Deliverable 1

1. What is a web server?

A **web server** is a software application that serves web pages to users over the internet or an intranet using the HTTP/HTTPS protocols. It listens for incoming requests from clients (like web browsers) and responds with requested web content (HTML, CSS, JS, images).
Example: Apache HTTP Server.

---

2. Different web server applications

Web Server	Definition	Website / Download	Operating System	Latest Version
Apache HTTP Server	Open-source web server software that serves web pages over HTTP/HTTPS.	https://httpd.apache.org/	Linux, Windows, macOS	2.4.57
Nginx	Lightweight, high-performance web server and reverse proxy server.	https://nginx.org/	Linux, Windows, macOS	1.26.1
Microsoft IIS	Web server developed by Microsoft for hosting web applications.	https://www.iis.net/	Windows	10.0
LiteSpeed	High-performance commercial web server with free OpenLiteSpeed version.	https://www.litespeedtech.com/	Linux, Windows	OpenLiteSpeed 1.8.29

3. What is virtualization?

Virtualization is the process of creating a virtual version of something, such as an operating system, server, storage device, or network resource. It allows multiple virtual systems to run on a single physical machine.

---

4. What is VirtualBox?

VirtualBox is a free and open-source virtualization software that allows users to create and run virtual machines on their computers. It supports running multiple operating systems simultaneously on a host machine.

---

5. What is a virtual machine?

A **virtual machine (VM)** is a software-based emulation of a physical computer that runs an operating system and applications as if it were a real computer.

---

6. Host machine vs Guest machine

- **Host machine:** The physical computer that runs virtualization software.
- **Guest machine:** The virtual machine that runs on the host system.

---

7. What is Debian?

Debian is a free and open-source Linux distribution known for stability and security. It serves as a base for many other distributions like Ubuntu.

---

8. What is a firewall?

A **firewall** is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules.

---

9. What is SSH?

SSH (Secure Shell) is a network protocol that allows secure remote login and command execution over an encrypted connection.

---

10. What is an IP Address?

An **IP Address** is a unique identifier assigned to a device on a network. It allows devices to communicate over a network using the Internet Protocol.

---

11. What is a network mask?

A **network mask** (or subnet mask) defines which portion of an IP address represents the network and which portion represents the host.
Example: `255.255.255.0`

---

12. What is a port?

A **port** is a numerical identifier for a communication endpoint in networking. It allows multiple services to run on the same IP address.
Example: HTTP uses port 80.

---

13. What is port forwarding?

Port forwarding is a technique that allows external devices to access services on a private network by mapping a port from the router to a specific device on the internal network.

---

14. What is localhost?

Localhost is a hostname that refers to the local computer. It is used to access network services running on the same machine.

---

15. What does the IP address 127.0.0.1 represent?

The IP `127.0.0.1` is the **loopback address** that points to the local machine, used to test networking and software locally.

---

16. What is Git?

Git is a distributed version control system used to track changes in source code during software development.

---

17. What is GitHub?

GitHub is a web-based platform that hosts Git repositories. It provides collaboration, version control, and project management tools for developers.
Website: https://github.com

Concepts I Did Not Understand

- **Systemctl:** I was not sure how to manage services with `systemctl`.
  Research: `systemctl` is a command-line tool for controlling `systemd` services. You can start, stop, enable, or check the status of services.
  Example: `systemctl status apache2` checks if the Apache server is running.

- **SSH keys:** I did not fully understand how SSH keys work for secure login.
  Research: SSH keys use a public/private key pair. The public key is stored on the server, and the private key stays on the client. This allows passwordless and encrypted authentication.

- **Firewall rules:** I was unsure how firewall rules are applied in Linux.
  Research: Firewalls filter network traffic. Using `ufw` or `iptables`, you can allow or block traffic on specific ports and protocols.

- **Port forwarding:** I was confused about how external ports connect to internal devices.
  Research: Port forwarding maps a port on a router to a device inside a private network. Example: forwarding port 8080 to a local web server at `192.168.1.10`.

- **Subnet mask:** I did not understand how subnet masks divide networks.
  Research: A subnet mask separates the network and host portions of an IP address. Example: `255.255.255.0` means the first 3 octets are network, the last octet is for hosts.

- **Virtual machines:** I was unclear about how resources are shared between host and guest machines. **Research:** A virtual machine runs an operating system in software. CPU, RAM, and disk are allocated to the VM, while the host machine controls overall resources.
- **Git staging vs commit:** I did not understand the difference between staging and committing changes. **Research:** Staging (`git add`) selects changes for the next commit. Committing (`git commit`) saves these changes to the local repository.
- **Loopback / localhost:** I was unsure why `127.0.0.1` works for testing without an internet connection. **Research:** The loopback interface sends network traffic back to the same machine. `127.0.0.1` (localhost) is used to test services locally without network access.