# Virtual Private Cloud (VPC) – Complete Overview

## What is a VPC?

A Virtual Private Cloud (VPC) is a logically isolated virtual network within a cloud provider such as Google Cloud Platform (GCP), Amazon Web Services (AWS), or Microsoft Azure. It allows you to launch, manage, and secure resources such as virtual machines, databases, and containers in a custom-defined network environment.

## Why is VPC Required?

Key benefits include:

* • Isolation – Resources are isolated from other tenants in the cloud.
* • Custom Networking – Full control over IP ranges, subnets, and routing.
* • Internet Control – Define what connects to the internet and what doesn’t.
* • Security – Use firewalls and IAM policies to protect your environment.
* • Connectivity – Easily link with on-premises systems or other VPCs.

## Key Components of a VPC

### Subnets

Subdivisions of a VPC network. GCP subnets are regional. Example: 10.0.1.0/24 in asia-south1.

### IP Address Ranges

CIDR blocks used to define address space (e.g., 10.0.0.0/16). Must be non-overlapping.

### Routing Tables

Control traffic routing within the VPC or to external networks.

### Firewall Rules

Control ingress and egress traffic. Based on IPs, ports, and protocols.

### Internet Gateway / Cloud NAT

Enables internet access for resources. Cloud NAT hides internal IPs.

### VPC Peering

Private communication between two VPCs. No internet or VPN needed.

### VPN / Interconnect / Direct Connect

Secure or dedicated links to on-premise networks.

### Private Google Access

Allows internal VMs to reach Google APIs without public IPs.

### MTU (Maximum Transmission Unit)

Defines the largest packet size supported. Typical: 1460–1500 bytes.

## Example: Product-Based VPC Setup

* • VPC Name: clahan-vpc
* • MTU: 1460
* • Region: asia-south1
* • Subnet: clahan-subnet-1 - 10.0.1.0/24
* • Firewall: Allow all traffic (for testing)
* • Remote State: GCS Bucket (murali-test-devops)