Networking and Cloud Computing Guide

Part 1: Networking Fundamentals

Internet Protocol (IP)

- Foundation of the internet.
- Responsible for addressing and routing data packets.
- Two versions: IPv4 and IPv6.

Open Systems Interconnection (OSI) Model

- Conceptual framework with seven layers.
- Each layer serves a specific purpose, ensuring interoperability.

OSI Model Layers

Physical Layer: Deals with raw bit transmission.
Data Link Layer: Manages access and error detection.
Network Layer: Focuses on addressing and routing.
Transport Layer: Ensures end-to-end communication.
Session Layer: Manages connections between applications.
Presentation Layer: Translates data, handles encryption.
Application Layer: Provides network services to end-users.

IPv4 and IPv6

- IPv4: 32-bit addressing scheme.
- IPv6: 128-bit addressing scheme, addressing IPv4 limitations.

Public and Private IP Addresses

- Public IPs: Globally unique, routable on the internet.
- Private IPs: Reserved for internal networks, with NAT for security.

Classless Inter-Domain Routing (CIDR)

- Flexible IP addressing method compared to class-based addressing.

TCP and UDP

- TCP: Reliable, connection-oriented communication.
- UDP: Faster, connectionless alternative for real-time applications.

HTTP, HTTPS, DNS, SSH

- HTTP: Communication between clients and servers.
- HTTPS: Secured version with data encryption.
- DNS: Resolves domain names to IP addresses.
- SSH: Secure remote access with encrypted communication.

Part 2: Virtual Private Cloud (VPC) on Google Cloud

Overview of Virtual Private Cloud (VPC)

- Virtual network for connecting and isolating cloud resources.

Google Cloud Platform (GCP) VPC Concepts

Default VPC

- Automatically created for each project for quick resource deployment.

Custom VPC

- Tailor network settings to specific requirements.

Subnets

- Segments IP space, enhancing security and performance.

Reserved IP Addresses in GCP

- Ensures stability by preventing dynamic allocation changes.

Routing in Google Cloud

Routing Types

- Default Route: Directs traffic to the internet.
- Static Route: Manually defined routes for control.
- Dynamic Route: Utilizes BGP for automatic updates.

Creating Static Routes (Command)

```
gcloud compute routes create [ROUTE_NAME] --destination-range [DESTINATION_IP_RANGE] --next-hop-address [NEXT_HOP_IP]
```

Dynamic Routing

- GCP supports dynamic routing through BGP.

Routing Order

- Decisions follow a specific order, directing traffic within the network.

Special Return Paths in GCP

- Some scenarios require special considerations, like asymmetric routing.

Private Google Access

- Allows VMs in a VPC to access Google Cloud services without external IP addresses.

VPC Creation on GCP (Short Guide)

Access Google Cloud Console

- Open your browser and go to the Google Cloud Console.

Select Project

- Ensure the correct GCP project is selected.

Navigate to VPC Networks

- In the left navigation, select "Networking," then "VPC Networks."

Create a New VPC

- Click "Create VPC Network."

Provide VPC Details

- Name: Unique name for VPC.
- Region: Choose desired region.
- Subnet creation mode: Keep default as "Automatic."
- Routing mode: Choose "Regional" for default VPC.

Configure Firewall Rules

- Optional, based on requirements.

Click "Create"

- After entering information, click the "Create" button.

Verify VPC Creation

- Confirm VPC status is "Ready" on the "VPC Networks" page.

Check_Out_Detailed_Blog:-https://medium.com/@srivastavayushmaan1347/a-comprehensive-guide-to-networking-and-cloud-computing-unveiling-the-depths-cd816d659449