

Practical No :- 01

Aim :- To study cloud architecture and cloud computing model.

Hardware/ Software Required :- Ubuntu operating system, Internet.

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 :-

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

* Advantages and disadvantages of cloud computing :-

- a) 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. 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 You avoid equipment going out of date and other familiar IT problems like ensuring system security and reliability.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.
- b) 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.

* Types of cloud computing :-

i) Infrastructure as a Service (IaaS) :-

If means you are 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.

(ii) Software as a Service (SaaS) :-

If 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.

(iii) Platform as a Service (PaaS) :-

It 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.

* Cloud computing services (Services in Cloud Computing) :-

There are three types of services and they are Private, Public & Hybrid.

(i) Private :- 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.

(ii) Public :- In the public cloud model, a third-party provider delivers the 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.

(iii) Hybrid :-

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

Conclusion :-

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

Practical No :- 02

Aim :- Installation and Configuration of virtualization using KVM.

Hardware / Software Required :- Ubuntu operating system, open source software KVM, Internet.

Theory :-

Virtualization is software that separates physical infrastructure 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 installed. There are three areas of IT where virtualization is making headways, network virtualization, storage virtualization and server virtualization.

- ① 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 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.

- (ii) 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).
- (iii) Server Virtualization is the masking of server resources from server users. The intention is to spare the user from having to understand and manage complicated details of server resource while increasing resource sharing and utilization and maintaining the capacity to expand later.

Procedure :-

Installation Steps :-

- ① #sudo grep -c "svm|lvmx" /proc/cpuinfo
- ② #sudo apt-get install qemu-kvm
- ③ #sudo adduser root
- ④ #sudo adduser root libvirtd

After running this command, log out and log back in as ~~root~~ root

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

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

- ⑥ Open Virtual Machine Manager application and Create Virtual Machine.

```
# virt-manager
```

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.

Practical No :- 03

Aim :- To study and implementation of Inst Infrastructure as a Service.

Hardware / Software Required :- usb web server, apache, php, mysql, phpmyadmin, Internet

Theory :-

USBWebserver is a freeware web server package released by a developer team consisting of two people, including Leon de Kries from Border-IT. This web server bundles the Windows versions of the programming language PHP, the database program MySQL, the web server Apache and the PHP program to manage databases via the Internet PhpMyAdmin. All these programs, like USBWebserver, are free ware programs. In addition, USBWebserver is designed to run from USB sticks or CD-ROMs, making it easier to transport and use. However, the program also simply runs from the hard disk.

USBWebserver is perfect for demonstrating an offline version of your website. It is also develop PHP websites anywhere and anytime. There will be no need for expensive hosting & it works at multiple locations on the projects.

Procedure :-

- ① Open USBWebserver.
- ② USB_Webserver window will appear by clicking down at right ^{bottom} side of taskbar.
- ③ To change the port, Go to settings and change port to 8081 and save it.
- ④ To run index.php file, Click on localhost ^{from} in General or in the URL, type 'localhost:8081' and then file will run.
- ⑤ In the Output, "Hello trcs" will be shown.
- ⑥ For database, Click on PHPMyadmin and Login by username = root and default password = usbw.
- ⑦ After this, Database will be shown.

Note :- Apache and MySQL both should be Green ticked while running website.

Conclusion :-

We can run website without installation of WAMP/XAMP Server. Just by having USBWebser, we can run our website.

Practical No:- 04

Aim :- To study and implementation of Storage as a Service

Hardware / Software Required :- -

Theory :-

Google Forms is a survey administration software included as part of the free, web-based Google Docs Editors suite offered by Google. The service also includes, Google Docs, Google Sheets, Google Slides, Google Drawings, Google Sites and Google Keep. Google Forms is only available as a web application. The app allows users to create and edit surveys online while collaborating with other users in real-time. The collected information can be automatically entered into a spreadsheet.

The Google Forms service has undergone several updates over the years. Features include, but are not limited to, menu search, shuffle of questions for randomized order, limiting responses to once per person, shorter URLs, custom themes, automatically generating answer suggestions when creating form and an 'Upload File' option for users answering questions that require them to share content or files from their computer or Google Drive. Users can analyze responses to their form using either the built-in analysis tools, or export them to a new or existing Google Sheets spreadsheet that updates as new responses are received.

Procedure :-

Step 1 :- Go to forms.google.com or Google Drive.

The first step is to open Google Forms. You can do this by going to forms.google.com in your web browser, or by going to Google Drive and Selecting "New" > "Google Forms".

Step 2 :- Select a template.

Next step is to select a template. Google Forms offers a variety of templates to choose from, so you can pick the one that best suits your needs. There are templates for RSVP, Contact info, Party invites and more.

Step 3 :- Change the title and add a description of your form.

Step 4 :- Adjust questions and answer.

Once title & form description is done, you have to start adding questions. Google Forms makes it easy to add a variety of different questions including multiple-choice, drop-down, short ans, etc.

Step 5 :- Customize the Google Form theme.

Step 6 :- Preview your Form.

Conclusion :- Google Docs provide an efficient way for storage of data.

If fits well in Storage as a Service (SaaS). It has varied options to create documents, presentation 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.

Practical No :- 05

Aim :- To Study and implementation of identity management

Hardware / Software Required :-

Theory :-

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.

Procedure :-

- ① 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 & 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.
- ② 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.

③ 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 user-name 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.

④ File Share permissions are -

- i) Can share; allows the users you share with to re-share.
- ii) Can edit; allows the users you share with to edit your shared files, and to collaborate using the Documents app.
- iii) Create; allows the users you share with to create new files and add them to the share.
- iv) Change; allows uploading a new version of a shared file and replacing it.
- v) Delete; allows the users you share with to delete shared files.

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 & feel to be used by anyone.

Practical No :- 06

Aim :- To study cloud Security management.

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

Theory :-

Cloud computing security is the set of control-based technologies and policies designed to adhere to regulatory compliance rules & 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 regulatn.

i) 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 are sufficiently robust to minimize the possibility of disruption. This is

normally achieved by serving cloud applications from 'world class' data centers.

(ii) 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, codes of conduct, policies, etc.

(iii) 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.

Procedure :- Security using MFA (Multi Factor Authentication) device code

- (1) go to 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)
make sign out from it.
- ⑦ Again go to "My Account".
select "AWS management console" and click on it.
Sign in again by entering the username 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 can't make any
~~changes~~ changes in it or you can't create new things as you
are not paying any charges to amazon.

To ~~create~~ the user in a root user

Conclusion :-

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

Practical No:- 07

Aim :- Case study on Google cloud Platform.

Hardware / Software Required :- Google cloud Platform (GCP)

Theory :-

Google cloud platform (GCP), offered by google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search and YouTube. Alongside a set of management tools, it provides a series of modular cloud services including computing, data storage, data analytics and machine learning. Registration requires a credit card or bank account details.

Google cloud Platform provides infrastructure as a service, platform as a service, and serverless computing environments. In April 2008, Google announced App Engine, a platform for developing and hosting web applications in Google-managed data centers, which was the first cloud computing service from the company. The service became generally available in November 2011. Since the announcement of App Engine, Google added multiple cloud services to the platform.

Google cloud platform is a part of Google cloud, which includes the Google cloud Platform public cloud infrastructure, as well as G suite, enterprise versions of Android and Chrome OS, and application programming interfaces

(APIs) for machine learning. Google Cloud Platform (GCP) is a collection of Google's computing resources, made available via servers to the general public as a public cloud offering. The GCP resources consist of physical hardware infrastructure — computers, hard disk drives, solid state drives, and networking — contained within Google's globally distributed data centers, where any of the components are custom designed using patterns similar to those available in the Open Compute Project. This hardware is made available to customers in the form of virtualized resources, such as virtual machines (VMs), as an alternative to customers building and maintaining their own physical infrastructure.