**LINUX**

File Systems

Ext (Extensible File System)

* Latest version: ext4
* Builds on Unix file system design concepts
* Uses blocks and block groups

Storage

|  |  |
| --- | --- |
| PATH | FUNCTION |
| / | Root directory of the entire file system |
| /bin | Essential command binaries |
| /boot | Boot loader files including kernels |
| /dev | Essential devices files |
| /etc | System configuration files |
| /home | Users’ Home directories |
| /lib | 32-bit system libraries |
| /lib64 | 64-bit system libraries |
| /media | Mount points for removable media |
| /mnt | Temporarily mounted filesystems |
| /opt | Optional application software packages |
| /proc | Virtual filesystem providing process and kernel info as files |
| /root | Home directory for the root users |
| /run | Run-time configuration data |
| /sbin | Essential system binaries |
| /sys | Contains information about the devices connected to the computer |
| /tmp | Temporary files |
| /usr | Read-only user data; contains the majority of utilities and applications |
| /var | Variable files whose content is expected to change during normal operation |

Process Lifecycle

Two Types of processes

* Foreground processes (also referred to as interactive processes)
  + These are initialized and controlled through a terminal session. In other words, there has to be a user connected to the system to start such processes; they haven’t started automatically as part of the system functions/services.
* Background processes (also referred to as non-interactive/automatic processes)
  + Processes not connected to a terminal; they don’t expect any user input.

**BASH (Bourne Again Shell)**

Written by Brian Fox and released in 1989.

Commands:

* whoami – shows current login user
* ls – list directory

**LAMP**

LAMP is a Web Server Solution Stack for dynamic, database driven websites. A solution stack which is a complete set of software that performs a task.

**L** – Linux - Operating System

**A** – Apache HTTP Server – Web Server

**M** – MySQL – Database Management

**P** – PMP – Scripting Language

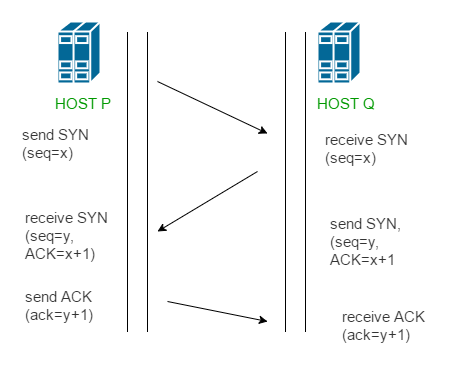
**TCP/IP (Transmission Control Protocol/Internet Protocol)**

Internet Protocol (Network Layer Protocol)

* Routes information across networks
* Provides an addressing scheme
* Delivers packets from source to destination

TCP (Transmission Control Protocol)

* Connection-oriented protocol
* Guarantees delivery through acknowledgement
* 3 Way Handshake
  + SYN: Opens a connection
  + FIN: Closes a connection
  + ACK: Acknowledge a SYN or FIN requests



UDP (User Datagram Protocol)

* Lightweight, connectionless protocol
* Doesn’t send acknowledgements or guarantee delivery
* Used for voice and video applications where guaranteed delivery is not essential

**OSI Model (Open Systems Interconnection)**

|  |  |  |
| --- | --- | --- |
| Layer 7 | Application Layer | HTTP, FTP, SMTP, User Programs |
| Layer 6 | Presentation Layer | Data Translation and encryption |
| Layer 5 | Session Layer | Exchange of data between systems |
| Layer 4 | Transport Layer | TCP and UDP, PORT |
| Layer 3 | Network Layer | Internet Protocol (IP), ICMP |
| Layer 2 | Data Link Layer | Data Transfer between two nodes, MAC Addresses |
| Layer 1 | Physical Layer | Sending bits using Wires, Radios, Optics |

**TCP Network Model**

|  |  |  |
| --- | --- | --- |
| Layer 4 | Application Layer | Layer 5, 6, and 7 of OSI   * User Programs * Data Translation and Encryption * Exchange of Data between systems |
| Layer 3 | Transport Layer | Layer 4 of OSI   * TCP and UDP |
| Layer 2 | Internet Layer | Layer 3 of OSI   * Internet Protocol (IP) |
| Layer 1 | Network Interface Layer | Layer 1 and 2 of OSI   * Data Transfer between two nodes * Sending bits using Wires, Radios, Optics |

**HTTP, DNS, NFS, RAID, DHCP**

HTTP (HyperText Transfer Protocol)

* TCP Port 80
* Designed in plain text to transfer hypertext
* Client/Server – Request/Response
* User Agent – Application that accesses web content
* Cache – copies of web content for quick delivery
* Proxy – Filter and cache content
* URL (Uniform Resource Locator) – Locates HTTP resources; resources are collected through a single connection
* Authentication through several challenge and response mechanisms
  + Authentical realms grant access to multiple authentication scopes under a single URL

Request Methods

GET = Retrieve Data

HEAD = Same as GET, but no response body

POST = Server accepts action from client, EX: submitting a form

First line of an HTTP response is the status line.

* Includes a numbered status code, and text-based reason phrase

HTTP Status Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Informational | Successful | Redirection | Client Error | Server Error |
| 1XX | 2XX | 3XX | 4XX | 5XX |

DNS (Domain Name System)

* Layer 7 of the OSI Model
* Client sends a query to a DNS server for an IP Address
  + Server will respond with the information
* Uses UDP port 53 for requests
* Uses TCP port 53 for zone transfer

DNS Records

|  |  |  |
| --- | --- | --- |
| 1 | A | Address. A 32-bit IPv4 address. It is used to convert a domain name to IPv4. |
| 2 | NS | Name Server. Identifies the authoritative servers for a zone. |
| 5 | CNAME | Canonical name. Defines an alias for the official name of a host. |
| 6 | SOA | Start of authority. Marks the beginning of a zone, Usually he first record in a zone file. |
| 12 | PTR | Pointer. Used to convert an IP address to a domain name. |
| 13 | HINFO | Shows host information. |
| 15 | MX | Mail Exchange. Redirects mail to a mail server. |
| 28 | AAAA | Shows the IPv6 address. |
| 252 | AXFR | Requests for the transfer of an entire zone. |
| 255 | ANY | Request for all records. |

|  |
| --- |
| DNS Sections |
| Message Header |
| Questions |
| Answers Resource Records |
| Authority Resource Records |
| Additional Resource Records |

NFC (Near-Field Communication)

* Works in a short range of 10cm
* Two-Way communication
* Similar to RFID, but RFID is read-only

RAID (Redundant Array of Inexpensive Disks or Drives/Redundant array of Independent Disks)

* 0 – Striped
* 1 – Mirror
* 5 – Distributed Parity
* 6 – Dual Parity

Nested RAID – Combination of 2 or more standard Raid Levels

* 0+1 – Mirrored and Striped

DHCP (Dynamic Host Configuration Protocol)

Assigns IP Address to Hosts

UDP Port

* Client: 68
* Server 67

DHCP Server

* 1. DHCP Discover – Host looks for a DHCP server, Broadcast message
  2. DHCP Offer – DHCP server offers an address
  3. DHCP Requests – Host requests to lease the address
  4. DHCHPACK – DHCP server send the IP addresses to the host