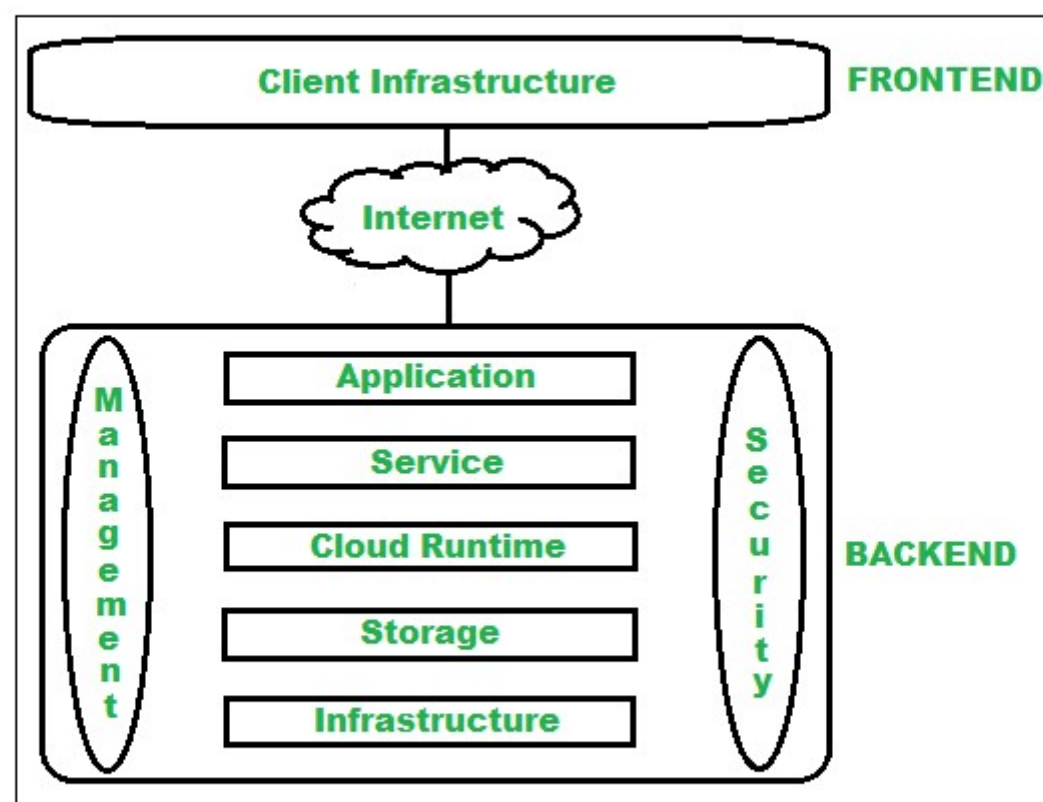


# CLOUD EXPERIMENT

## Experiment No -1

**Aim:** To study of cloud computing & its architecture

- **Cloud Computing:** Cloud Computing is a delivery of different Services through the Internet, including, data storage, servers. database Networking and software. Cloud-based storage makes it possible to save files a remote database and retrieve them on demand.
- **Architecture of cloud computing:**



- **Front End:** The front End refers to the client part of cloud computing System. It consists of interfaces and application that are required to access the cloud computing platforms
- **Back End:** The Back End refers to the cloud itself It consists of all the Resources required to Provide cloud computing services. It comprises of huge data storage, virtual machines, security mechanism services, deployment models, servers etc.
- **Cloud Computing Services:** There are three most common services are
  - A.IAAS (Infrastructure as a Service)
  - B.PAAS (Platform as a Service)
  - C.SAAS (Software as a Service)

**A. IAAS (Infrastructure as a Service):** IaaS provides on-demand access to fundamental Computing resources- Physical and virtual servers, networking, and storage over the internet on a pay-as-you-go basis. IaaS enables end users to Scale and Shrink resource on an as-needed basis reducing the need for high up-front capital expenditure or unnecessary on Premises or, owned infrastructure and for over buying resources to accommodate Periodic spikes in usage.

**B. PAAS (Platform as a Service):** PaaS Provides Software developers with on-demand hardware complete software stack, infrastructure and even development tools - for running, developing, and managing applications without the cost, Complexity and inflexibility of maintaining that platform on premises.

**C. SAAS (Software as a Service):** SaaS also known as cloud-based software or cloud application is application software that's hosted in the cloud and that You access and use via a web browser, a dedicated desktop Client, or an API that integrates with your desktop client or mobile operating system. In most cases SaaS users Pay a monthly or annual subscription fee; some may offer, Pay as-you-go Pricing based on your actual usage.

- **Advantages of cloud computing**

1. Cost Saving
2. Security
3. Flexibility
4. Mobility
5. Insight
6. Quality Control
7. Loss Prevention
8. Sustainability

- **Disadvantages of Cloud Computing**

1. Internet Connectivity
2. Vendor lock-in
3. Limited Control
4. Security

- **Types of cloud computing:** There are four types of cloud computing

- 1. Public Cloud**

Public cloud is open to all to store and access information via the Internet using the pay-per-usage method.

In public cloud, computing resources are managed and operated by the Cloud Service Provider (CSP). The CSP looks after the supporting infrastructure and ensures that the resources are accessible to and scalable for the users.

## **2. Private Cloud**

Private cloud is also known as an internal cloud or corporate cloud. It is used by organizations to build and manage their own data centers internally or by the third party. It can be deployed using Opensource tools such as Open stack and Eucalyptus.

## **3. Hybrid Cloud**

Hybrid Cloud = Public Cloud + Private Cloud

Hybrid cloud is partially secure because the services which are running on the public cloud can be accessed by anyone, while the services which are running on a private cloud can be accessed only by the organization's users. In a hybrid cloud setup, organizations can leverage the benefits of both public and private clouds to create a flexible and scalable computing environment.

## **4. Community Cloud**

Community cloud allows systems and services to be accessible by a group of several organizations to share the information between the organization and a specific community. It is owned, managed, and operated by one or more organizations in the community, a third party, or a combination of them.

### **• Components of Cloud Computing Architecture**

#### **1. Client Infrastructure**

Client Infrastructure is a Front-end component. It provides GUI (Graphical User Interface) to interact with the cloud.

#### **2. Application**

The application may be any software or platform that a client wants to access.

#### **3. Service**

A Cloud Services manages that which type of service you access according to the client's requirement.

Cloud computing offers the following three type of services:

A] Software as a Service (SaaS)    B] Platform as a Service (PaaS)    C] Infrastructure as a Service (IaaS)

#### **4. Runtime Cloud**

Runtime Cloud provides the **execution and runtime environment** to the virtual machines.

#### **5. Storage**

Storage is one of the most important components of cloud computing. It provides a huge amount of storage capacity in the cloud to store and manage data.

#### **6. Infrastructure**

It provides services on the **host level**, **application level**, and **network level**. Cloud infrastructure includes hardware and software components such as servers, storage, network devices, virtualization software, and other storage resources that are needed to support the cloud computing model.

#### **7. Management**

Management is used to manage components such as application, service, runtime cloud, storage, infrastructure, and other security issues in the backend and establish coordination between them.

#### **8. Security**

Security is an in-built back end component of cloud computing. It implements a security mechanism in the back end.

#### **9. Internet**

The Internet is medium through which front end and back end can interact and communicate with each other.

## **Experiment No -2**

**Aim:** To study the storage as a service using Google [GSP]

**Theory:** Storage as a Service (SaaS) is a cloud computing model that provides users with on-demand, scalable, and managed storage resources over the internet. Google, as a leading cloud service provider, offers Storage as a Service through its cloud platform, Google Cloud Platform (GCP). To study storage as a service using Google (a part of Google Workspace, previously known as G Suite).

### **Procedure:**

#### **Step 1: Sign in to Your Google Account**

- Open your web browser and navigate to the Google homepage ([www.google.com](http://www.google.com)).
- Click on "Sign In" and enter your Google account credentials (email and password).

#### **Step 2: Access Google Drive**

- After signing in, click on the Google Apps icon (usually represented by nine dots) in the upper-right corner.
- Select "Drive" from the available apps. This will take you to Google Drive, which is Google's cloud-based storage and file-sharing platform.

#### **Step 3: Explore the Google Drive Interface**

- Familiarize yourself with the Google Drive interface. You will see a list of your files and folders. You can create, upload, and organize files and folders here.

#### **Step 4: Upload Files and Folders**

- To upload files or folders to Google Drive, click on the "+ New" button on the left-hand side or simply drag and drop files from your computer into Google Drive.
- You can also create new documents, spreadsheets, presentations, and more directly in Google Drive using the "+ New" button.

#### **Step 5: Share and Collaborate**

- Google Drive allows you to easily share files and collaborate with others. Right-click on a file or folder and select "Share." Enter the email addresses of the people you want to share with and set permissions (view, edit, comment).

#### **Step 6: Explore Additional Features**

- Google Drive offers additional features such as the ability to create and edit documents with Google Docs, spreadsheets with Google Sheets, and presentations with Google Slides.

-You can also integrate Google Drive with other Google Workspace apps like Google Photos, Google Forms, and more.

### **Step 7: Learn about Storage Plans**

If you plan to use Google Drive for substantial storage needs, explore the various storage plans offered by Google Workspace. You may need to upgrade to a paid plan depending on your storage requirements.

**Conclusion:** By following these steps, you can study storage as a service using Google Drive, gaining a solid understanding of how to store, organize, collaborate on, and access your files in the cloud using this platform.

### **Experiment No -3**

**Aim:** Create a word document of your class timetable & store locally & upload on cloud with doc & pdf format

**Theory:** Google Docs is a free cloud-based suite of tools for creating documents, spreadsheets, presentations, and more. Google Docs is an online word processor that lets you create and format text documents and collaborate with other people in real time. Here's what you can do with Google Docs:

- Upload a Word document and convert it to a Google document
- Add flair and formatting to your documents by adjusting margins, spacing, fonts, and colors — all that fun stuff
- Invite other people to collaborate on a document with you, giving them edit, comment or view access
- Collaborate online in real time and chat with other collaborators — right from inside the document
- View your document's revision history and roll back to any previous version
- Download a Google document to your desktop as a Word, OpenOffice, RTF, PDF, HTML or zip file
- Translate a document to a different language
- Email your documents to other people as attachments

#### **Procedures:**

##### **Step 1: Create a new document.**

- You can create a new document right in Docs or in Google Drive.
- In Docs, click Create new Document
- In Drive, Click New > Google Docs > Blank Document or select from a template.

##### **Step 2: Create class timetable.**

- Title the document with something like class timetable.
- Set the font style size and other formatting absence to make the document look neat and organized.
- Create a table to structure your timetable. Click on “**table**” in the menu and choose the number of rows and columns for your timetable.
- Fill in the table cells with your respective class timings. Subject and any additional details.

##### **Step 3: Save the document.**

- Click on file in the top menu, then select save or “save as”.

#### **Step 4: Export to PDF.**

-To save the document as PDF click on file in the top menu, then select download and choose PDF document.

#### **Step 5: Upload to Google Drive.**

-Go to Google Drive & in with your Google account. Click on the new button and select file upload. Choose the PDF file with just downloaded and click open.

#### **Step 6: Access and share the PDF.**

-Once the PDF is uploaded, you can access it in your Google Drive, Right click on PDF file and choose share control who can access the file.

-To get a shareable link, Right click on the PDF file, select “share”, then click on the “copy link”.



## **Experiment No -4**

**Aim:** Create a spreadsheet which contain employee salary information & calculate gross & total salary using formula using google cloud. [SaaS]

**Theory:** Google Sheets is an online spreadsheet app that lets you create and format spreadsheets and simultaneously work with other people. Here's what you can do with Google Sheets:

- Import and convert Excel, .csv, .txt and .ods formatted data to a Google spreadsheet
- Export Excel, .csv, .txt and .ods formatted data, as well as PDF and HTML files
- Use formula editing to perform calculations on your data, and use formatting make it look the way you'd like
- Chat in real time with others who are editing your spreadsheet
- Create charts with your data
- Embed a spreadsheet — or individual sheets of your spreadsheet — on your blog or website

### **Procedures:**

#### **Step 1: Sign in to google sheets**

-Open your web browser and visit [docs.google.com/Spreadsheets](https://docs.google.com/Spreadsheets) & sign in with your Google or Gmail account. Your Gmail account give you free access to Google sheets.

#### **Step 2: Create a new document**

-Click the blank option to create a new blank document.

#### **Step 3: Work on the spreadsheet**

-Click on “untitled spreadsheet” and type in the title name to name the spreadsheet.

-You can work on Google sheets like how you would work in MS Excel.

-Label the columns to organize the information, hence you might have column like emp id, emp name, basic salary [BS], Dearness Allowance [DA] , house rent allowance[HRA], Provident Fund[PF].

-In the rows below the labels, enter the relevant employee information.

#### **Step 4: Calculate Gross Salary**

Before calculating gross salary calculate DA, HRA, PF and tax from basic salary.

-DA is = 10% of BS.

-HRA = 30% of BS

-PF = 10% of BS If BS ≤ 3000

= 12% of BS If BS > 3000

-Tax = 10% of BS If BS ≤ 1500

= 11% of BS If BS > 1500 and BS ≤ 2500

= 12% of BS If BS > 2500

Show gross salary is equal to BS + BA + HRA + BF + tax. (Amount paid before tax or other deductions and includes overtime pay and bonuses.)

-Input the formula and calculate the gross salary.

### **Step 5: Calculate Total Salary**

-Total or net salaries = gross salary - All deductions.

-So, TS = gross salary - Tax - PF

### **Step 6: Save the file**

There's no need to save with Google sheets as everything you do is automatically saved at regular intervals

### **Step 7: Exit the spreadsheet when you're finished.**

You can access your document from Google sheets or Google Drive.

## **Experiment No -5**

**Aim:** Prepare a PPT on Cloud Computing models services & architecture. PPT should contain explanation, images & at least 15 slides using Google Service Provider [SaaS]

**Theory:** Google Slides is an online presentations app that allows you to show off your work in a visual way. Here's what you can do with Google Slides:

- Create and edit presentations
- Edit a presentation with friends or coworkers, and share it with others effortlessly
- Import .pptx and .pps files and convert them to Google presentations
- Download your presentations as a PDF, a PPT, or a .txt file
- Insert images and videos into your presentation
- Publish and embed your presentations in a website

### **Procedure:**

#### **Step 1: Sign in to Google slides.**

-Open your web browser and go to Google slides.

-Sign in with your Google account, or create one if you don't have an account.

#### **Step 2: Create a new presentation.**

-Click on the “+blank” option to create a new blank presentation.

#### **Step 3: Add a title slide.**

-Click on slide in the top menu and select “new slide” to add a title slide.

-Enter the title, subtitle and any other necessary info related to your presentation.

#### **Step 4: Create sections for introduction model service and architecture.**

-Click on slide in the top menu and select new slide to add new slides for each section.

- Label each slide with the section title.

#### **Step 5: Add content to each section.**

-Enter content such as text image and diagrams to explain the concept related to that section.

-Click on “slide”> “change background” to change the background color or add an image.

-Use toolbar to change fonts, colors and text formatting.

#### **Step 6: Add images graphics and include diagrams.**

-Click on “insert” in the top menu and select “image” or “shape” to insert image, icons or shapes relevant to your content

-To create desired diagram or flowchart add & arrange shapes line and arrows from insert menu.

**Step 7: Present your ppt.**

-Click on present in the top right corner to start presenting your slides.

## **Experiment No -6**

**Aim:** Create your resume in a neat format using Google Cloud Service [SaaS]

**Theory:** Creating a resume using Google Cloud Services (SaaS) can be a straightforward process. Google Docs, a part of Google Workspace, is a commonly used tool for this purpose. Here are the steps to create your resume:

### **Procedure:**

#### **Step 1: Sign in to Your Google Account**

- Open your web browser and navigate to the Google homepage ([www.google.com](http://www.google.com)).
- Click on "Sign In" and enter your Google account credentials (email and password).

#### **Step 2: Access Google Docs**

- Once you are signed in, click on the Google Apps icon (usually represented by nine dots) in the upper-right corner.
- Select "Docs" from the available apps. This will open Google Docs, which is a cloud-based word processing application.

#### **Step 3: Choose a Resume Template**

- In Google Docs, you can choose from a variety of pre-designed resume templates. To do this, click on "Template Gallery" located at the top-right corner.

#### **Step 4: Select a Resume Template**

- Browse through the available templates and select one that suits your style and professional needs. Click on the template to open it.

#### **Step 5: Edit and Customize the Template**

- After selecting a template, you'll be taken to a new document based on that template. You can now edit the content to match your own qualifications, experiences, and personal information.
- Click on each section (e.g., contact information, work experience, education) and replace the sample text with your own details.
- Format the text, adjust fonts, colors, and styles to create a personalized resume.

#### **Step 6: Add Sections and Details**

- If the template does not include sections you need, or if you want to add additional information, you can insert new sections.

-To add a section, click on "Insert" in the menu bar and choose the type of content you want to include (e.g., text box, table, image).

-Insert and format new sections as needed.

### **Step 7: Save Your Resume**

-Click on "File" in the menu bar and select "Save" to save your resume to Google Drive. You can choose a specific folder or keep it in the root directory.

### **Step 8: Export or Share**

-Once your resume is ready, you can export it in various formats such as PDF, Word, or other compatible formats by clicking on "File" > "Download."

-Alternatively, you can share the document directly with potential employers or collaborators by clicking on the "Share" button in the upper-right corner.

**Conclusion:** By following these steps, you can create a professional and neatly formatted resume using Google Cloud Services (Google Docs), a Software as a Service (SaaS) platform.

## **Experiment No -7**

**Aim:** Create a form Using google service provider & share it using cloud

**Theory:** Google Forms is a versatile, cloud-based tool offered by Google that enables users to create and distribute custom online surveys, quizzes, forms, and questionnaires. It is designed for a wide range of purposes, from collecting feedback to conducting research and assessments.

### **Procedure:**

#### **Step 1: Sign in to Your Google Account**

- Open your web browser and navigate to the Google homepage (www.google.com).
- Click on "Sign In" and enter your Google account credentials (email and password).

#### **Step 2: Access Google Forms**

- Once signed in, click on the Google Apps icon (usually represented by nine dots) in the upper-right corner.
- Select "Forms" from the available apps. This will open Google Forms, a cloud-based form creation tool.

#### **Step 3: Create a New Form**

- In Google Forms, click on the "+ Blank" option to create a new form.

#### **Step 4: Design Your Form**

- You'll be taken to a blank form where you can add questions and customize the form's appearance.
- Click on "Untitled Form" to give your form a title and, if desired, a description.
- Add questions by clicking the "+" button. You can choose from various question types, such as multiple choice, short answer, or paragraph.
- Customize each question by adding options, setting required questions, and adding descriptions.

#### **Step 5: Add Sections**

- To organize your form, you can add sections by clicking on the "Add section" button. Sections help break the form into different parts, each with its own set of questions.

#### **Step 6: Customize Theme**

- Click on the color palette icon to customize the form's theme, background color, and fonts.

#### **Step 7: Preview Your Form**

- Click the "Preview" button to see how your form will look to respondents.

#### **Step 8: Save Your Form**

-Google Forms auto-saves your work as you go, so there's no need to manually save.

### **Step 9: Distribute Your Form**

-After creating and customizing your form, click on the "Send" button in the upper-right corner.

### **Step 10: Choose Sharing Options**

You have multiple options for sharing your form:

-Email: You can send the form via email by entering email addresses or a group list.

-Link: You can generate a shareable link to the form. You can set permissions for who can view and respond to the form.

-Embed: You can embed the form on a website or blog by copying the provided HTML code.

-Social Media: Share the form on various social media platforms.

-QR Code: Generate a QR code that, when scanned, opens the form.

### **Step 11: Monitor Responses**

-As respondents fill out the form, you can monitor and analyze their responses in Google Forms.

### **Step 12: Access Responses**

-To view responses, open your form in Google Forms and click on the "Responses" tab. You can also export responses to Google Sheets for more in-depth analysis.

**Conclusion:** By following these steps, you can create a form using Google Forms and share it using cloud-based sharing options, making it easy for respondents to access and complete the form online.



## **Experiment No -8**

**Aim:** To study installation of virtual machine using VMware & find procedure to install VMware Workstation with different flavors of Linux or windows OS

### **Procedure:**

#### **Step 1: Download Link**

-The link for downloading the software is <https://www.vmware.com/products/workstation-pro/workstation-pro-evaluation.html>

-Download the software for Windows good thing is that there is no signup of process.

-Click and download begins, software around 608 MB.

#### **Step 2: Download the installer file**

-It should probably be in the downward folder by default, if you have not changed the settings in your browser.

-Find name should be something like VMware-workstation-Pro-17.0.0-20800274.exe. This file can be changed depend upon the version of software currently available for download.

#### **Step 3: Locate the downloaded installer file**

-For demonstration purpose, I have placed downloaded installer on my desktop.

-Find the installer on your system and double click and launch the application.

#### **Step 4: User access control [UAC] warning.**

-Now you should see your user access control [UAC] dialog box. Click yes to continue.

-Initial splash screen will appear. Wait for the process to complete.

#### **Step 5: VMware Workstation Setup Wizard**

-Now you see VMware workstation setup wizard dialog box. Click next to continue.

#### **Step 6: End User License Agreement**

-This time you should see end user license agreement dialog box. Check “I accept the terms in the license agreement” box and press next to continue.

#### **Step 7: Custom setup options.**

-Select the folder in which you would like to install the application.

-There is no harm in leaving the default as it is. Also select enhanced keyboard driver check box.

### **Step 8: User experience settings.**

-Next you are asked to select check for updates and help improve VMware workstation pro do as you wish. I normally leave it to defaults that is uncheck.

### **Step 9: Application shortcuts Preference.**

-Next step is to select the place you want the shortcut icons to be place on your system to launch the application.

-Please select both the options desktop and start menu and click next.

### **Step 10: Installation begins.**

-Now you see the beginning installation dialog box. Click install to start the installation process. At the end, you will see installation complete dialog box.

-Click finish, and you are done with the installation process. You may be asked to restart your computer. Click on yes to restart.

### **Step 11: Launch VMware workstation.**

-After the installation completes, you should see VMware WorkStation icon on the desktop. Double click on it to launch the application.

### **Step 12: License key**

-If you see the dialog box asking for license key, click on trial or enter license key, then what you have is the VMware workstation 17 pro running on your windows 11 desktop.

-If you Don't have the license key, you will have 30 days trial.

**Step 13:** At some point of time, if you decide to buy the license key, you can enter the license key by going to help>Enter a License key you can enter the 25-character license key in the dialog box shown below & click OK. Now you have the license version of the software

## Experiment No -9

**Aim:** Create a virtual machine using oracle virtual box

### **Procedure:**

#### **Step 1: Install Virtual Box**

- Visit <https://www.virtualbox.org/wiki/downloads>
- Download Virtual Box Platform packages for your OS
- Open the installation Package by double clicking
- Click continue and finish installing VirtualBox
- When finished installation close the window

#### **Step 2: Download Linux**

- Visit the page <http://www.ubuntu.com/download/ubuntu/download>
- Choose the Latest Version of Ubuntu and 32-bit and click "Start Download"

#### **Step 3: Install Linux using Virtual Box**

- Run VirtualBox by double-clicking the icon
- Click "New" button on the top left corner
- Click Continue on the pop-up window
- Type VM name, select "Linux" for the OS and choose "Ubuntu" for the version.
- Choose the amount of memory to allocate (I suggest choosing between 512MB to 1024MB)
- Click Continue or Next
- Choose to create a new virtual hard disk
- Click Continue to Next
- Choose VDI (VirtualBox Disk Image)
- Click Continue to Next
- Choose "Dynamically Allocated" click continue. This way, the size of your virtual hard disk will grow as you use
- Click the folder icon and choose the ubuntu iso file you download.
- Select the size of the virtual Disk (I recommend choosing 8 GB) and click continue.
- Click Create

## **Step 4: Running Linux**

- Choose Ubuntu from left column and click start
- Click continue on pop-up window
- Click the folder icon and choose the ubuntu iso file you downloaded and click continue and start
- Click Install Ubuntu
- Check 'Download Updates' and click Forward
- Choose "Erase disk and install Ubuntu" and click Forward (Don't worry, it won't wipe your computer)
- Click "Install Now" and wait. Maybe grab a snack.
- When finished, Click Restart and press Enter.

## **Step 5: C Programming on Linux**

- Open Terminal (Applications-Accessories-Terminal)
- Open gEdit by typing "gedit &" on terminal (You can also use any other TextEditor application)
- Type the c program on text editor
- Save this file as "helloworld.c"
- Type "ls" on terminal to see all files under current folder
- Confirm that "helloworld.c" is in the current directory. If not type cd DIRECTORY\_PATH to go the directory that has "helloworld.c"
- Type "gcc helloworld.c" to compile and type ls to confirm that new exe file a.out is created
- Type "./a.out" on Terminal to run the program
- If you see "Hello World" on the next line, you just successfully ran your first c program!

## Experiment No -10

**Aim:** Installation & configuration of virtualization using KVM

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

**Theory:** Virtualization is software that separates physical infrastructures to create various dedicated resources. It is the fundamental technology that powers cloud computing. The technology behind virtualization is known as a virtual machine monitor (VMM) or virtual manager, which separates compute environments from the actual physical infrastructure.

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 head roads, network virtualization, storage virtualization and server virtualization:

- **Network virtualization** is a method of combining the available resources in a network by splitting up the available bandwidth into channels, each of which is independent from the others, and each of which can be assigned (or reassigned) to a particular server or device in real time. 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 workloads.

### **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`

### **Result:**

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

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

**Step 3:** `#sudo adduser rait`

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

**Step 4:** `#sudo adduser rait libvirt`

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

**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

**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.

## **Experiment No -11**

**Aim:** Creating an AWS account & study of S3 Service

**Theory:** Amazon Simple Storage Service (Amazon S3) is an object storage service that offers industry-leading scalability, data availability, security, and performance. Customers of all sizes and industries can use Amazon S3 to store and protect any amount of data for a range of use cases, such as data lakes, websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics. Amazon S3 provides management features so that you can optimize, organize, and configure access to your data to meet your specific business, organizational, and compliance requirements.

### **How Amazon S3 works?**

Amazon S3 is an object storage service that stores data as objects within buckets. An object is a file and any metadata that describes the file. A bucket is a container for objects. To store your data in Amazon S3, you first create a bucket and specify a bucket name and AWS Region. Then, you upload your data to that bucket as objects in Amazon S3. Each object has a key (or key name), which is the unique identifier for the object within the bucket. S3 provides features that you can configure to support your specific use case. For example, you can use S3 Versioning to keep multiple versions of an object in the same bucket, which allows you to restore objects that are accidentally deleted or overwritten. Buckets and the objects in them are private and can be accessed only if you explicitly grant access permissions. You can use bucket policies, AWS Identity and Access Management (IAM) policies, access control lists (ACLs), and S3 Access Points to manage access.

### **Procedure:**

#### **Step 1: Access the AWS Sign-Up Page:**

-Open your web browser and go to the AWS Sign-Up page: <https://aws.amazon.com/>.

#### **Step 2: Click on "Create an AWS Account":**

-On the AWS home page, click the "Create an AWS Account" button located in the top-right corner.

#### **Step 3: Provide Your Email Address**

-Enter your email address in the provided field. Make sure it's an email address that you have access to because AWS will use it for communication and account verification.

#### **Step 4: Choose a Password**

-Create a secure password for your AWS account. Follow the password requirements displayed on the page, which typically include using a combination of upper and lower-case letters, numbers, and special characters.

#### **Step 5: Add an AWS Account Name**

-Enter a unique name for your AWS account. This name helps you identify your AWS resources later.

#### **Step 6: Enter Your Contact Information**

-Fill out the required contact information, including your name and phone number.

#### **Step 7: Payment Information**

-Enter your payment information. AWS requires a valid credit card for account verification purposes. You won't be charged unless you use AWS services that incur charges.

#### **Step 8: Identity Verification**

-AWS may ask for identity verification to prevent fraud. You can choose to verify your identity through a text message or a phone call.

#### **Step 9: Review the AWS Customer Agreement**

-Read the AWS Customer Agreement and the other relevant legal terms and policies. Make sure you understand them before proceeding.

#### **Step 10: Confirm Your Identity**

-AWS will send a verification code to your provided email address. Retrieve the code from your email and enter it on the verification page.

#### **Step 11: Complete the Sign-Up Process**

- Once your identity is confirmed, you'll receive a welcome email from AWS, and your account will be created.

#### **Step 12: Sign in to Your AWS Account**

- Return to the AWS Sign-In page (<https://aws.amazon.com/>).

- Click the "Sign in to the Console" button.

- Enter the email address and password you used during the sign-up process.

#### **Step 13: Start Using AWS Services**

- Once signed in, you can start using AWS services and resources. You'll be taken to the AWS Management Console, where you can access and manage various AWS services



**Conclusion:** Keep in mind that AWS offers a free tier with certain usage limits for the first 12 months after signing up. This allows you to explore and use many AWS services at no cost during that period. However, some services may have separate free tiers or additional terms and conditions, so be sure to check the AWS Free Tier details for each service you plan to use.

## **Experiment No -12**

**Aim:** Creating bucket & setting permissions for general users to access that bucket using S3

**Theory:** Bucket policies – Use IAM-based policy language to configure resource-based permissions for your S3 buckets and the objects in them.

Amazon S3 access points – Configure named network endpoints with dedicated access policies to manage data access at scale for shared datasets in Amazon S3.

### **Procedure:**

#### **Step 1: Sign in to the AWS Management Console:**

-Open your web browser and navigate to the AWS Management Console (<https://aws.amazon.com/>).

Sign in with your AWS account credentials.

#### **Step 2: Access the S3 Service:**

-Once logged in, you'll be on the AWS Management Console dashboard. Search for and select "S3" under the "Storage" category.

#### **Step 3: Create a New S3 Bucket:**

In the S3 dashboard, click the "Create bucket" button.

#### **Step 4: Configure Bucket Settings:**

-In the "Create bucket" wizard, provide the following information: Bucket name: Choose a globally unique name for your bucket (e.g., "my-example-bucket").

-Region: Select the AWS region where you want to create the bucket. Choose the region that is geographically closest to your target audience to optimize latency.

-Block all public access: For security reasons, you can choose to block all public access to the bucket. By default, this option is selected.

#### **Step 5: Set Up Permissions for Public Access:**

-To allow general users to access the bucket, you need to configure public access permissions. Follow these steps:

-Uncheck the "Block all public access" option.

-A warning message will appear. Read the warning to understand the implications of enabling public access.

-Click the "Edit" button next to "Public access settings."

#### **Step 6: Configure Public Access Permissions:**

-In the "Edit public access settings" panel, configure the following settings to grant public access: Block new public ACLs and uploading public objects: Uncheck this option to allow public access.

-Remove public access granted through public ACLs: Uncheck this option.

-Block new public bucket policies: Uncheck this option.

-Block public and cross-account access if bucket has public policies: Uncheck this option.

-Be cautious when enabling public access, as it can make your bucket and its contents accessible to anyone on the internet.

### **Step 7. Confirm Changes:**

-After configuring the public access settings, review your choices and understand the security implications.

-Type "confirm" in the text box to confirm that you understand the consequences of allowing public access.

-Click the "Save" button to apply the changes.

### **Step 8. Create the Bucket:**

-After confirming the public access settings, click the "Create bucket" button to create the bucket with the configured permissions.

### **Step 9. Upload Files to the Bucket:**

-With the bucket created, you can now upload files to it by clicking the "Upload" button in the bucket's dashboard. You can also use the AWS CLI or other tools to upload files.

### **Step 10. Access Objects in the Bucket:**

- Once objects are in the bucket and public access is allowed, anyone with the object's URL can access them using a web browser or other HTTP clients.

**Conclusion:** By following these steps, you can create an S3 bucket in AWS and configure public access permissions to allow general users to access the bucket and its contents. Be cautious when enabling public access and ensure that sensitive data is not exposed inadvertently.

## **Experiment No -13**

**Aim:** Creating Bucket & implementing bucket versioning & deletion of object & bucket in S3

### **Procedure:**

#### **Step 1: Sign in to AWS Console**

- Log in to your AWS Management Console using your credentials.

#### **Step 2: Navigate to S3 Service**

- From the AWS Dashboard, locate and click on the "S3" service under the "Storage" category.

#### **Step 3: Create a New Bucket**

- Click the "Create bucket" button.
- Choose a unique and meaningful name for your bucket. Bucket names must be globally unique.
- Select the AWS region where you want to create the bucket.
- Configure additional settings like logging, versioning, and tags as needed.
- Click the "Create" button to create the bucket.

#### **Step 4: Enable Versioning**

- Once the bucket is created, select the bucket from the S3 dashboard.
- Go to the "Properties" tab.
- Under "Advanced settings," click on "Versioning."
- Click the "Enable versioning" button.
- Confirm the action by clicking "Enable."

#### **Step 5: Upload Objects**

- To upload objects to your bucket, click the "Upload" button.
- Select the files you want to upload.
- Configure permissions and metadata as needed.
- Click the "Upload" button to add objects to your bucket.

#### **Step 6: View Object Versions**

- To view object versions, select the bucket and click on the "Objects" tab.
- You will see a list of objects with their versions if versioning is enabled.

### **Step 7: Delete Objects**

- To delete objects, select the object you want to delete from the list.
- Click the "Actions" button, and then select "Delete."
- Confirm the deletion.

### **Step 8: Delete Bucket**

- Before you can delete a bucket, you must first delete all of its objects and object versions.
- Navigate to the "Objects" tab in the bucket, select all objects, and delete them as shown in Step 7.
- Once all objects are deleted, go back to the bucket overview page.
- Click on the "Delete" button for the bucket.
- Confirm the deletion of the bucket.

## Experiment No -14

**Aim:** Using AWS S3 hosting static website

### **Procedure:**

#### **Step 1: Sign in to AWS Console**

- Log in to your AWS Management Console using your credentials.

#### **Step 2: Navigate to S3 Service**

- From the AWS Dashboard, locate and click on the "S3" service under the "Storage" category.

#### **Step 3: Create a New Bucket**

- Click the "Create bucket" button.
- Choose a unique and meaningful name for your bucket. Bucket names must be globally unique.
- Select the AWS region where you want to create the bucket.
- Configure additional settings like logging and versioning as needed.
- Click the "Create" button to create the bucket.

#### **Step 4: Configure Bucket for Static Website Hosting**

- After creating the bucket, select the bucket from the S3 dashboard.
- Go to the "Properties" tab.
- Under "Static website hosting," click the "Edit" button.
- Choose the option for "Use this bucket to host a website."
- Enter the index document (e.g., "index.html") and optionally an error document.
- Click the "Save changes" button.

#### **Step 5: Upload Your Website Content**

- To host your static website, you need to upload your website files (HTML, CSS, JavaScript, etc.) to the S3 bucket.
- Click the "Upload" button to add your website files to the bucket.
- Configure permissions and metadata as needed.
- Click the "Upload" button to upload your website content.

#### **Step 6: Configure Bucket Policy**

- To make your website files publicly accessible, you'll need to configure a bucket policy.

- Under the "Permissions" tab of your bucket, click "Bucket policy."
- Add a policy similar to the following, replacing **<your-bucket-name>** with your actual bucket name:
- Click the "Save" button to apply the policy.

### **Step 7: Enable Website Hosting**

- After configuring the bucket policy, go to the "Properties" tab of the bucket.
- Under "Static website hosting," ensure that the website hosting is enabled.
- Note the provided endpoint URL; this is the URL where your website will be accessible.

### **Step 8: Test Your Website**

- Open a web browser and enter the endpoint URL noted in the previous step.
- You should now be able to access and test your static website hosted on AWS S3.

## **Experiment No -15**

**Aim:** Bucket replication using S3

**Theory:** Bucket replication in Amazon S3 allows you to automatically replicate data from one S3 bucket to another in different AWS regions. Here are the steps to set up bucket replication using S3:

### **Procedure:**

#### **Step 1: Sign in to AWS Console**

- Log in to your AWS Management Console using your credentials.

#### **Step 2: Navigate to S3 Service**

- From the AWS Dashboard, locate and click on the "S3" service under the "Storage" category.

#### **Step 3: Create Two Buckets**

- You need two S3 buckets: the source bucket (where data will be replicated from) and the destination bucket (where data will be replicated to).
- Create the source bucket as described in the previous answer or use an existing one.
- Create the destination bucket in a different AWS region. Ensure both buckets have unique names.

#### **Step 4: Enable Versioning on Both Buckets**

- For replication to work correctly, versioning must be enabled on both the source and destination buckets.
- Select each bucket and go to the "Properties" tab.
- Under "Advanced settings," click on "Versioning" and enable versioning if not already enabled.

#### **Step 5: Set Up Bucket Replication**

- Select the source bucket.
- Go to the "Management" tab.
- Click on "Replication" and then "Create replication rule."

#### **Step 6: Configure Replication Rule**

- In the "Source" section, choose the source bucket.
- In the "Destination" section, select the destination bucket.
- Configure other settings, including the IAM role for replication, storage class, and replication options.
- Click "Next" to proceed.



### **Step 7: Specify Object Replication Rules**

- You can define rules to specify which objects should be replicated.
- Configure rules based on prefixes, tags, or other criteria.
- Click "Next" to continue.

### **Step 8: Review and Create Replication Rule**

- Review the configuration settings to ensure they are correct.
- Click "Create rule" to create the replication rule.

### **Step 9: Monitor and Manage Replication**

- After the rule is created, you can monitor replication status and progress in the S3 Management Console.
- You can also configure metrics, set up event notifications, and manage replication rules from the "Replication" tab.

### **Step 10: Test and Verify Replication**

- Upload or modify objects in the source bucket to test replication.
- Check the destination bucket to ensure that data is correctly replicated.

## **Experiment No -16**

**Aim:** To Study Cloud Security management

**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 data backup' 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.

**Procedure:**

Security using MFA (Multi Factor Authentication) device code:

- 1) go to [aws.amazon.com](https://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 can't make any changes in it or you can't 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 cannot 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.

**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.

## **Experiment No -17**

**Aim:** Creating Account of Microsoft 365 & study of its services

**Procedure:** Creating a Microsoft 365 account and exploring its services is a straightforward process. Here are the steps to get started:

### **Step 1: Visit the Microsoft 365 Signup Page**

- Open a web browser and go to the Microsoft 365 signup page: <https://www.microsoft.com/en-us/microsoft-365/get-started-with-office-2019>.

### **Step 2: Choose a Plan**

- Microsoft 365 offers different plans for personal, business, and education use. Select the plan that best suits your needs. Common plans include Microsoft 365 Personal, Microsoft 365 Family, Microsoft 365 Business, and more.

### **Step 3: Create a Microsoft Account**

- If you already have a Microsoft account (e.g., Outlook, Hotmail, Xbox Live), sign in with your existing credentials. If not, click on the "Create one!" option to set up a new Microsoft account.
- Follow the prompts to provide your email address, create a password, and fill in other required information.

### **Step 4: Verification**

- Microsoft may send a verification code to your email or phone number to confirm your identity. Enter the code to verify your account.

### **Step 5: Payment Information (if applicable)**

- Depending on your selected plan, you may need to provide payment information. Microsoft 365 offers both free and paid plans.

### **Step 6: Complete the Signup Process**

- Follow the on-screen instructions to complete the signup process. This may include setting up security questions, choosing your language and region preferences, and more.

### **Step 7: Accessing Microsoft 365 Services**

- Once your account is set up, you can access Microsoft 365 services through the web portal, desktop applications, or mobile apps.
- Common Microsoft 365 services include:

- **Microsoft Word:** A word processing application.
- **Microsoft Excel:** A spreadsheet application.
- **Microsoft PowerPoint:** A presentation application.
- **Outlook:** An email and calendar application.
- **OneDrive:** A cloud storage service.
- **Teams:** A collaboration and communication platform.
- **SharePoint:** A document management and collaboration tool.
- **OneNote:** A note-taking application.
- And more.

### **Step 8: Explore and Use Microsoft 365 Services**

- Take the time to explore and familiarize yourself with the Microsoft 365 services that are relevant to your needs.
- Microsoft offers extensive documentation, tutorials, and help resources to assist you in getting the most out of these services.

## **Experiment No -18**

**Aim:** Installation & Configuration. of Dropbox [Storage as a service]

**Theory:** The cloud makes it possible for you to access your data and documents anywhere, from any device, and at any time. The cloud isn't physical, but rather refers to anything that is stored online. It allows you to save and access your content securely across any device—not just the specific one you're using. It doesn't matter what system you use Dropbox is platform agnostic. That means you can choose whether you want to use the Dropbox desktop app, the Dropbox mobile app, or just visit [dropbox.com](https://www.dropbox.com). There's no wrong way, operating system, or web browser to use Dropbox—the choice is entirely yours.

Dropbox is a cloud storage service that lets you save files online and sync them to your devices.

- You can use Dropbox links to share files and folders with other people without sending large attachments. Dropbox offers a free plan that includes 2 GB of storage.
- You can pay to increase that to as much as 3 TB with a subscription.
- Dropbox is a file hosting service, often referred to as a “cloud storage” service. Dropbox is one of the oldest and most popular cloud storage services in use today, though there are many alternatives, including Microsoft OneDrive, Box, Sync, and Google Drive.

### **How Dropbox works?**

When you subscribe to Dropbox, you are allotted a certain amount of storage space in an online server known as “the cloud” After installing the Dropbox app on your PC, mobile device, or both, any files that you store in your Dropbox locally will be copied to the Dropbox server as well. If you make changes to these files in one place, the updates are automatically mirrored everywhere. By synchronizing your Dropbox files locally and online, you can easily access these files anywhere and share them with others more easily.

### **Procedure:**

#### **Step 1: Download Dropbox Desktop App**

1. Open a web browser and go to the Dropbox website (<https://www.dropbox.com>).
2. Click on the "Download Dropbox" button or the equivalent option for your operating system (Windows, macOS, or Linux).

#### **Step 2: Install Dropbox**

3. Once the installer is downloaded, run the installer file by double-clicking it.
4. Follow the on-screen instructions to install Dropbox on your computer.
5. During the installation, you will be prompted to sign in or create a Dropbox account. If you don't have one, you can create an account at this stage.

### **Step 3: Sign in to Your Dropbox Account**

6. After installation, the Dropbox app should automatically start.
7. Sign in to your Dropbox account using your email address and password.

### **Step 4: Choose Setup Options**

8. You'll be presented with setup options:
  - Choose the location for your Dropbox folder. This is where your files will be stored locally.
  - Select whether you want to sync all files and folders or choose specific ones.
  - Decide if you want to enable Camera Upload to automatically upload photos and videos from your devices to Dropbox.

### **Step 5: Explore Dropbox on Your Computer**

9. Once setup is complete, a Dropbox folder will be created on your computer in the location you specified.
10. You can start adding files and folders to your Dropbox folder. Anything you add here will be automatically synchronized to your Dropbox cloud storage.

### **Step 6: Access Dropbox Online**

11. You can also access your Dropbox account and files online by going to the Dropbox website and signing in with your account credentials.

### **Step 7: Share and Collaborate**

12. Dropbox allows you to share files and folders with others. You can right-click on a file or folder in your Dropbox folder and select "Share" to generate a shareable link or invite collaborators.