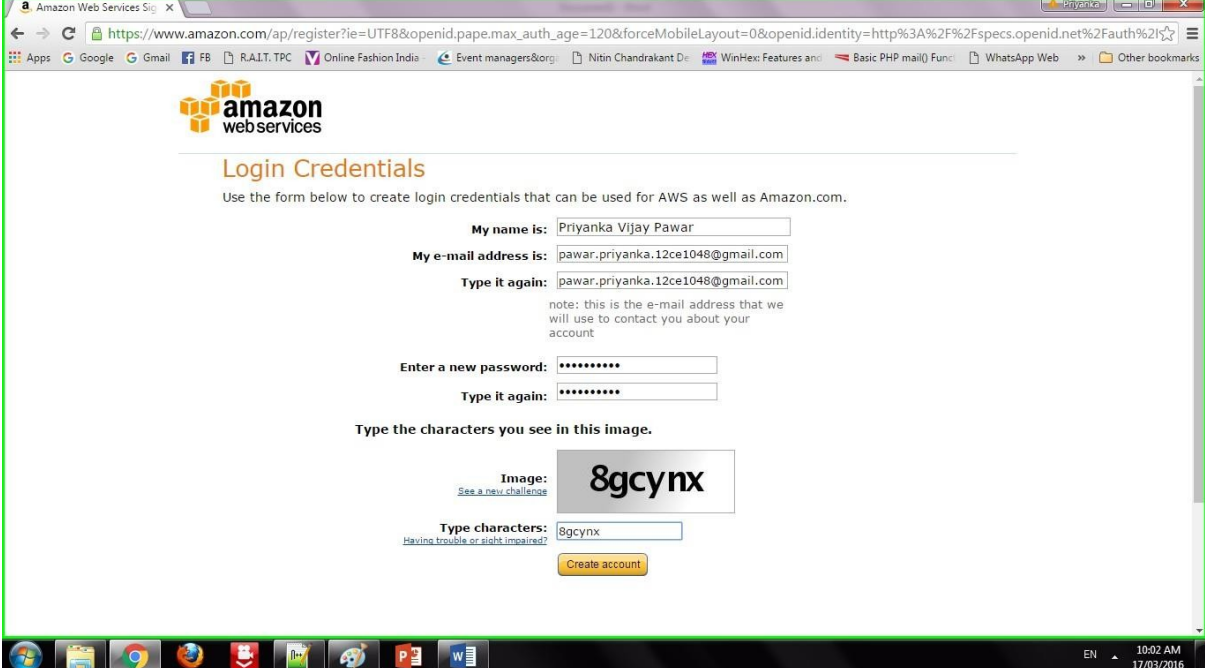
Step 1 :goto aws.amazon.com



Step 2 : Click on "My Account". Select "AWS management console" and click on it. Give Email id in the required field



The screenshot shows the Amazon Web Services Sign In page. The header includes the Amazon Web Services logo. The main heading is "Sign In or Create an AWS Account". Below this, there is a section titled "What is your email (phone for mobile accounts)?" with a sub-label "E-mail or mobile number:". A text input field contains the email "pawarp0712@gmail.com". There are two radio buttons: "I am a new user." (selected) and "I am a returning user and my password is:". Below the radio buttons is a password input field and a "Sign in using our secure server" button. A link "Forgot your password?" is also present. To the right, there is a section titled "New AWS Accounts Include:" with a sub-heading "12 months of access to the AWS Free Tier". This section lists various AWS services and their free usage limits: Amazon EC2 (750 hrs/month of Windows and Linux t2.micro instance usage), Amazon S3 (5GBs of Storage), Amazon RDS (750 hrs/month of Micro DB Instance usage), and Amazon DynamoDB (25 GB of storage, up to 200 million requests/month). Below this, there is a section titled "AWS Basic Support Features" listing "Customer Service: 24x7x365", "Support Forums", and "Documentation, White Papers, and Best Practice Guides". At the bottom, there is a link to "Visit aws.amazon.com/free for full offer terms." and a paragraph about "AWS Identity and Access Management" and "AWS Multi-Factor Authentication".



The screenshot shows the Amazon Web Services Register page. The header includes the Amazon Web Services logo. The main heading is "Login Credentials". Below this, there is a paragraph: "Use the form below to create login credentials that can be used for AWS as well as Amazon.com." The form contains several fields: "My name is:" with the value "Priyanka Vijay Pawar", "My e-mail address is:" with the value "pawar.priyanka.12ce1048@gmail.com", and "Type it again:" with the value "pawar.priyanka.12ce1048@gmail.com". A note states: "note: this is the e-mail address that we will use to contact you about your account". Below these fields are two password fields: "Enter a new password:" and "Type it again:", both containing masked characters. Below the password fields is a section titled "Type the characters you see in this image." with a sub-label "Image:". The image shows the text "8gcynx". Below the image is a text input field labeled "Type characters:" containing the text "8gcynx". A link "Having trouble or sight impaired?" is also present. At the bottom right of the form is a "Create account" button.

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Contact Information

☐ Company Account ☒ Personal Account

* Required Fields

Full Name* Priyanka Vijay Pawar

Country* India

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

Address* 328, Shri Krupa Sadan, Thakurnagar
Mhatavli, Nagaon-Uran

City* Uran

State / Province or Region* Maharashtra

Postal Code* 400702

Phone Number* 7738531274

Security Check ?

CETE58

Refresh Image

Step 3: Addition of security features

Menu **amazon web services** Products Solutions Pricing Software Support More

English **My Account** Complete Sign Up

SECURITY

- AWS Cloud Security >
- What is Cloud Security? >
- Benefits of AWS Security >

AWS Cloud Security

Cloud Security at AWS is job zero. All AWS customers benefit from a data center and network architecture built to satisfy the requirements of the most security-sensitive organizations. AWS and its partners offer

MY ACCOUNT

- AWS Management Console
- Account Settings
- Billing & Cost Management
- Security Credentials

Contact AWS Sales

Step 4: Sign in to an AWS account

amazon web services

Sign In or Create an AWS Account

What is your email (phone for mobile accounts)?

E-mail or mobile number:

pawar.priyanka.12ce1048@gmail.com

☐ I am a new user.

☒ I am a returning user and my password is:

Sign in using our secure server

Forgot your password?

New AWS Accounts Include:

12 months of access to the AWS Free Tier

- Amazon EC2: 750 hrs/month of Windows and Linux t2.micro instance usage
- Amazon S3: 5GBs of Storage
- Amazon RDS: 750 hrs/month of Micro DB Instance usage
- Amazon DynamoDB: 25 GB of storage, up to 200 million requests/month


AWS Basic Support Features

- Customer Service: 24x7x365
- Support Forums
- Documentation, White Papers, and Best Practice Guides

Visit aws.amazon.com/free for full offer terms.

Learn more about [AWS Identity and Access Management](#) and [AWS Multi-Factor Authentication](#), features that provide additional security for your AWS Account. View full [AWS Free Usage Tier](#) offer terms.


 **Service Catalog**
Create and Use Standardized Products


 **Trusted Advisor**
Optimize Performance and Security

Security & Identity

 **Identity & Access Management**
Manage User Access and Encryption Keys

 **Directory Service**
Host and Manage Active Directory

 **Inspector** PREVIEW
Analyze Application Security

 **WAF**

AWS **Services** **Edit** Priyanka Vijay Pawar Global Support

Dashboard
Search IAM
Details
Groups
Users
Roles
Policies
Identity Providers

Create New Users **User Actions**

Filter

<input type="checkbox"/>	User Name	Groups	Password	Password Last Used	Access Keys	Creation Time
No records found.						

Step 5 : Creation of users

AWS **Services** **Edit**

Create User

Enter User Names:

- Priyanka
- Mansi
- Manan
- Nilam
- Santosh

Maximum 64 characters each


☒ **Generate an access key for each user**

Users need access keys to make secure REST or Query protocol requests to AWS :

AWS **Services** **Edit** Priyanka Vijay Pawar

Create User

☒ Your 1 User(s) have been created successfully.
This is the last time these User security credentials will be available for download.
You can manage and recreate these credentials any time.
[Hide User Security Credentials](#)

 **pawarpriyankavijay**

Access Key ID:	AKIAJ3BDWCXLO7E3DTXA
Secret Access Key:	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

Step 6: Adding users to group

The screenshot shows the AWS IAM console interface. The top navigation bar includes the AWS logo, 'AWS' dropdown, 'Services' dropdown, and 'Edit' dropdown. The left sidebar contains a 'Dashboard' link, a 'Search IAM' input field, and a list of navigation items: 'Details', 'Groups', 'Users' (highlighted), 'Roles', 'Policies', 'Identity Providers', 'Account Settings', 'Credential Report', and 'Encryption Keys'. The main content area shows the breadcrumb 'IAM > Users > pawarpriyankavijay' and a 'Summary' section with the following details:

- User ARN:** arn:aws:iam::911721231659:user/pawarpriyankavijay
- Has Password:** No
- Groups (for this user):** 0
- Path:** /
- Creation Time:** 2016-03-17 10:12 UTC+0530

Below the summary, there are four tabs: 'Groups' (selected), 'Permissions', 'Security Credentials', and 'Access Advisor'. The 'Groups' tab displays the message 'This user does not belong to any groups.' and a blue button labeled 'Add User to Groups'.

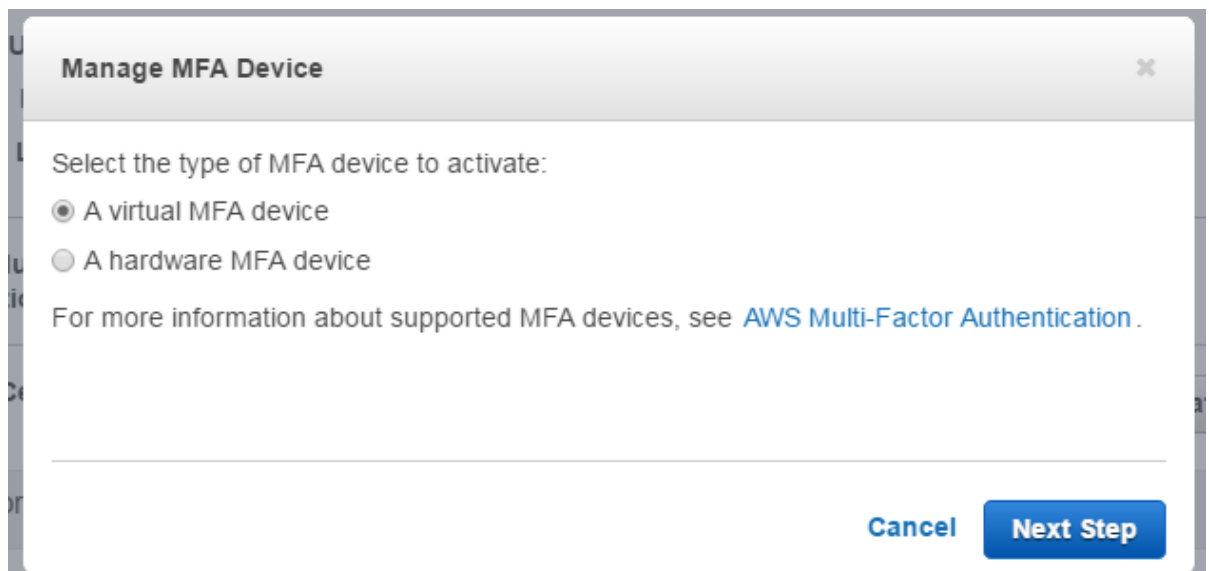
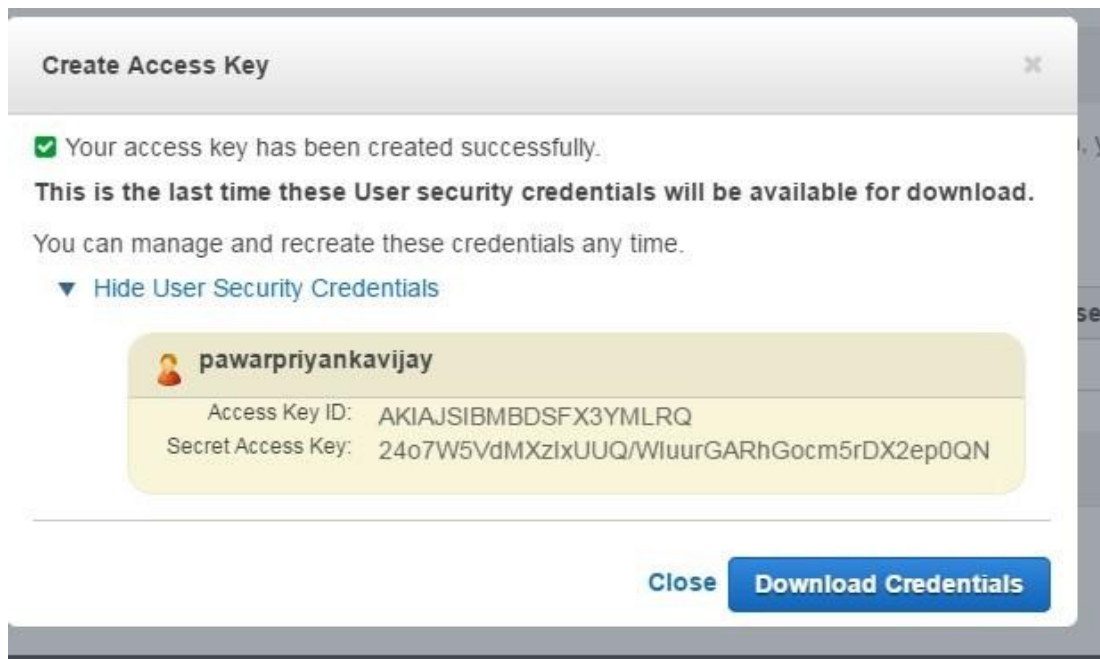
Step 7: Creating Access key

The screenshot shows the 'Security Credentials' tab for the user 'pawarpriyankavijay'. The tab bar at the top includes 'Groups', 'Permissions', 'Security Credentials' (selected), and 'Access Advisor'. The 'Access Keys' section contains a description: 'Use access keys to make secure REST or Query protocol requests to any AWS service API. For your protection, you should never share your secret keys with anyone. In addition, industry best practice recommends frequent key rotation. [Learn more about Access Keys](#)'. Below this is a blue button labeled 'Create Access Key'. A table lists the existing access keys:

Access Key ID	Created	Last Used	Last Used Service	Last Used Region	Status	Actions
AKIAJ3BDWCXLO7E3DTXA	2016-03-17 10:12 UTC+0530	N/A	N/A	N/A	Active	Make Inactive Delete

Below the table is the 'Sign-In Credentials' section, which shows the 'User Name' as 'pawarpriyankavijay' and 'Password' as 'No'. A 'Manage Password' button is located to the right of the password field.

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Step 8 : Setting permissions to users

Groups

Users

Roles

Policies

Identity Providers

Account Settings

Credential Report

Encryption Keys

Path: /

Creation Time: 2016-03-17 10:12 UTC+0530

Groups Permissions Security Credentials Access Advisor

Managed Policies

There are no managed policies attached to this user.

[Attach Policy](#)

Attach Policy

Select one or more policies to attach. Each user can have up to 10 policies attached.

Filter: Policy Type

Showing 193 results

	Policy Name	Attached Entities	Creation Time	Edited Time
<input checked="" type="checkbox"/>	AdministratorAccess	0	2015-02-07 00:09 UTC+0530	2015-02-07 00:09 UTC+0530
<input checked="" type="checkbox"/>	AmazonAPIGatewayAdministr...	0	2015-07-09 23:04 UTC+0530	2015-07-09 23:04 UTC+0530
<input type="checkbox"/>	AmazonAPIGatewayInvokeFul...	0	2015-07-09 23:06 UTC+0530	2015-07-09 23:06 UTC+0530
<input type="checkbox"/>	AmazonAPIGatewayPushToCL...	0	2015-11-12 05:11 UTC+0530	2015-11-12 05:11 UTC+0530

Groups

Users

Roles

Policies

Identity Providers

Account Settings

Credential Report

Encryption Keys

Groups Permissions Security Credentials Access Advisor

Managed Policies

The following managed policies are attached to this user. You can attach up to 10 managed policies.

[Attach Policy](#)

Policy Name	Actions
AdministratorAccess	Show Policy Detach Policy Simulate Policy
AmazonAPIGatewayAdministrator	Show Policy Detach Policy Simulate Policy

IAM Policy Simulator

Mode: Existing Policies

Priyanka Vijay Pawar

Policies

Back

Editing policy: AdministratorAccess

AWS Managed Policy

Policy Simulator

Select service Select actions Select All Deselect All Reset Contexts Clear Results Run Simulation

Global Settings

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

Service	Action	Resource Type	Simulation Resource	Permission
---------	--------	---------------	---------------------	------------

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8. 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.

Ex 7: Write a program for web feed

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

Technology: XML / PHP, HTML

<https://www.w3schools.in/php/php-rss-feed/>

RSS technology is used by millions of users around the world to get the latest information from their favorite websites.

<https://www.xul.fr/en-xml-rss.html>

Building and Using an RSS Feed

Ex 8: Study and implementation of Single-Sing-On.

Title: Study and implementation of Single-Sing-On.

Concept: Single Sing On (SSO),openID

Objective: is to understand the concept of access control in cloud and single sing on (SSO), Use SSO and advantages of it, and also students should able to implementation of it.

Scope: installing and using JOSSO

Technology: JOSSO

Ex 9: User Management in Cloud.

Concept: Administrative features of Cloud Managenet ,User Management

Objective: is to understand how to create, manage user and group of users accounts.

Scope: Installing and using Administrative features of ownCloud Technology:
ownCloud

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Ex 10: Case study on Amazon EC2/Microsoft Azure/Google Cloud Platform

GCP

The screenshot shows the Google Cloud Platform (GCP) console dashboard. The top navigation bar includes the Google Cloud logo, the project name 'GirishLinux', and a search bar. Below the navigation bar, the 'ACTIVITY' tab is selected. The dashboard is divided into several sections:

- Project info:** Displays the project name 'GirishLinux', Project ID 'graphic-charter-218402', and Project number '94398552761'. A link to 'Go to project settings' is provided.
- Resources:** Lists the resources in the project, including 'Compute Engine' (4 instances) and 'Cloud Storage' (1 bucket).
- Compute Engine:** Shows a CPU usage graph. The graph indicates 'No data is available for the selected time frame.' A link to 'Go to Compute Engine' is provided.
- Google Cloud Platform status:** Displays 'All services normal' and a link to 'Go to Cloud status dashboard'.
- Billing:** Shows 'Estimated charges' for the billing period Dec 1 - 14, 2018, with a total of 'INR ₹0.00'. A link to 'View detailed charges' is provided.
- Error Reporting:** Displays 'No sign of any errors. Have you set up Error Reporting?' and a link to 'Show all'.

The bottom of the dashboard shows a list of running instances, including 'Univention-App-o...ova' and 'Univention-App-o...ova' (Cancelled).

The screenshot shows the Google Cloud Platform (GCP) console 'VM instances' page. The left sidebar contains a navigation menu with options like 'VM instances', 'Instance groups', 'Instance templates', 'Sole tenant nodes', 'Disks', 'Snapshots', 'Images', 'TPUs', and 'Marketplace'. The main content area displays a table of VM instances:

Name	Zone	Recommendation	Internal IP	External IP	Connect
cluster-ad9c-m	us-east1-b		10.142.0.4 (nic0)	None	SSH
cluster-ad9c-w-0	us-east1-b		10.142.0.2 (nic0)	None	SSH
cluster-ad9c-w-1	us-east1-b		10.142.0.5 (nic0)	None	SSH
moodle-1-vm	us-central1-f		10.128.0.3 (nic0)	104.198.204.117 E3	SSH

The bottom of the page shows a list of running instances, including 'Univention-App-o...ova' and 'Univention-App-o...ova' (Cancelled).

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