

Preview

Sheets

FINAL NOTES

5x7 NOTECARD ALLOWED

70 ~ 75 MCQ

- Chapter 1, 3, 4, 6, 7, 8, 9, 10,
virtual memory, 15, 18, Network ch1
- Layers of Protocol [TCP/IP 5 LAYERS]
& function (slide 2 in Network ch1)
- OS management functions (ch 15)
 - file - memory
 - security - BIOS
- instruction Cycle
- What are 2 major issues w/ technology hardware
over time

What are six management functions of the OS? Briefly describe

Well Known Ports 20,21,22,23 25, 80,

How many total well-known ports are there?

Which protocol, TCP or UDP do application services use?

Convert binary, hexadecimal, decimal numbers

What are the layers of the TCP/IP Internet protocol stack?

What are the responsibilities of each layer?

What are the protocols, hardware if applicable, and PDU of each layer?

Name three states of processes during CPU scheduling.

Know how to identify register values from a simple program line.

What are three basic network physical topologies?

Calculate actual physical memory address given a virtual memory address.

Calculate Propagation Delay, d/s Transmission Delay L/R

Know generally physical properties of UTP, coax and Fiber

What is the difference between baseband and broadband??

Why is a port number necessary?

Why is packet switching a more efficient method of transmission?

What is the difference between authoritative server and a local DNS server?

Why do you need a default gateway?

Identify: Len Kleinrock, Vince Cerf and Robert Kahn, Tim Berner-Lee, Marc Andreessen

Identify elements in the display of ipconfig /all -

Brief history of the Internet.

Calculate the values of the CPU registers.

Calculate amount of time it takes a datagram to arrive to its destination network $(Q+(M-1))*L/R$

Describe five major functions of the operating system

Calculate the actual physical memory location given a virtual address

How does the process of paging and the swap file increase Virtual Memory?

Analyze lines of code and which registers have which values after a completion of one instructions

Some binary /decimal conversions

Identify LAN topologies

What are interrupts What are some of its uses

What are the various process's states in CPU scheduling?

What do they do?

What are DMA and Programmed I/O?

Why would DMA be useless if there were no interrupts?

What are the seven major types of operating systems

Quiz 1.3

Operating System: Collection of PROGRAMS

Components

- o HARDWARE
- o SOFTWARE
- o DATA
- o Personnel & Procedures + Communications

BIOs : Basic Input Output System

-What it does/Where is it located?

Starts up computer. If BIOS fails,
computer fails to start up.

/ Flash ROM
Chip

Steps in BIOS

- o POST Test
- o UPDATE CMOS
- o LOAD OS Kernel

OS Management

- o BIOS → Starts up Computer
- o file → Organizes files in directories ; Check file status
- o memory → Allocates & deallocates memory from Processors
- o Device → Tracks the hardware the users use
- o security → Manages firewall to protect from malware

CPU : Central Processing Unit

Definition: The Brain of Computer ; Process instructions

Components

- o ALU
- o CU
- o I/O
- o Registers / Cache

Memoru

Primary

- o RAM - volatile & internal
- o DATA must be in RAM in ORDER to RUN

Fastest type of ram - Most data is stored in this

Cache

Secondary

Non-Volatile

What type of software managers general operation of the computer?

OPERATING SYSTEM

What does the OS not do?

WORD PROCESSING

Who developed the first internet? What's it called?

DOD (Department of Defense) : ARPANET

Len Kleinrock. What he do?

Develop packet switching

Vinton Cerf & Robert Kahn

Developed TCP/IP protocol standard as internet LANGUAGE

What year did NASA and ARPANET was created?

1969

Ray Tomlinson

CREATED email address STANDARD

Tim Berners Lee

Developed WWW (WORLD WIDE WEB)

Mark Anderson

Developed Mosaic , 1st GRAPHical BROWSER

What are the two types of architecture?

- Peer-to-Peer
- Client-Server

The largest number representing 8 bits is

$$2^8 - 1$$

16 terabytes is how many bytes?

$$16 \text{ trillion bits}$$

The decimal range of an 18 bit word is

$$[0 \text{ to } (2^{18} - 1)]$$

Hexadecimal to Decimal Convert

$$3EFC = 3(16^3) + 14(16^2) + 15(16) + 12$$

1011011101 to Decimal

$$2^9 + 2^7 + 2^6 + 2^4 + 2^3 + 2^2 + 1$$

FDACE to Binary

1111 1101 1010 1100 1110

ADD the following

$$\begin{array}{r} 11 \\ 1FF9 \\ + 19 \\ \hline 26 \end{array} \quad \begin{array}{r} 15 \\ 9BB1 \\ + 21 \\ \hline 27 \end{array} \quad \begin{array}{r} 101101101 \\ 10011011 \\ + 100001000 \\ \hline \end{array}$$

Binary to Hexa

1001 1010 1111
9 A F

Hexa to Decimal

$$9AF = 9(16^2) + 10(16) + 15$$

$$DC = 13(16) + 12$$

$$2^8 = 256 \quad 2^9 = 512 \quad 2^{10} = 1024$$

What's 1030 in Binary

100000000110

Write 256 in Hexa

$$\begin{array}{r} 100 \\ 16^2 = 256 \end{array}$$

Add the following

$$\begin{array}{r} 11 \\ 11011 \\ 10011 \\ 101110 \end{array}$$

$$\begin{array}{r} 111 \\ 8CD6 \\ 5CBF \\ E995 \end{array}$$

$$\begin{array}{r} +15 \\ 6 \\ \hline 21 \end{array}$$

$$\begin{array}{r} +13 \\ 11 \\ \hline 25 \end{array}$$

Convert Hexa to Binary

4BAF

0100 1011 1010 1111

Convert Binary to Decimal

11111111 ↛ 9

$$2^{10} - 1$$

Chapter 4 6 7

Data Representation

- 1 Alphanumeric (Unicode, ASCII)
- 2 Page Description (HTML, XML, PDF)
- 3 Graphics + Fonts (Postscript, TrueType)
- 4 IMAGE Bitmap (PNG, JPEG, GIF)
- 5 IMAGE Objects (SVG, SWF, EPS)
- 6 Video (mov, mp4, wmv)
- 7 Sound (avi, mp3, wav)

When data and instructions are loaded into a computer, from a solid state drive, where do they load?

PRIMARY STORAGE

~ All data must load in RAM to be executed in CPU

Compression

- 1 Lossy ~ Data degradation to save storage
- 2 Lossless ~ Data retains original form

CPU ~ BRAIN

Components of CPU

- 1 CU ~ Control Unit ~ Fetch + Decode
- 2 ALU ~ Algorithm Logic Unit ~ Execute + Store
- 3 Registers
- 4 Cache
- 5 Memory Management
- 6 IU ~ I/O Interface

sub component

This type of file format is proprietary, display 250 colors and does animation

Gif

Which registers activates the address line, IR, MAR, or the MDR?

- 1 MDR
- 2 MAR
- 3 PC

This graphic format is NOT scalable, and cannot do actual curves

Raster

A register writes its contents to a second register, what happens to the value in the first register?

Nothing as the first register is not touched.
Only when the data is overwritten is when it changes.

What are their decimal values?

- Giga ~ Billion
Tera ~ Trillion
Mega ~ Million

The ability to process multiple instructions per clock cycle

Super Scalar

Newer graphic format that replaces GIF, not proprietary

PNG

Uses math for smoother curves and resolution independent. Not good for photographs because they can't be mathematically described

Vector / Object

The four phases of the machine cycle:

Fetch, Decode, Execute, Store

This type of RAM is much faster, more expensive, and does not have to be refreshed

STATIC RAM

RAM

1 Primary memory ~ Volatile ~ Temporary
Data will be deleted when powered off.

2 Static

- o Expensive
- o Faster

o Used in High-Speed PC
o Volatile

3 Dynamic

- o Cheaper, Common
- o Slower

o Refreshes often
o Volatile

How to calculate space of memory address?

$$2^k - 1$$

What are types of contents a register might hold?

- 1 Data
- 2 Instructions
- 3 Addresses

Nonvolatile Memory

- 1 ROM ~ READ ONLY
- o Holds FIRMWARE
- o DATA NOT EXPECTED TO CHANGE

2 Flash memory

- o CHEAP SECONDARY MEMORY
- o USED IN LAPTOPS, DIGITAL CAMS, PHONES
- o SLOWER REWRITE THAN RAM

A word size refers to

Amount of bytes a CPU retrieves, interprets, and executes at one time

To increase the power of a computer, you would

- o Increase RAM
- o Replace SATA drives with SSD
- o Get fast processor

The code that is multilingual in the most global sense and allows the largest number of values is

Unicode

Lossy compression is best for which type of files?

- o movie files because some data can be lost without significant effect

Instruction Cycle

Given the following program:

30 - 570

31 - 171

70 - 60

71 - 250

LDA = 5 ADD = 1. SUB = 2. STO = 3

Whats the value of MAR after 30 executes?

70

What the value of MDR after 30 executes?

60

What the value of the PC after 30 executes?

31

What the value of the accumulator after 31 is complete?

310

Cache memory has how many levels?

3

Describe each level

- L1 PRIMARY ~ small + FAST / embedded in CPU, volatile
- L2 Secondary ~ embedded or in coprocessor, nonvolatile
- L3 slowest cache, stores large amount of data

Refers to a permanent program etched into a chip

FIRMWARE

The three lines of a memory cell are:

- 1 Activation Line
- 2 Read/Write
- 3 Address

ROM chip that does Post-Test and load the Os kernel

BIOS

CPU component of the execute cycle

ALU

3 billion pulses per second is 3GHz

What are the actions done by the BIOS when booted?

- 1 Post-Test
- 2 Update CMOS
- 3 LOAD Kernel

Which is a two-way register?

MDR

What register holds the address?

MAR

What component of CPU is responsible for fetching and decoding phases of machine cycle?

CU

This bus protocol has replaced PCI. Its speed increases w/ additional lines

PCIe

Fastest type of drive and consists of banks of chips and has no moving parts.

SSD ~ solid state drive

One method of i/o communication within the motherboard and CPU

INTERRUPTS

Functions of an IRQ include:

- 1 completion signal
- 2 Traps + Exceptions
- 3 Free CPU from wait events

You need to email a 1000 page documents which is over 25mb, which method of compression do you use?

Lossless

This USB version has a speed of 20 gbps

3.2

40. LDA 70

41 ADD 71

What is the value of MAR after the completion of 40?

MAR = 70

Bitmap

- 1 Realistic images w/ a lot of details
- 2 managed by photo-editing / paint software

Raster

- 1 Continuous tone images
- 2 Smoother Gradients / Does not scale well
- 3 Easier color correction

Vector

- 1 Logos, 3D, CAD
- 2 Smoother Curves
- 3 small file size
- 4 Resolution Independent / Scalable.

Silicon Video

What main element silicon is made?

Raw Poly Silicon

What silicon property is revered?

Semi-conductor

What's Moore's Law

Double transistors on chip every 2 years

Why they wear bunny suits during production?

To reduce dust & debris in production

How pure is the air?

1000x purer than operating room

What is photolithography?

imprinting chips using lights

Little Person Calculator

What is the output of the program below.

Add = 1 Subtract = 2 Store = 3 Load = 5

901 = Input 902 = Output 000 = Stop

00. 901

n1
n1 → 99

01 - 399

n2
n2 → 98

02 - -901

n2 - n1

03 - -398

n2 - n1

04 - -299

n2 - n1

05 - -902

n2 - n1

06 - -000

What are the three uses of registers?

- o FLAGS
- o SCRATCH PAD for intermediate instructions
- o STORE data

During the boot process, if there has been a change in the amount of RAM since the last boot up, what would the BIOS update with this change of configuration?

The CMOS

Program counter

Mem Loc 65: 590 (Load 90)

Mem Loc: 66 192 (Add 92)

Mem Loc 67: 390 (Store 90)

Mem Loc 90: 111

Mem Loc 92: 222

PC

PC > MAR

bb

bb

← Activates Line

192

192

MAR > MDR

192

MDR > IR

92

← Activates Line

IR > MAR

222

MAR > MDR

222

MDR >

333

MDR > A

67

PC + 1

END

PC

67

MAR

92

MDR

222

A

333

CISC VS RISC

CiSc Complex instruction Set Computer

- o Slower than RISC
- o Rarely used

RiSc Reduce instruction Set Computer

- o Faster with simple/common instructions
- o Used frequently

BUS directions definitions

Simplex ~ One direction only

Half-Duplex ~ Goes two directions but one at a time

Full-Duplex ~ Can communicate through two directions simultaneously.

What is Multipoint configuration?

Computers all connected to each other, with the final computer connected to the server.

What is Point to Point configuration?

Each computer connected to the server individually.
Known as star configuration.

What is replacing the FSB (Front Side Bus)?

Quick Path Interconnect (QPI)

Name four registers in the CPU that is responsible for the instruction cycle

PC, MAR, MDR, IR

What does the width of an address bus have to do with the speed of a computer?

The bus width determines the # of bits transmitted at one time. Bigger bus width = faster computer.

How to calculate bus bandwidth

$$\text{Bus width} = \frac{\text{Data transfer rate (bits)}}{8 \text{ bits}} * \text{MHz}$$

Why does increasing RAM improve computer performance?

more RAM allows more instructions to be processed. This makes a computer faster

List bus Protocols

- o PCIE
- o USBs (1,2,3,3.1,3.2)
- o SCSI

List Bus Protocol Characteristics

- o Bus interfaces/Bridges
- o Bus width
- o Data Transfer Rate

What's locality of reference?

When a memory location is accessed often in a short period of time

What's the difference between write through and write back when contents change in the cache?

Write back processes the data in cache later, out of sync

Write through syncs cache to RAM instantly, but halts any other processing until finished

Why is cache faster than Primary Storage (RAM)?

Cache accesses the processor much faster than RAM

Identify the motherboard

Label the following on the diagram below-old model:

Word Bank:

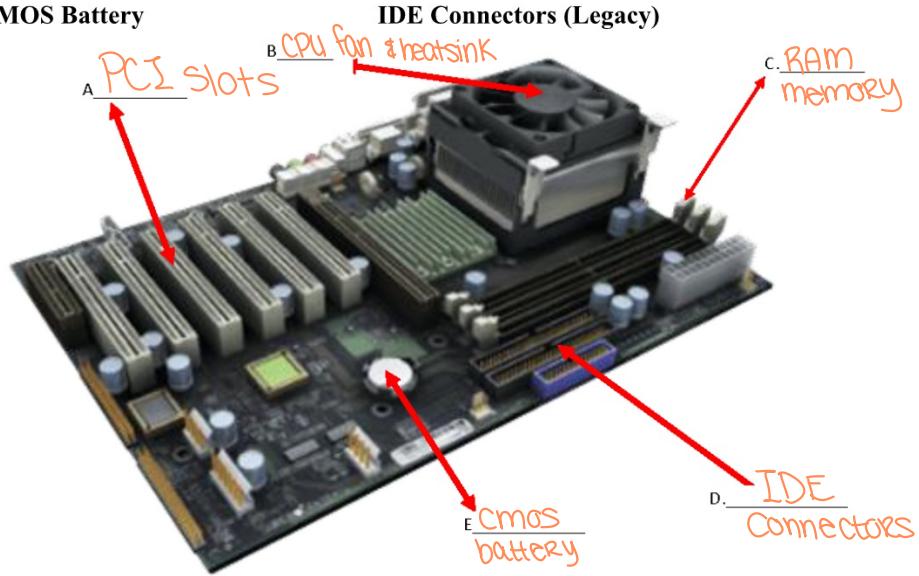
PCI Slot

Slots

CMOS Battery

CPU Fan & Heatsink

RAM Memory



What are three types of memory?

- o Primary cache (L1)
- o Secondary cache (L2)
- o Specialized cache (L3)

If you drop a USB drive into water, what would happen?

The data in the USB is preserved as the plastic cover protects the insides of the USB from being destroyed.

If there was no OS, how would the computer work?

The BIOS would be booted up and used. However, the BIOS has limited features compared to an OS.

Cache memory holds what type of data?

frequently used instructions & data

The method of transferring data one word at a time from the CPU, such as keyboards, mice, and some harddrives

Programmed I/O

DMA assign lines, which are used by the hard drive to transfer blocks of data directly to memory

The number of bits used to store information about each pixel

Bit Color Depth

What are the types of broadcast buses?

- o Multi Point / Multidrop
- o Point to Point

This protocol has the ability to be put in the port either right-side or upside down

Type C ; USB 3.1/3.2

Putting file parts of a file on disk in a contiguous matter

Defragmentation

The supervisor files of the OS

OS Kernel

Device drivers and xxxxxxxx are the same

ISR → Interrupt Service Routine

Microprocessors are made from?

Silicon wafers

This accounts for the disparity in size of a platter and the memory capacity

Data Density

When the second instruction begins before the completion of the first instruction

Pipelining occurs

What is a reason to generate an interrupt?

- o Signals Completion
- o Software needs a peripheral
- o Trap or Exception

The mechanism which facilitates the CPU returns to the place after servicing an interrupt

Process Control Block

Instead of formatting a hard drive into piecshape divisions, a more effective format is

Zone bit RECORDING

Whats the relationship between the instruction cycle and computer speed?

If the instruction cycle processes quickly, then the computer can run more instructions at a faster rate.

Whats the issue with polling vs having interrupts?

When an interrupt occurs with polling, each device is checked first to locate the location of the interrupt

A vector interrupt goes directly to the requested device

How does clock speed have to do with performance?

FASTER CLOCK SPEED = BETTER PERFORMANCE
AS CLOCK SPEED IS THE SPEED INSTRUCTIONS ARE PROCESSED

How is the DMA useless without interrupts?

IF CONFLICTS OCCUR BETWEEN I/O AND CPU, THE DMA WOULD BE UNABLE TO DETECT IT.

Quiz 9,10

What is an I/O device?

An external device that allows users to communicate with the computer

Examples

- o mouse
- o Keyboard
- o Head Phone

Programmed IO

Definition

- o CPU controlled I/O

Uses

- o Slowly transfer data between CPU & device
- o Secondary storage
- o Communicates with I/O controllers

Interrupts

Definition

Signals that alter normal flow of instruction execution in CPU

Example

- o Signal completion
- o Abnormal situations
- o High Priority Action

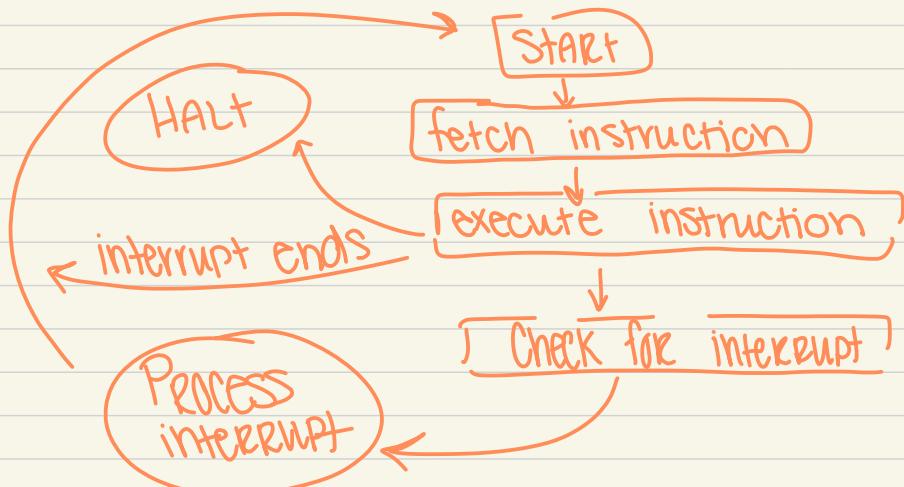
Interrupt Driven IO

- o External Input Control

Servicing interrupts

- o Lower Priority interrupts held until high Priority finish
- o Suspend Program in Progress
- o Save last executed instructions & data in Registers
- o Branch to interrupt handler program

Draw the interrupt cycle



Vectorized Interrupt

- o Address of I/O Device is Known
- o Requires additional hardware to implement
- o immediately process interrupt to the I/O

Polling

- o Polls each device to find interrupt
- o Slower / Less efficient

DMA - aka Direct Memory Access

- Transfer large blocks of data
- Direct transfer to and from memory
- CPU not involved in transfer

In order for DMA to work, the DmaC is required

- I/O + memory must be connected
- I/O controller must read/write to memory
- Conflicts between CPU & I/O controller are avoided
- Interrupt required for completion

IO Controller Functions

- Recognize msg from device & process CPU commands
- Provide buffer, holding data until it can be transferred
- Physically controls devices
- Communicates with CPU

Bus and Port examples

- o SCSI
- o USB
- o Thunderbolt
- o RS-232C bus

Thunderbolt / Usb

- o Serial & multipoint bus specifications
- o Add/Remove devices without powering down
- o Packet Protocol for data transfer

SCSI aka

- o Universal I/O interfacing
- o Daisy-Chaining: Provide Address on each device

Platter

- o Stores permanent data, A part of a disk

Label parts of a platter

Tracks

Sectors

Spins

- o Access Time:
Time it takes to
locate a sector by
spinning

Metal Filings

- o Platter covered in
metal filings, representing
the permanent data as
1s and 0s.



Types of Secondary Storage

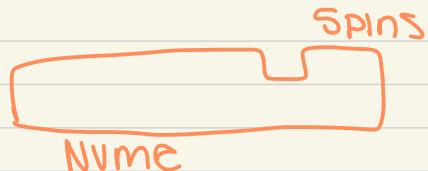
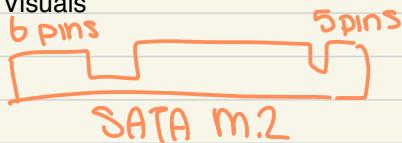
- o SSD - Solid State Drive
- o Magnetic Disk
- o Optical Disk
- o Magnetic Tape
- o Network Storage

SATA M.2 vs NVMe M.2

Similarity: Same size as a stick of Gum

Difference: different ends

Visuals



SSD

- o Flash memory - Nonvolatile
- o Data is R/W in blocks
- o small size great for USB, cameras, smartphones
- o Generate little to no heat

Magnetic Disk

- o Platter made of Glass, metal, Plastic
- o Magnetic Polarization

Partitions

- o Divide Drive into Parts
- o Format file systems & arrange their locations
- o Can't put two filesystems in one partition

Disk layouts

CAV Constant Angular Velocity

- o Number of bits in track are same
- o Spins same speed on each track

CLV Constant Linear Velocity

- o All tracks have same number of bits
- o Speeds up at center, slows down at edge

Multiple Zone aka Zone Bit Recording

- o Compromise between CAV & CLV
- o Disk divided into ZONES
- o Data buffered so data rate in I/O constant

Defragmentation

- o Reorganizing bits on disk so that files are aligned in continuous fashion

RAID

- o MIRRORED
- o STRIPED

Levels: 0 to 5

Mirrored RAID

- o 2+ disk w/ same data, used as backups
- o Reduce access times based on # of disks drives

Striped RAID

- o file stored in different disks
- o minimum 3 disks ; 1 for error checking

SKIN

- o o

OLED Display

- o NO BACKLIGHT
- o consist of red, Green, blue LEDs
- o EACH LED LIGHTS UP individually
- o VERY thin display w/ panels

LCD Liquid CRYSTal DISPLAY

- o FLUORESCENT Light OR LED Panel
- o 3 color cells per pixel

Virtual Memory

- o increase memory by allocating parts of disks
- o data transferred in fixed amounts
- o Multitasking

Paging

- o A fixed amount of data sent at a time
- o managed by OS & Built into hardware
- o Independent of Application

Logical VS Physical

- o Logical - Relative location of data.
seen by PROGRAMMER & CPU
- o Physical - Not Required to display
consecutively. Seen by hardware

Shared Pages

- o Must have readable data. A copy is needed if it can be modified
- o Libraries share pages across different programs

Demand Paging

- o Pages are only loaded from original file when needed

Thrashing

- o Over-committed memory
- o Slows / crashes computer

Kahoot

Represents a piece of a process that can be executed independently of other parts of the process

THREAD | Threading

Refers to the hardware which maps logical page addresses to the actual physical frame

MMU - Memory Management Unit

If a logical address is on page 8, mapped to frame 10 with a fixed size of 4096 and offset = 30, then what is its physical address?

$$\text{Physical Address} = \text{Frame} * \text{Fixed page size} + \text{offset}$$

$$PA = 10 * 4096 + 30$$

$$PA = 40990$$

In virtual memory, for each program, this is created to track actual memory locations of logical pages

PAGE TABLE

Since many interrupts exist to support I/O devices, most of the interrupt handling programs are also known as

Device Drivers

The three type of user interface include

- o Menu Driven
- o Command line
- o GUI

Virtual memory refers to

SWAP files

Memory Management include

- o Keep track of memory
- o Amount of space each program uses
- o Prevents programs from reading & writing memory outside of their allocated space.

Without an operating system...

- o Program instructions must be loaded into memory by hand
- o No ability to control peripheral devices
- o No user interface except for I/O routines

When memory is divided into frames, the address within the frame is called

Offset

Refers to the situation if all the pages in main memory are in use, the OS must choose a page to replace

PAGE FAULT

Refers to over accessing secondary storage because of insufficient memory, which causes

THRASHING

A process is

- o A program being executed
- o Basic unit of work
- o A program with all its associated resources

Process Control Block

- o A block of data for each process in the system
- o Contains all relevant information about the process
- o Contains process state, ID, Program counter, memory pointers

When a change in cache memory is written in RAM immediately is called

Write through

High Level Formatting

- o Put OS file structure on Disk
- o identifies bad sectors
- o Creates tracks & sectors

An interrupt is generated for the following reasons

- o Abnormal event indicator of an illegal action
- o Means of allocation of CPU time
- o Completion of an I/O track

DMA has specific assigned lines and is used by hard drives to

Transfer blocks of data directly to memory without CPU involvement

High speed cache set up page table entries to keep track of recently used translations called.....

Translation Look Aside Buffer

This refers to the number of bits per inch. It explains how a large platter which can have the storage capacity of 5 megabytes versus a very small hard drive which can have the very large capacity of 5 terabytes!

DATA DENSITY

Windows NTFS file master volume table refers to.....

is a database in which information about every file and directory on an NT File System (NTFS) volume is stored.

Refers to the division of the physical disk as independent sections. It can either be physical or a logical division.

PARTITIONS

A virtual memory system has a page size of 2048 bytes. Find the physical address of 65600 bytes

Virtual Page Number.	Frame number
0.	
1	2
2	
8	30
12	5
16	20
32	10

VIRTUAL Address \div PAGE SIZE = PAGE

$$65600 \div 2048 = 32$$

VIRTUAL Address % PAGE SIZE = OFFSET

$$65600 \% 2048 = 64$$

Physical Page = Frame * PAGE SIZE + OFFSET

$$10 * 2048 + 64 = \boxed{20,544}$$

Final Review Kahoot

The year the internet is born

1969

The developer of TCP/IP

Vinton Cerf

Port 25 refers to this service.....

SMTP

Refers to over accessing the physical drive of one's computer. Is usually the result of not enough primary storage.

Thrashing

802.11 refers to which protocols?

Wireless Fidelity ~ Wifi

Refers to one way transmission

Simplex

Email use this protocol because it guarantees delivery

TCP

Nodes on LAN all have this table mapping IP and MAC addresses.

ARP

This layer delivers messages to host to host

Transport Layer

This layer has frames as its PDU

DATA LINK LAYER

The most secure and fastest media used by the military

fiber optic cable

Loss of electrical signal strength

Accentuate

Refers to the ability to process multiple instruction per clock cycle

Super scalar

Unique 12 digit hexadecimal number which is the physical address of each node

MAC Address

In a virtual storage system, the OS creates a x x x x x x which maps the pages to the frame

PAGE TABLE

Guided single copper media which supports up to gigabit ethernet

COax

A broadcast protocol at the datalink layer

Ethernet

Word size refer to

The amount of bits which can be retrieved/executed at a time

Refers to the first router on the LAN

DEFAULT GATEWAY

Interrupts are used for

- o Sending an completion signal
- o A trap or exception has occurred
- o A peripheral device requires CPU attention

An example of volatile memory is

PRIMARY STORAGE

PDU used by the network layer

DATAGRAM

The newest wireless protocol

802.11ax Wifi 6

When memory is divided into frames, the address within the frames is called

Offset

Refers to the hardware which maps the logical page addresses to the actual memory location

MEMORY MANAGEMENT UNIT

Cache memory holds

frequently used instructions and data

The method of transferring data one at a time from slower devices such as a keyboard to the CPU

PROGRAMMED IO

This type of formatting creates zone around a track instead of pie-shaped sectors

ZONE BIT RECORDING

Port Description

- o 20 : FTP-Data ; TCP, SCTP
- o 21 : FTP ; TCP, UDP, SCTP
- o 22 : SSH-SCP ; TCP, UDP, SCTP
- o 23 : Telnet ; TCP
- o 25 : SMTP ; TCP
- o 80 : HTTP ; TCP, UDP, SCTP

What protocols does application services use?

Both TCP & UDP : DNS, SMTP, SFTP, HTTP

What are the layers of TCP/IP? What do they do?

Name.	PDU.	FUNCTION.	Protocol
1) Application	Bytes	Services	DNS, SMTP, SFTP, HTTP
2) Transport	Segment	Host to Host	UDP, TCP
3) Network	DataGram	Network to Network	IP, ICMP OSPF, RIP, BGP
4) Datalink	Frame	Node to Node	Ethernet, ARP MAC
5) Physical	Bits	Transport data	Physical media like cables

States of processes during CPU scheduling

High LVL : Adding a Program to the pool of PROGRAMS to be executed.

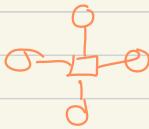
Short-term : Deciding which Process shall be (dispatcher) executed next by processor

Mid-level: Swapping processes

I/O : Deciding which process's pending I/O Request shall be handled by an available I/O device

Network physical topologies

o STAR



o Ring



o Multipoint Bus



Calculate Propagation Delay and transmission delay

$$d_{\text{prop}} = d \div s$$

d: length of physical link

s: propagation speed ($2 \times 10^8 \text{ m/sec}$)

$$d_{\text{trans}} = L \div R$$

L: Packet Length (bits)

R: Link bandwidth (bps)

Physical qualities of UTP, coax, fiber cable

- Coax :
 - Copper wire
 - Bidirectional
 - Broad band

Fiber Optic

- Glass fiber
- Used by government
- High speed
- low-error rate

UTP

- 1000 BASE T
- Twisted pair

What is the difference between baseband and broadband?

Baseband : Single channel

Broad band: Multiple channel on cable

Why is port number necessary?

Direct network traffic by
ensuring the correct protocol is used
for the data

Why is packet switching an effective method of data transfer?

- Sent separately, can take multiple routes
- Allow more users on network
- Quick arrival to location

What is the difference between authoritative user and local DNS server?



Why is a default gateway needed?

The first router on LAN

forwards packets when there is no routing destination

• Back up route for lost packets

Identify elements in IPCONFIG command

IP vb : HexAdecimal

IPv4 : Old IP address, still used for older devices
8 bits

↓ An IP Address consist of a Network Address & Host Address

{ Network Address : ZIP Code }

Host address : Physical address of device }

subnet mask : identifies the Host/Network Address in IP

DHCP Server : Provides IP Address to devices
Lease : IP lease expires

Default Gateway : First Router that connects to Network

DNS server :

- Domain Name Server
- Links domain name to an IP Address
- Each website has 2 DNS servers

Physical / MAC Address : Unique 12 hexadecimal address of the ethernet

~~Calculate datagram travel time~~

How. Does paging and swap file increase virtual memory.?

PAGING organizes and sends necessary data only, reducing memory waste

SWAPPING offloads idle data , providing additional space for more necessary data

Seven major types of OS

- o Single - User
- o mobile
- o mainframe
- o Network server
- o Real - Time
- o Embedded Control
- o Distributed