SUBJECT: CS-513 — Lab Course on CS-512-MJ (Cloud Computing)

Assignment-1

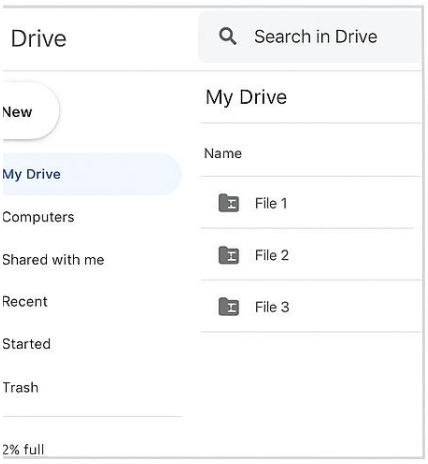
Q1) Workings of Google Drive to make spreadsheet and notes

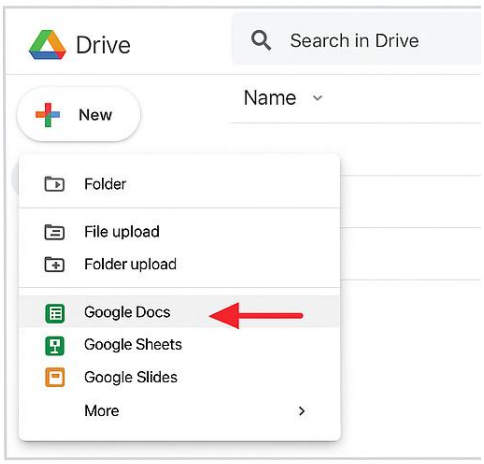
Steps (Step-wise procedure)

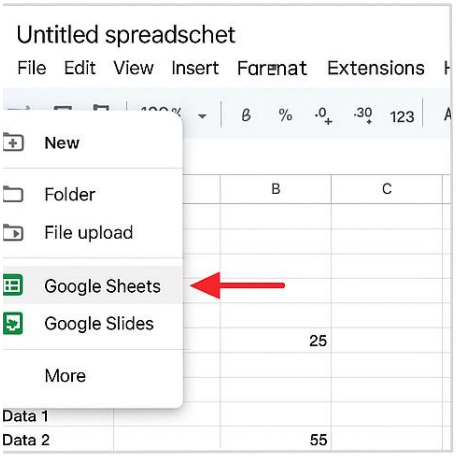
1. **Sign in to Google Drive**
    - Open a web browser and go to https://drive.google.com.
    - Sign in with your Google account (Gmail). If you don't have one, create a Google account.
2. **Create a new Spreadsheet (Google Sheets)**
    - Click the **New** button (top-left) → select **Google Sheets** → **Blank spreadsheet**.
    - A new Google Sheets document opens in a new tab.
3. **Enter Data and Use Basic Features**
    - Enter data into cells (A1, A2, ...).
    - Use basic formulas: =SUM(A1:A5), =AVERAGE(B1:B5), =IF(C1>50, "Pass", "Fail").
    - Format cells using toolbar (bold, number format, borders).
    - Create simple charts: Insert → Chart → choose chart type.
4. **Create Notes (Google Docs)**
    - From Google Drive click **New** → **Google Docs** → **Blank document**.
    - Add headings, text, images: Insert → Image or drag-and-drop images.
    - Use Bulleted/Numbered lists, styles (Normal text → Heading 1/2).
5. **Organize Files in Folders**
    - In Drive: **New** → **Folder**. Name it (e.g., Workshop_CS-512).
    - Drag the spreadsheet and the notes into the folder.
6. **Share Files with Others**
    - Open any file → Click **Share** (top-right).
    - Add collaborator email(s) and set permission: Viewer / Commenter / Editor.

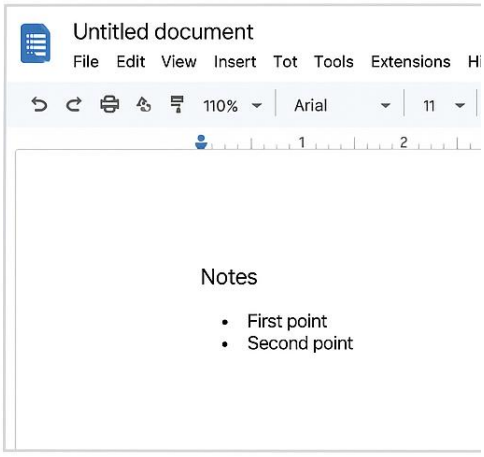
- Alternatively, click **Get link** → change link access to **Anyone with the link** (Viewer) if public sharing is ok.

7. **Version History and Comments**
   - For Docs/Sheets: File → Version history → See version history (view or restore previous versions).
   - Use Insert → Comment or highlight text and comment for collaborative review.









Q2) Create and host static web page using any cloud provider

Option chosen for worked steps: AWS S3 (Static Website Hosting)

Pre-requisites

- An AWS account (email + billing information).
- AWS IAM user with permissions for S3, or use root account for lab practice (not recommended in production).

Steps (Step-wise procedure)

1. **Create the static site files locally**

   Create a folder static-site/ with files: index.html, styles.css, images/.

   Example index.html minimal content:

   ```
   <!doctype html>
   <html>
   <head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <title>Workshop Static Site</title>
    <link rel="stylesheet" href="styles.css">
   </head>
   <body>
    <h1>Welcome to CS-512 Workshop</h1>
    <p>This is a static page hosted on AWS S3.</p>
   </body>
   </html>
   ```

2. **Sign in to AWS Console and open S3**
   - Go to https://console.aws.amazon.com/s3/ and sign in.
3. **Create an S3 bucket**
   - Click **Create bucket**.
   - Bucket name must be globally unique (e.g., cs512-workshop-<yourid>).
   - Choose Region (nearest to you). Leave defaults for lab.

- Uncheck **Block all public access** (to allow public website). Confirm the warning.
- Click **Create bucket**.

4. **Upload website files to the bucket**
   - Open the bucket → Upload → Add files (index.html, styles.css) → Upload.
5. **Set Object Permissions (Make files public)**

   Select index.html → Actions → Make public (or set bucket policy to allow public reads).

   Example bucket policy (JSON) to allow public read:

```
{
 "Version":"2012-10-17",
 "Statement":[
  {
   "Sid":"PublicReadGetObject",
   "Effect":"Allow",
   "Principal":"*",
   "Action":["s3:GetObject"],
   "Resource":["arn:aws:s3:::cs512-workshop-<yourid>/*"]
  }
 ]
}
```

6. **Enable Static Website Hosting**
   - In the bucket Properties → Static website hosting → Enable.
   - Set **Index document** = index.html. (Optionally set Error document = error.html.)
   - Save.
   - AWS will show the **Endpoint** URL, e.g. http://cs512-workshop-<yourid>.s3-website-us-east-1.amazonaws.com.
7. **Access the website**
   - Open the endpoint URL in a browser. You should see your index.html content.

8. **(Optional) Use custom domain and HTTPS**
    - For production, use Amazon CloudFront + ACM to provide HTTPS on a custom domain.
    - Configure alternate domain names (CNAME) in CloudFront and request an ACM certificate in the Region us-east-1.

Assignment-2

Q.1) Exploring OneDrive: Creating and Sharing Documents and Presentations

OneDrive is Microsoft's cloud storage service that allows users to create, store, access, and share files such as Word documents, Excel sheets, and PowerPoint presentations from any device.

Steps to Create Documents and Presentations in OneDrive

1. Sign in to OneDrive

- Open a browser → go to **https://onedrive.live.com**
- Sign in with your Microsoft account (Outlook/Hotmail).

2. Access the New File Menu

- Click the **New** button.
- You will see options like:
    - **Word Document**
    - **Excel Workbook**
    - **PowerPoint Presentation**
    - **Forms**, **Text Document**, **Folder**, etc.

---

3. Creating a Word Document

1. Select **Word Document** from the New menu.
2. A new blank document opens in Office Online.
3. Add headings, text, tables, images, etc.
4. The file saves automatically to OneDrive.

---

4. Creating a PowerPoint Presentation

1. Click **New → PowerPoint Presentation**.
2. Choose a blank layout or template.
3. Add slides, insert images, shapes, themes, animations, etc.
4. It is automatically saved in your OneDrive folder.

---

5. Organizing Files

- Create a **folder** using New → Folder.
- Move documents/presentations into folders for better management.

---

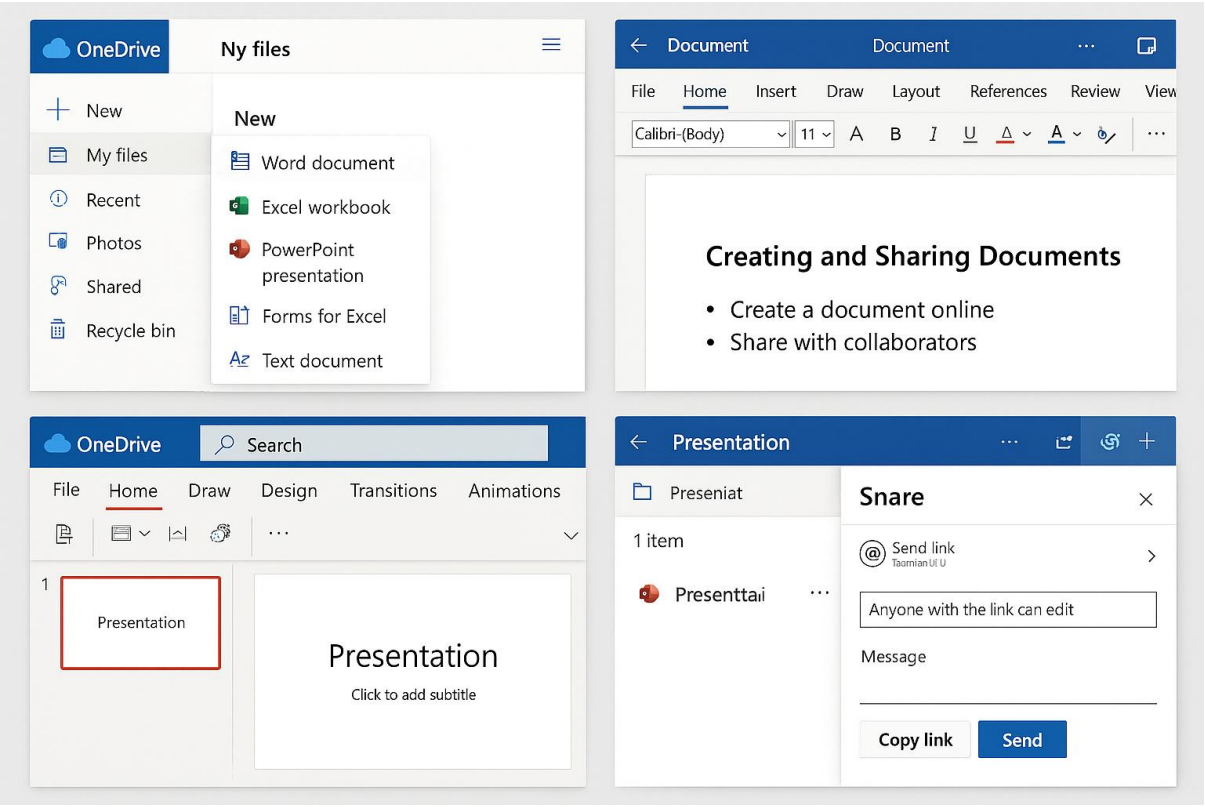
6. Sharing Documents & Presentations

1. Right-click the file → **Share**.
2. Choose:
    - **Send link**
    - **Copy link**
    - Share via **email**
3. Set permission:
    - **Can View**
    - **Can Edit**
4. Share the link with collaborators.

---

7. Collaboration in Real-Time

- Multiple users can edit the file simultaneously.
- You can:
    - View cursors of collaborators
    - Leave comments
    - Check version history
    - Restore previous versions


OneDrive
Ny files
New
My files
Recent
Photos
Shared
Recycle bin
New
Word document
Excel workbook
PowerPoint presentation
Forms for Excel
Text document
Document
Document
File
Home
Insert
Draw
Layout
References
Review
View
Calibri-(Body)
11
Creating and Sharing Documents
Create a document online
Share with collaborators
OneDrive
Search
File
Home
Draw
Design
Transitions
Animations
1
Presentation
Presentation
Click to add subtitle
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Send link
Anyone with the link can edit
Message
Copy link
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Q.2) Developing and Deploying a Simple Web Application using AWS

1. Create a Simple Python Web App (Flask)

Create application.py:

```
from flask import Flask

app = Flask(__name__)


@app.route('/')

def home():

  return "Hello! This is a simple AWS web application."


if __name__ == '__main__':

  app.run()
```

Create **requirements.txt**:

```
Flask==2.0.2
```

---

2. Install AWS Elastic Beanstalk CLI

```
pip install awsebcli
```

---

3. Initialize Beanstalk Project

```
eb init
```

- Choose region
- Platform: **Python**

---

4. Deploy Application

```
eb create my-simple-app

eb deploy
```

---

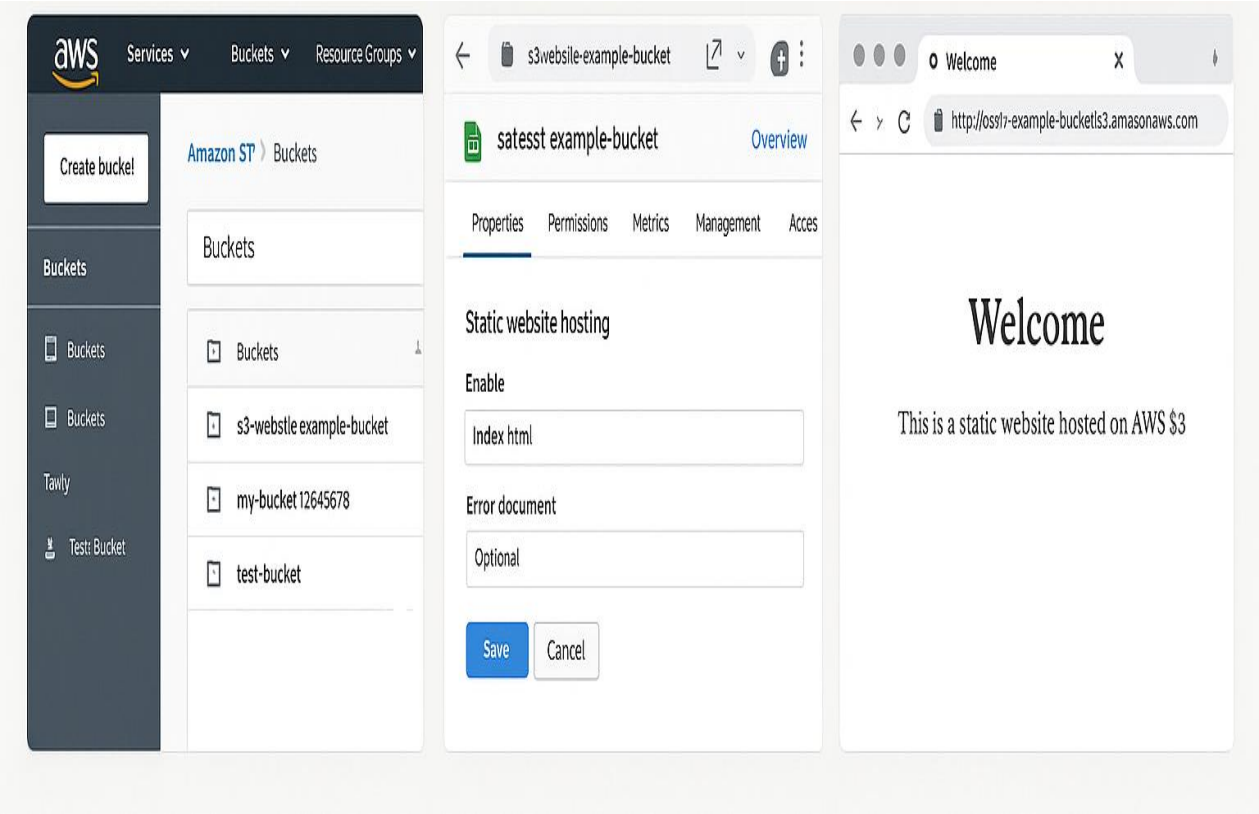
5. Access the Application

Run:

eb open

You will see:

Hello! This is a simple AWS web application.



Assignment-3

Q.1) Developing Python Application (Addition of 10 Numbers) Using Google App Engine

Steps:

Step 1: Create a new folder for your project (e.g., add10-app).
Step 2: Create the file **main.py** and write Python/Flask code to accept 10 numbers and display their sum.
Step 3: Create **requirements.txt** and add:

Flask

gunicorn

Step 4: Create **app.yaml** with the following content:

runtime: python39

entrypoint: gunicorn -b :$PORT main:app

Step 5: Install Google Cloud SDK and initialize using:

gcloud init

Step 6: Deploy the application using:

gcloud app deploy

Step 7: Open the deployed web application using:

gcloud app browse

Step 8: Enter 10 numbers in the form → click *Calculate* → View the result.

Q.1) Developing python Application (addition of 10 numbers) Using Google App Engine

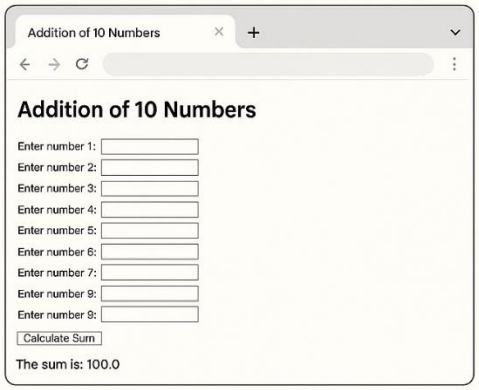
1 Create the file **main.py**
2 Creote configuration file **app.yaml**
3 Deploy using the command gcloud app deploy
4 Access the deployed application

main py

```
1  import Flask app
2  app.appyaml
3
4  on create(),flask()
5    crate(");
6     rout =(),pnw[floate], qpp:yaml)
7      add ten humber 1="_"
8      amg()
9    if app. run()
```

```
rutime: python3
entryprint: gunicond-gunciron app.yaml
```

```
gcloud app deploy
```



Q.2) Workings of Google Drive to Create a Spreadsheet (Inventory Management for Office Supplies)

Steps:

Step 1: Open **https://drive.google.com** and sign in.
Step 2: Click **New → Google Sheets** to create a new spreadsheet.
Step 3: Enter headers such as:

- Item Name
- Quantity
- Unit Price
- Total Cost

Step 4: Enter inventory data (e.g., Pens, Paper, Staplers).
Step 5: Use formula for each row:

=B2 * C2

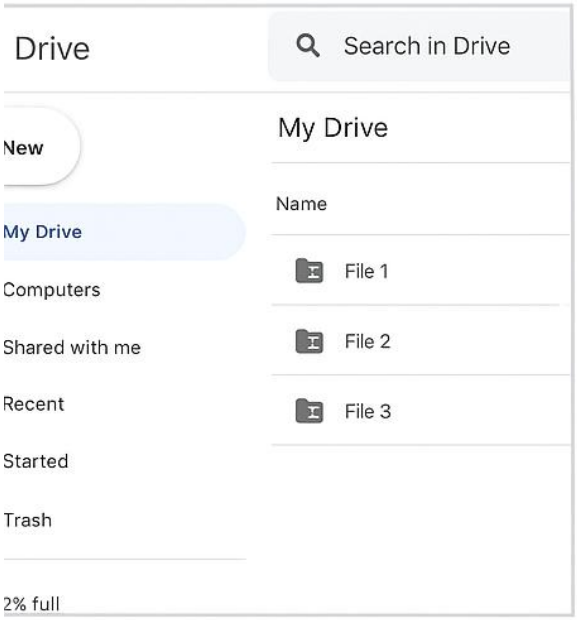
to calculate **Total Cost**.

Step 6: Use formula:

=SUM(D2:D20)

to calculate overall inventory cost.

Step 7: Format the sheet (header bold, currency formatting).
Step 8: Rename the file: **Office Inventory Management**.
Step 9: Click **Share → Add people** to share with team members.


Drive
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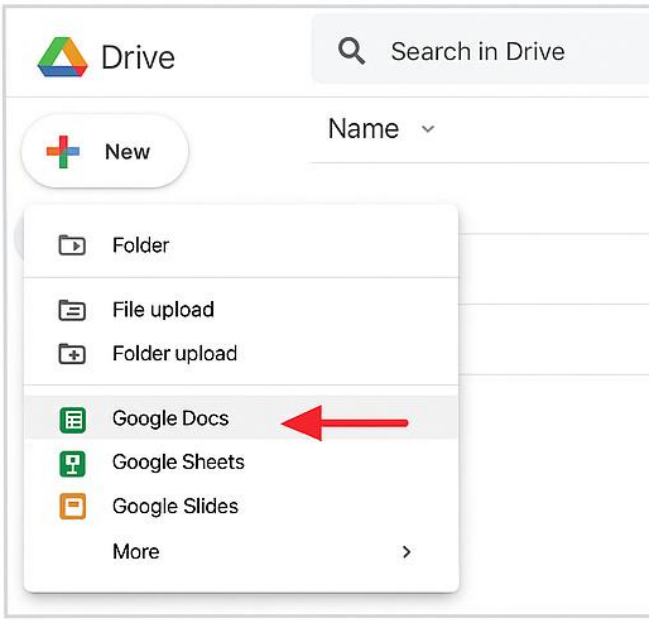
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Google Sheets
Google Slides
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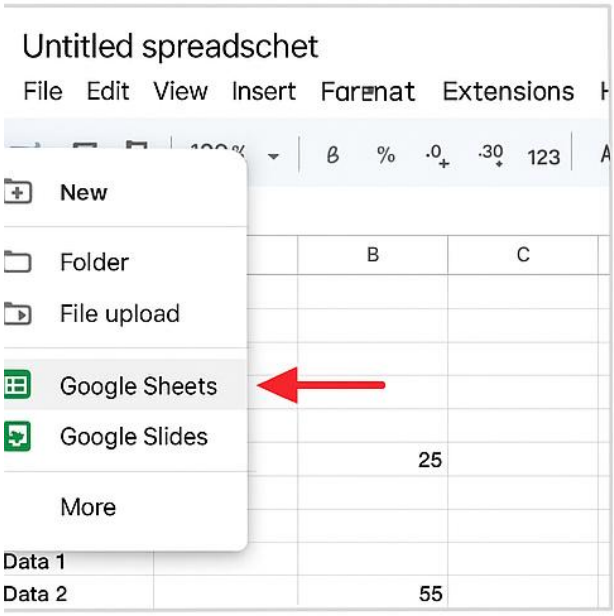
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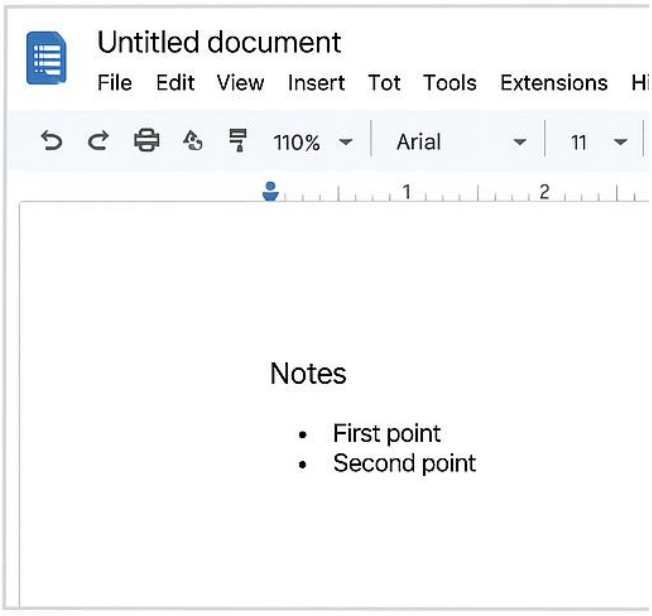
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Notes
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Second point

Assignment-4

Q.1) Working and Implementation of Storage as a Service (SaaS) using Google Drive

Steps:

Step 1: Open a browser and go to **https://drive.google.com**.
Step 2: Sign in using your Google account.
Step 3: Click the **New** button to create folders or upload files.
Step 4: Select **File Upload** or **Folder Upload** to store data in the cloud.
Step 5: Upload documents, images, PDFs, videos, etc.
Step 6: Create files directly using:

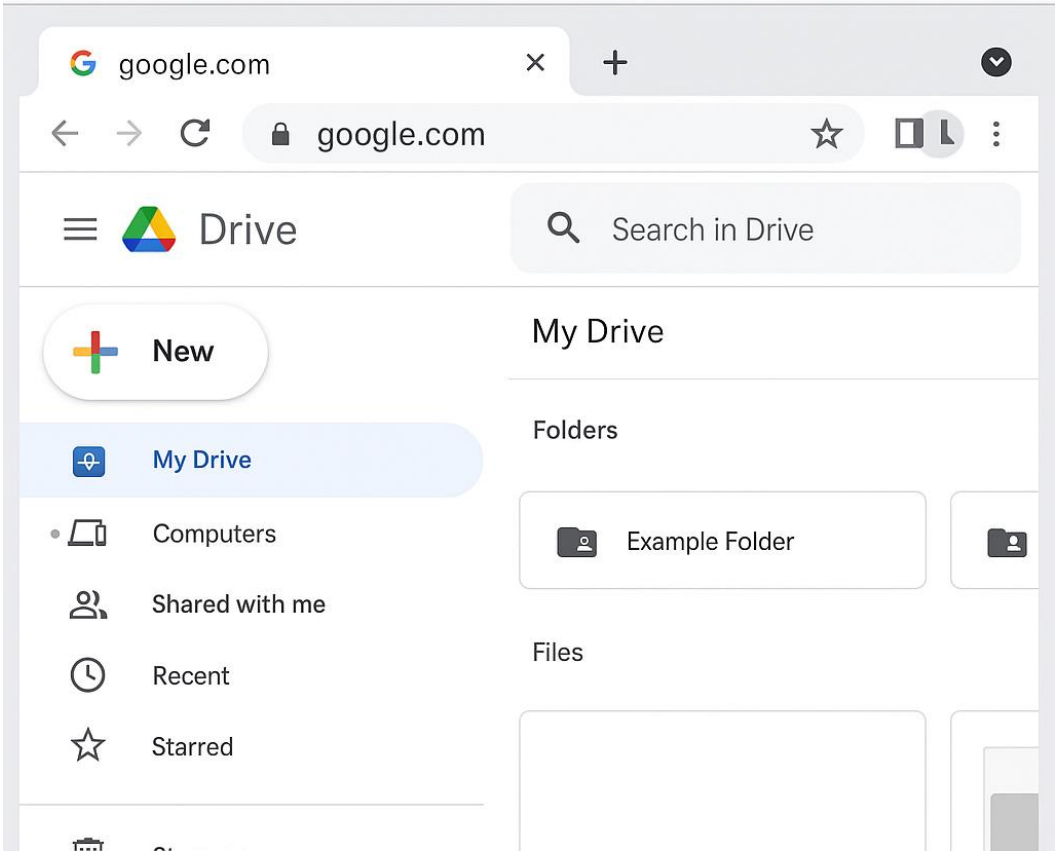
- **Google Docs** (text documents)
- **Google Sheets** (spreadsheets)
- **Google Slides** (presentations)

Step 7: Files are saved automatically in the cloud.
Step 8: Right-click any file → Click **Share** → Add people or copy the link.
Step 9: Control file access by selecting **Viewer / Commenter / Editor**.
Step 10: Access stored files anytime from any device using Google Drive.

SaaS Features Demonstrated in Google Drive:

- Online storage
- File synchronization
- Auto-backup
- Real-time collaboration
- Anywhere access
- Secure file sharing

Storage as a Service (SaaS) Using Google Drive



Q.2) Practical Implementation of IaaS using Microsoft Azure

Steps:

Step 1: Go to **https://portal.azure.com** and sign in.
Step 2: Click **Create a resource** from the Azure dashboard.
Step 3: Select **Virtual Machine** under Compute services.
Step 4: Enter VM details:

- VM Name
- Region
- Image (Windows/Linux)
- Size (CPU/RAM)

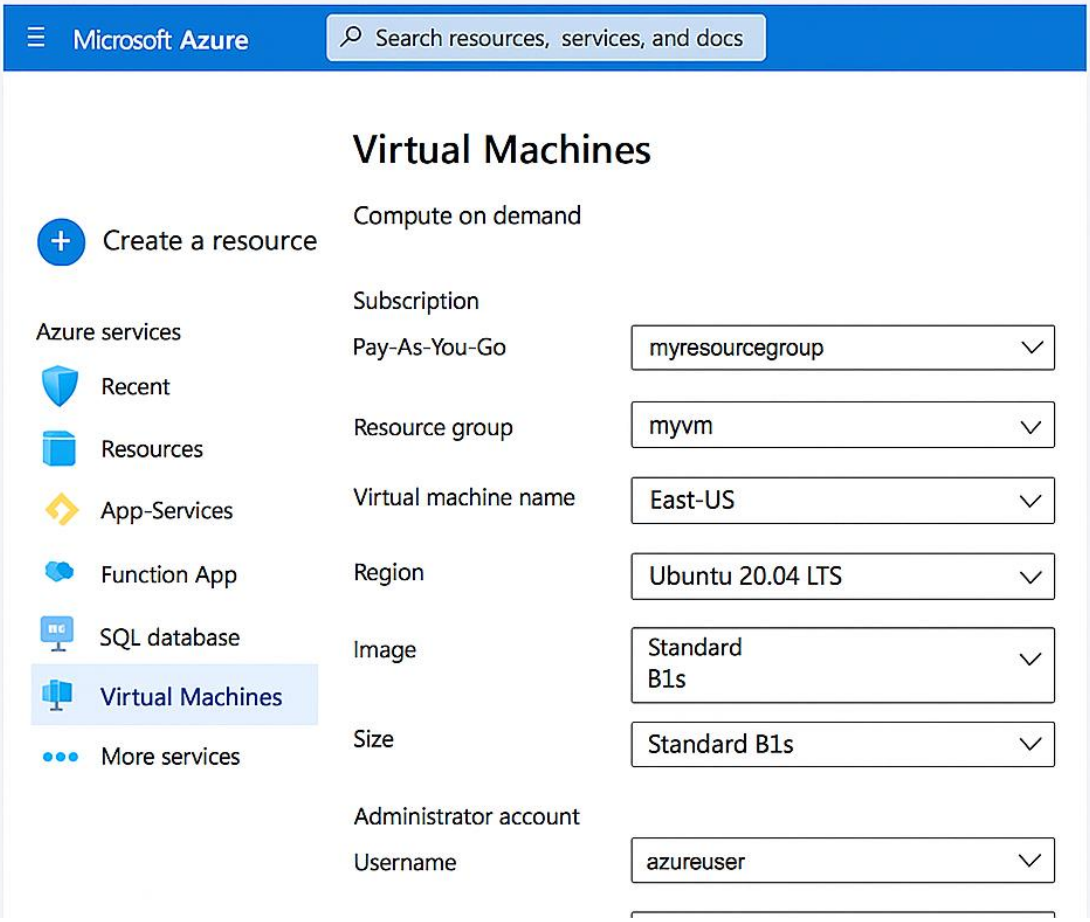
Step 5: Create administrator login credentials.
Step 6: Configure disk type (Standard SSD / Premium SSD).
Step 7: Configure networking settings (Virtual Network, Subnet, Public IP).
Step 8: Click **Review + Create**.
Step 9: After validation, click **Create** to deploy the VM.
Step 10: Access the VM:

- For Windows VM → Use **Remote Desktop (RDP)**
- For Linux VM → Use **SSH**

Azure IaaS Concepts Demonstrated:

- Virtual Machines
- Virtual Networks
- Storage Disks
- Public IP
- Cloud-based compute infrastructure

Practical Implementation of IaaS Using Microsoft Azure



Assignment-5

Q.1) Working and Implementation of Infrastructure as a Service (IaaS)

Working of IaaS

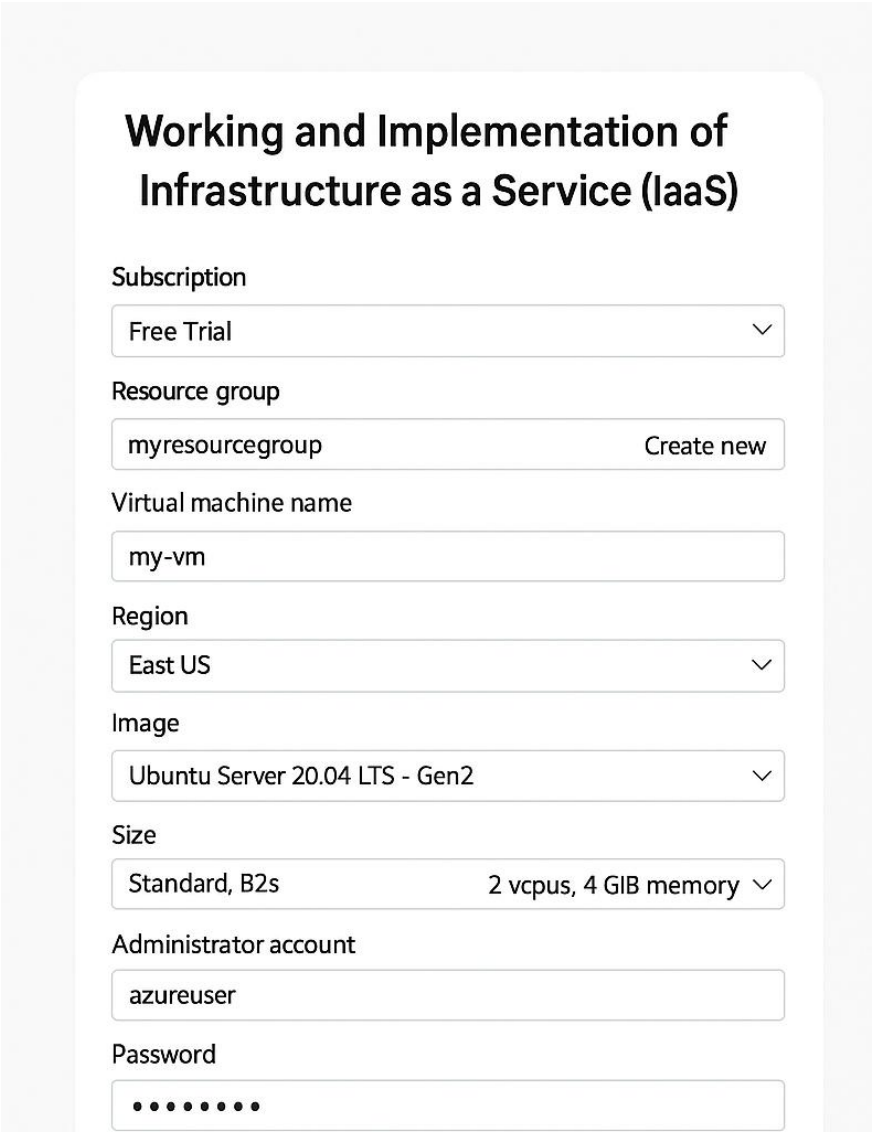
Infrastructure as a Service (IaaS) provides virtualized computing resources over the cloud.
Users can create and manage:

- Virtual Machines
- Storage
- Networks
- Firewalls
- Operating systems

IaaS providers (AWS, Azure, Google Cloud) provide the hardware, while the user manages the OS and applications.

Implementation Steps (General IaaS Process):

Step 1: Log in to any IaaS provider (AWS / Azure / Google Cloud Platform).
Step 2: Go to the Compute section (e.g., AWS EC2, Azure Virtual Machines).
Step 3: Click **Create Instance** or **Create Virtual Machine**.
Step 4: Choose an OS image (Ubuntu, Windows Server, CentOS, etc.).
Step 5: Select machine size (CPU, RAM, storage).
Step 6: Configure networking (VPC, subnet, firewall/security group).
Step 7: Add storage (SSD/HDD).
Step 8: Create a key pair (for SSH/RDP access).
Step 9: Launch the virtual machine.
Step 10: Connect using SSH (Linux) or RDP (Windows) to use the VM.



Q.2) Create and Configure Multiple Virtual Machines

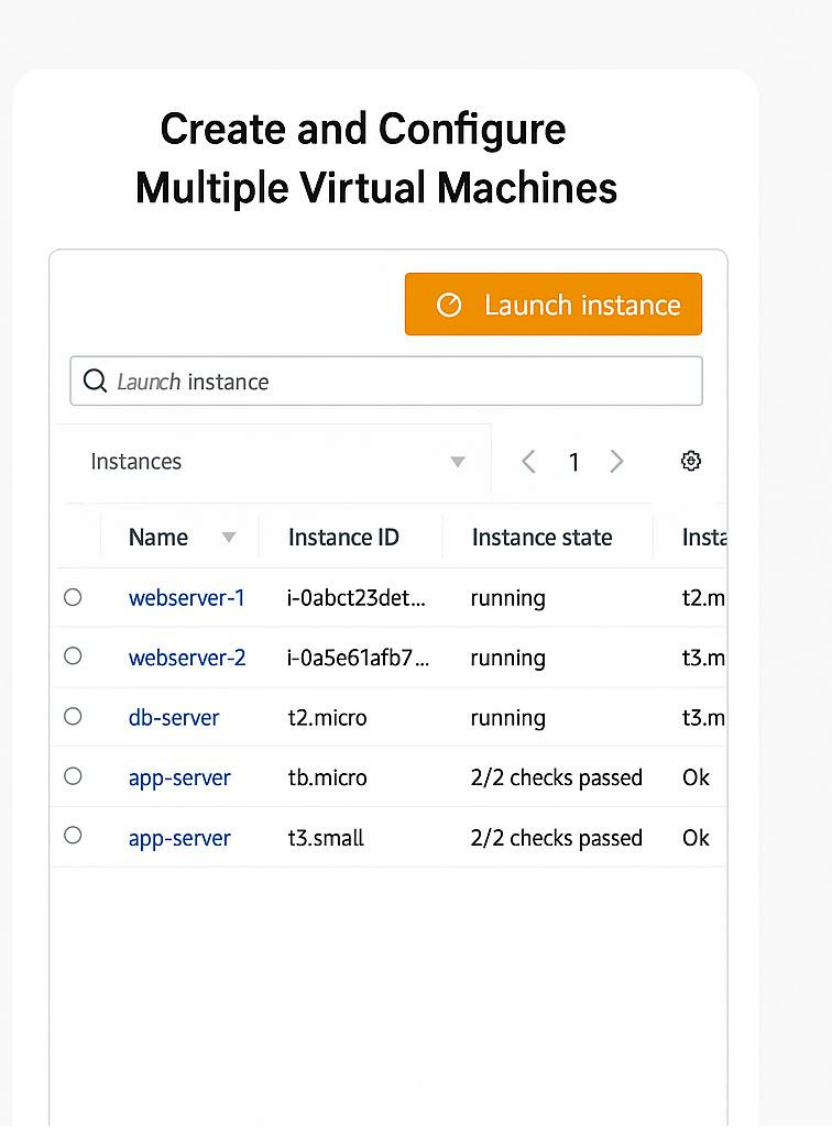
Steps:

Step 1: Log in to Cloud Platform (AWS / Azure / Google Cloud).
Step 2: Open Compute Service:

- AWS → EC2
- Azure → Virtual Machines
- GCP → Compute Engine

Step 3: Click **Create VM / Launch Instance**.
Step 4: Select OS image (Ubuntu/Windows).
Step 5: Choose VM size (vCPU, RAM).
Step 6: Configure disk size & type.
Step 7: Configure network settings (VPC, Subnet, Firewall rules).

Step 8: Create or use an existing key pair.
Step 9: Launch the First VM.
Step 10: Repeat the same steps to create a second or third VM.
Step 11: Verify both VMs appear in the dashboard.
Step 12: Connect to each using SSH/RDP and test functionality.



Assignment-6

Q.1) Developing Python Application (Addition of 10 Numbers) Using Google App Engine

Steps:

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Step 2: Create the file **main.py** and write Python/Flask code to accept 10 numbers and display their sum.
Step 3: Create **requirements.txt** and add:

Flask

gunicorn

Step 4: Create **app.yaml** with the following content:

runtime: python39

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Step 5: Install Google Cloud SDK and initialize using:

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Step 6: Deploy the application using:

gcloud app deploy

Step 7: Open the deployed web application using:

gcloud app browse

Step 8: Enter 10 numbers in the form → click *Calculate* → View the result.

Q.1) Developing python Application (addition of 10 numbers) Using Google App Engine

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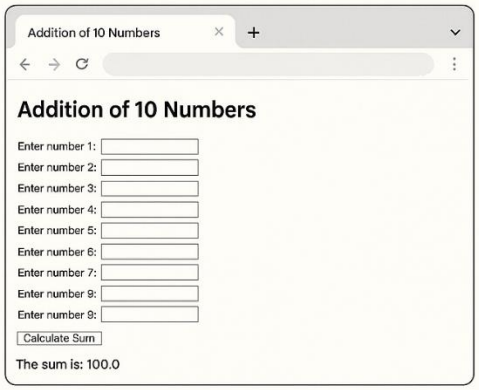
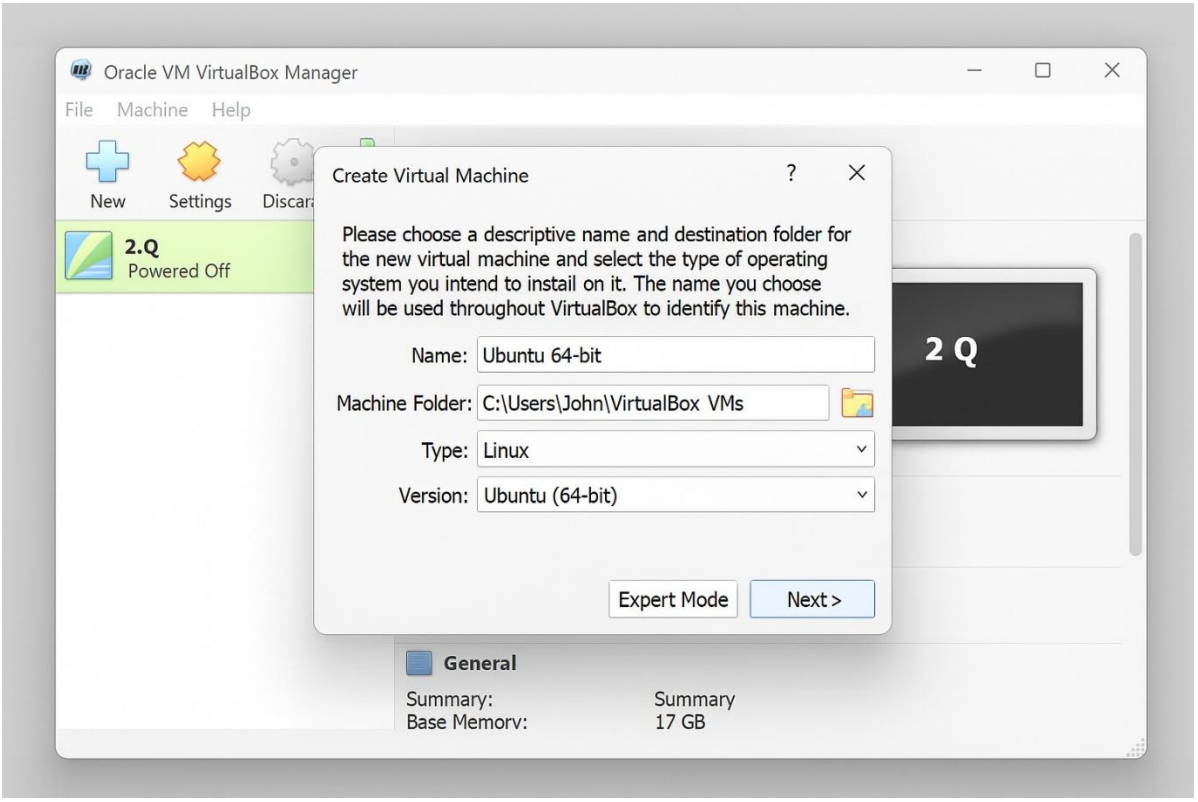
entryprint: gunicond-gunciron app.yaml
```

```
gcloud app deploy
```



Q.2) Create a Virtual Machine using Virtual Box.

Step 1: Install and open **Oracle VM VirtualBox** on your computer.
Step 2: Click the **New** button in the top-left corner.
Step 3: Enter the **Name** of the virtual machine (e.g., Ubuntu 64-bit).
Step 4: Choose the **Machine Folder** where VM files will be stored.
Step 5: Select **Type** (e.g., Linux, Windows) and **Version** (Ubuntu 64-bit, Windows 10, etc.).
Step 6: Click **Next** and assign **RAM size** (e.g., 2048 MB).
Step 7: Select **Create a virtual hard disk now** → click **Create**.
Step 8: Choose the disk type **VDI** and click **Next**.
Step 9: Choose **Dynamically allocated** and click **Next**.
Step 10: Set disk size (e.g., 20 GB) and click **Create**.



Assignment-7

Q.1) Create and Display a “Hello World” Application in Salesforce.com using Apex

Steps:

Step 1: Login to Salesforce Developer Edition at https://login.salesforce.com
Step 2: Go to Setup → Developer Console.
Step 3: In Developer Console, click File → New → Apex Class.
Step 4: Name the class HelloWorldDemo.
Step 5: Write the following Apex code:

```
public class HelloWorldDemo {

  public static void displayMessage() {

    System.debug('Hello World');

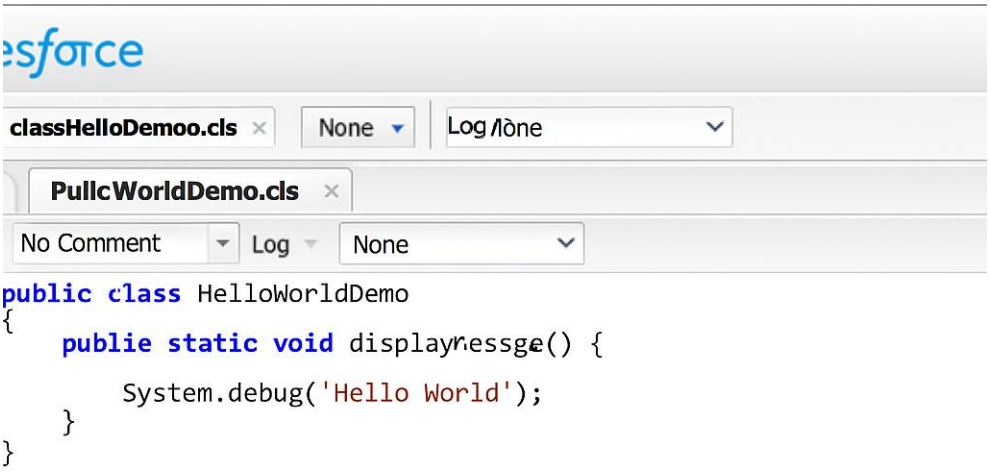
  }

}
```

Step 6: Save the class**.**
Step 7: Now run the code:
Go to Debug → Open Execute Anonymous Window.
Step 8: Enter the code:

```
HelloWorldDemo.displayMessage();
```

Step 9: Check “Open Log” and click Execute.
Step 10: The output “Hello World” appears in the Debug Logs**.**


classHelloDemoo.cls
None
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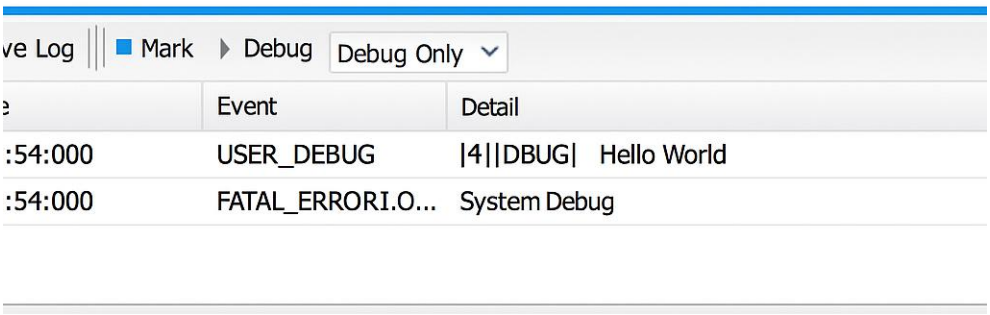
None
public class HelloWorldDemo
{
public static void displayMessge() {
System.debug('Hello World');
}
}


Mark
Debug
Debug Only
Event
Detail
:54:000
USER_DEBUG
|4||DBUG| Hello World
:54:000
FATAL_ERRORI.O...
System Debug

Q.2) Program for Web Feed (RSS Feed Generator)

Steps:

Step 1: Use any programming language (Java / Python / PHP) to generate an RSS feed.
Step 2: Create an XML structure following RSS 2.0 specifications.
Step 3: Add channel information and feed items.
Step 4: Display feed in browser or feed reader.

Sample Program (XML RSS Web Feed)

```
<?xml version="1.0" encoding="UTF-8" ?>

<rss version="2.0">

 <channel>

  <title>My Web Feed</title>

  <description>Simple RSS Feed Example</description>

  <link>http://example.com</link>


  <item>

   <title>First Update</title>

   <description>Hello, this is my first RSS update!</description>

   <link>http://example.com/first</link>

  </item>


  <item>

   <title>Second Update</title>

   <description>This is the second feed update!</description>

   <link>http://example.com/second</link>

  </item>


 </channel>

</rss>
```

Output:

A valid RSS feed that can be opened in any feed reader.

Assignment-8

Q1) Workings of Google Drive to make spreadsheet and notes

Final Answer (Exam-style)

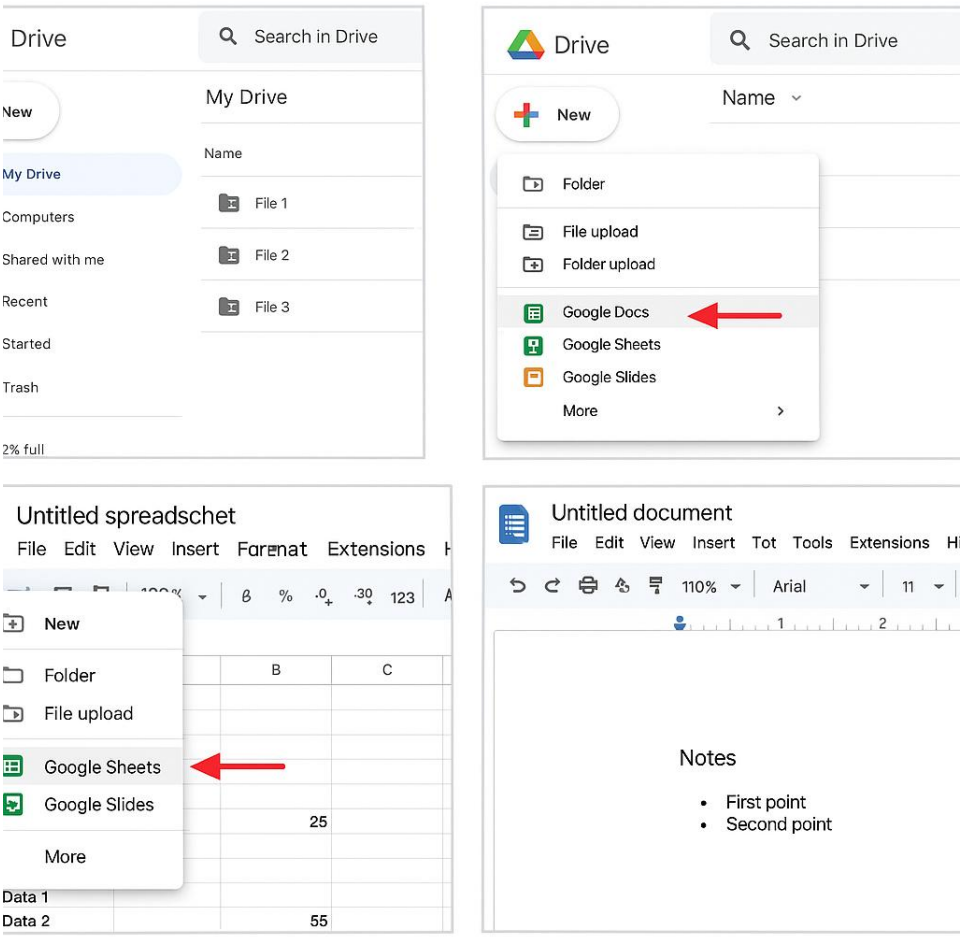
Create a Google Drive account, create or upload a spreadsheet and notes, and share them with others. Below are clear step-by-step instructions with labeled mock screenshots so you can reproduce this in the lab.

Steps (Step-wise procedure)

1. **Sign in to Google Drive**
    - Open a web browser and go to https://drive.google.com.
    - Sign in with your Google account (Gmail). If you don't have one, create a Google account.
2. **Create a new Spreadsheet (Google Sheets)**
    - Click the **New** button (top-left) → select **Google Sheets** → **Blank spreadsheet**.
    - A new Google Sheets document opens in a new tab.
3. **Enter Data and Use Basic Features**
    - Enter data into cells (A1, A2, ...).
    - Use basic formulas: =SUM(A1:A5), =AVERAGE(B1:B5), =IF(C1>50, "Pass", "Fail").
    - Format cells using toolbar (bold, number format, borders).
    - Create simple charts: Insert → Chart → choose chart type.
4. **Create Notes (Google Docs)**
    - From Google Drive click **New** → **Google Docs** → **Blank document**.
    - Add headings, text, images: Insert → Image or drag-and-drop images.
    - Use Bulleted/Numbered lists, styles (Normal text → Heading 1/2).
5. **Organize Files in Folders**
    - In Drive: **New** → **Folder**. Name it (e.g., Workshop_CS-512).
    - Drag the spreadsheet and the notes into the folder.
6. **Share Files with Others**
    - Open any file → Click **Share** (top-right).

- Add collaborator email(s) and set permission: Viewer / Commenter / Editor.
- Alternatively, click **Get link** → change link access to **Anyone with the link** (Viewer) if public sharing is ok.

7. **Version History and Comments**
   - For Docs/Sheets: File → Version history → See version history (view or restore previous versions).
   - Use Insert → Comment or highlight text and comment for collaborative review.



Q2) Steps to Create a Docker Instance (Container)

Step 1: Install Docker Desktop

- Go to https://www.docker.com/products/docker-desktop
- Download and install for Windows / Mac / Linux.

Step 2: Verify Installation

Open Terminal / CMD / PowerShell and run:

docker --version

Step 3: Pull an Image from Docker Hub

Example: Pull Ubuntu image

docker pull ubuntu

Step 4: Create & Run a Docker Container

Run the following command:

docker run -it ubuntu

This creates a Docker instance (container) and opens a shell inside it.

Step 5: Confirm Container is Running

Open a new terminal and type:

docker ps

Step 6: Exit the Container

Inside the container, type:

exit

Step 7: View All Containers (Running + Stopped)

docker ps -a

Step 8: Remove Container (Optional)

docker rm <container_id>

Output Example

root@a2b34f21c:/# echo "Hello from Docker"

Hello from Docker

```
user@linux:~$ docker run -it ubuntu
root@a2b34f21c/~ eho 'Hello from Docker'
exit
user@linux:$
```

Assignment-9

Q1) Exploring OneDrive: Creating and Sharing Documents and Presentations

Steps to Create Documents in OneDrive

Step 1:

Open a browser → Go to **https://onedrive.live.com** and sign in with your Microsoft account.

Step 2:

Click the **New** button on the top menu.

Step 3:

Select the type of document you want to create:

- **Word Document** (Notes, essays, reports)
- **Excel Workbook** (Sheets, calculations, tables)
- **PowerPoint Presentation** (Slides, projects)
- **OneNote Notebook**

Step 4:

A new document opens in **Office Online** (Word, PowerPoint, etc.).
Add text, images, tables, or slides as required.

Step 5:

Your work is automatically saved to OneDrive (AutoSave ON).

Steps to Create Presentations in OneDrive

Step 1:

Click **New → PowerPoint Presentation**.

Step 2:

Choose a blank presentation or a built-in template.

Step 3:

Add slides (Title Slide, Content Slide, Image Slide, etc.).

Step 4:

Insert:

- Images
- SmartArt
- Charts
- Animations
- Transitions

Step 5:

Rename the presentation using the filename box at the top-left.

Steps to Share Documents & Presentations

Step 1:

Right-click a file in OneDrive and click **Share**.

Step 2:

Choose sharing options:

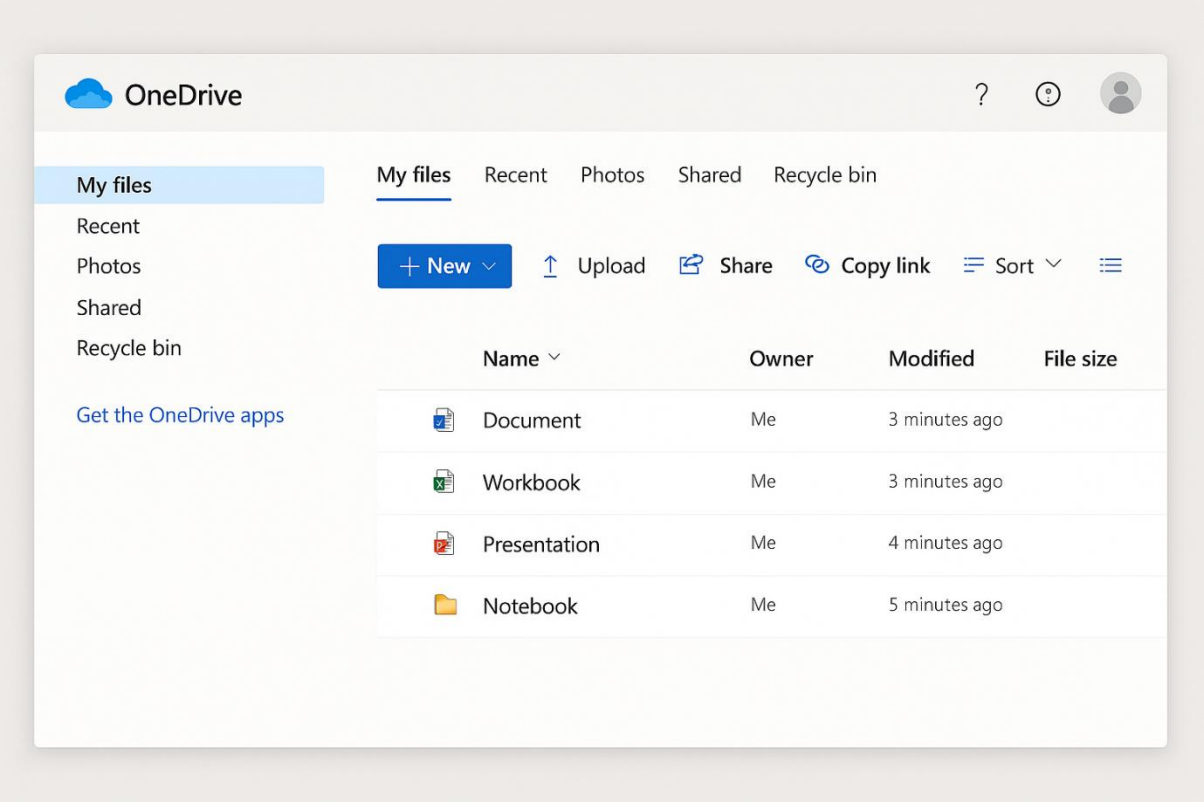
- **People with the link**
- **Specific people**
- **View / Edit permission**

Step 3:

Click **Copy Link** or **Send Email**.

Step 4:

Users can now access and collaborate on the file in real time.


OneDrive
My files
Recent
Photos
Shared
Recycle bin
Get the OneDrive apps
My files
Recent
Photos
Shared
Recycle bin
New
Upload
Share
Copy link
Sort
Name
Owner
Modified
File size
Document
Me
3 minutes ago
Workbook
Me
3 minutes ago
Presentation
Me
4 minutes ago
Notebook
Me
5 minutes ago

Q.2) Create and Configure Multiple Virtual Machines

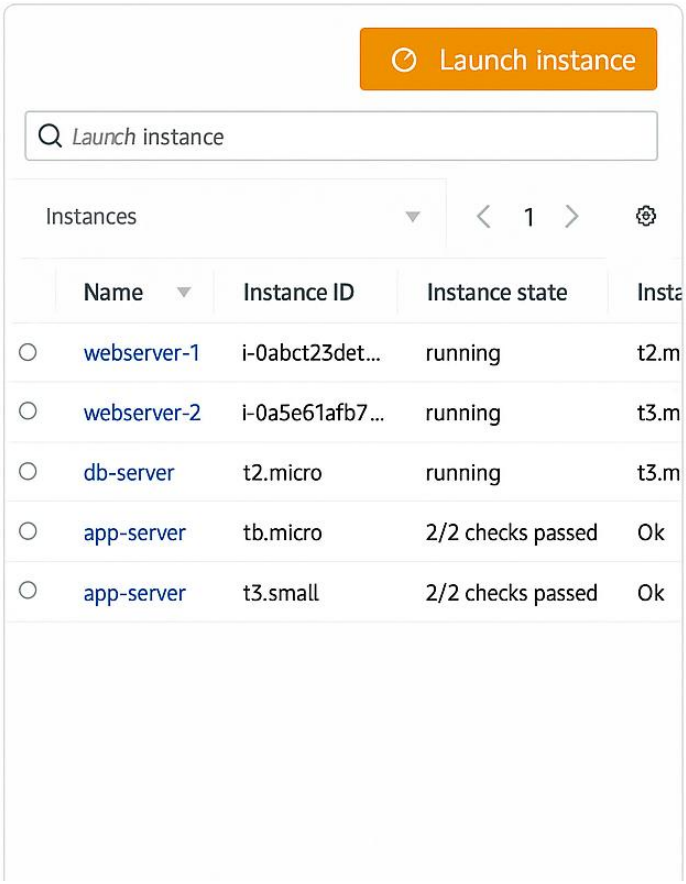
Steps:

Step 1: Log in to Cloud Platform (AWS / Azure / Google Cloud).
Step 2: Open Compute Service:

- AWS → EC2
- Azure → Virtual Machines
- GCP → Compute Engine

Step 3: Click **Create VM / Launch Instance**.
Step 4: Select OS image (Ubuntu/Windows).
Step 5: Choose VM size (vCPU, RAM).
Step 6: Configure disk size & type.
Step 7: Configure network settings (VPC, Subnet, Firewall rules).
Step 8: Create or use an existing key pair.
Step 9: Launch the First VM.
Step 10: Repeat the same steps to create a second or third VM.
Step 11: Verify both VMs appear in the dashboard.
Step 12: Connect to each using SSH/RDP and test functionality.

Create and Configure Multiple Virtual Machines



Assignment-10

Q1) Using Google Drive to Create a Student Registration Form and Automate Data Analysis

PART 1: Create Student Registration Form (Google Forms)

Step 1: Open browser → go to drive.google.com → sign in**.**
Step 2: Click New → Google Forms → Blank Form**.**
Step 3: Type title: Student Registration Form.
Step 4: Add fields: Name, Roll No, Department, Email, Phone, Gender, Course, Year/Semester.
Step 5: Select field type (Short Answer / MCQ / Dropdown).
Step 6: Turn Required ON for necessary fields.
Step 7: Click Send → Copy link → Share with students.

PART 2: Link Responses to Google Sheets

Steps (Very Short):

Step 1: Open the form → Click Responses.
Step 2: Click the Green Sheets Icon.
Step 3: A new Google Sheet is created; all responses store automatically.

PART 3: Automate Data Analysis in Google Sheets

A. Count Total Students

Formula:

=COUNTA(A2:A)

B. Count Students per Department

Example:

=COUNTIF(C:C,"Computer Science")

C. Gender Count

=COUNTIF(G:G,"Male")

=COUNTIF(G:G,"Female")

D. Charts (Auto-update)

Step 1: Select data.
Step 2: Insert → Chart.
Step 3: Choose Pie / Bar chart.

E. Pivot Table Summary

Step 1: Insert → Pivot Table.
Step 2: Rows → Department.
Step 3: Values → Count of Student Name.

PART 4: Automated Alerts

Step 1: Go to Form Settings.
Step 2: Turn ON Email notifications for new responses.
(Optional: Use Apps Script for advanced alerts)

Final Output

- Student Registration Form created
- Responses stored in Google Sheets
- Automatic totals, counts, charts, and pivot table
- Useful for attendance, enrollment, and analytics

Q.2) Developing and Deploying a Simple Web Application using AWS

1. Create a Simple Python Web App (Flask)

Create application.py:

```
from flask import Flask

app = Flask(__name__)


@app.route('/')

def home():

  return "Hello! This is a simple AWS web application."


if __name__ == '__main__':

  app.run()
```

Create **requirements.txt**:

```
Flask==2.0.2
```

---

2. Install AWS Elastic Beanstalk CLI

```
pip install awsebcli
```

---

3. Initialize Beanstalk Project

```
eb init
```

- Choose region
- Platform: **Python**

---

4. Deploy Application

```
eb create my-simple-app

eb deploy
```

---

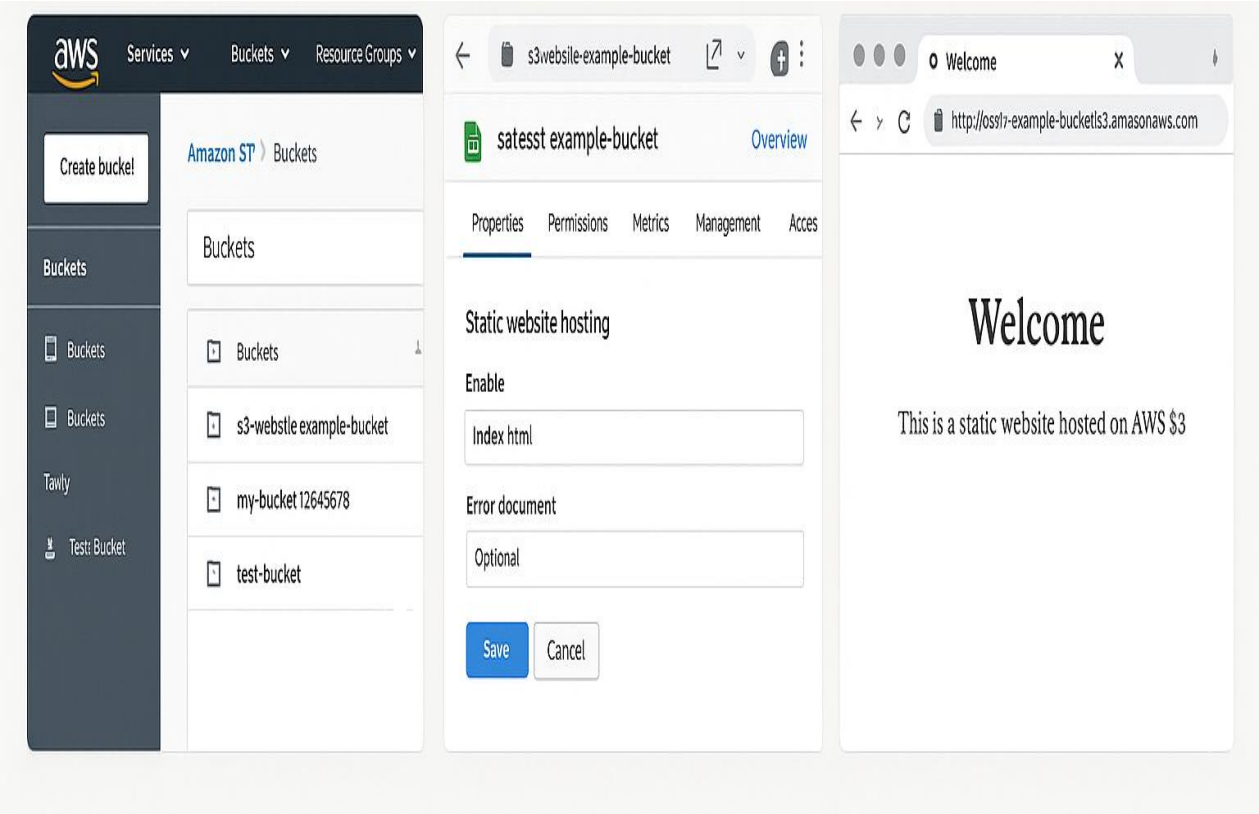
5. Access the Application

Run:

eb open

You will see:

Hello! This is a simple AWS web application.



Assignment-11

Q.1) Working and Implementation of Storage as a Service (SaaS) using Google Drive

Steps:

Step 1: Open a browser and go to **https://drive.google.com**.
Step 2: Sign in using your Google account.
Step 3: Click the **New** button to create folders or upload files.
Step 4: Select **File Upload** or **Folder Upload** to store data in the cloud.
Step 5: Upload documents, images, PDFs, videos, etc.
Step 6: Create files directly using:

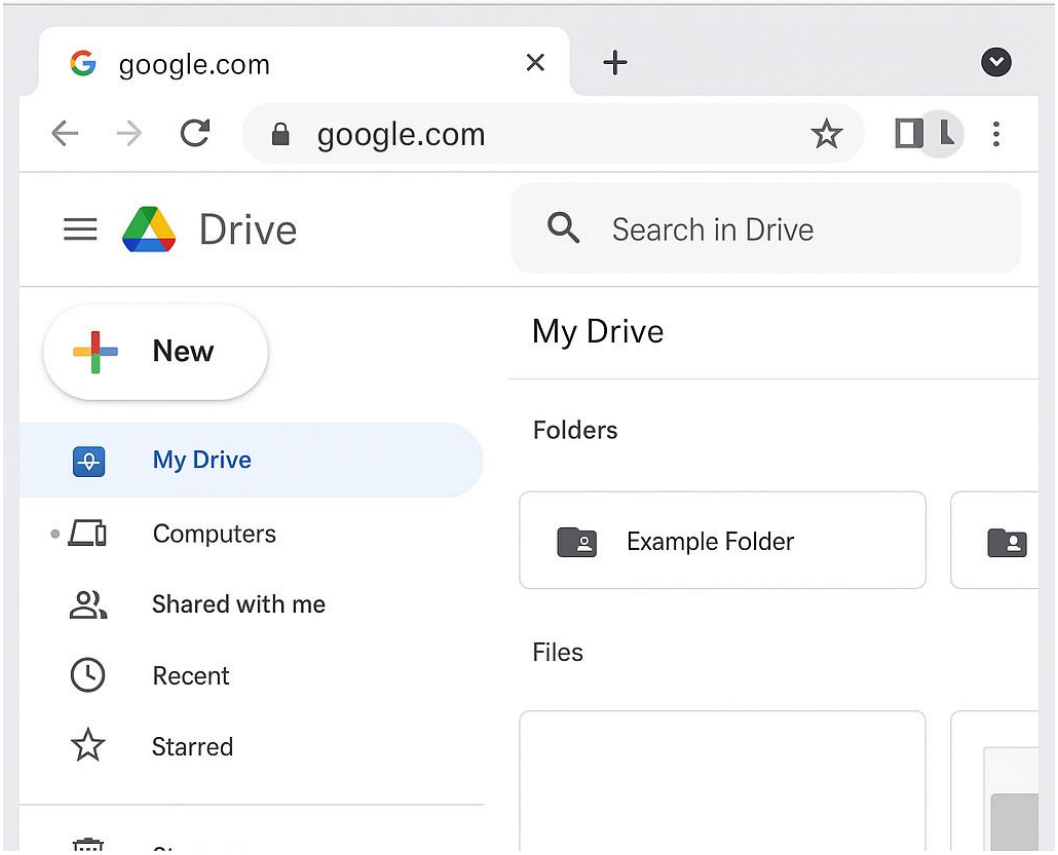
- **Google Docs** (text documents)
- **Google Sheets** (spreadsheets)
- **Google Slides** (presentations)

Step 7: Files are saved automatically in the cloud.
Step 8: Right-click any file → Click **Share** → Add people or copy the link.
Step 9: Control file access by selecting **Viewer / Commenter / Editor**.
Step 10: Access stored files anytime from any device using Google Drive.

SaaS Features Demonstrated in Google Drive:

- Online storage
- File synchronization
- Auto-backup
- Real-time collaboration
- Anywhere access
- Secure file sharing

Storage as a Service (SaaS) Using Google Drive



Q.2) Practical Implementation of IaaS using Microsoft Azure

Steps:

Step 1: Go to **https://portal.azure.com** and sign in.
Step 2: Click **Create a resource** from the Azure dashboard.
Step 3: Select **Virtual Machine** under Compute services.
Step 4: Enter VM details:

- VM Name
- Region
- Image (Windows/Linux)
- Size (CPU/RAM)

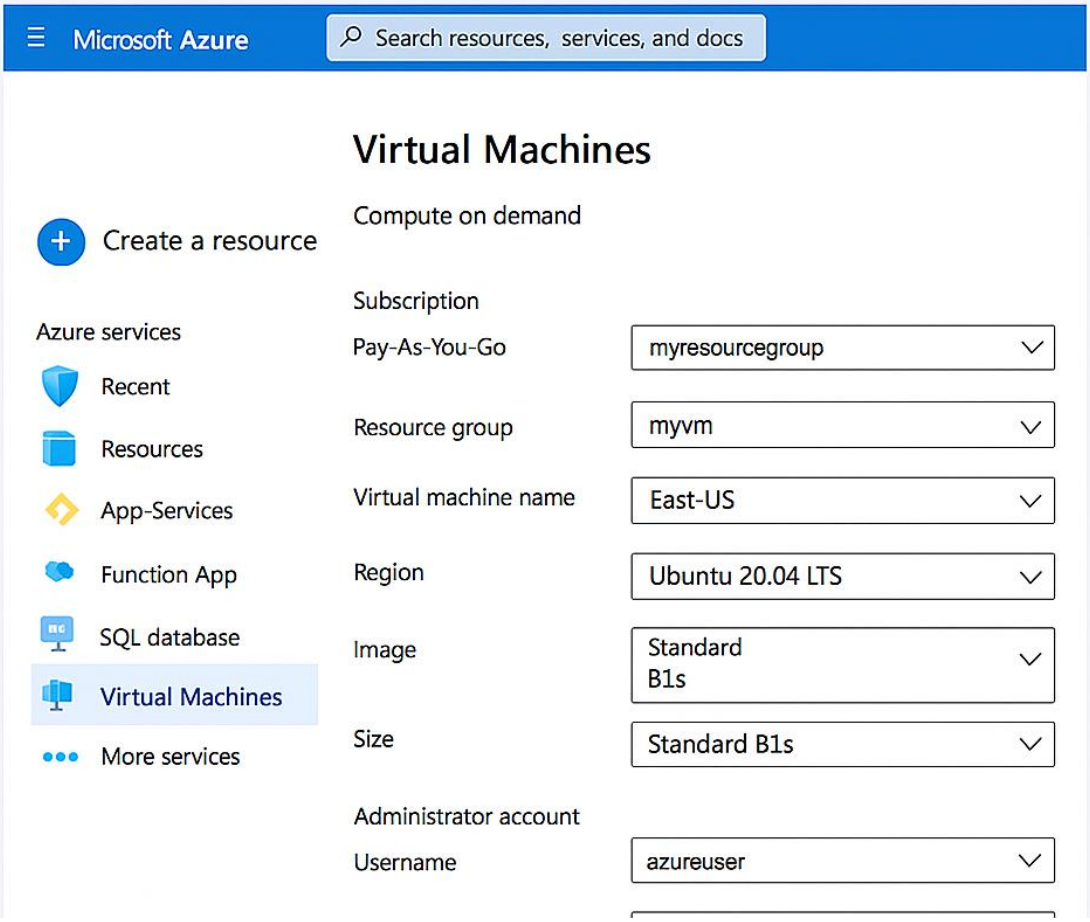
Step 5: Create administrator login credentials.
Step 6: Configure disk type (Standard SSD / Premium SSD).
Step 7: Configure networking settings (Virtual Network, Subnet, Public IP).
Step 8: Click **Review + Create**.
Step 9: After validation, click **Create** to deploy the VM.
Step 10: Access the VM:

- For Windows VM → Use **Remote Desktop (RDP)**
- For Linux VM → Use **SSH**

Azure IaaS Concepts Demonstrated:

- Virtual Machines
- Virtual Networks
- Storage Disks
- Public IP
- Cloud-based compute infrastructure

Practical Implementation of IaaS Using Microsoft Azure



Assignment-12

Q.1) Working and Implementation of Infrastructure as a Service (IaaS)

Working of IaaS

Infrastructure as a Service (IaaS) provides virtualized computing resources over the cloud.
Users can create and manage:

- Virtual Machines
- Storage
- Networks
- Firewalls
- Operating systems

IaaS providers (AWS, Azure, Google Cloud) provide the hardware, while the user manages the OS and applications.

Implementation Steps (General IaaS Process):

Step 1: Log in to any IaaS provider (AWS / Azure / Google Cloud Platform).
Step 2: Go to the Compute section (e.g., AWS EC2, Azure Virtual Machines).
Step 3: Click **Create Instance** or **Create Virtual Machine**.
Step 4: Choose an OS image (Ubuntu, Windows Server, CentOS, etc.).
Step 5: Select machine size (CPU, RAM, storage).
Step 6: Configure networking (VPC, subnet, firewall/security group).
Step 7: Add storage (SSD/HDD).
Step 8: Create a key pair (for SSH/RDP access).
Step 9: Launch the virtual machine.
Step 10: Connect using SSH (Linux) or RDP (Windows) to use the VM.

Q2).**Create and Host a Static Web Page using Any Cloud Provider**

Steps (Very Short & Simple)

Step 1: Create a simple **index.html** file using Notepad/VS Code.
Example content:

```
<html>
 <body>
  <h1>Welcome to My Static Web Page</h1>
 </body>
</html>
```

Step 2: Choose any cloud provider:

- **AWS S3**
- **Google Cloud Storage**
- **Microsoft Azure Storage**

Step 3: Login to your cloud account.

Step 4: Create a **Storage Bucket** (S3 Bucket / Cloud Storage Bucket / Azure Blob Container).

Step 5: Upload your **index.html**, CSS, and image files.

Step 6: Make the files **public** (Enable public access).

Step 7: Turn on **Static Website Hosting** from bucket settings.

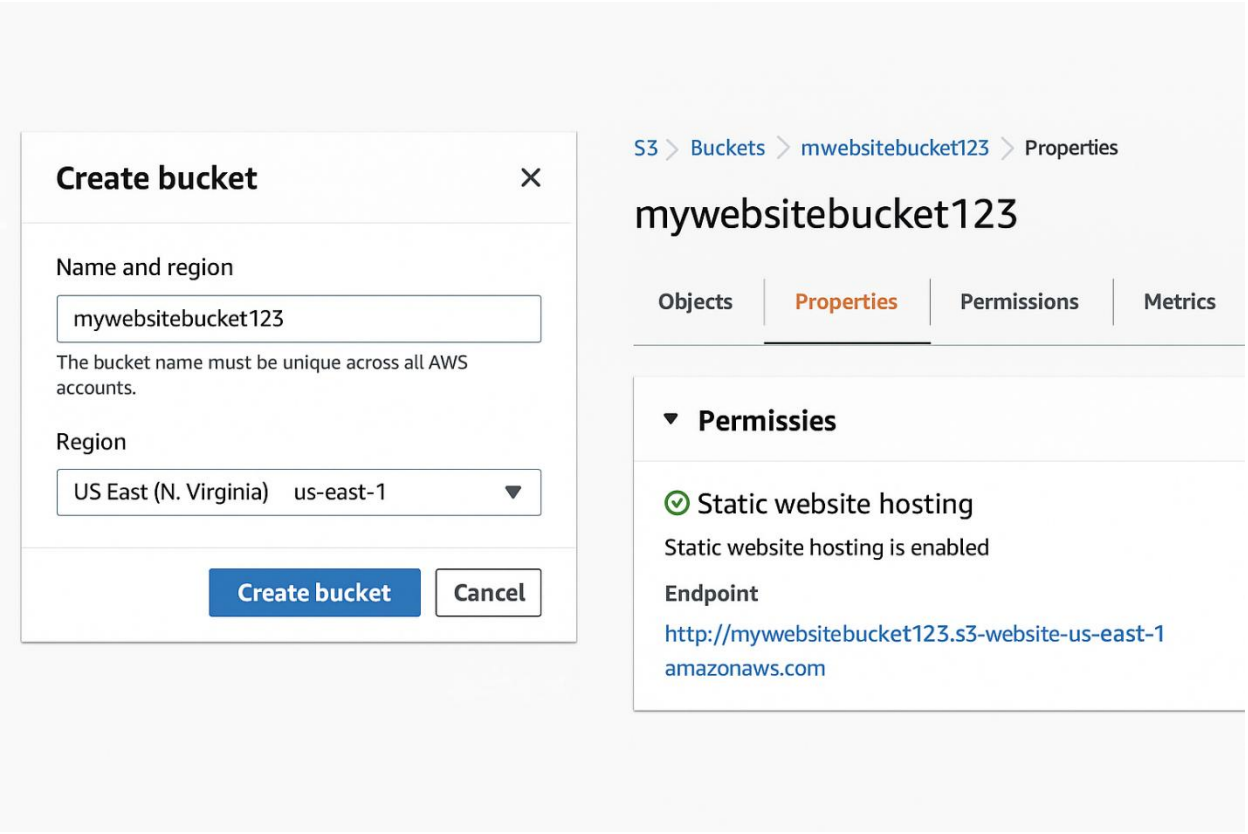
Step 8: Set index.html as the **default home page**.

Step 9: Copy the hosting **URL** provided by the cloud platform.

Step 10: Paste the URL in a browser → Your website is now live.

Final Output

- Your static website is hosted on a cloud provider
- Accessible from anywhere using a public URL
- No server needed (HTML/CSS only)


Create bucket
Name and region
mywebsitebucket123
The bucket name must be unique across all AWS accounts.
Region
US East (N. Virginia) us-east-1
Create bucket
Cancel
S3 > Buckets > mwebsitebucket123 > Properties
mywebsitebucket123
Objects
Properties
Permissions
Metrics
Permissies
Static website hosting
Static website hosting is enabled
Endpoint
http://mywebsitebucket123.s3-website-us-east-1
amazonaws.com

Assignmet-13

Q1) **Step-by-Step: Sign Up for a Free Google Cloud Account**

---

1. Go to the Google Cloud Website

- Open your browser
- Visit: https://cloud.google.com/
- Click Get started for free or Try Free.

---

2. Sign In with Your Google Account

- Use your Gmail / Google account to log in.
- If you don't have one, click Create account.

---

3. Accept Google Cloud Terms

- Choose your Country
- Check the Terms of Service box
- Click Agree & Continue

---

4. Verify Your Identity (Card Required but NOT Charged)

- Google requires a credit or debit card for identity verification
- You won’t be charged
- Enter your card + address details
- Click Start my free trial

---

5. Your Free-Tier Account Is Now Active

- You will be redirected to the Google Cloud Console
- You now get:
  ✓ 90-day free trial credit
  ✓ Always Free Tier services
  ✓ Access to Compute Engine, Storage, Cloud Functions, and more

Google

Sign in

with your Google Account

Email or phone

Forgot email?

Not your computer? Use Guest mode to sign in privately.
Learn more

Create account

Next

English (United States)

Help Privacy Policy Terms of Service

CLOUD SERVICES AGREEMENT

THIS AGREEMENT is made this _____ day of __, __ (the "Effective Date"), by and between _____ (the "Provider"), a corporation organized and existing under the laws of _____, and _____ (the "Customer"), a corporation organized and existing under the laws of _____.

1. DEFINITIONS

1.1 "Services" refers to the cloud services provided by the Provider, which include but are not limited to data storage, data processing, and data transfer services. The specifics of these services, including the scope, quality, and manner of delivery, will be as mutually agreed upon by the parties and may be further detailed in subsequent sections of this Agreement.

1.2 "Customer Data" refers to all data, information, and other materials that Customer uploads or transfers into the Services.

2. ACCESS AND LICENSE

2.1 Subject to the terms and conditions of this Agreement, the Provider grants the Customer a non-exclusive, non-transferable, revocable license to access and use the Services.

2.2 The Customer will not use the Services in any manner that could damage, disable, overburden, or impair the Services, or interfere with any other party's use and enjoyment of the Services.

3. SERVICES AND SUPPORT

3.1 The Provider will provide the Services to the Customer in a professional and workmanlike manner, consistent with industry standards.

3.2 The Provider will make the Services available to the Customer 24 hours a day, 7 days a week, except for planned downtime for system maintenance (for which the Provider will provide at least 24 hours' notice and which will be scheduled during low-usage hours), or for any unavailability caused by circumstances beyond the Provider's reasonable control, such as acts of God, acts of government, floods, fires, earthquakes, civil unrest, acts of terror, strikes or other labor problems, Internet service provider failures or delays, or denial of service attacks.

3.3 The Provider will provide Customer with technical support services from Monday to Friday, 9:00 AM to 5:00 PM Eastern Time, excluding federal holidays. The Provider will respond to support requests
within 24 hours.

4. USE OF THE SERVICES

4.1 The Customer will use the Services in compliance with the terms of this Agreement, applicable laws, and the Provider's acceptable use policy, which prohibits the use of the Services for illegal activities, the transmission of harmful or malicious software, the infringement of intellectual property

Q.2) Program for Web Feed (RSS Feed Generator)

Steps:

Step 1: Use any programming language (Java / Python / PHP) to generate an RSS feed.
Step 2: Create an XML structure following RSS 2.0 specifications.
Step 3: Add channel information and feed items.
Step 4: Display feed in browser or feed reader.

Sample Program (XML RSS Web Feed)

```
<?xml version="1.0" encoding="UTF-8" ?>

<rss version="2.0">

 <channel>

  <title>My Web Feed</title>

  <description>Simple RSS Feed Example</description>

  <link>http://example.com</link>


  <item>

   <title>First Update</title>

   <description>Hello, this is my first RSS update!</description>

   <link>http://example.com/first</link>

  </item>


  <item>

   <title>Second Update</title>

   <description>This is the second feed update!</description>

   <link>http://example.com/second</link>

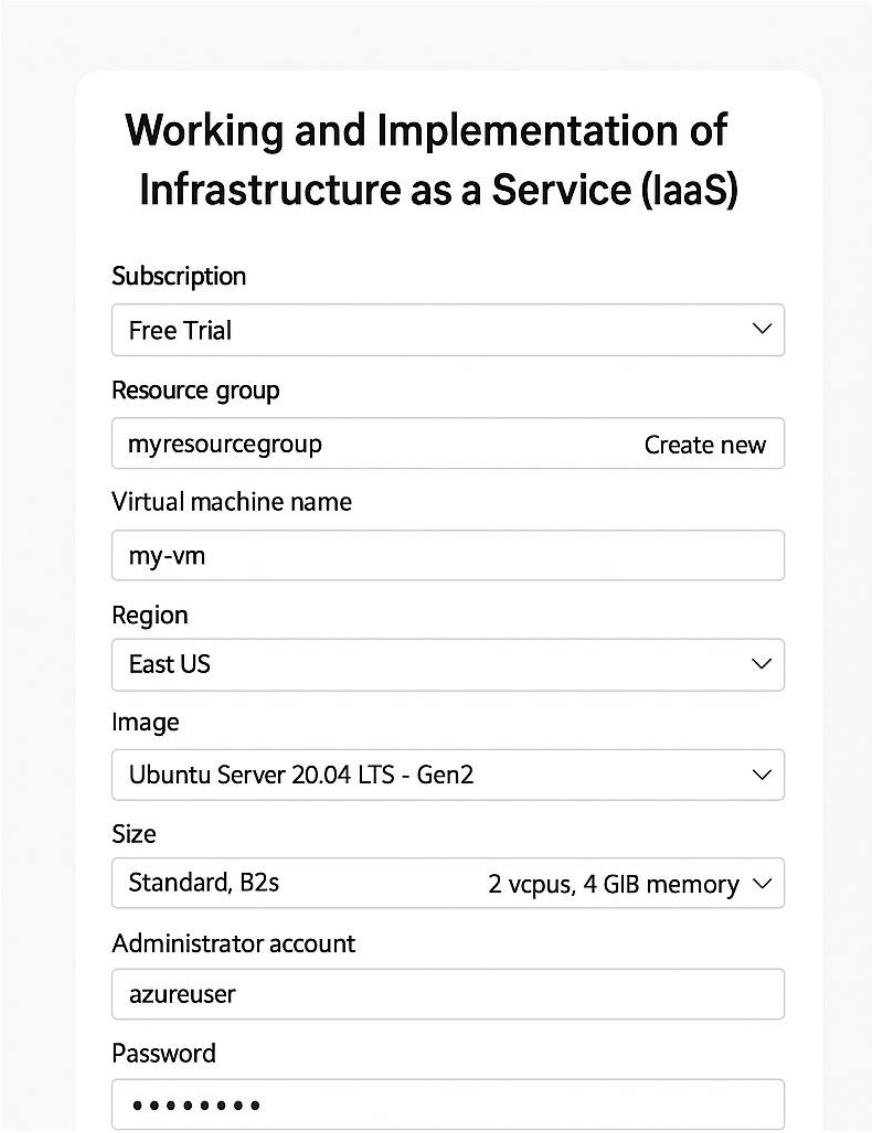
  </item>


 </channel>

</rss>
```

Output:

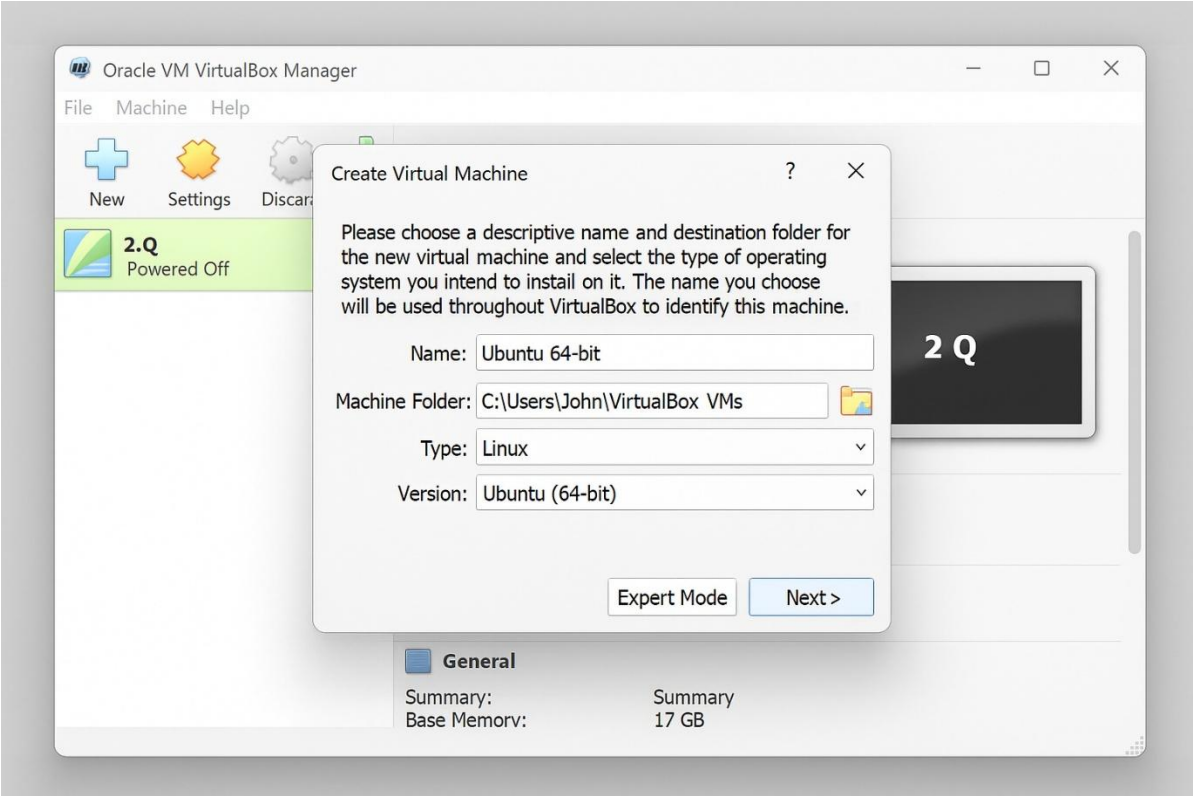
A valid RSS feed that can be opened in any feed reader.


Working and Implementation of Infrastructure as a Service (IaaS)
Subscription
Free Trial
Resource group
myresourcegroup
Create new
Virtual machine name
my-vm
Region
East US
Image
Ubuntu Server 20.04 LTS - Gen2
Size
Standard, B2s
2 vcpus, 4 GIB memory
Administrator account
azureuser
Password
••••••••

Assignmet-14

Q.1) Create a Virtual Machine using Virtual Box.

Step 1: Install and open **Oracle VM VirtualBox** on your computer.
Step 2: Click the **New** button in the top-left corner.
Step 3: Enter the **Name** of the virtual machine (e.g., Ubuntu 64-bit).
Step 4: Choose the **Machine Folder** where VM files will be stored.
Step 5: Select **Type** (e.g., Linux, Windows) and **Version** (Ubuntu 64-bit, Windows 10, etc.).
Step 6: Click **Next** and assign **RAM size** (e.g., 2048 MB).
Step 7: Select **Create a virtual hard disk now** → click **Create**.
Step 8: Choose the disk type **VDI** and click **Next**.
Step 9: Choose **Dynamically allocated** and click **Next**.
Step 10: Set disk size (e.g., 20 GB) and click **Create**.



Q2) Steps to Create a Docker Instance (Container)

Step 1: Install Docker Desktop

- Go to https://www.docker.com/products/docker-desktop
- Download and install for Windows / Mac / Linux.

Step 2: Verify Installation

Open Terminal / CMD / PowerShell and run:

docker --version

Step 3: Pull an Image from Docker Hub

Example: Pull Ubuntu image

docker pull ubuntu

Step 4: Create & Run a Docker Container

Run the following command:

docker run -it ubuntu

This creates a Docker instance (container) and opens a shell inside it.

Step 5: Confirm Container is Running

Open a new terminal and type:

docker ps

Step 6: Exit the Container

Inside the container, type:

exit

Step 7: View All Containers (Running + Stopped)

docker ps -a

Step 8: Remove Container (Optional)

docker rm <container_id>

Output Example

root@a2b34f21c:/# echo "Hello from Docker"

Hello from Docker

```
user@linux:~$ docker run -it ubuntu
root@a2b34f21c/~ eho 'Hello from Docker'
exit
user@linux:$
```

Assignment-15

Q1)Workings of Google Drive to make spreadsheet and notes

Final Answer (Exam-style)

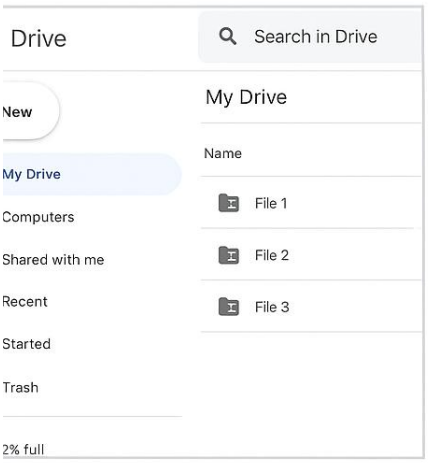
Create a Google Drive account, create or upload a spreadsheet and notes, and share them with others. Below are clear step-by-step instructions with labeled mock screenshots so you can reproduce this in the lab.

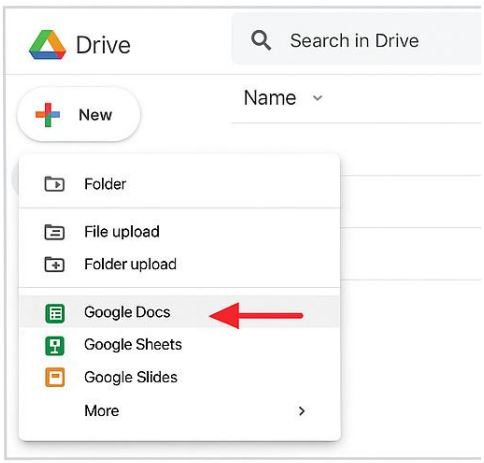
Steps (Step-wise procedure)

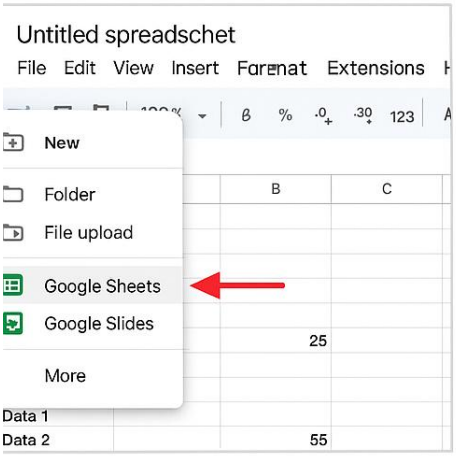
1. **Sign in to Google Drive**
    - Open a web browser and go to https://drive.google.com.
    - Sign in with your Google account (Gmail). If you don't have one, create a Google account.
2. **Create a new Spreadsheet (Google Sheets)**
    - Click the **New** button (top-left) → select **Google Sheets** → **Blank spreadsheet**.
    - A new Google Sheets document opens in a new tab.
3. **Enter Data and Use Basic Features**
    - Enter data into cells (A1, A2, ...).
    - Use basic formulas: =SUM(A1:A5), =AVERAGE(B1:B5), =IF(C1>50, "Pass", "Fail").
    - Format cells using toolbar (bold, number format, borders).
    - Create simple charts: Insert → Chart → choose chart type.
4. **Create Notes (Google Docs)**
    - From Google Drive click **New** → **Google Docs** → **Blank document**.
    - Add headings, text, images: Insert → Image or drag-and-drop images.
    - Use Bulleted/Numbered lists, styles (Normal text → Heading 1/2).
5. **Organize Files in Folders**
    - In Drive: **New** → **Folder**. Name it (e.g., Workshop_CS-512).
    - Drag the spreadsheet and the notes into the folder.
6. **Share Files with Others**
    - Open any file → Click **Share** (top-right).

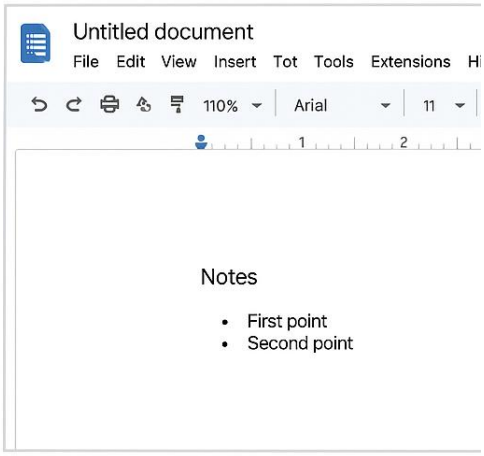
- Add collaborator email(s) and set permission: Viewer / Commenter / Editor.
- Alternatively, click **Get link** → change link access to **Anyone with the link** (Viewer) if public sharing is ok.

7. **Version History and Comments**
   - For Docs/Sheets: File → Version history → See version history (view or restore previous versions).
   - Use Insert → Comment or highlight text and comment for collaborative review.









Q2) Steps to Create an IAM User in Google Cloud

Step 1 — Open IAM & Admin

1. Go to Google Cloud Console → https://console.cloud.google.com
2. From the left navigation menu, click IAM & Admin
3. Click IAM

Step 2 — Add New User

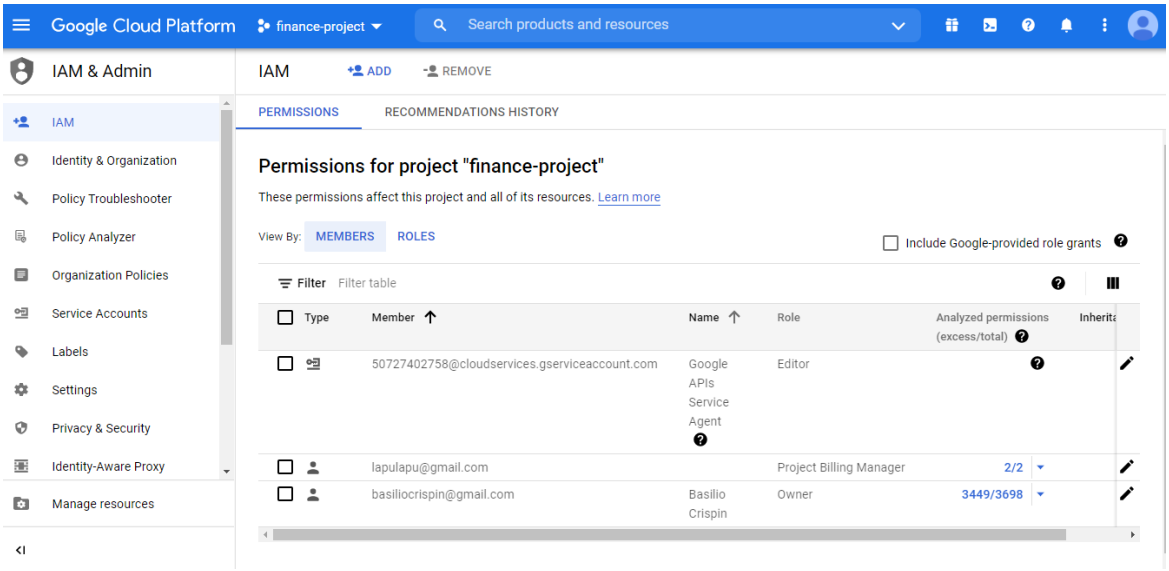
1. Click Grant Access (top of the IAM page)

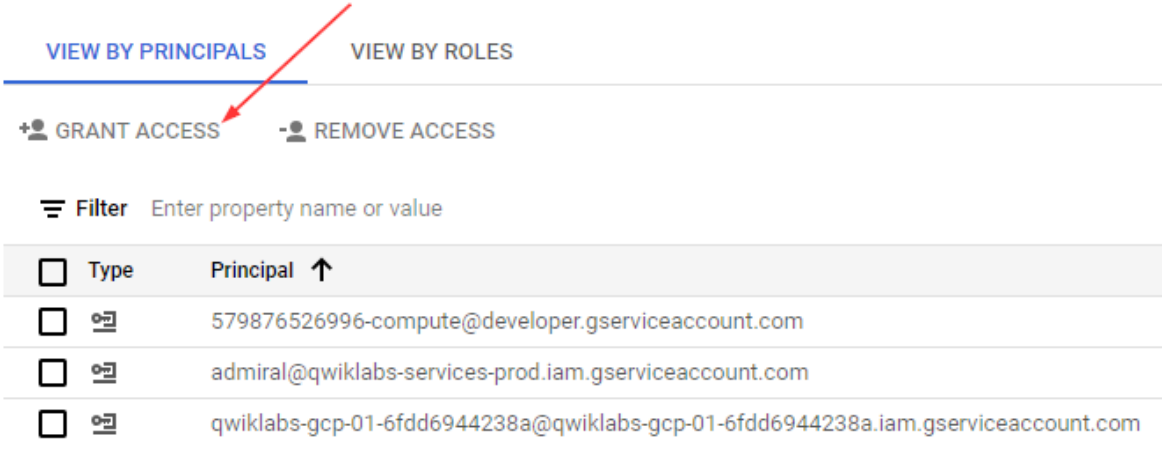
Step 3 — Enter Email + Set Permissions

1. In Add principals, enter the user's Google email
2. Click Select a role
3. Choose a role (e.g., Viewer, Editor, Owner)

Step 4 — Save

1. Click Save
2. The user will receive an email invitation to access the project.


Google Cloud Platform
finance-project
Search products and resources
IAM & Admin
IAM
ADD
REMOVE
IAM
Identity & Organization
Policy Troubleshooter
Policy Analyzer
Organization Policies
Service Accounts
Labels
Settings
Privacy & Security
Identity-Aware Proxy
Manage resources
PERMISSIONS
RECOMMENDATIONS HISTORY
Permissions for project "finance-project"
These permissions affect this project and all of its resources. Learn more
View By: MEMBERS ROLES
Include Google-provided role grants
Filter Filter table
Type
Member
Name
Role
Analyzed permissions (excess/total)
50727402758@cloudservices.gserviceaccount.com
Google APIs Service Agent
Editor
lapulapu@gmail.com
Project Billing Manager
2/2
basiliocrispin@gmail.com
Basilio Crispin
Owner
3449/3698


VIEW BY PRINCIPALS
VIEW BY ROLES
GRANT ACCESS
REMOVE ACCESS
Filter
Enter property name or value
Type
Principal
579876526996-compute@developer.gserviceaccount.com
admiral@qwiklabs-services-prod.iam.gserviceaccount.com
qwiklabs-gcp-01-6fdd6944238a@qwiklabs-gcp-01-6fdd6944238a.iam.gserviceaccount.com

Assignment -16

Q1) Exploring OneDrive: Creating and Sharing Documents and Presentations

Steps to Create Documents in OneDrive

Step 1:

Open a browser → Go to **https://onedrive.live.com** and sign in with your Microsoft account.

Step 2:

Click the **New** button on the top menu.

Step 3:

Select the type of document you want to create:

- **Word Document** (Notes, essays, reports)
- **Excel Workbook** (Sheets, calculations, tables)
- **PowerPoint Presentation** (Slides, projects)
- **OneNote Notebook**

Step 4:

A new document opens in **Office Online** (Word, PowerPoint, etc.).
Add text, images, tables, or slides as required.

Step 5:

Your work is automatically saved to OneDrive (AutoSave ON).

Steps to Create Presentations in OneDrive

Step 1:

Click **New → PowerPoint Presentation**.

Step 2:

Choose a blank presentation or a built-in template.

Step 3:

Add slides (Title Slide, Content Slide, Image Slide, etc.).

Step 4:

Insert:

- Images
- SmartArt
- Charts
- Animations
- Transitions

Step 5:

Rename the presentation using the filename box at the top-left.

Steps to Share Documents & Presentations

Step 1:

Right-click a file in OneDrive and click **Share**.

Step 2:

Choose sharing options:

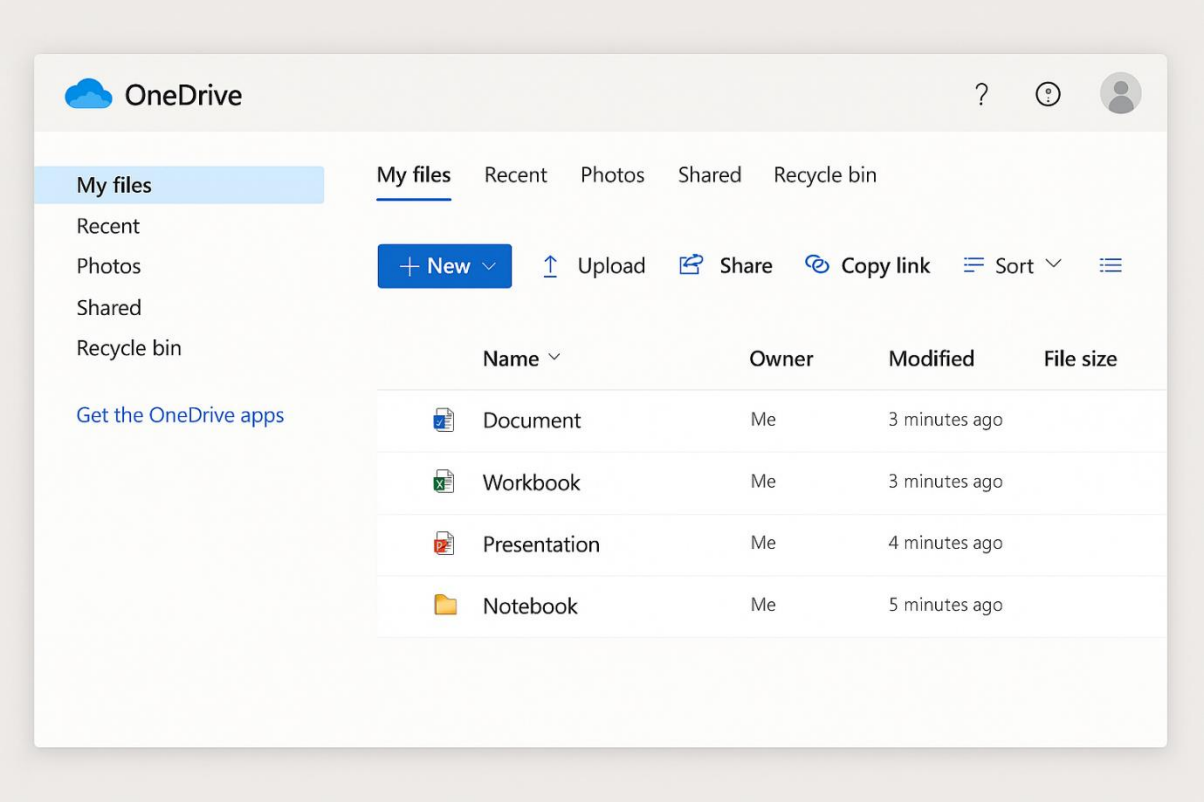
- **People with the link**
- **Specific people**
- **View / Edit permission**

Step 3:

Click **Copy Link** or **Send Email**.

Step 4:

Users can now access and collaborate on the file in real time.


OneDrive
My files
Recent
Photos
Shared
Recycle bin
Get the OneDrive apps
My files
Recent
Photos
Shared
Recycle bin
New
Upload
Share
Copy link
Sort
Name
Owner
Modified
File size
Document
Me
3 minutes ago
Workbook
Me
3 minutes ago
Presentation
Me
4 minutes ago
Notebook
Me
5 minutes ago

Q2) Steps to Create an IAM User in Google Cloud

Step 1 — Open IAM & Admin

4. **Go to Google Cloud Console → https://console.cloud.google.com**
5. **From the left navigation menu, click IAM & Admin**
6. **Click IAM**

Step 2 — Add New User

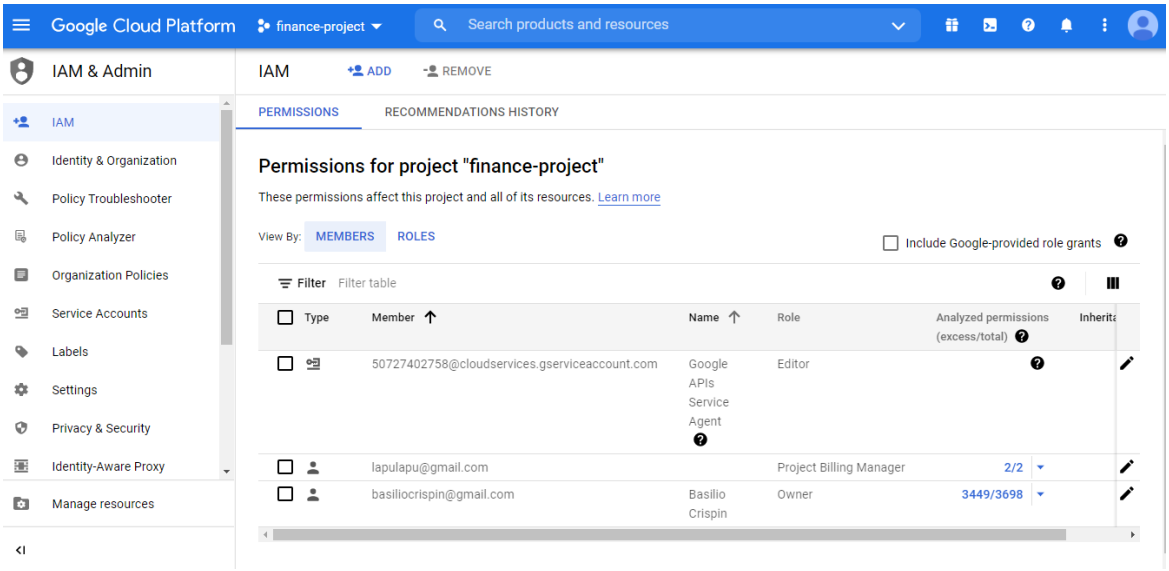
2. **Click Grant Access (top of the IAM page)**

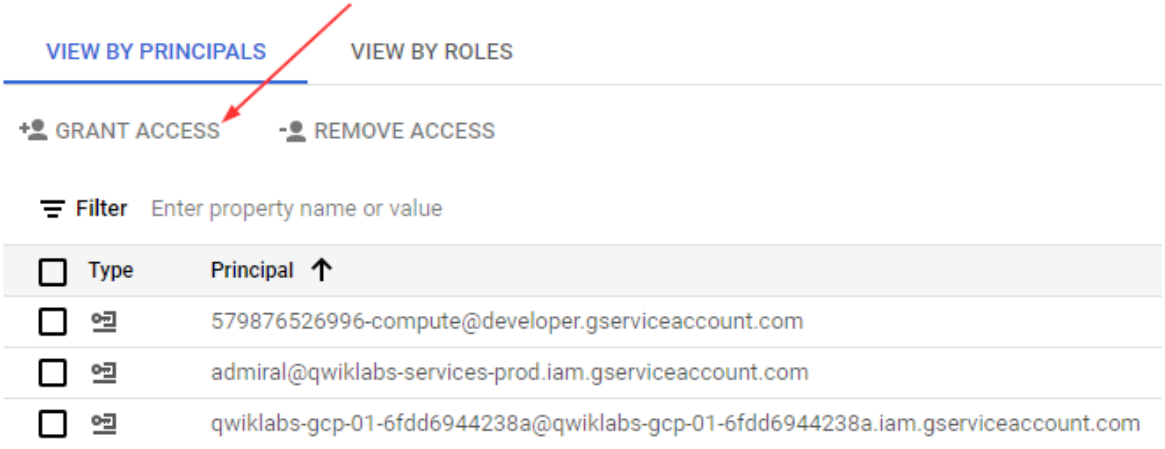
Step 3 — Enter Email + Set Permissions

4. **In Add principals, enter the user's Google email**
5. **Click Select a role**
6. **Choose a role (e.g., Viewer, Editor, Owner)**

Step 4 — Save

3. **Click Save**
4. **The user will receive an email invitation to access the project.**


Google Cloud Platform
finance-project
Search products and resources
IAM & Admin
IAM
ADD
REMOVE
IAM
Identity & Organization
Policy Troubleshooter
Policy Analyzer
Organization Policies
Service Accounts
Labels
Settings
Privacy & Security
Identity-Aware Proxy
Manage resources
PERMISSIONS
RECOMMENDATIONS HISTORY
Permissions for project "finance-project"
These permissions affect this project and all of its resources. Learn more
View By: MEMBERS ROLES
Include Google-provided role grants
Filter Filter table
Type
Member
Name
Role
Analyzed permissions (excess/total)
50727402758@cloudservices.gserviceaccount.com
Google APIs Service Agent
Editor
lapulapu@gmail.com
Project Billing Manager
2/2
basiliocrispin@gmail.com
Basilio Crispin
Owner
3449/3698


VIEW BY PRINCIPALS
VIEW BY ROLES
GRANT ACCESS
REMOVE ACCESS
Filter
Enter property name or value
Type
Principal
579876526996-compute@developer.gserviceaccount.com
admiral@qwiklabs-services-prod.iam.gserviceaccount.com
qwiklabs-gcp-01-6fdd6944238a@qwiklabs-gcp-01-6fdd6944238a.iam.gserviceaccount.com

Assignment -18

Q.1) Working and Implementation of Storage as a Service (SaaS) using Google Drive

Steps:

Step 1: Open a browser and go to **https://drive.google.com**.
Step 2: Sign in using your Google account.
Step 3: Click the **New** button to create folders or upload files.
Step 4: Select **File Upload** or **Folder Upload** to store data in the cloud.
Step 5: Upload documents, images, PDFs, videos, etc.
Step 6: Create files directly using:

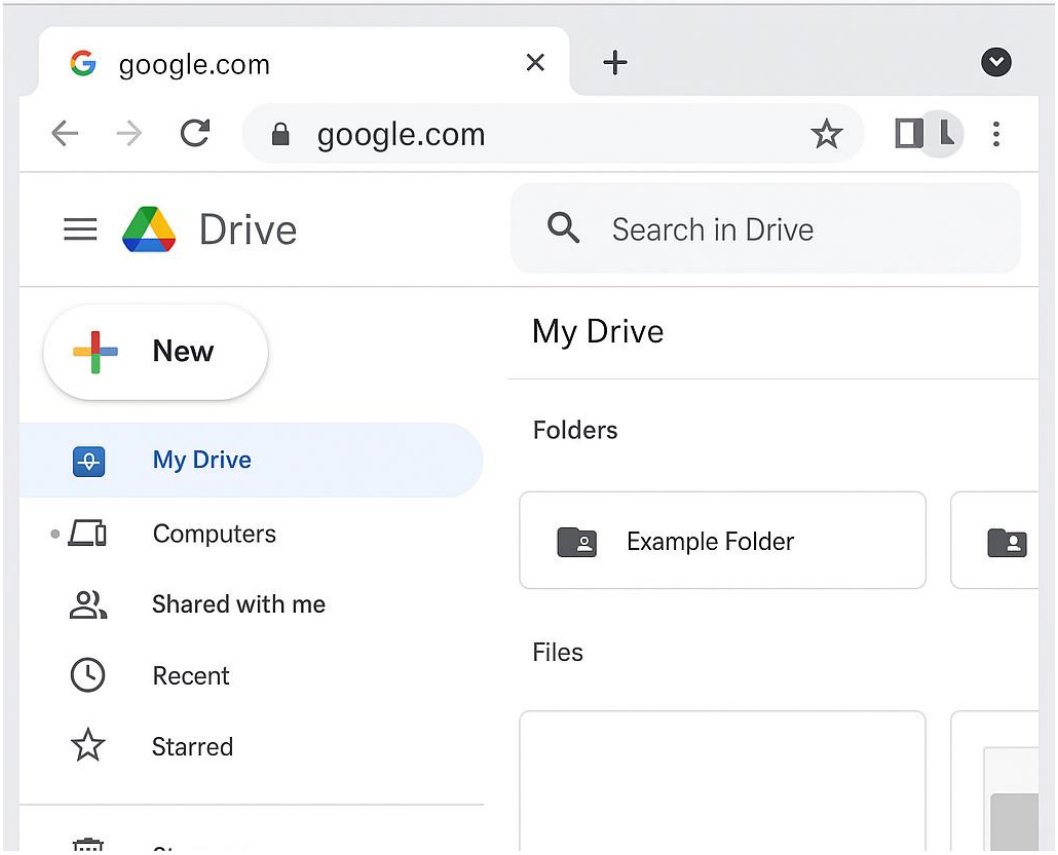
- **Google Docs** (text documents)
- **Google Sheets** (spreadsheets)
- **Google Slides** (presentations)

Step 7: Files are saved automatically in the cloud.
Step 8: Right-click any file → Click **Share** → Add people or copy the link.
Step 9: Control file access by selecting **Viewer / Commenter / Editor**.
Step 10: Access stored files anytime from any device using Google Drive.

SaaS Features Demonstrated in Google Drive:

- Online storage
- File synchronization
- Auto-backup
- Real-time collaboration
- Anywhere access
- Secure file sharing

Storage as a Service (SaaS) Using Google Drive



Q.2) Practical Implementation of IaaS using Microsoft Azure

[20 Marks]

Final Answer:

In Infrastructure as a Service (IaaS), Azure provides virtual machines, storage, and networking resources on demand.

Steps:

Step 1: Go to **https://portal.azure.com** and sign in.
Step 2: Click **Create a resource** from the Azure dashboard.
Step 3: Select **Virtual Machine** under Compute services.
Step 4: Enter VM details:

- VM Name
- Region
- Image (Windows/Linux)
- Size (CPU/RAM)

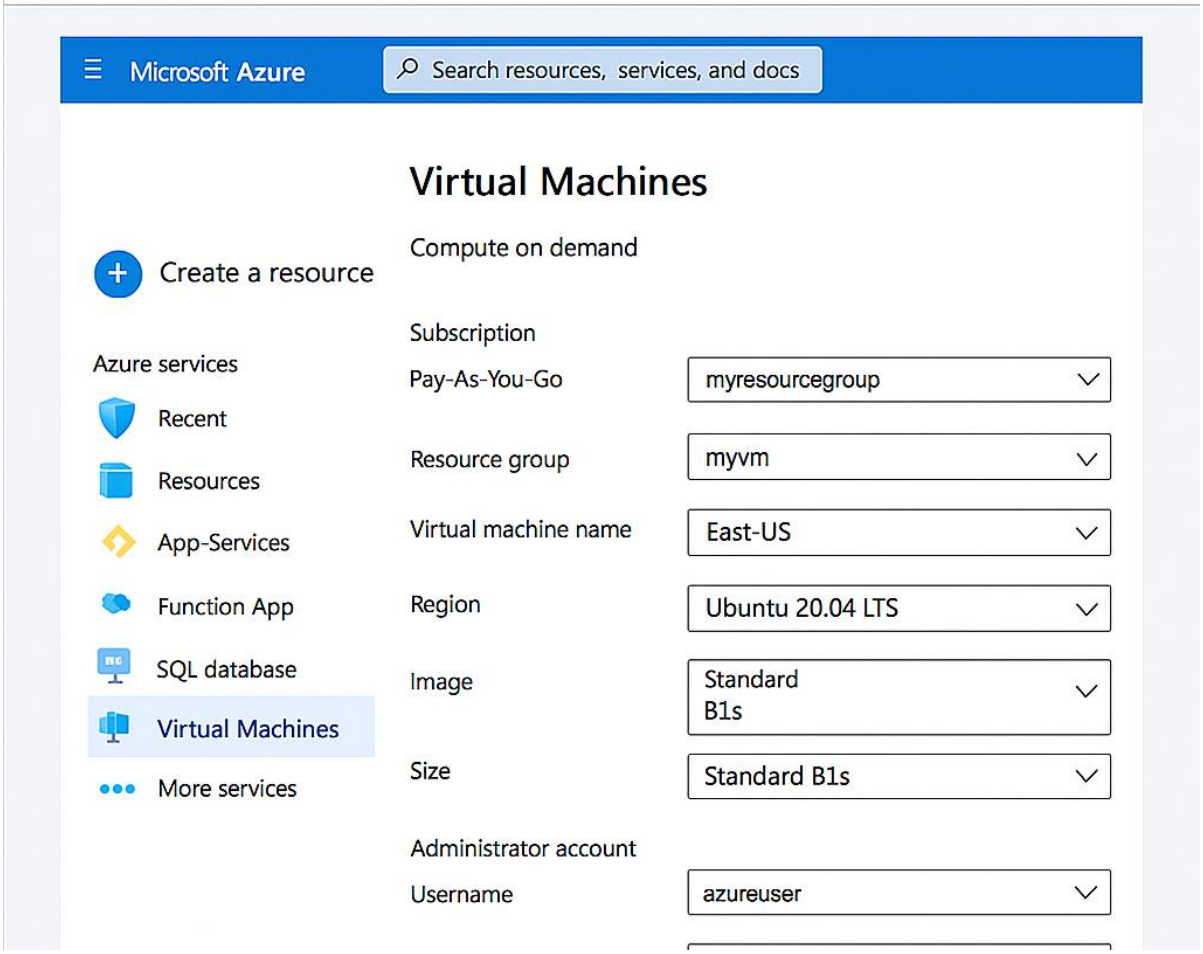
Step 5: Create administrator login credentials.
Step 6: Configure disk type (Standard SSD / Premium SSD).
Step 7: Configure networking settings (Virtual Network, Subnet, Public IP).
Step 8: Click **Review + Create**.
Step 9: After validation, click **Create** to deploy the VM.
Step 10: Access the VM:

- For Windows VM → Use **Remote Desktop (RDP)**
- For Linux VM → Use **SSH**

Azure IaaS Concepts Demonstrated:

- Virtual Machines
- Virtual Networks
- Storage Disks
- Public IP
- Cloud-based compute infrastructure

Practical Implementation of IaaS Using Microsoft Azure



Assignment-19

Q.1) Working and Implementation of Infrastructure as a Service (IaaS)

[10 Marks]

Working of IaaS

Infrastructure as a Service (IaaS) provides virtualized computing resources over the cloud.
Users can create and manage:

- Virtual Machines
- Storage
- Networks
- Firewalls
- Operating systems

IaaS providers (AWS, Azure, Google Cloud) provide the hardware, while the user manages the OS and applications.

Implementation Steps (General IaaS Process):

Step 1: Log in to any IaaS provider (AWS / Azure / Google Cloud Platform).
Step 2: Go to the Compute section (e.g., AWS EC2, Azure Virtual Machines).
Step 3: Click **Create Instance** or **Create Virtual Machine**.
Step 4: Choose an OS image (Ubuntu, Windows Server, CentOS, etc.).
Step 5: Select machine size (CPU, RAM, storage).
Step 6: Configure networking (VPC, subnet, firewall/security group).
Step 7: Add storage (SSD/HDD).
Step 8: Create a key pair (for SSH/RDP access).
Step 9: Launch the virtual machine.
Step 10: Connect using SSH (Linux) or RDP (Windows) to use the VM.

Working and Implementation of Infrastructure as a Service (IaaS)

Subscription

Free Trial

Resource group

myresourcegroup Create new

Virtual machine name

my-vm

Region

East US

Image

Ubuntu Server 20.04 LTS - Gen2

Size

Standard, B2s 2 vcpus, 4 GIB memory

Administrator account

azureuser

Password

••••••••

Q2)Steps to Create a Docker Instance (Container)

[10 Marks / Practical Format]

Step 1: Install Docker Desktop

- Go to https://www.docker.com/products/docker-desktop
- Download and install for Windows / Mac / Linux.

Step 2: Verify Installation

Open Terminal / CMD / PowerShell and run:

docker --version

Step 3: Pull an Image from Docker Hub

Example: Pull Ubuntu image

docker pull ubuntu

Step 4: Create & Run a Docker Container

Run the following command:

docker run -it ubuntu

This creates a Docker instance (container) and opens a shell inside it.

Step 5: Confirm Container is Running

Open a new terminal and type:

docker ps

Step 6: Exit the Container

Inside the container, type:

exit

Step 7: View All Containers (Running + Stopped)

docker ps -a

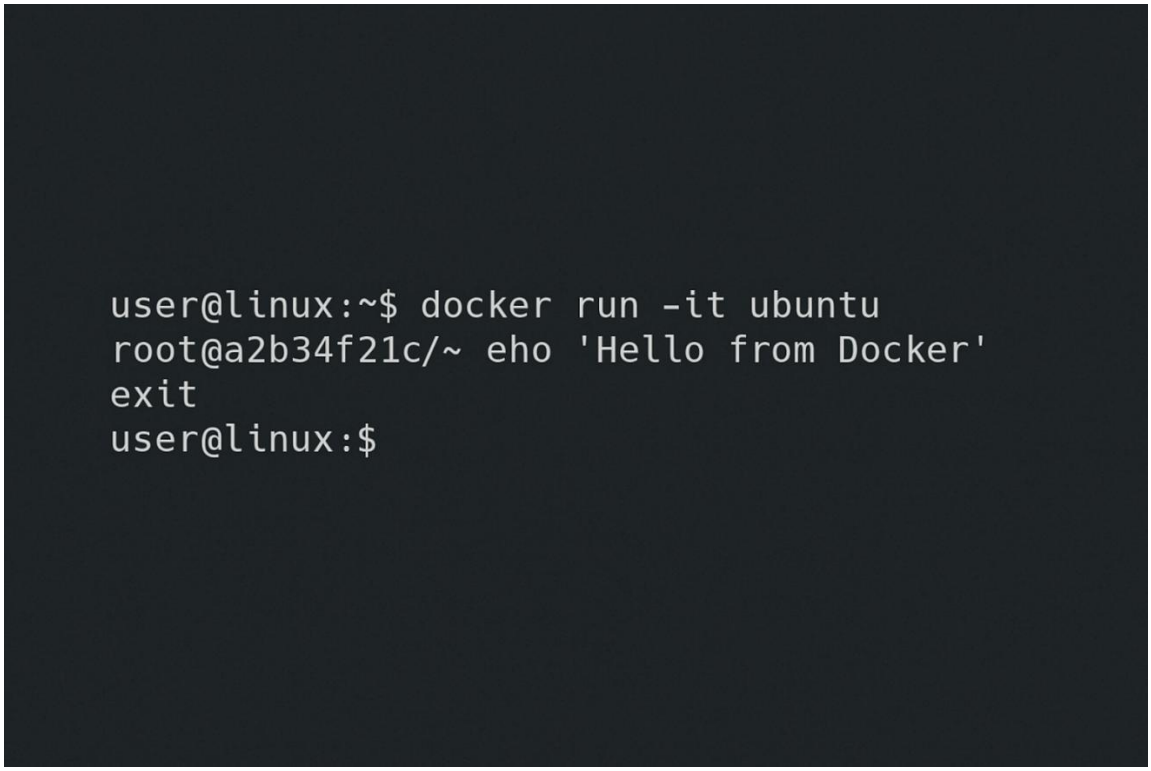
Step 8: Remove Container (Optional)

docker rm <container_id>

⭐ **Output Example**

root@a2b34f21c:/# echo "Hello from Docker"

Hello from Docker


user@linux:~$ docker run -it ubuntu
root@a2b34f21c/~ eho 'Hello from Docker'
exit
user@linux:$

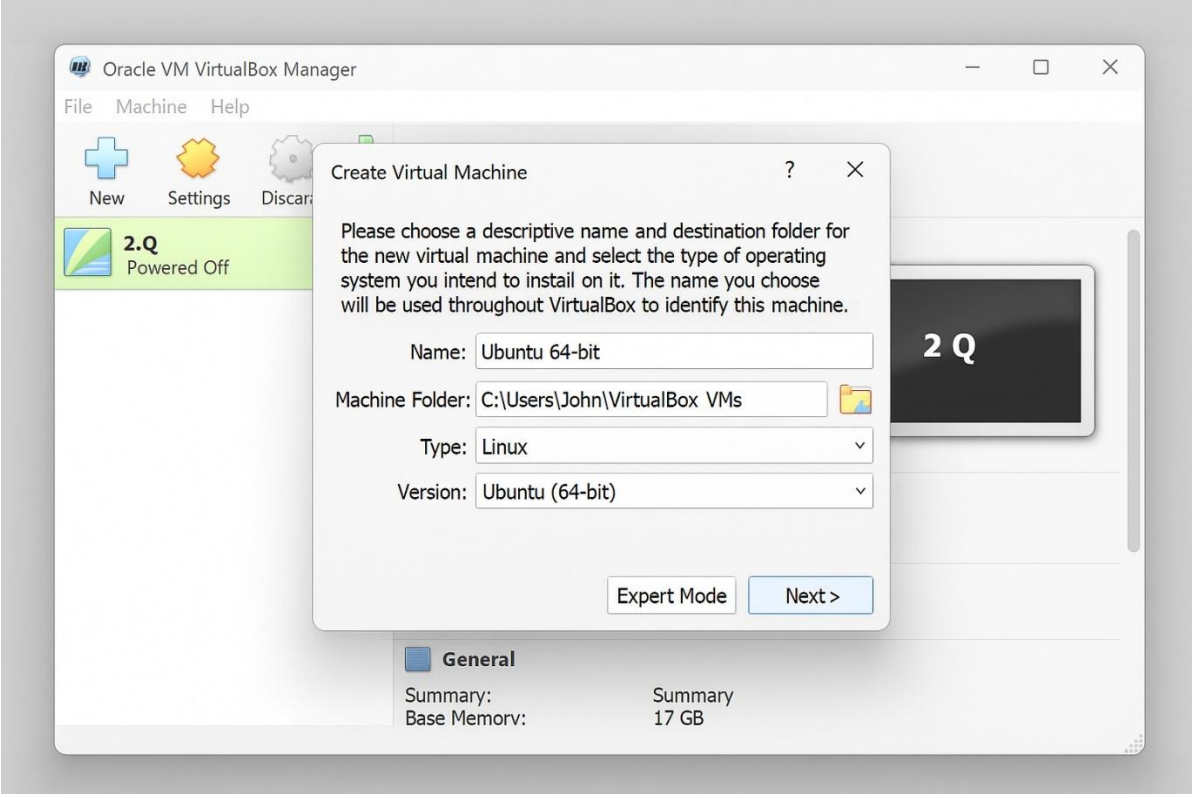
.

Assignment-21

-

Q.1) Create a Virtual Machine using Virtual Box.

Step 1: Install and open **Oracle VM VirtualBox** on your computer.
Step 2: Click the **New** button in the top-left corner.
Step 3: Enter the **Name** of the virtual machine (e.g., Ubuntu 64-bit).
Step 4: Choose the **Machine Folder** where VM files will be stored.
Step 5: Select **Type** (e.g., Linux, Windows) and **Version** (Ubuntu 64-bit, Windows 10, etc.).
Step 6: Click **Next** and assign **RAM size** (e.g., 2048 MB).
Step 7: Select **Create a virtual hard disk now** → click **Create**.
Step 8: Choose the disk type **VDI** and click **Next**.
Step 9: Choose **Dynamically allocated** and click **Next**.
Step 10: Set disk size (e.g., 20 GB) and click **Create**.



Q2)Steps to Create a Docker Instance (Container)

Step 1: Install Docker Desktop

- Go to https://www.docker.com/products/docker-desktop
- Download and install for Windows / Mac / Linux.

Step 2: Verify Installation

Open Terminal / CMD / PowerShell and run:

docker --version

Step 3: Pull an Image from Docker Hub

Example: Pull Ubuntu image

docker pull ubuntu

Step 4: Create & Run a Docker Container

Run the following command:

docker run -it ubuntu

This creates a Docker instance (container) and opens a shell inside it.

Step 5: Confirm Container is Running

Open a new terminal and type:

docker ps

Step 6: Exit the Container

Inside the container, type:

exit

Step 7: View All Containers (Running + Stopped)

docker ps -a

Step 8: Remove Container (Optional)

docker rm <container_id>

⭐ **Output Example**

root@a2b34f21c:/# echo "Hello from Docker"

Hello from Docker

```
user@linux:~$ docker run -it ubuntu
root@a2b34f21c/~ eho 'Hello from Docker'
exit
user@linux:$
```

Assignment-22

Q.1) Working of Software as a Service (SaaS) – Salesforce (10 Marks)

1. Cloud-Based Delivery

- Salesforce applications are hosted on Salesforce's cloud servers.
- Users do not install any software locally.
- Only an internet browser + login is needed.

---

2. Multi-Tenancy Architecture

- Multiple customers (organizations) share the same application instance.
- Data is securely separated for each customer.
- This enables low cost and continuous updates.

---

3. Subscription-Based Model

- Users pay monthly or yearly license fees.
- Pricing depends on features, number of users, storage, etc.
- No upfront investment needed in hardware or software.

---

4. Automatic Updates & Maintenance

- Salesforce handles:
    - Security patches
    - Version upgrades
    - Server maintenance
- Customers automatically get the latest features without downtime.

---

5. High Availability & Scalability

- Salesforce runs on a highly reliable cloud.
- Applications scale automatically depending on user load.
- No hardware upgrades required by customers.

---

6. Anywhere, Anytime Access

- Users can access Salesforce through:
    - Desktop browser
    - Mobile app
    - Tablet
- All that is required is the internet.

---

7. Data Storage & Security

- All customer data is stored in Salesforce's data centers.
- Security features include:
    - Data encryption
    - Role-based access
    - Two-factor authentication
    - OAuth login
- Backups and disaster recovery are handled by Salesforce.

---

8. Integration Capability

- Salesforce integrates with:
    - Email systems
    - Payment gateways
    - ERPs
    - APIs and web services
- Organizations can extend or customize it using Apex, Visualforce, and LWC.

Q.2) Python Application to Calculate the Average of 5 Numbers using Google App Engine

A) Install Google App Engine Tools

1. Install Python (3.x)
2. Install Google Cloud SDK
3. Run:

gcloud init

B) Create Application Folder

myapp/

├— main.py

├— app.yaml

C) Write Python Code (main.py)

```
from flask import Flask, request


app = Flask(__name__)


@app.route('/')
def index():
   return '''
      <form action="/average" method="post">
         Enter 5 numbers:<br>
         <input name="n1"><br>
         <input name="n2"><br>
         <input name="n3"><br>
         <input name="n4"><br>
         <input name="n5"><br><br>
         <button type="submit">Calculate Average</button>
```

```
    </form>
  '''

@app.route('/average', methods=['POST'])
def average():
  nums = [float(request.form[f'n{i}']) for i in range(1, 6)]
  avg = sum(nums) / 5
  return f"<h2>Average = {avg}</h2>"

if __name__ == '__main__':
  app.run()
```

D) Configure App Engine (app.yaml)

```
runtime: python311
entrypoint: gunicorn -b :$PORT main:app
```

E) Deploy the Application

```
gcloud app deploy
```

Then open:

```
gcloud app browse
```

Result

A web application runs on Google App Engine where users enter 5 numbers and get the average.

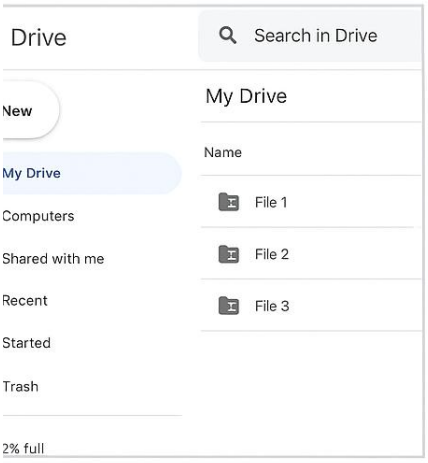
Assignment-23

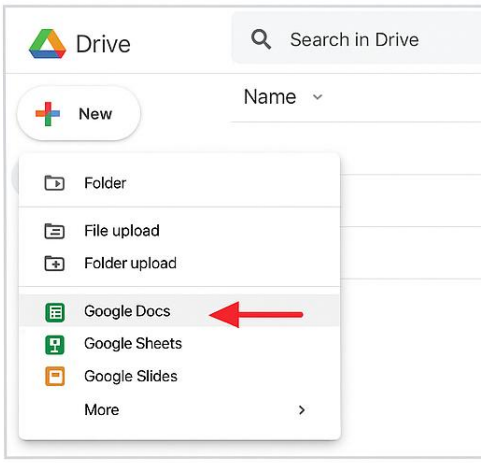
Q1)Workings of Google Drive to make spreadsheet and notes

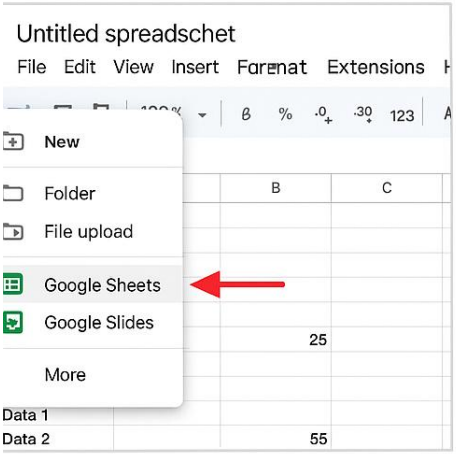
Steps (Step-wise procedure)

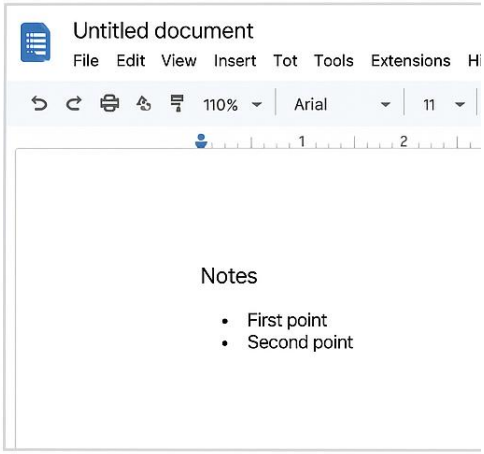
1. **Sign in to Google Drive**
    - Open a web browser and go to https://drive.google.com.
    - Sign in with your Google account (Gmail). If you don't have one, create a Google account.
2. **Create a new Spreadsheet (Google Sheets)**
    - Click the **New** button (top-left) → select **Google Sheets** → **Blank spreadsheet**.
    - A new Google Sheets document opens in a new tab.
3. **Enter Data and Use Basic Features**
    - Enter data into cells (A1, A2, ...).
    - Use basic formulas: =SUM(A1:A5), =AVERAGE(B1:B5), =IF(C1>50, "Pass", "Fail").
    - Format cells using toolbar (bold, number format, borders).
    - Create simple charts: Insert → Chart → choose chart type.
4. **Create Notes (Google Docs)**
    - From Google Drive click **New** → **Google Docs** → **Blank document**.
    - Add headings, text, images: Insert → Image or drag-and-drop images.
    - Use Bulleted/Numbered lists, styles (Normal text → Heading 1/2).
5. **Organize Files in Folders**
    - In Drive: **New** → **Folder**. Name it (e.g., Workshop_CS-512).
    - Drag the spreadsheet and the notes into the folder.
6. **Share Files with Others**
    - Open any file → Click **Share** (top-right).
    - Add collaborator email(s) and set permission: Viewer / Commenter / Editor.
    - Alternatively, click **Get link** → change link access to **Anyone with the link** (Viewer) if public sharing is ok.

7. **Version History and Comments**
    - For Docs/Sheets: File → Version history → See version history (view or restore previous versions).
    - Use Insert → Comment or highlight text and comment for collaborative review.









Q.2) Developing and Deploying a Simple Web Application using AWS

1. Create a Simple Python Web App (Flask)

Create application.py:

```
from flask import Flask

app = Flask(__name__)


@app.route('/')

def home():

  return "Hello! This is a simple AWS web application."


if __name__ == '__main__':

  app.run()
```

Create **requirements.txt**:

```
Flask==2.0.2
```

---

2. Install AWS Elastic Beanstalk CLI

```
pip install awsebcli
```

---

3. Initialize Beanstalk Project

```
eb init
```

- Choose region
- Platform: **Python**

---

4. Deploy Application

```
eb create my-simple-app

eb deploy
```

---

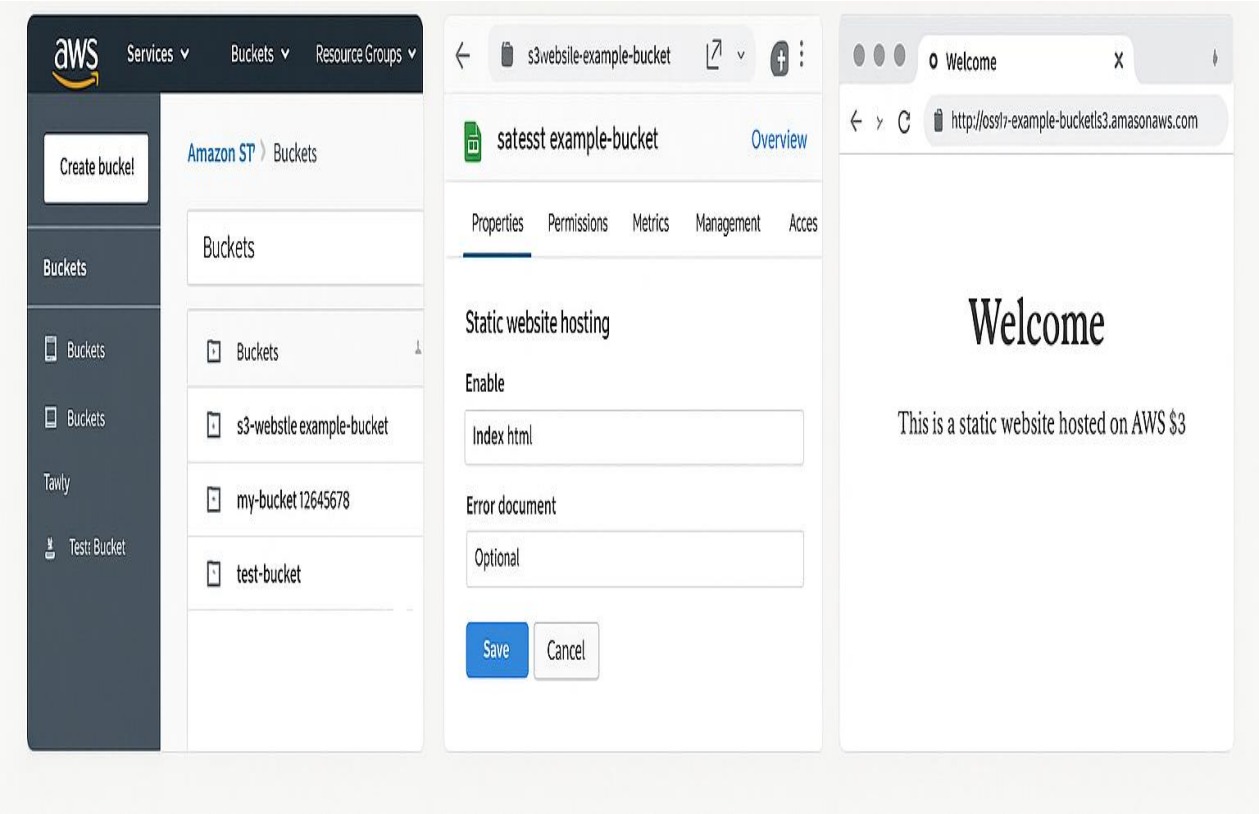
5. Access the Application

Run:

eb open

You will see:

Hello! This is a simple AWS web application.



Assignment-24

Q1)Create & Display “Hello World” in Salesforce (Apex)

Step 1 — Go to Developer Console

1. Log in to Salesforce.
2. Click the Gear icon (Setup)
3. Select Developer Console

Step 2 — Create an Apex Class

1. In Developer Console → File → New → Apex Class
2. Name it: HelloWorldController
3. Paste the following code:

```
public class HelloWorldController {
   public String message { get; set; }

   public HelloWorldController() {
      message = 'Hello World';
   }
}
```

Step 3 — Create a Visualforce Page

1. In Developer Console → File → New → Visualforce Page
2. Name the page: HelloWorldPage
3. Add this code:

```
<apex:page controller="HelloWorldController">
   <h1>{!message}</h1>
</apex:page>
```

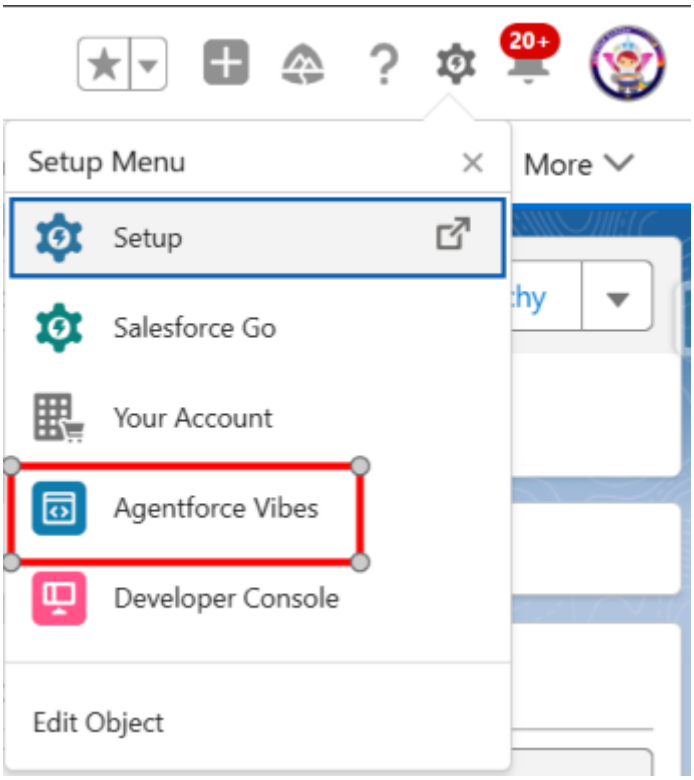
Step 4 — Preview the Page

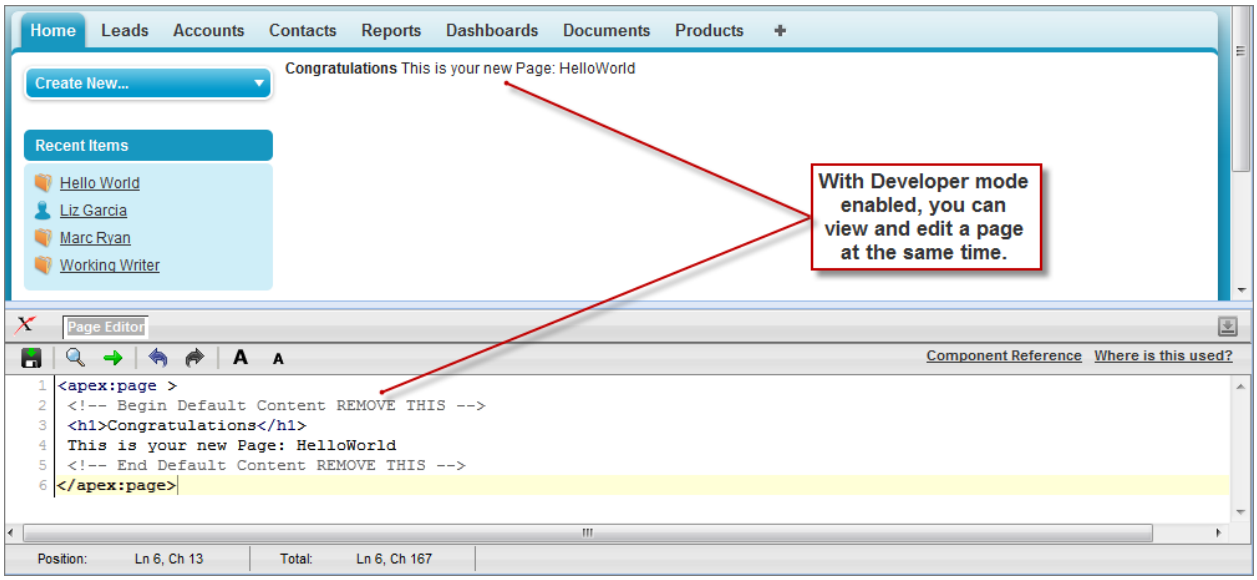
1. In the Visualforce Page editor

2. Click Preview (top right)

You will see:

Hello World





Q.2) Developing and Deploying a Simple Web Application using AWS

1. Create a Simple Python Web App (Flask)

Create application.py:

```
from flask import Flask
app = Flask(__name__)

@app.route('/')
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if __name__ == '__main__':
    app.run()
```

Create **requirements.txt**:

```
Flask==2.0.2
```

---

2. Install AWS Elastic Beanstalk CLI

```
pip install awsebcli
```

---

3. Initialize Beanstalk Project

```
eb init
```

- Choose region
- Platform: **Python**

---

4. Deploy Application

```
eb create my-simple-app
eb deploy
```

---

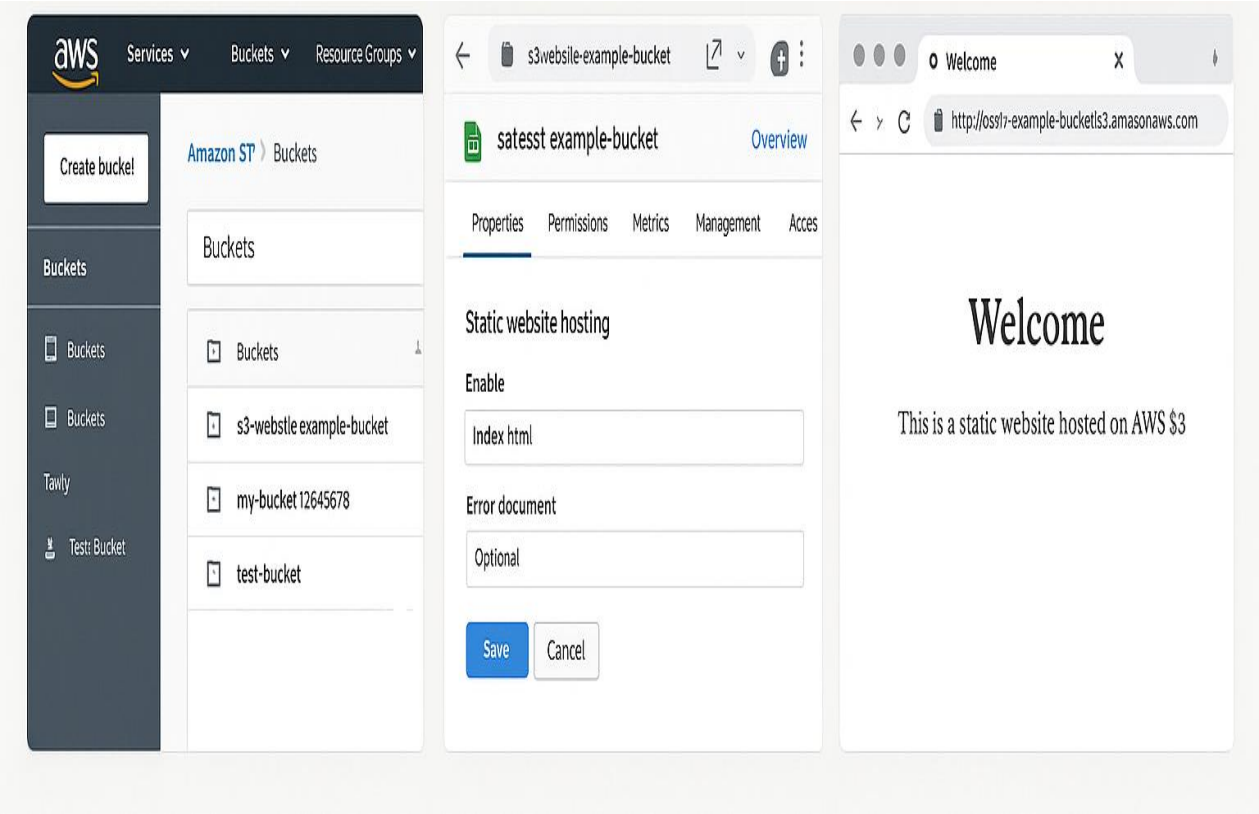
5. Access the Application

Run:

eb open

You will see:

Hello! This is a simple AWS web application.



Assignment-25

Q.1) Working and Implementation of Storage as a Service (SaaS) using Google Drive

[10 Marks]

Final Answer:

Google Drive provides cloud-based Storage as a Service (SaaS) where users can upload, store, access, and share files online from anywhere.

Steps:

Step 1: Open a browser and go to **https://drive.google.com**.
Step 2: Sign in using your Google account.
Step 3: Click the **New** button to create folders or upload files.
Step 4: Select **File Upload** or **Folder Upload** to store data in the cloud.
Step 5: Upload documents, images, PDFs, videos, etc.
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- **Google Slides** (presentations)

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Step 8: Right-click any file → Click **Share** → Add people or copy the link.
Step 9: Control file access by selecting **Viewer / Commenter / Editor**.
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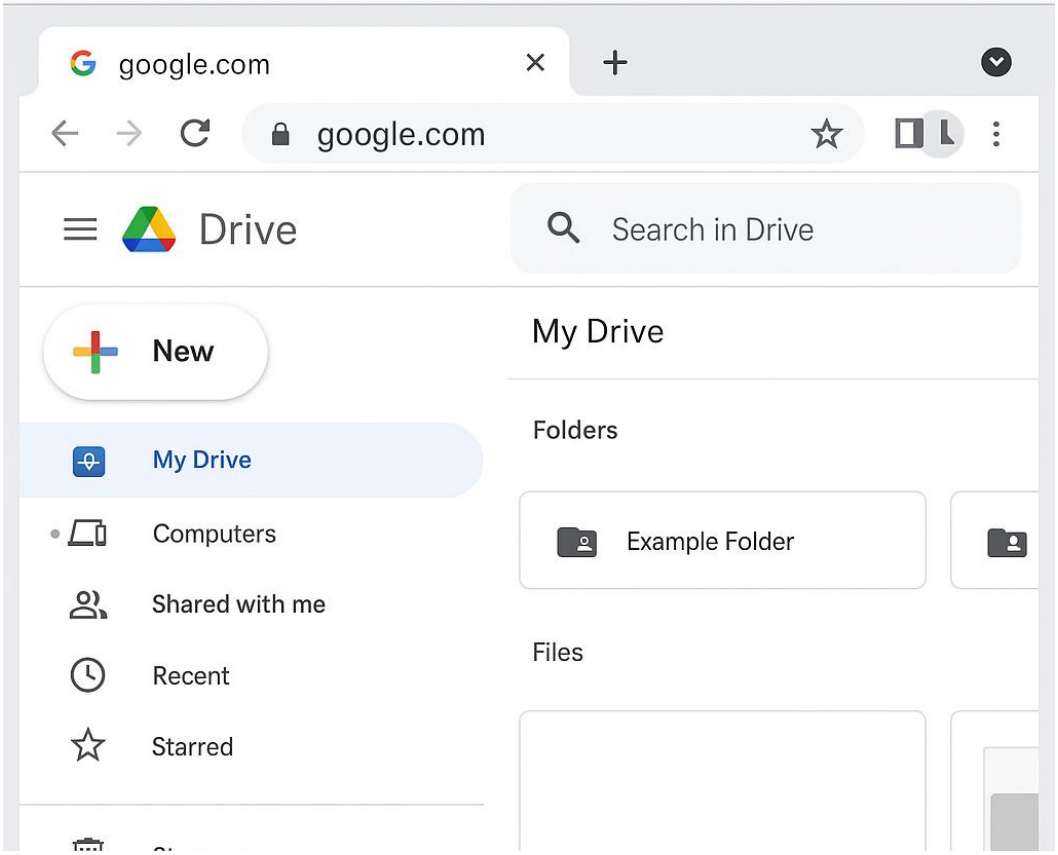
SaaS Features Demonstrated in Google Drive:

- Online storage
- File synchronization
- Auto-backup
- Real-time collaboration
- Anywhere access
- Secure file sharing

Storage as a Service (SaaS) Using Google Drive



Q2) Steps to Create an IAM User in Google Cloud

Step 1 — Open IAM & Admin

1. **Go to Google Cloud Console → https://console.cloud.google.com**
2. **From the left navigation menu, click IAM & Admin**
3. **Click IAM**

Step 2 — Add New User

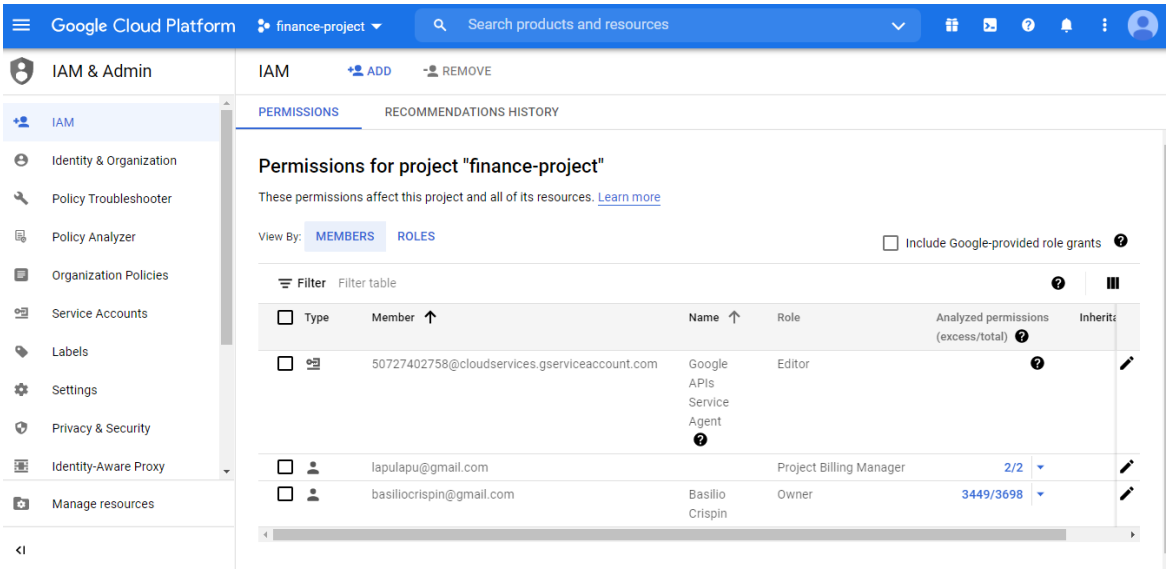
4. **Click Grant Access (top of the IAM page)**

Step 3 — Enter Email + Set Permissions

5. **In Add principals, enter the user's Google email**
6. **Click Select a role**
7. **Choose a role (e.g., Viewer, Editor, Owner)**

Step 4 — Save

8. **Click Save**
9. **The user will receive an email invitation to access the project.**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Project Billing Manager
2/2
basiliocrispin@gmail.com
Basilio Crispin
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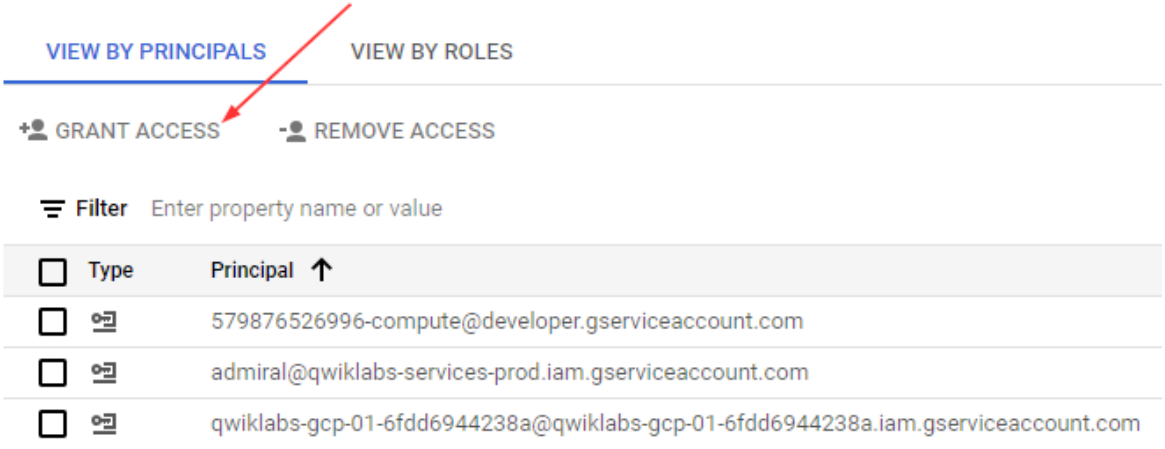
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