ETHICAL HACKING

1. A+ - BASICS OF COMPUTER HARDWARE
2. N+ - BASICS OF COMPUTER NETWORK
3. CCNA - ROUTING & SWITCHING
4. SERVER - WINDOWS,SQL,AWS
5. LINUX
6. ETHICAL HACKING & CYBER SECURITY

A+ - BASICS OF COMPUTER HARDWARE

6 CHAPTERS

IDENTIFYING PURPOSE & CHARACTERISTICS

1. MOTHERBOARD
2. PROCESSOR
3. MEMORY DEVICES
4. STORAGE DEVICES
5. VIDEO TECHNOLOGIES
6. OTHER COMPONENTS

Chapter 1

IDENTIFYING PURPOSE & CHARACTERISTICS OF MOTHERBOARD

Types of Motherboard

1. Based on Component Placement

We have two types

INTEGRATED MOTHERBOARD

* Small
* They are used in laptops
* Size is very small
* Portable
* No wires
* Disadvantage - it produces more heat, troubleshooting is tough

NON INTEGRATED MOTHERBOARD

* Big
* They are used in desktops
* Heat produced is very less
* Troubleshooting is easy
* Size is big
* Not portable
* More no of wires

1. BASED ON FORM FACTOR

We have two types of motherboards

ATX

* Advanced technology extended
* 80% of all the desktops, laptops are ATX motherboards
* Perpendicular 90 degrees

BTX

* Balanced technology extended
* This is used in server rooms
* Speed is high and heat produced is high - both are maintained equally.
* Not perpendicular.

CHIPSET

* Checks with all the components functionality with input and output process
* Evolution - Electronic components -> circuit board -> integrated circuit -> chipset
* Intel manufactured motherboard - 2 chipset
* Sis - silicon integrated system motherboard - 1 chipset
* Iha - intel hub architecture - 1 chipset

PROCESSOR

* Has two components with it
* North Bridge : connect all the high speed components to the processor.(ex : RAM,AGP,PCI)
* South Bridge : connect all the slow speed components to the processor.(ex:USB,BIOS)

PROCESSOR SLOT

* LGA : Land Grid Array (old)
* PGA : Pin Grid Array (new)

EXPANSION SLOT

* Used to upgrade your computer
* Troubleshooting
* Peripheral ports (backside ports)

PCI - Peripheral Component Interconnect

AGP - Accelerated Graphics Port

PCIe -PCI express : PCI + AGP

MEMORY SLOT

* RAM slot
* Old : Single Inline Memory Module (SIMM)
* Desktops : Dual Inline Memory Module (DIMM)
* Laptops : Small Outline Dual Inline Memory Module (SODIMM)
* Mobile : Micro DIMM

POWER CONNECTOR

* SMPS : SWITCH MODE POWER SUPPLY
* Converts actual current to direct current and then feed its to other components
* Ex : mobile charger

ON BOARD DISK DRIVE CONNECTORS

* ON BOARD - motherboard
* DISK DRIVE - hdd, fdd, cd/dvd
* CONNECTORS - PATA & SATA
* PATA - Parallel Advanced Technology Attachment
* Old, slow, 40 pins
* SATA - Serial Advanced Technology Attachment
* New, fast, 7 pins
* PATA - IDE/EIDE
* IDE - Integrated Drive Electronics
* EIDE - Enhanced Integrated Drive Electronics

KEYBOARD CONNECTORS

* AT - Advanced Technology , 5 pins
* PS/2 - Personal System , 6 pins
* Purple - keyboard
* Green - mouse

BIOS

* Basic Input Output Settings
* Blue color screen when starting your pc.
* F1 or F8 to start BIOS
* BOOT DEVICE PRIORITY - setting priority in which order the processor should choose os from hdd or cd/dvd or usb.

CMOS

* Complementary Metal Oxide Semiconductor
* Responsible for date & time and BIOS
* Failure : date and time moving backwards, password lost or internet not connected.

JUMPER

* Used for hardware configuration
* This decides which harddisk os should be the master os.

FIRMWARE

* It is a software
* Any important software is called a firmware
* Ex : vlc, windows xp - firmware

**CHAPTER - 2**

**IDENTIFYING PURPOSE AND CHARACTERISTICS OF PROCESSOR**

Function - Converting to 0s and 1s

PROCESSOR EVOLUTION

1. Transistors(transfer resistance) and semi conductors - switch electronic signals and electrical power. Takes tiny electric current at one end and produces much bigger electric current.
2. Dual Inline Package (DIP) - two parallel rows of electrical connecting pins.
3. Single Edge Contact Catridge (SECC) - this is where a processor with north bridge and south bridge was introduced
4. Single Edge Processor Package (SEPP) - same as SECC but with a protective covering.
5. Pin Grid Array (PGA)
6. Staggered Pin Grid Array (SPGA) - checkboard pattern. More no of pins. So speed is high.

TODO

Between PGA and SPGA, there was a processor called BGA. this is not used now.

BGA (Ball Grid Array):

PRINTING INSTRUCTIONS

2.2 / 288 / 256 /1

Processor speed / cache memory / FSB speed / voltage

FSB - Front Side Bus - Processing Speed

RAM Processor FSB

2.5 3.2 2

Computer speed is the least speed.

CHARACTERISTICS

Threading Technology

* Ability of a processor to perform multiple task at a time.

Overclocking

* Process of increasing processor speed manually. Increasing the clock rate.

TODO :

see how this is done:

-Increase CPU Clock ratio from BIOS settings

-Increase CPU Voltage accordingly

-Trial and error by checking if system crashes

Computer beep sounds (AMI BIOS):

|  |  |
| --- | --- |
| 1 short | DRAM refresh failure. |
| 2 short | Parity circuit failure. |
| 3 short | Base 64 K RAM failure. |
| 4 short | System timer failure. |
| 5 short | Process failure. |
| 6 short | Keyboard controller Gate A20 error. |
| 7 short | Virtual mode exception error. |
| 8 short | Display memory Read/Write test failure. |
| 9 short | ROM BIOS checksum failure. |
| 10 short | CMOS shutdown Read/Write error. |

CORE SPECIFICATION

No of Cores Name

1 single

2 dual

3 tri

.

.

.

.

.

20 ICOSA

Todo

Intel dual core

Intel core duo

Intel core 2 duo

**CHAPTER - 3**

**IDENTIFYING PURPOSE AND CHARACTERISTICS OF MEMORY DEVICES**

ERROR CHECKING IN RAM

PARITY RAM

NAME BITS NO OF 1’S PARITY BIT RESULT

Sowmitha 010101 Odd 1 010101 | 1

Pratheek 011011 Even 0 011011 | 0

Sankar 010110 Odd 1 010110 | 1

This concept is called “False Positive”

NON PARITY RAM

NAME BITS NO OF 1’S RESULT

Sowmitha 010101 3 010101 | 3

Pratheek 011011 4 011011 | 4

Sankar 111110 3 010110 | 5

This is called “Checksum”

RAM

* Random Access Memory
* Temporary memory
* WE have two types of RAM - Static RAM and Dynamic RAM

Static RAM

* It is also called as asynchronous RAM
* Non volatile
* ZBT
* SRAM
* In static RAM, the data will always be permanent.
* Because it will not obey the processor and there is no refresh signal going to static ram from processor
* Its speed depends on itself

DYnamic RAM

* Synchronous DRAM
* DDR1
* DDR2
* DDR3
* DDR4
* DRD
* In dynamic RAM, the data is lost
* Because it always obeys the processor. SO whenver the signal from processor to Dynamic RAM stops, there is a data loss.
* The speed depends on the processor.

SDRAM - SIngle Data Rate RAM / Synchronous DRAM

DDR - Double Data Rate RAM

DRD - Direct Rambus Dynamic

ZBT - Zero Bus Turnaround (remove all the dead bus cycles from the static RAM)

**SPEED IN RAM**

Type Data Rate \* No of Bits Transferred \*Clock Rate = Speed in MBPS

SDRAM 1 \* 8\*100 = 800 mbps

DDR1 2 \* 8\*100 =1600 mbps

DDR2 4 \* 8\*100 =3200 mbps

DDR3 8

**DDR4**

PHYSICAL ORIENTATION OF RAM

DDR1

DDR2

DDR3

DRD - Direct Rambus Dynamic

* This was introduced by “Rambus Inc”
* Speed is high, heat generated is also high
* It was mostly used in playstation, bio medical, home theatres
* But not used now.

Static RAM

* Costly
* Speed is high
* Used in GPS and Bio medicals
* This has the memory , L1,L2,L3

ROM

* Read Only Memory
* Permanent Memory

PROM

* Programmable Read Only Memory
* AUdio / Video CD

EPROM

* Erasable Programmable Read Only Memory
* EMpty CD

EEPROM

* Electronically Erasable Programmable Read Only Memory
* Using computer’s high voltage to erase the data

FLASH EEPROM

* Pendrives.

**CHAPTER - 4**

**IDENTIFYING PURPOSE AND CHARACTERISTICS OF STORAGE DEVICES**

1. HARD DISK
2. FLOPPY DISK
3. ZIP DRIVE
4. TAPE DRIVE
5. FLASH DRIVE
6. CD/DVD

HARD DISK

To recover data from the hard disk - data recovery software is used. One such is 7 Data Recovery.

HDD spinning speed - 3200 to 7400 rpm (revolution per min)

5400 - 15000 rpm

It has a platter, spindle, actuator and actuator arms

It also has connections for power supply, jumpers and ide (sata/pata)

FLOPPY DISK

* Used for moving data between computers.
* Speed is very slow and the size is also small

ZIP DRIVE

* Advanced version of floppy disk
* Used mainly for backing up.
* Size was big and the speed was also high

TAPE DRIVE

* In CCTV’s
* 1 harddisk - 6000 - i tb - 1 month - 1 cctv
* Are very cheap. Like 12td - 20,000 a year.

FLASH DRIVE

* Pendrive / usb / thumb drive
* Version : usb 2.0 (old), 3.0 (new)
* SD Card - Secure digital
* Class : 2 4 6 8 10 - Data transfer rate

CD/DVD

* CD - COMPACT DISC
* CDR - COMPACT DISK RECORDABLE
* CDRW - COMPACT DISK REWRITABLE
* DVD - DIGITAL VERSATILE DISK
* Single Sided Single Layered CD/DVD
* Single Sided Double Layered Cd/DVD
* Double SIded Double Layered CD/DVD

TODO

* **Bluray**
* Uses blue lasers instead of traditional red lasers, shorter wavelength, smaller beams, more data
* 25 GB capacity as compared to 4.7 GB in DVDs
* 1080p support
* Support Dolby and DTS HD audio
* **HD/HD-DVDs**
* 15 GB capacity
* 1080p support

**CHAPTER 5**

**Identifying PURPOSE AND CHARACTERISTICS OF VIDEO TECHNOLOGIES**

**Key Terms**

1. Pixel - tiny particles/elements in a picture (Picture Element)
2. Dot Pitch - distance between two pixels. (can be from 0.24 mm to 0.04 mm)
3. Resolution - 1024\*720 screen resolution . there are like 4 lakh pixels on the screen.
4. Refresh Rate - Every video you record, the motion is captured as pictures and every single pic is called a frame. The distance between frames is called the refresh rate.

TECHNOLOGIES

1. MONOCHROME - Black/White. IBM introduced this. “Text as graphics”. Connector - DB-9D Subconnector.
2. COLOR GRAPHICS ARRAY (CGA) - 4 colours were introduced. Graphics was introduced.
3. ENHANCED CGA - 16 colours were introduced. Graphics was enhanced.
4. VIDEO GRAPHICS ARRAY - 256 colors were introduced. First cache memory was introduced (256kb). Connector - DB-15D Subconnector.
5. Super VGA - VESA (Video Electronics Standard Association) - announced that all IBM products will be standardised.
6. DIGITAL VIDEO INTERFACE (DVI) - high quality video. Successor of VGA. Types - DVIA, DVID, DVII.
7. HIGH DEFINITION MULTIMEDIA INTERFACE (HDMI) - used for higher transmission rate.
8. SEPARATE VIDEO (SVIDEO) - old, split video into color and b/w.
9. COMPOSITE VIDEO - combine every color into a composite color.

DISPLAY DEVICES

* CRT - CATHODE RAY TUBE
* LCD - LIQUID CRYSTAL DISPLAY
* LED - LIGHT EMITTING DIODE

CRT

* Old monitor.
* Consume more power
* Generate more heat
* Graphics is very poor
* Price is very low

LCD

* Introduced in watch,calculator.
* Consumes less power
* Graphics was limited.
* Liquid - neither a liquid nor a solid - semi crystalline.
* Used for dispersing light uniformly.

LED

* Best used for low power
* Graphics are good
* Direct LED - White LED
* RGB LED - Red,green,blue
* Edge LED - grid line structure.

**CHAPTER 6**

**IDENTIFYING PURPOSE AND CHARACTERISTICS OF OTHER COMPONENTS**

* ADAPTOR CARDS
* PERIPHERAL COMPONENTS

1. USB
2. LAN PORT
3. SERIAL PORT
4. PARALLEL PORT

* COOLING SYSTEMS

ADAPTOR CARDS

* They are used in expansion slots.
* We have network adaptor cards, sound adaptor cards and video adaptor cards.

Peripheral components

USB

* Universal Serial Bus
* Type A connector - COmputer End
* Type B connector - Device End
* VErsions - USB 2.0 (old) and USB 3.0 (new)

LAN PORT

* Ethernet POrt / Internet Port/ Wan / NIC (Network Interface Card)
* Function : convert parallel signal into serial signal

Computer sends the parallel signal to NIC card. It converts to serial signal and then send it to the server.

Parallel signal - for shorter distance communication

Serial signal - for longer distance communication

PARALLEL PORT

* Used for connecting printers to your computers.
* Unidirectional Parallel POrt - there is only communication from computer to printer.
* Bidirectional Parallel Port - there is communication between both the computer and printer

SERIAL PORT

* Used for connecting two devices
* Standard Serial Port - can connect two similar devices
* Null Modem Serial Port - can connect two dissimilar devices

COOLING SYSTEM

* FAN
* HEAT SINK
* PELTIER COOLING
* LIQUID COOLING (centralised AC)

Low cost, mostly preferred.

* PHASE CHANGE COOLING

High cost, it can achieve upto -20 degree. It is only used in data centers.