N+ - BASICS OF COMPUTER NETWORKS

1. COMMAND PROMPT
2. OPERATING SYSTEM
3. NETWORK TYPES
4. NETWORK TOPOLOGY
5. TRANSMISSION MEDIA
6. NETWORK DEVICES

**CHAPTER 1 - COMMAND PROMPT**

* Command line interface (CLI)
* Cmd.exe - new, commands are written in full form
* Command.com - old, commands were written in short form ex : cd Docu~

Properties of cmd.exe

* System Commands (20)

Dir, cd, exit,edir,clr, copy,del...

* Network Commands (15)

Ping, tracert, netstat, arp….

Exercise

Gather as many system and network commands that are commonly used.

Command Name - Function of the Command

Syntax - CD directoryname

Ex - CD Desktop

Output : the directory changes to desktop.

Arguments - mention if any -t -l

**CHAPTER 2 - OPERATING SYSTEM**

* User interface between hardware and the user.

Key Terms

1. VERSION

Type of a software.

Major Version - VLC 2.0, VLC 3.0

Minor Version - VLC 2.0, VLC 2.1

Windows XP, Windows XP SP1, Windows XP SP2

1. SOFTWARE/OS DESIGNING STAGES

Alpha Version - designing stage

Beta Version - release with bugs

Final Release - public usage

1. SOURCE CODE

Main code of any software.

* Open Source - where we can see, edit and modify and it is free. Ex : linux
* Closed Source - where you cannot see the code. Ex : windows

1. SHELL

It is an outer layer of an operating system.

It is responsible for CLI and GUI to work properly.

1. KERNEL

BInding factor between your OS and any application.

OS TYPES / EVOLUTION

OS TYPES

CLIENT SERVER

Windows XP Windows Server 2003

Windows 7 Windows Server 2008

Windows 8 Windows Server 2012

Windows 10 Windows Server 2019

EVOLUTION

* When you design an OS - functionality, security, usability.
* Functionality and usability - windows
* Functionality and security - linux

OS Usability

Win 1.0 Introduction to OS

Win 2.0 More windows

Win 3.0 NT More graphics, cd/dvd

Win 95 Internet Explorer was introduced

Win Xp Safe and secure

Win Vista secure (encryption, decryption)

Win 7 wireless world, more wifi options

Win 8,10 touch screen devices

MS DOS

* Disk Operating System
* Evolution of MS DOS
* Initially there was CP/M (Control Program for Microcomputers) - Assembly level language. From this CP/M, Tim Patterson created QDOS (Quick and Dirty Operating System). Bill Gates from Microsoft bought all the copyrights from Tim and developed MS DOS. Now this is again taken over by IBM. That is IBM DOS.
* Other companies like HP, Zenith, Compaq also developed DOS.

REGISTRY

* Has a set of instructions.

HKEY\_CLASSES\_ROOT it will decide which file opens in which app.

HKEY\_USER all the users and their configuration

HKEY\_CURRENT\_USER currently logged user details

HKEY\_LOCAL\_MACHINE dynamically occuring h/w or s/w changes

HKEY\_CURRENT\_CONFIG display all your recent documents

KEY BOOT FILES

1. NTLDR - New Technology Loader

This loads the MBR file.

MBR - Master Boot Record.

1. BOOT.INI

Will locate the MBR file in HDD and give it to NTLDR.

MBR resides in C:

1. BOOTSECT.DOS

Will intimate how many OS’s are installed in HDD.

1. NTDETECT.COM

Intimate dynamic hardware changes.

Ex : CMOS battery failure, keyboard not found.

1. KERNEL.EXE

Basic kernel files needed for an OS.

SYSTEM ERROR FILES

NON CRITICAL ERROR CRITICAL ERROR

-.dll (dynamic link library) .hal (hardware abstraction layer)

- os will boot but s/w will not work. Os will not boot. Ex : mbr file missing.

OS BOOTING SEQUENCE

* Power On
* POST - power on self test , load bios, load ram, load graphics
* BIOS - bios settings and your ram starts working.
* BOOT SECTOR FILES - MBR, VBR are loaded and WINRESUME.EXE is executed.
* NTLDR, BOOT.INI, BOOTSECT.DOS will perform
* NTDETECT.DOM will perform and will check if any hardware changes occur.
* F8 ADVANCED BOOT MENU OPTIONS
* NTOS KRNL IMAGES will be loaded
* KERNEL.EXE will execute
* SMSS.EXE will execute - Session Manager Sub System (login screen)
* WINLOGIN.EXE will execute once u enter your password and login.

VBR - VOLUME BOOT RECORD

It saves all the files in the drive as a copy. Recovery softwares will target vbr file to recover the data.

**CHAPTER 3 - NETWORK TYPES**

**LAN - LOCAL AREA NETWORK**

* NOT DEFINED BY THE AREA OR NO OF COMPUTERS

**LAN CREATION**

* LAN WITH INTERNET
* LAN WITHOUT INTERNET

**DEFINITION**

It is an interconnection of computing devices (computer, switch,routers,printer..) for achieving two objectives.

Data sharing

Resource sharing

**LAN WITH INTERNET**

CO AXIAL CABLE (LIKE ELECTRIC CABLE)

CONVERTER - CONVERTS AC/DC CURRENT

RJ11 - CABLE CONNECTOR USED IN TELECOMMUNICATION

TWISTED PAIR CABLE - REDUCES CROSSTALK.

SPLITTER - FOR ADSL - ASYMMETRIC DIGITAL SUBSCRIBER LINE - FOR MODEM.

RJ45 - USED IN NETWORK TO CONNECT COMPUTER TO OTHER ELEMENTS.

**LAN WITHOUT INTERNET**

A SWITCH WITH COMPUTERS (24 PORT SWITCH, 16 PORT SWITCH, 48 PORT SWITCH)

**OTHER NETWORK TYPES**

WAN - WIDE AREA NETWORK

MAN - METROPOLITAN AREA NETWORK

PAN - PERSONAL AREA NETWORK

**CHAPTER 4 - NETWORK TOPOLOGIES**

* PHYSICAL TOPOLOGY
* LOGICAL TOPOLOGY

**BUS TOPOLOGY :**

* OLD, NOT USED NOW
* TROUBLESHOOTING IS TOUGH
* LIMITATIONS TO NO OF SYSTEMS.
* BNC CONNECTORS ARE USED

**RING TOPOLOGY**

* Packets travel in unidirectional. One connection is broken - entire network is affected
* Token ring technology - to avoid collision

**STAR TOPOLOGY**

* WIRE - TWISTED PAIR CABLE
* CONNECTOR - RJ45
* ADV - EASY TO ADD/REMOVE COMPUTERS WITHOUT SHUTTING DOWN THE N/W
* ALL NODES ARE INDIVIDUALLY CONNECTED TO CENTRAL POINT
* HIGH SPEED.

**TREE TOPOLOGY**

* USED IN LARGE SCALE TELECOMMUNICATION NETWORK.
* COMBINATION OF BUS & STAR

**MESH TOPOLOGY**

* EVERY COMPUTER IN NETWORK HAS CONNECTION TO EACH OTHER COMPUTER IN THAT NETWORK.
* CABLE COST IS MORE
* INTERNET IS BASED ON MESH

**CHAPTER 5 - TRANSMISSION MEDIA**

* WIRED
* WIRELESS

|  |  |  |  |
| --- | --- | --- | --- |
| **CHARACTERISTICS** | **CO AXIAL CABLE** | **TWISTED PAIR CABLE** | **OPTICAL FIBRE CABLE** |
| USAGE | Shorter distance communication | Medium distance communication | Longer distance communication |
| TYPES | Thicknet - telecommunication,  Thinnet - network | UTP - unshielded twisted pair cable,  STP - shielded twisted pair cable - high cost, extra covering. | SM - Single Mode(longer),  MM - Multi Mode(Shorter) |
| CONNECTORS | BNC Connector - BNCF, BNCT | 4 pair cable (8 cables) - n/w,  2 pair cable (4 cables) - telecommunication  RJ45, RJ11 | SC -Subscriber Channel  ST - Subscriber Terminal  MTRJ - Mechanical Transfer Registered Jack |
| STANDARD | Radio guide (RG)  RG48 Cable  RG8 Cable | Category (CAT)  CAT1,CAT2, CAT3, 4,5,5e,6  CAT6 cable is used now |  |
| LOSS | EMI -Electro Magnetic Interference  RFI - Radio Frequency Interference  DIsturbance generated by external source. | EMI & RFI (but less than Co Axial Cable) | NO EMI & RFI  Reflection / Refraction. |
|  |  |  |  |

**CHAPTER 6 - NETWORK DEVICES**

|  |  |  |
| --- | --- | --- |
| HUB | SWITCH | ROUTER |
| Older device. Not used now | Advanced than hub which is used | Advanced device |
| Present in OSI Layer 1 | Present in OSI Layer 2 | Present in OSI Layer 3 |
| It is also called collision domain - it has no memory | It has a memory - MAC Table  MAC Address 48 bits | It has a memory - IP Table  IP Address 32 Bits |
| Type  Active HUB - will boost signal  Passive HUB - will not boost signal | Manageable Switch (can config)  Unmanageable Switch (cannot config) | Types of Packet Forwarding  Cut through - will check 48 bits of packet and transfer quick  Fragment free - half packet  Store and forward - full packet (slow) , secure |
| Ports  4 port hub  8 port hub  16 port hub | It is called broadcast domain. | Function  To find the best path where network and speed will be good  Routing  Static  Dynamic |

GATEWAY

* THIS TERMS REFERS YOUR ROUTER
* GATEWAY IP - ACTUAL ROUTER’S IP

To check the ip of your computer type ipconfig in the command prompt.

FIREWALL

* IT IS BOTH HARDWARE AND SOFTWARE
* FUNCTION - ANALYSING INCOMING & OUTGOING TRAFFIC

RULES

* INBOUND RULES - INCOMING
* OUTBOUND RULES - OUTGOING

VPN

VIRTUAL PRIVATE NETWORK

* TO SECURE YOUR TRAFFIC
* USING TECHNOLOGY CALLED IPSEC - IPSECURITY