Feb 5 Class Notes

Intranet:
Uses web-based protocol
End users already know how to use it

internet: network of networks
Internet: proper name
PAN: Bluetooth
WAN: NYC>LA; 2 computers connected via satellite
LAN: 2 computers connected on desk

3 Things Determine Network Type:
- Who owns the connecting media
- What protocol are used, ie: Ethernet
- Distance/Proximity of computers

Phone Company Network
- NYC>LA is WAN
- Protocols
- Distance/Proximity

Digital vs Analog
- Light switch > on/off > 2 options
- 2 light switches > 4 options > 2^2
- 3 light switches > 8 options > 2^3
- 4 light switches > 16 options > 2^4
- If there is a discrete number of options, it is digital

Number of Options

Base 10: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 > 10 discrete numbers
but highest number is 9
Binary: Base 2 > 0, 1
Octal: Base 8: 0, 1, 2, 3, 4, 5, 6, 7
Hexadecimal: Base 16 > 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and A, B, C, D, E, F

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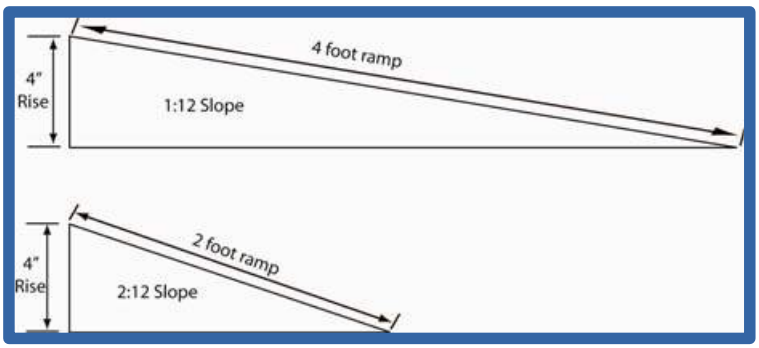
Test Question:
Digital: means discrete number of options
All binary numbers are digital
But NOT all digital is binary

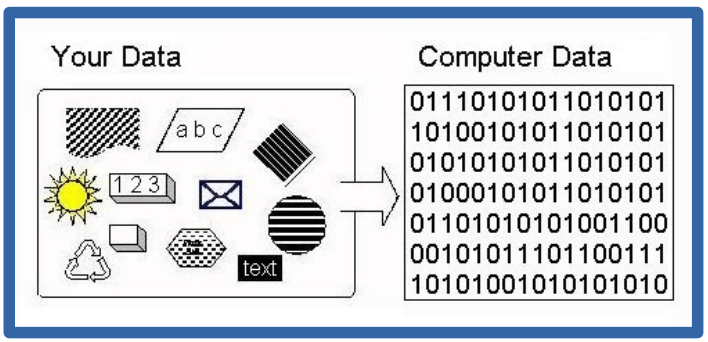
Digital is similar to stairs
Discrete numbers

Analog is similar to ramps
Infinite number of spots on ramp



Analog signals are controlled by a dimmer switch

All computers are binary



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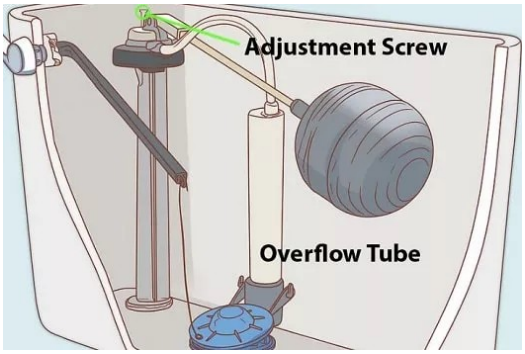
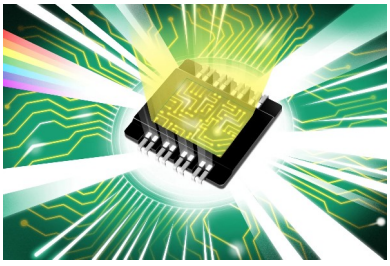
Toilet shutoff system > analog computer



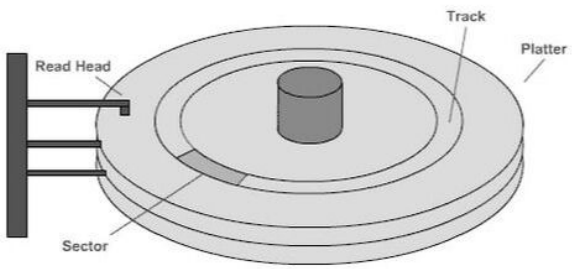
Abacus: earliest digital computers because of discrete, distinct states

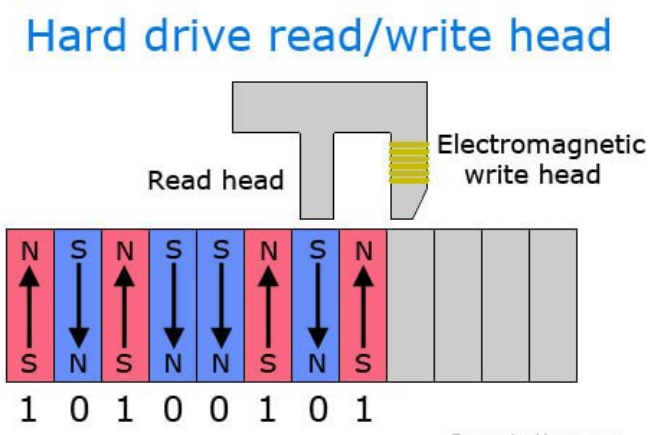
Computer chips have billions of tiny on/off switches; 0 and 1



CD: 2 colors; 0 and 1

Hard drive: magnetize 0s and 1s





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$9,876

10^3 10^2 10^1 10^0

Thousands Hundreds Tens Ones

9 x 1000 = 9000
8 x 100 = 800
7 x 10 = 70
6 x 1 = 6

9000 + 800 + 70 + 6 = 9,876

Base 2: 2^0, 2^1,2^2,2^3

Octal: 8^0, 8^1,8^2,8^3

Base 16:16^0, 16^1,16^2,16^3

Base 2 - Binary:
$2^0 = 1$
$2^1 = 2$
$2^2 = 4$
$2^3 = 8$
$2^4 = 16$
$2^5 = 32$
$2^6 = 64$

2^0	2^1	2^2	2^3	2^4
1	2	4	8	16

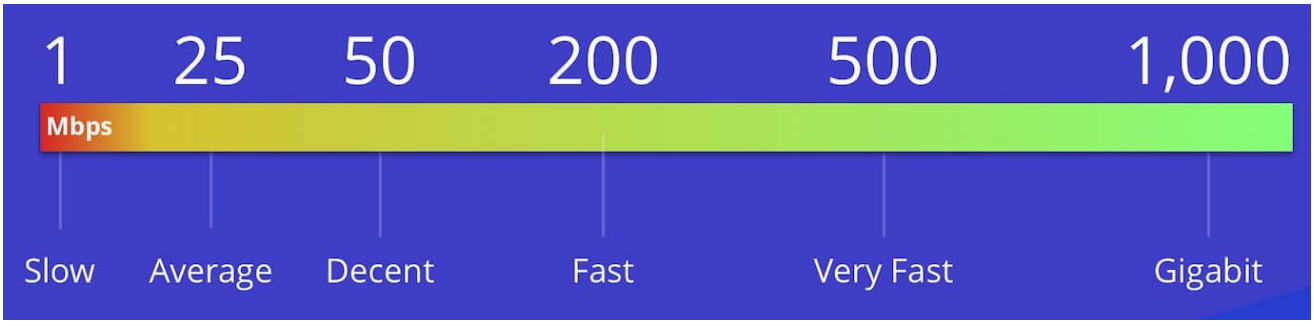
Binary Number:

1	0	0	1	1	1	0	= 78
2^6	2^5	2^4	2^3	2^2	2^1	2^0	
64 + 0 + 0 + 8 + 4 +2+ 0							= 78

Bit: 0 or 1
Byte: 8 bits
KB: 1024 bytes
MB: 1024 KB
GB: 1024 MB
TB: 1024 GB
Petabyte: 1024 TB

<u>Storage</u>
Bytes: File size and storage

<u>Network Speed</u>
Bits: how fast 0s and 1s are moving across the wire
Megabit > network speed
Gigabit speed > Internet communication speed



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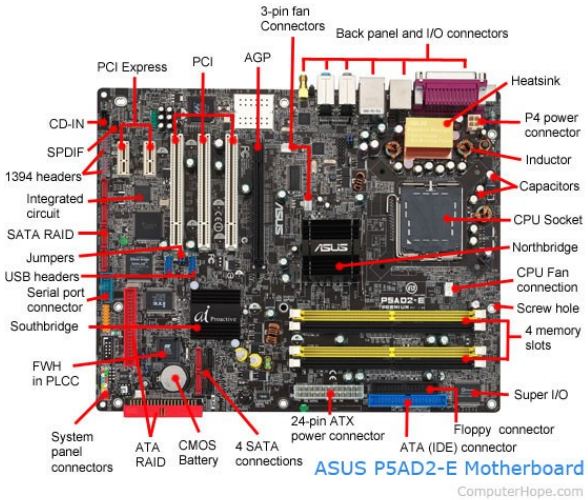
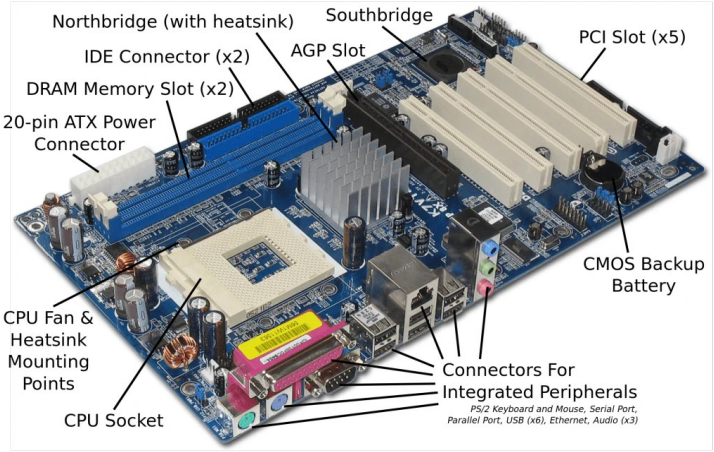
Computer Parts

Motherboard

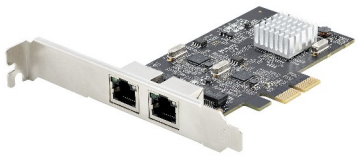
- All parts are plugged into it
- All computing devices have motherboards: watch, tablets, laptops





Interface cards

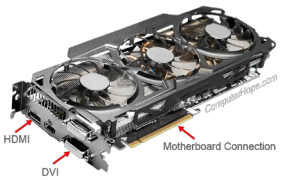
- Plug into motherboard slots
- Examples: USB, Network



Video cards

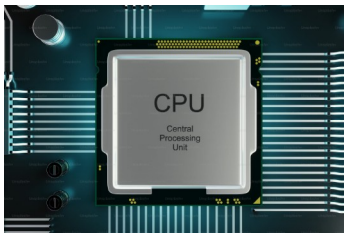
- Plug into video slots
- Examples: HDMI ports

PCI Express Discrete Video Card



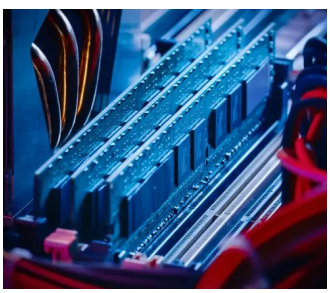
CPU Central Processing Unit

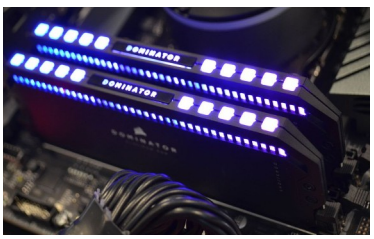
- Plug into CPU slot
- Math is computed in CPU



RAM Random Access Memory

- Volitile memory; needs electricity
- RAM works on grid pattern therefore random
- Very fast; nanoseconds [billionth of second]





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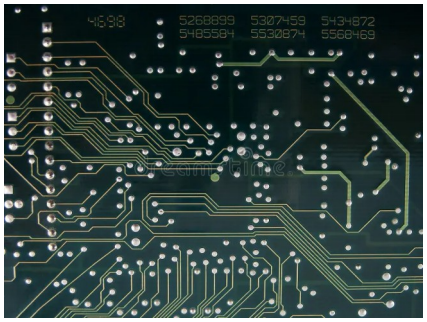
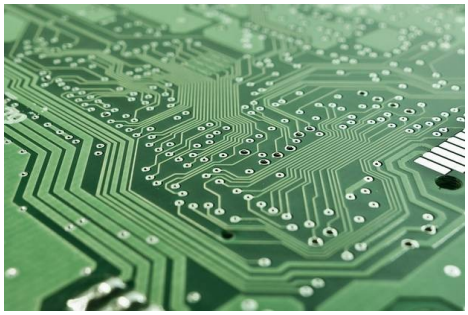
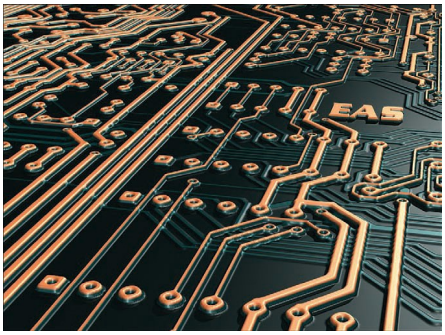
Bus [Not the one on Lexington]
- "Highway" of wires
- Bottom of motherboard

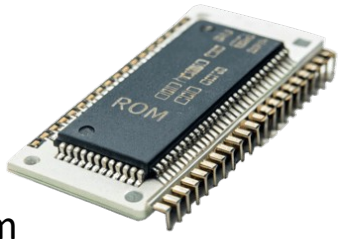




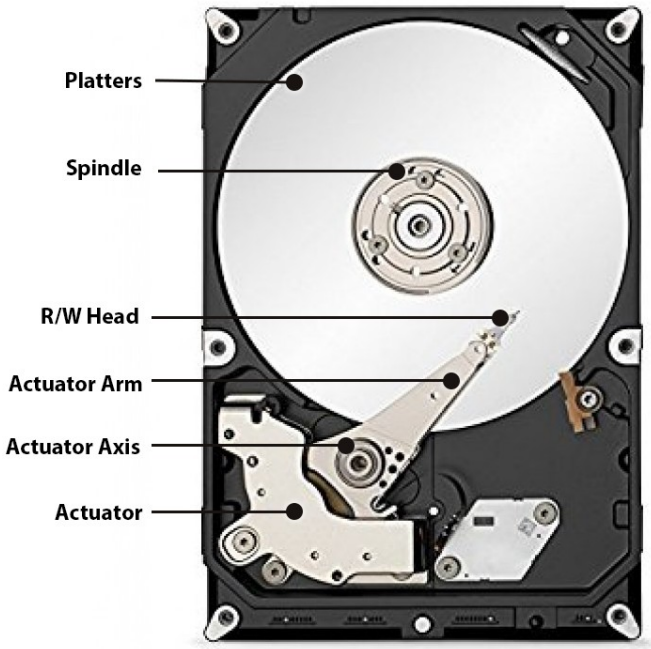


ROM

ROM
- Read Only Memory
- Programs burned into ROM chip
- Cannot be changed
- Motherboards, video cards have them

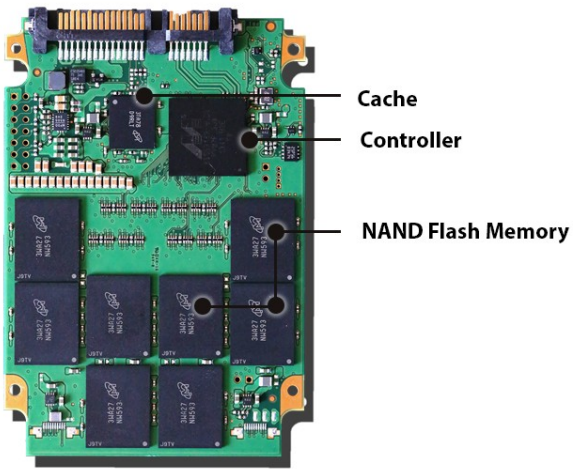


HDD
3.5"



Hard Drive
- Store programs and data
- Platter drives and SSDs

SSD
2.5"



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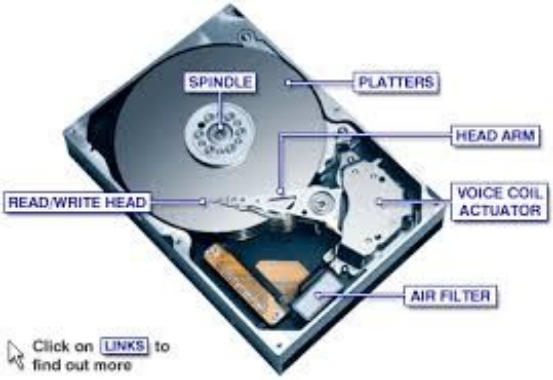
SSD/Flash Memory

- In between RAM and hard drive
- Semi-permanent state
- Data retained without electricity
- Give up speed/slower than RAM
- Non-volitile for a certain amount of time!
- If does not hit by electricity, will blank out

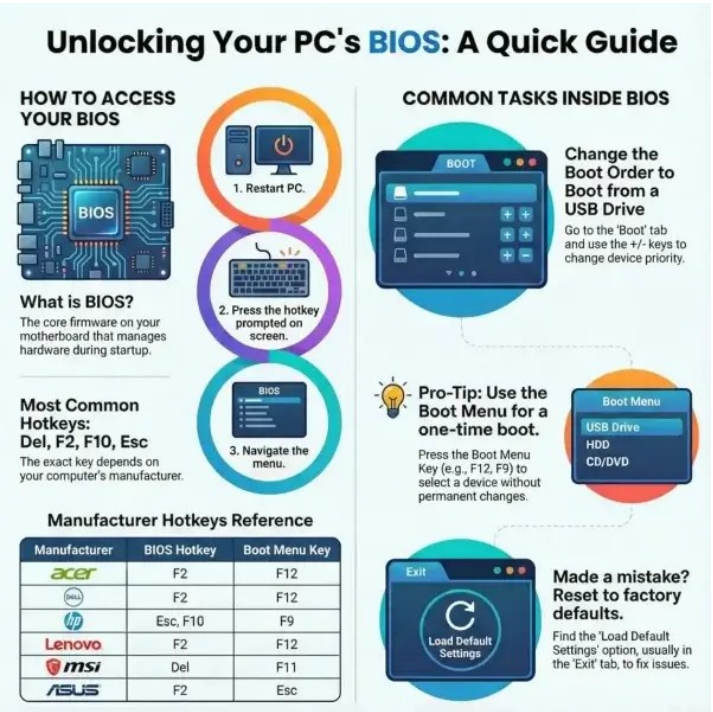
Hard Drive

- Storage only
- Non-volitile; magnetic platters
- Files are fragmented
- Needs to read a table to find data
- Cheaper than RAM
- Operating system ie: Linux, Windows, on hard drive



BIOS: Basic Input Output System

- Takes hardware inventory
- Overclocking: set speed in BIOS; can run at higher rated speed



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NIC: Network Interface Card

- Attaches computer to network
- Can be wired or wireless
- Connects device/node to network
- Can be USB, connect to motherboard or built into motherboard

Internet Protocol version 4 vs MAC address

- Cell phone not permanently attached to phone number
- IMEI is permanent part of phone; cannot be changed

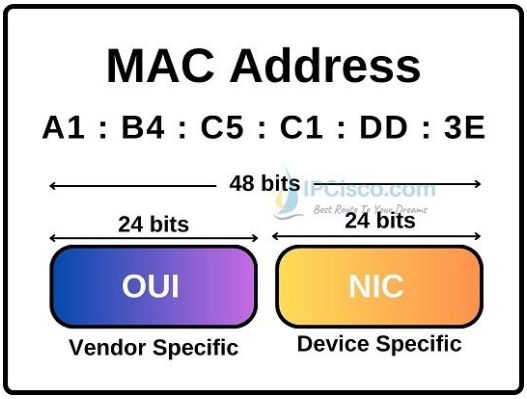
MAC address:

- physical address burned into NIC card
- Similar to IMEI number

- 8 bits:8 bits:8 bits 8 bits:8 bits:8 bits = 48 bits

Created by company that made network card
Eg: Dell
24 bits

Device number
24 bits



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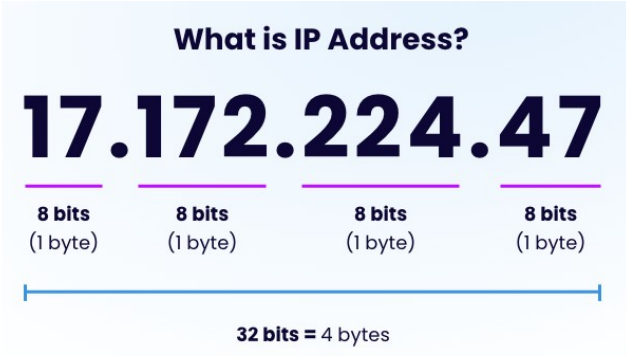
IP Address

-Links to your phone number
- Communicate between computers
- IP Address is always changed
- Automatic registration
- IP addresses are routable
- MAC addresses are NOT routable!
- IP addresses are 32 bits



IP address 10 . 20 . 184 . 63

Subnet mask 0-255 0-255 0-255 0-255

# of bits 8 8 8 8

32 bits

IP address 192.168.1.10
Subnet address / Node address

Subnet mask 255.255.255.0

- IP addresses determine if computers are on the same network
- First 3 numbers on IP address determine what network the node is on:
Eg: 10.20.184.xxx

IP address 10 . 20 . 184 . 63

Network Node

Subnet mask 255 . 255 . 255 . 0

Network Node

255 . 255 . 0 . 0

Network Node

255 . 0 . 0 . 0

Network Node