Create and Manage Cloud Resources

a) Tour of Google Cloud

1. Sign Up for Google Cloud
   - Go to the Google Cloud Console.
   - If you don't have an account, sign up for one. Google offers a free tier with credits for new users.
   - Once signed in, you'll be in the Google Cloud Console, which is the web-based management interface for Google Cloud.
2. Explore the Google Cloud Console
   - Navigation Menu: Located on the top left (three horizontal lines), this menu gives access to all GCP services such as Compute Engine, Cloud Storage, BigQuery, etc.
   - Dashboard: The main dashboard provides an overview of your resources, billing information, and project details.
   - Projects: GCP organizes resources under projects. You can create multiple projects to manage different environments or applications.
   - IAM & Admin: Manage user permissions and access control here.
   - Billing: Monitor your usage and costs associated with your projects.
   - APIs & Services: Manage API usage, enable or disable APIs, and access API credentials.
3. Explore Documentation and Support
   - Access the documentation through the "Documentation" link in the console. This is a valuable resource for learning more about specific services.
   - The Help option offers various support options, including community forums and direct support (depending on your support plan).

b)Creating a virtual machine

Steps to Create and Access a Virtual Machine in Google Cloud Platform
1. Navigate to Compute Engine
   - In the Google Cloud Console, click on the Navigation Menu (top left).
   - Select Compute Engine > VM instances.
2. Create a New VM Instance
   - Click on the Create Instance button.
   - Name your instance (e.g., *my-vm-instance*).
   - Region and Zone: Choose a region close to your user base.
   - Machine Configuration:
     - Select a machine family (e.g., *General-purpose*).
     - Choose a machine type (e.g., *e2-medium* with 2 vCPUs and 4 GB RAM).
   - Boot Disk:
     - Default is a Debian Linux image, but other operating systems are available.
     - Set the disk size (default is 10 GB).
   - Firewall: Enable HTTP and HTTPS traffic if running a web server.
   - Identity and API access: Choose a default or specific service account.
   - Click Create to launch your virtual machine.
3. Accessing Your VM
   - After creation, go to VM instances in Compute Engine.
   - Click on SSH next to your VM instance to access it directly from the browser.
   - Alternatively, use the external IP address and an SSH client to connect remotely.

Your virtual machine is now ready for use!

c) Getting Started with Cloud Shell and gcloud

Google Cloud Shell and gcloud CLI Guide
1. Open Cloud Shell
- In the Google Cloud Console, locate the Cloud Shell icon in the upper right corner (a terminal icon).
- Click the icon to open a Cloud Shell session. This provides access to a Debian-based shell with gcloud and other tools pre-installed.
- Cloud Shell is free to use, with a small amount of persistent storage.

2. Initialize the gcloud CLI
- Cloud Shell will automatically authenticate with your Google account and set up the gcloud CLI.
- Check your gcloud configuration by running:
- gcloud config list
- If needed, set the project you are working on:
- gcloud config set project [PROJECT_ID]

3. Basic gcloud Commands
List Available Zones:
gcloud compute zones list
Create a VM Instance:
```
gcloud compute instances create my-vm-instance \
  --zone=us-central1-a \
  --machine-type=e2-medium \
  --subnet=default \
  --tags=http-server,https-server \
  --image-family=debian-10 \
  --image-project=debian-cloud \
  --boot-disk-size=10GB
```
SSH into a VM:
gcloud compute ssh my-vm-instance --zone=us-central1-a
Stop a VM:
gcloud compute instances stop my-vm-instance --zone=us-central1-a
Delete a VM:
gcloud compute instances delete my-vm-instance --zone=us-central1-a

a). Cloud Storage: Qwik Start - Cloud Console

1. Open Google Cloud Console

- Navigate to the Google Cloud Console.

2. Create a Cloud Storage Bucket

- In the Navigation Menu, go to **Storage > Browser**.
- Click on **Create Bucket**.
- Enter a unique name for your bucket (bucket names must be globally unique).
- Choose a location for your bucket: **Region, Multi-region, or Dual-region**, depending on redundancy and latency needs.
- Choose a storage class: **Standard, Nearline, Coldline, or Archive**.
- Set access controls: Choose between **Uniform or Fine-grained**.
- Click **Create**.

3. Upload Files to the Bucket

- Click on the newly created bucket in the **Storage > Browser** section.
- Click on the **Upload Files** button.
- Select the file(s) from your local machine to upload.

4. Manage Bucket Permissions

- Click on the **Permissions** tab.
- Add **IAM roles** to control who has access to your bucket and what operations they can perform (e.g., **Viewer, Editor, Admin**).

5. Download Files from the Bucket

- Select a file from the bucket.
- Click on the **Download** button to save it to your local machine.

6. Delete the Bucket

- To avoid charges, delete the bucket after use.

c)Cloud Functions

Cloud Without the Need to Manage a Server

1. Access Cloud Functions in Google Cloud Console
    - In the Navigation Menu, go to Cloud Functions.
2. Create a New Cloud Function
    - Click on Create Function.
    - Name your function (e.g., helloWorld).
    - Select the Region where the function will run.
    - Trigger: Select how the function will be triggered. Options include HTTP, Pub/Sub, Cloud Storage, etc.
    - Authentication: For HTTP, you can set the function to require authentication or allow unauthenticated invocations.
3. Write the Function Code
    - Use the inline editor or upload code.
    - Example of a simple helloWorld function in Node.js:

```
exports.helloWorld = (req, res) => {
  res.send('Hello, World!');
};
```

    - Specify the runtime (e.g., Node.js, Python, Go).
4. Deploy the Function
    - Set the Memory and Timeout according to your function's needs.
    - Click Deploy to create the function.
5. Test the Function
    - Once deployed, click on the function to open its details page.
    - If it's an HTTP function, you'll see a Trigger URL. Visit this URL in your browser or use curl to test the function.
    - For other triggers, invoke the corresponding event (e.g., uploading a file to a bucket for Cloud Storage).
6. View Logs
    - Go to the Logs tab to view execution logs, useful for debugging and monitoring.
7. Delete the Function
    - To avoid charges, delete the function when it's no longer needed by selecting it and clicking Delete.

d)Cloud networking

VPC (Virtual Private Cloud) Setup

1. In the Google Cloud Console, navigate to **VPC network > VPC networks**.
2. Click **Create VPC network**.
3. Provide a **Name** for the VPC.
4. Choose **Automatic** or **Custom** subnet creation.
    - **Automatic**: Google creates subnets in each region.
    - **Custom**: You manually define subnets.
5. Set default **firewall rules**, such as allowing internal traffic, SSH, RDP, or ICMP.
6. Click **Create**.

Creating Subnets

If you chose custom subnets:

1. Go to **VPC network > Firewall**.
2. Click **Create firewall rule**.
3. Define the **Name, Network, Priority,** and **Direction of traffic**.
4. Set **Action on match** to **Allow** or **Deny**.
5. Define the **Targets** (all instances or specific tags) and **Source IP ranges**.
6. Specify the **Protocols and ports** to allow or deny.
7. Click **Create**.

Setting Up VPN or Cloud Interconnect

To connect your on-premises network with Google Cloud:

1. Go to **Hybrid Connectivity > VPN or Cloud Interconnect**.
2. Follow the setup instructions to establish a secure connection between your networks.

Load Balancing

To distribute traffic across multiple instances:

1. Go to **Network services > Load balancing**.
2. Click **Create load balancer** and choose **HTTP(S), TCP/UDP, or SSL Proxy** based on your needs.
3. Configure the **backend services, health checks,** and **frontend IPs**.
4. Click **Create** to deploy the load balancer.

Peering and Shared VPC

For advanced networking configurations:

- Set up **VPC peering** to connect VPCs.
- Use **Shared VPC** for cross-project networking.

Monitoring and Logs

Monitor network performance and security using Google Cloud's **Monitoring and Logging** services.