Ch. Ø INTRO

- Field Tech = repairs computers on site "in the field" "good people skills" "good tech skills"
- remote Tech = remotes into a system to perform repairs. "good people skills"
- Bench tech = performs warranty type services at a central facility.

Ch 1. INTRO TO THE PC

- COMPUTER SYSTEM = HW & SW COMPONENTS
- "FORM FACTOR" = SIZE & SHAPE = MBOARDS, CASES, ~~HARD DRIVE~~, PWR SUP.
- HW = PHYSICAL (YOU CAN TOUCH IT)
- SW = 1's + 0's = DATA.
- PWR SUP = AC TO DC, 12 3.3 & 5V (- OR + respectively)

PWR CONNECTORS = MOLEX = hard drives / optical drives

BERG = floppy drive power

SATA = hard drives / optical drives

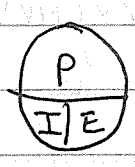
20/24 PIN w/ 4 OR 8 PIN AUX = MBoard PWR

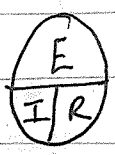
6/8 PIN PCIe = for other internal components

P8 + P9 = older unkeyed no longer used

* NOT IMPORTANT

BLUE	BLUE	-12 V
YARN	YELLOW	+12 V
WILL	WHITE	-5 V
ROT	RED	+5 V
OFF	ORANGE	3.3 V
BOARDS	BLACK	0 V





pwr sup should have more than you need
25% RULE OF THUMB

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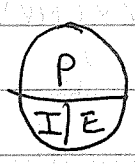
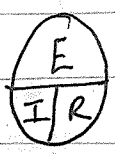




pwr sup should have more than you need
25% RULE OF THUMB

= DO NOT OPEN PWR SUPPLIES DUE TO CAPACITORS. HOLDING HIGH VOLTAGE

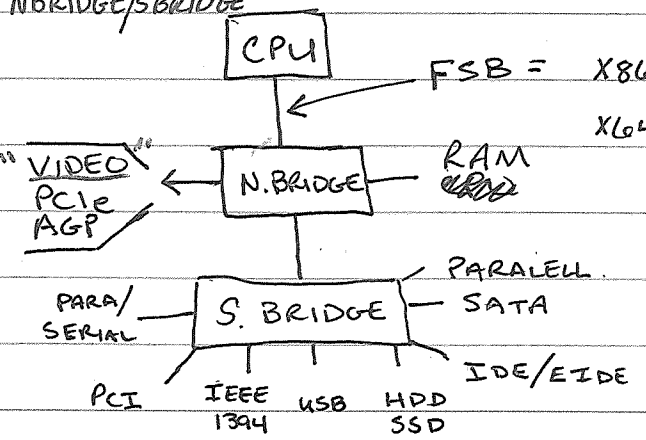
= MBOARD = MAIN PRINTED CIRCUIT BOARD = INTERCONNECTS ALL COMPONENTS.

↳ AT / ATX / MINI ATX / MICRO ATX / LPX / NLX / BTX / MINI ITX / PICO ITX

MOST COMMON — MOBILE DEVICES

*(1) PCI FOR EXPANSION

= CHIPSETS = NBRIDGE/SBRIDGE



= CPU has ↳ PGA's & LGA's INSERTETED INTO A ZIF

↳ SLOT CPU's FIT INTO SLOT SOCKETS.

↳ ALIGN PIN (1) (w) PIN (1).

= CPU SPEED (PWR) IS MEASURED IN HZ (GHZ/MHZ)

RISC	CISC
2+2 = 2X2	2X2 = 2+2
4 = 2X2	4=4 = LARGER INST. SETS
4=4 = SMALL INST SETS	USING FEWER
↑ EXICUTED RAPIDLY.	STEPS.
- very particular mathematics created for a specific function.	↑ MORE STEPS FOR MORE COMPLEX INSTRUCTION STEPS.

= HYPERTHREADING = MAKES PROCESSOR SEEM DOUBLE TO COMPUTER.

= HYPER TRANSPORT = SPEEDS UP DATA BETWEEN N.BRIDGE & CPU

↳ BASICALLY INCREASES THE SPEED LIMIT ON THE 32 OR 64 LANE FSB.

= OVERCLOCKING = MAKING CPU RUN FASTER THAN THE MANUFACTURER DESIGNED IT. (CPU CAN ONLY PROCESS AS FAST AS THE FSB CAN DELIVER)
(MORE PWR REQ, MORE HEAT, INCREASED WEAR/TEAR)

= THROTTLING = MAKING CPU RUN SLOWER THAN ORIGINALLY DESIGNED. (SOMETIMES USED IN LAPTOPS)
(LESS PWR REQ, LESS HEAT, INCREASED WEAR/TEAR)

= GPU = GRAPHICS PROCESSING UNIT = VIDEO CARD...

= MMX = CREATED TO INPROVE MULTIMEDIA // REPLACED BY SSE = STREAMING SINGLE INSTRUCTION SET EXTENTIONS.

= FANS = PROVIDE COOLING FOR CASE / PROCESSOR / VIDEO CARDS

= WATER (LIQUID COOLED) SYSTEMS ARE MORE EFFICIENT @ COOLING

ROM = BIOS IS STORED ON ROM. (NONVOLITILE)

- ROM = WRITTEN @ FACTORY / NO CHANGE
- PROM = YOU PROGRAM IT / NO CHANGE
- EPROM = YOU PROGRAM IT / CAN ERASE W/ SPECIAL UV LIGHT
- EEPROM = YOU PROGRAM IT / YOU CAN ERASE & REWRITE MANY TIMES.

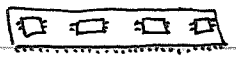
RAM = RANDOM ACCESS MEMORY = (VOLITILE)

- DRAM = MAIN MEM = CONSTANT REFRESH.
- SRAM = CACHE MEM = DOESN'T HAVE TO BE REFRESHED AS OFTEN.
  - ↳ MORE EXPENSIVE THAN DRAM & MUCH FASTER
- SDRAM = DRAM THAT IS IN SYNC W/ MEM BUS.
- DDR SDRAM = ↑ & XMTS 2^{CE} PER CYCLE
- DDR2 SDRAM = ↑ & DECREASES NOISE & CROSSTALK.
- DDR3 SDRAM = ↑ & XMTS 4 TIMES PER CYCLE < USES LESS PWR & PRODUCES LESS HEAT THAN DDR2
- RDRAM = RAMBUS = RIMM = VERY HIGH RATES OF SPEED // MUST BE INSTALLED IN PAIRS // 800MHz // NOT COMMONLY USED. (HIGH END SERVERS..)
  (must be installed in pairs IS NOT the same as dual channel configuration) DDR

*** NO DDR TECHNOLOGIES ARE BACKWARD/FORWARD COMPATIBLE.

MEMORY MODULES

= DIP =  DUAL INLINE PACKAGE

= SIMM =  = 30 OR 70 PIN CONFIGURATIONS.

= DIMM = ↗ DIPS ON BOTH SIDES OF A ~~SIMM~~ MEMORY MOD * 168/184/240 PIN

= RIMM = 72/100 PIN FOR 32 BIT // 144/200/204 PIN FOR 64 BIT

= SODIMM = ↖ LAPTOP RAM SAME PINOUT ↗

RAM CONT.

PC 100	SDRAM	PC-100	100 MHz
PC 133	SDRAM	PC-133	133 MHz

÷2

DDR 333	PC 2700	166 MHz
DDR 400	PC 3200	200 MHz

x8

x8

DDR2 667	PC2 5300	667 MHz
DDR 2 800	PC2 6400	400 MHz

÷2

SAME

DDR 3 1333	PC3 10600	1333 MHz
DDR3 1600	PC3 12800	1600 MHz
DDR3 1866	PC3 14900	1866 MHz
DDR3 2133	PC3 17000	2133 MHz

x8

Basically, if the student x8 or ÷2 or x2 or ÷8 the answers provided they'll get the answer.

= SRAM = CACHE MEMORY L1 L2 L3 (INTEGRATED) To the CPU

= NONPARITY = NO ERROR CHECKING

= PARITY = CHECKS FOR SINGLE BIT ERRORS

= ECC = CHECKS FOR MULTIBLE BIT ERRORS / FIXES SINGLEBIT ERRORS.

* CNR = COMMUNICATIONS & NETWORK RISER (OR RISER CARD)
- USED FOR NETWORKING/AUDIO EXPANSION CARDS MAINLY
RISERS WERE USED IN SLIMLINE PC's.

- EXPANSION SLOTS = PCI — PCIx = 32 bit bus w/ higher bandwidth
PCIe — Mini PCI: 32bit, Type I, II, III
AGP

- STORAGE DRIVES = - FLOPPY DR: 720KB OR 1.44MB
- HDD & SSD's
- TAPE DRIVES = BACKING UP LARGE AMTS OF DATA.
- CD = 700MB
- DVD = 4.7GB OR 8.5GB ON DUAL LAYER
- BD = 25GB OR 50GB ON " "
- EXTERNAL FLASH.

- DATA CABLES =

(EIDE = 512MB HDD & LARGER)
- IDE/EIDE = PATA = 40 OR 80 CONDUCTOR = 40 PIN = JUMPERS
- SATA = 7 PIN — PS2 = keyboard/mouse.
- eSATA = external SATA
- SCSI = 7 OR 15 DEVICES/MUST BE TERMINATED (↙ 320MB/s) — PINS: 50 NARROW / 68 WIDE / 80 ALT 4
- FLOPPY DR PATA = 34 PIN w/ a twist
- Serial — SLow — single bit of data @ a time (DB9/DB25) 50ft
- USB = 127 devices = 1.1 - (3m) 11 OR 12 Mbps = 2.0 - (5m) 480Mbps = 3.0 - (3m) ← MAX Length 5Gbps
- IEEE 1394 = 63 devices = IEEE 1394a (15ft) = 400Mbps // b = 800Mbps // c = (100m) 1 to 3.2G depending on media
- PARALELL = IEEE 1284 = 15ft = PRINTERS (36 PIN CENTRONIX)

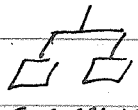
(- COLORED STRIPE = PIN 1)

- HTPC = HOME THEATER PC

- CAD = COMPUTER AIDED ~~DRAFTING~~ DESIGN
- CAM = COMPUTER AIDED MANUFACTURING
- also seen as CAx

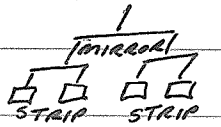
RAID = REDUNDANT ARRAY OF INDEPENDANT DISK

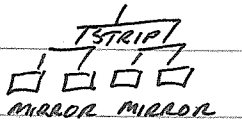
- RAID SW IS SOMETIMES INTEGRATED INTO A COMPUTER (OR) YOU CAN PURCHASE RAID SW/HW.

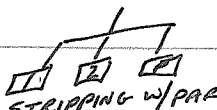
RAID 0

STRIPPING

RAID 1

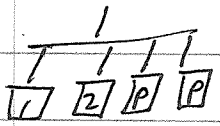
MIRRORING

RAID 10 (highest protection & performance)


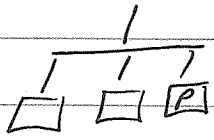
RAID 0+1 (highest performance)


RAID 5 (SLOWER THAN 0+1)


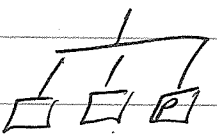
STRIPPING W/PARITY
NOT dedicated parity

RAID 6


STRIPPING W/ DOUBLE PARITY
ANNY (2) DRIVES CAN BE LOST.

RAID 3


BYTE LEVEL STRIPPING w/ dedicated parity. Slower

RAID 4


BLOCK LEVEL STRIPPING w/ dedicated parity Slow

NOT important.

EXTERNAL PORTS

"DIGITAL"

= DVI = DIGITAL VISUAL INTERFACE

DVI I = DIGITAL + ANALOG

DVI D = DIGITAL ONLY

DVI A = ANALOG ONLY

HDMI = HIGH DEF DIG/ANALOG

"ANALOG"

= DISPLAY PORT = 20 PINS // AUDIO/VIDEO

= RCA = ANALOG OR VIDEO

= COMPOSITE = ANALOG AUDIO/VIDEO

= SVIDEO = 4 PIN ANALOG

= COAX/ETHERNET/ = ANALOG/VIDEO

= COMPONENT RGB = ANALOG

= VGA = ANALOG

INPUT DEVICES

= KVM SWITCH
- MOUSE
- VIDEO
- KEYBOARD

OUTPUT DEVICES.

LCD = USES INVERTER (DC TO AC) TO PWR BACKLIGHT

LED = USES DC BACKLIGHT

OLED = USES NO BACKLIGHT (very EXPENSIVE)

PLASMA = USES MOST PWR / CREATES MOST HEAT

DLP = PROJECTORS (DIGITAL LIGHT PROCESSING)

DISPLAYS

- PIXEL = DOTS ON YOUR SCREEN.
- DOT PITCH = HOW MUCH SPACE IS IN BETWEEN EACH PIXEL.
- CONTRAST RATIO - difference in intensity between light.
- Refresh rate = how often an image is redrawn.
- interlace / non interlace = ways an image is fed to screen.

= ASPECT RATIO = 4:3 = FOR EVERY 4 inches across = 3 inches high.

= NATIVE RESOLUTION = what the screen was designed for.

= VRM = voltage regulator module = integrated on MBoard to ensure correct V. is maintained to the CPU.

CPU SOCKETS

ARCHITECTURE	SOCKET	EXAMPLES	MANUFACTURER
LGA =	775 =	PENTIUM	INTEL
	1155	CELERON	
	1156	CORE i	
	1366	Xeon	
LGA = F = AMD		~~OPTERON~~	

ARCHITECTURE	SOCKET	EXAMPLES	MANUFACTURER
PGA	940	Athlon	AMD
	AMx	Phenom	
	FM1	Sempron	

Thick Client = standard desktop computer

Thin Client = designed to pull info/resources from server. use

CAx = CAD/CAM = SW often requires complex & robust HW, ex... MAX CPU CORES, RAM, VIDEO CAPABILITIES.

VIRTUALIZATION

- VDI = VIRTUAL DESKTOP INFRASTRUCTURE
- VIRTUALIZATION = MANY COMPUTERS ON YOUR COMPUTER (SHARES YOUR RAM, CPU, MBOARD etc...)
- VIRTUALIZATION SW = VMWARE, HYPER V, VIRTUAL BOX

- HTPC = HOME THEATER PC

Ch. 2 SAFETY

- FIRE EXTINGUISHER = CLASS C FOR ELECTRICAL

P - PULL
A - AIM
S - SQUEEZ
S - SWEEP

- ESD = ELECTROSTATIC DISCHARGE = 3000V YOU FEEL IT
  10,000V IT HURTS
  30V CAN DAMAGE PC COMPONENTS.

  ESD MATS, BAGS
  ESD WRIST BAND

  ↑humidity = ↓ESD = ↑water damage
  ↑heat = ↓humidity = ↑ESD = ↑overheat

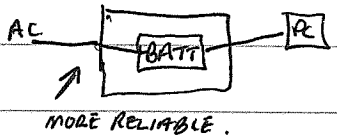
- EMI = ELECTROMAGNETIC INTERFERENCE = PWR LINES, motors [redacted]

- RFI = RADIO FREQ INTERFERENCE. = FREQUENCY TOO CLOSE TOGETHER.

- BLACKOUT = COMPLETE LOSS OF AC
- BROWNOUT = REDUCED AC
- NOISE = INTERFERENCE
- SPIKE = SUDDEN INCREASE THAT EXCEEDS 160% NORMAL LINE LOAD
- PWR SURGE = DRAMATIC INCREASE ABOVE NORMAL LINE LOAD

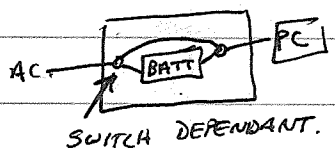
- SURGE SUPRESSOR
- UPS
- SPS

UPS



MORE RELIABLE.

SPS



SWITCH DEPENDANT.

- HAZMAT / MSDS / OSHA / STATE & LOCAL GUIDELINES.

even base has regulations

- RECYCLE OLD LAPTOP BATTERIES AS IS, DO NOT TRY TO DISCHARGE
- * CAPACITORS
- CRT MONITORS
  PWR SUPS
  PRINTERS
  } "DANGER HIGH VOLTAGE"

TOOLS

* PUNCHDOWN TOOL / MULTIMETER / LOOPBACK ADAPTR
  TONER PROBE / EXTERNAL HARD DRIVE ENCLOSURE /
  CABLE TESTER / PWR SUP TESTER.

new → DISKPART = creates or deletes partitions in XP FWD...
old → fdisk = creates or deletes partitions ... NOT ON XP, VISTA OR 7.

- DISK MANAGEMENT = CREATES/DELETES/INITIALIZES/FORMATS DISK.
- format = CLI cmd to format.
- SCANDISK / ~~CHECKDISK~~ CHKDSK = (SCAN DISK OLD) CHECKS DISK INTEGRITY / DISK SURFACE.
- DEFRAG = MAKES NON CONTIGUOUS FILES CONTIGUOUS.
- DISK CLEANUP = SEARCHES FOR FILES THAT CAN BE DELETED TO FREE UP HDD SPACE ... EX... TEMP FILES / CACHE etc...
- SYSTEM FILE CHECKER = SFC (SFC SCANNOW) SCANS "CRITICAL OS FILES" & REPLACES IF NECESSARY,
- WINDOWS ACTION CENTER = WIN 7 = CHECKS IF THE ANTIVIRUS / SPYWARE / FIREWALL ARE ON, ALSO ENSURES AUTO UPDATES ARE INSTALLED AUTOMATICALLY FOR THE OS.

→ chkdsk /f /r /x

- Dr Watson = debugs

HW config DATA is saved to a memory chip called a Complementary Metal Oxide Semiconductor (CMOS)
- ~~Maintain~~ configs are maintained by CMOS batt, if Batt dies, replace it & re config the BIOS.

Ch. 3. * new computers ~~are~~ use NONvolitile chips + CMOS Batt only maintains date & time

- Signed drivers = tested by microsoft.
- EJECT A CD ~~if~~ w/ NO PWR. (USE HOLE IN OPTICAL DR.) + a paper clip

ASSEMBLING A DESKTOP

- SELECT COMPONENTS - RESEARCH - FORMFACTORS/COMPATIBILITY
- INSTALL THE MBOARD = (STANDOFFS)
- INSTALL CPU (SOMETIMES EASIER PRIOR TO INSTALLING MBOARD (ESD))
- THERMAL COMPOUND / HEAT SINK / FAN ASSEMBLY.
- INSTALL PWR SUP (USE ALL SCREWS)
- INSTALL DRIVES (JUMPERS / SCSI ID)
- INSTALL EXPANSION CARDS (PCI 6/8 PIN)
- INSTALL RAM (INSTALL ORDER // speed must be = to or greater than what you have)
- INSTALL DATA CABLES
- INSTALL PWR CABLES
- INSTALL FANS
- CHECK BEHIND YOURSELF = PWR & DATA TO EVERYTHING
- CLOSE CASE
- PWR ON, LISTEN FOR POST BEEP.
  → insert all periferal cables, RJ 45, PS2, etc...
- INSTALL OS.
- .

go over each ~~phase~~ phase w/ students, Breakdown is done in any order...

Cisco → * MBOARD I/O CONNECTOR PLATE (students will see on cert)

↓ "BIOS" ↓

SLIDE - 3.2.1.2 pic #2 fwd to 3.3.1.1

Ch. 4 TROUBLESHOOTING.

I	I	(1) IDENTIFY THE PROBLEM
EST.	EAT	(2) ESTABLISH THEORY OF PROB CAUSES
TEST	T-BONES	(3) TEST THE THEORY
EXAMS	EVERY	(4) EST. PLAN / IMPLEMENT SOLUTION
VICE	VALENTINES	(5) VERIFY
DRINKING	DAY	(6) DOCUMENT.

- TASK MANAGER WILL SHOW YOU WHO IS LOGGED ON TO A COMPUTER UNDER THE "USERS" TAB.

- POST = POWER ON SELF TEST = CHECKS HW EMITTS PATTERN OF BEEPS FOR ERRORS DUE TO NO DISPLAY LOADED.
- BIOS = BASIC INPUT/OUTPUT SYSTEM = INSTRUCTION SET THAT TELLS YOUR HW WHERE OR HOW TO FIND THE OS & LOAD IT. (MBR) (Rom)

Ch. 5 OS

- OS = CONTROL HW ACCESS, MANAGES FILES/FOLDERS, PROVIDES USER INTERFACE, MANAGE APPS.
- DRIVER = SMALL PROGRAM ALLOWS OS TO COMM W/ HW.
- REGISTRY = INFO ABOUT: APPS, USERS, HW, NETWORK SETTINGS, & FILE TYPES.

- CLI / GUI

** MULTITHREADING = A PROGRAM IS BROKEN INTO SMALLER PARTS & LOADED AS NEEDED BY OS.

- API = Application programming interface = guidelines for programmers
  - Open GL = crossplatform (multiple OS) Multi-Media graphics
  - DirectX = M/media task for windows.
  - Windows API = Allows Aps From Old windows to operate in new windows.
  - JAVA API = JAVA PROGRAMMING RULES.

F8 STARTUP MODES

- REAL MODE = 1 PROGRAM / 1 MB OF SYS MEM (DOS)
- PROTECTED MODE = ALL PROGRAMS / ALL MEM = WILL NOT STARVE AN PROGRAMS resources.
- VIRTUAL REAL MODE = RUNNING CLI OR DOS FROM YOUR GUI.
- COMPATIBILITY MODE = ALLOWS COMPATIBILITY W/ OLDER SW.

- VIRTUAL MEMORY = SWAP FILE = SPACE ALLOCATED ON HDD TO IMULATE RAM.

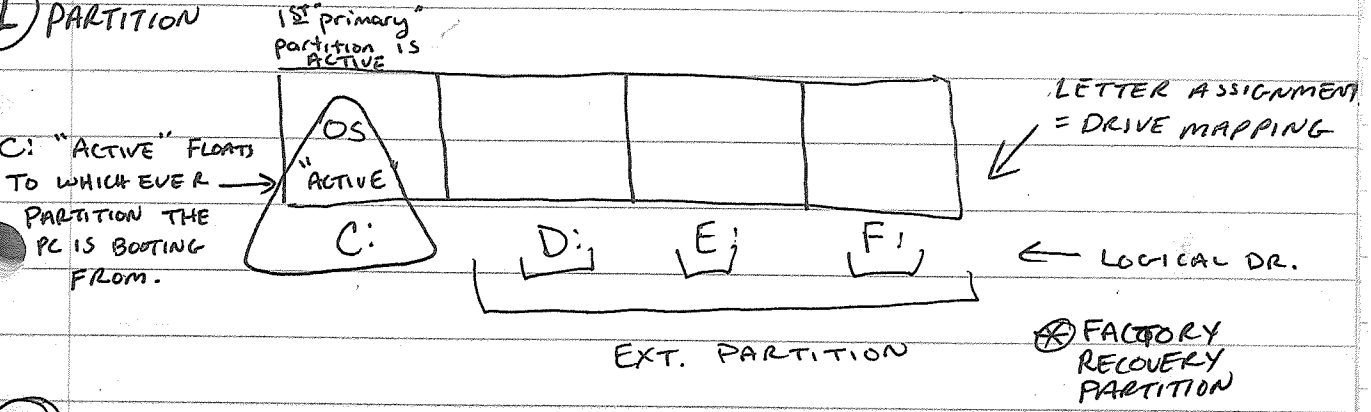
ARCHITECTURE	ARCHITECTURE
X86	X64
32 bit OS	64 bit OS
4 GB RAM	128 GB RAM
	ENHANCED SEC FEATURES.

- X64 is backward compatible w. X86

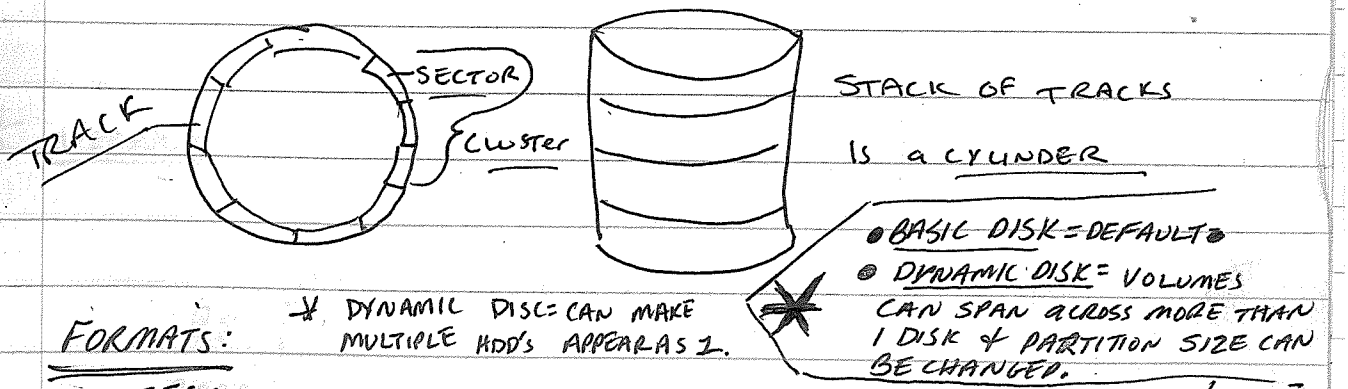
- HCL = HARDWARE COMPATIBILITY LIST w/ XP BACK
- WINDOWS 7 & VISTA HAVE COMPATIBILITY CENTER

? MOVE NOTE USMT USER STATE MIGRATION TOOL &
WINDOWS EASY TRANSFER

(1) PARTITION



(2) FORMATING = prepares a disk to recieve a file system.



FORMATS:

NTFS = NEW TECHNOLOGY FILE SYSTEM: 16 EXABYTE PARTITIONS w/ MORE SECURITY

FAT32 = MOST WIDELY USED = 2TB PARTITIONS.

EXFAT = FOR FLASH DRIVES, PROPRIETARY, PATENT PENDING

COFS = CD FILE SYSTEM FOR CD's

* CONVERT.EXE = FAT32 TO NTFS BUT NOT BACK.

Shake = Minimize windows
Peek = Makes all transparent if you view desktop bottom right.
Snap = resizes windows

Jumplist = view list of task unique to the app.
Pinned ap = pin to task bar
Thumbnail preview

INSTALLATION REQS & FEATURES

Generalized chart.

WIN 7

CPU	RAM	HDD	Features
1 GHz & ↑	1 GB For 32 bit 2 GB For 64 bit	16/20	JUMPLIST, PIN, SNAP, SHAKE HOMEGROUP

VISTA

CPU	RAM	HDD	FEATURES
1GHz & ↑	1GB	40 total / 15gb free	UAC / AERO

XP

CPU	RAM	HDD	FEATURES
MHz SMALL	MB Range	1.5GB	Media center roaming profiles

* BITLOCKER = • WIN 7 ULTIMATE & enterprise
  • Vista ULTIMATE

* UPGRADES

	2000	XP	VISTA	7
98	✓	✓	✓	x
2000		✓	✓	x
XP			✓	x
VISTA				✓

NO ↑

* USMT / WINDOWS EASY TRANSFER (MIGRATION)

*CERT

FROM WIN 7 REPAIR:
YOU CAN CHOOSE "OPEN CLI" &
USE: bootrec \fix mbr (fixes) or fix boot (rewrites)

INSTALLING / LOADING AN OS

OPTIONS

- XP
  - SETUP XP
  - REPAIR XP
  - QUIT
- VISTA
  - UPGRADE
  - CUSTOM (ADV)
  - QUIT
- 7
  - INSTALL
  - WHAT TO KNOW
  - REPAIR

- INSTALLATION MEDIA = CD, DVD, BR, USB, NETWORK etc...
- CLEAN INSTALL. = WIPES ALL USER DATA
- REPAIR = DOES NOT WIPE USER DATA.

- NETWORK SETTINGS
  - ↳ HOME NETWORK = LEAST RESTRICTIVE.
  - ↳ WORK NETWORK
  - ↳ PUBLIC NETWORK = MOST RESTRICTIVE

- OS VERIFICATION (OR) REGISTRATION = TO GET UPDATES & PATCHES.
- DEVICE MANAGER = SNAPSHOT OF ALL HW.

✱ INSTALL OPTIONS (CONT.)

- ~~DISK IMAGE~~
- ① CREATE MASTER (IMAGE) HARD DRIVE
- ③ SYSPREP = PACKAGES IMAGE (GENERALIZES IDENTIFICATION DATA)
- ② CLONE = COPIES THE IMAGE (3rd PARTY SW) NORTON GHOST.
  - → USED WITH A BOOT DISK THAT HAS TO BE CREATED FOR THE RCVING COMPUTERS. ALL COMPUTERS MUST BE SET TO RCV THE PUSH.

INSTALLATION OPTIONS CONT.

5.2.2.2

- PXE = PRE INSTALLATION ENVIRONMENT = IN BIOS. (BIOS CONFIGURED INSTEAD OF BOOT DISK)
- NETWORK INSTALLATION = REQUIRES A BOOT DISK & ALL SETUP FILES COPIED TO THE NETWORK
- UNATTEND = USES UNATTEND.TXT OR AUTOUNATTEND.XML AS AN ANSWER FILE FOR (ACCTS, COMPUTER NAME, PRODUCT I.D. ETC...)
- REMOTE INSTALLATION = CAN BE REQUESTED BY USER OR FORCED BY ADMIN.

= SYSTEM RECOVERY IS PART OF WINRE (WINDOWS Recovery Environment)
- ACCESS WINRE BY PRESSING F8 during POST.

BOOT PROCESS

* Always load oldest OS first

bootrec /fixmbr (repairs) OR /fixboot (rewrites)

XP	VISTA / 7
POST = Adaptr cards	POST
BIOS = MBR	BIOS = MBR
NTLDR READS BOOT.INI (OS)	BOOTMGR READS BOOTCONFIG DATA (OS)
NTLDR STARTS NTDETECT.com (HW)	BOOTMGR envokes winload.exe, loads NTOSKRNL.EXE & HAL.DLL
NTLDR LOADS NTOSKRNL.EXE & HAL.DLL	
NTLDR Reads ~~LOADS~~ REGISTRY & DRIVERS	BOOTMGR reads registry, loads drivers
NTOSKRNL.EXE STARTS WINLOGON.EXE	NTOSKRNL.EXE STARTS WINLOGON.EXE

* IF SCSI IS USED WINDOWS COPIES NTBOOTDD.SYS.

Boot ~~Process~~

DETECTS

KRNL & HAL

REGISTERS THEM, SEATS HAL

KRNL LOGS ON

TURN OUT

- ~~LIKE BOOT.INI~~

- BOOTMGR = YOU CAN SET THE TIMELIMIT YOU WANT TO SELECT BETWEEN (2) OS LOADED.

- SHRINK VOLUMN FEATURE IS USED TO SPLIT A PARTITION IN WIN 7.

- XP = ADD OR REMOVE PROGRAMS
  WIN 7 = PROGRAMS + FEATURES

* ALT F4 WILL CLOSE A POP-UP WINDOW < ROUGE ANTIVIRUS POP UP >

VIRTUALIZATION

- HYPERVISOR = ALLOWS YOU TO RUN VIRTUAL MACHINES ON YOUR PC
  BARE METAL HYPERVISOR ↳ TYPE 1 = (NATIVE) RUNS ON THE HOST & MANAGES RESOURCES TO GUEST OS's
  TYPE 2 = (HOSTED) HOSTED BY AN OS.
  (GUEST OR HOSTED OS's ARE VIRTUALIZED ON THE NATIVE ~~HYP~~ MACHINE)

- VIRTUAL PC SYS REQUIREMENTS
  ↳ PROCESSOR = 1GHz 32 OR 64 bit CPU
  HDISK SPACE = 15 GB. per vertual OS
  MEMORY = 2GB
  SUPPORTED HOST OS = (NATIVES) 7 HOME BASIC, ENTERPRISE, ULTIMATE
  7 HOME PREM., PRO.

  SUPPORTED GUEST OS's = WIN XP / VISTA / WIN 7

- MMC = MICROSOFT MANAGEMENT CONSOLES.

- REGISTRY (HKEYS) (HIVES)

- DLL = DYNAMIC LINK LIBRARY. = MUST BE REGISTERED OR "DRIVER LOADED"

* from cmd LINE USE regsvr32 filename.dll to register a.dll

- FILE ATTRIBUTES = R A S H (+) adds
  read only, Archive, System, hidden, (-) removes

- EASE OF ACCESS = HEARING & MOBILITY NEEDS

- UAC = USER ACCOUNT CONTROL

BACKUPS

- NORMAL - ALL DATA / REMOVES ARCHIVE BIT
- INCRIMENTAL - ALL FILES MODIFIED SINCE LAST FULL / REMOVES BIT
- DIFFERENTIAL - " " " " " " / DOES NOT REMOVE BIT
- DAILY - ALL FILES CHANGED THAT DAY / " " " "
- COPY - ONLY SELECTED FILES WILL BE B/U / " " " "

F D D * _ _ _ (M T W)
Day A A A: FULL & LAST DIFF

Days of week → M T W T F S S
Cat A
bob

F I I * _ _ _
M T W T F S S → Full & EACH INC IN order

Ch. 6

- LAN = LOCAL AREA NETWORK = ALL DEVICES UNDER SAME ADMIN
- WLAN = WIRELESS LAN
- PAN = PERSONAL AREA NETWORK = BLUETOOTH = IEEE 802.15.1 = AFH = 2.4GHz BAND.
  - ↳ BLUETOOTH CLASS 1 2 3
    100m 10m 1m
- MAN = METROPOLITAN AREA NETWORK.
- WAN = WIDE AREA NETWORK = CONNECTS LANS
- P2P = NO CENTRAL ADMIN, BEST FOR 10 OR LESS
- CLIENT SERVER = CLIENTS CONNECT TO SERVER "NETWORK ADMIN"
  - ↳ the server has an admin.
- WORKGROUP = COLLECTION OF WORKSTATIONS/SERVERS ON A LAN
- DOMAIN = GROUP OF COMPUTERS/DEVICES UNDER COMMON RULES/PROCEDURES.
- BANDWIDTH = AMOUNT OF DATA THAT CAN BE XMT IN A FIXED TIME.
- SIMPLEX = UNIDIRECTIONAL = CABLE TV.
- HALF DUPLEX = ONE DIRECTION AT A TIME = 2 WAY RADIO
- FULL DUPLEX = BOTH DIRECTION SAME TIME = PHONE CALL
- MAC ADDRESS = PHYSICAL ADDRESS = DOES NOT CHANGE (Delivers Frames on LAN)
- IP ADDRESS = CHANGES (LOGICAL) (transports frames outside LAN)

6 GROUPS OF 2 CHARACTERS (HEX NOTATION) (16 posibilities per place holder)

MANUFACTURER ITEM

00-01-0F-31-FF-2B

IPV4

8 bits . 8 bits . 8 bits . 8 bits

- (4) eight bit bytes.
- 1 BYTE = 8 bits
- (4) OCTETS
- 32 bit Address.

0 1 1 0 1 1 0 1
128 64 32 16 8 4 2 1

64 + 32 + 8 + 4 + 1 = 109

"128"
+"64"
192
"32"
224

range	CLASS	SNM
0-127	A	255.0.0.0
128-191	B	255.255.0.0
192-223	C	255.255.255.0
	D	multicasting
	E	exp.

(SNM determine network from host)

255.255.0.0
network HOST

PRIVATE IP's

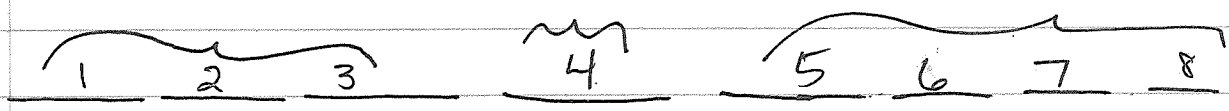
10.X.X.X	A
172.16.X.X - 172.31.X.X	B
192.168.X.X	C

IPV6 (128 bit address)

- HEXIDECIMAL NOTATION

1 2 3 4 5 6 7 8 — (8) GROUPS seperated By colons (:)

each group has (4) hex characters



GLOBAL PREFIX — SUBNET ID — INTERFACE ID

- groups of Ø's can be omited 1ce by a (::) double colon.
- leading Ø in a group can be omited
- NO CHARACTER greater than F (hexidecimal)

- Loopback IP for IPV6 is (::1) IPV4 = 127.0.0.1

- DEFAULT GATEWAY = DEVICE USED TO GET ON THE INTERNET "ROUTER"

DHCP = DYNAMIC HOST CONFIG PROTOCOL = AUTO ASSIGNS IP'S
= LEASES IP'S

- CAN'T COMM W/ DHCP = APIPA 169.254.X.X
  ↳ CAN ONLY COMM W/ DEVICES IN SAME RANGE.

- DNS = IP TO HOST NAME URL (OR) HOSTNAME URL TO IP

- ALTERNATE IP CONFIG.

- PING = USED TO VERIFY LINK.
- IPCONFIG & IPCONFIG \all = verify IP/SNM/Default Gateway

- TCP = CONNECTION = EMAIL
  UDP = CONNECTIONLESS = VOICE/STREAMING VIDEO

NOT SECURE, simple

115 SFTP
20/21 FTP
22 SSH
23 TELNET

25 SMTP
110 POP
143 IMAP

80 HTTP
443 HTTPS

DNS 53
DHCP 67

RDP = 3389
LDAP = 389 = access info directories
(NOT important)
445 = shared access
161 = SNMP = manages/monitors devices on a network

NETWORK DEVICES

- HUBS - broadcast out all ports
- SWITCHES - use MAC address
- Routers - use IP addresses

- POE = Power over ethernet = small amount of pwr up to 100m

- wireless access point = provides wireless
- ~~router~~
- multipurpose device = router/switch/access point

- NAS = Network attached storage.

- Firewall = keeps data out or IN.

6.4.2.2 NETWORK MEDIUM (HOW it's connected)

= COAX = THICKNET/THINNET/RG6 & RG59 → CABLE T.V. F-series BNC MILSPEC Connector

= STP/UTP = ~~ETHERNET~~ 100M MAX = CAT3 @ 10Mbps CAT5e @ 1000Mbps or 1Gbps CAT5 @ 100Mbps CAT 6+6e 1Gbps

↳ crossover T568A - T568B LIKE DEVICE CONNECTION

straight through. T568A - T568A UNLIKE DEVICE CONNECTIONS

TIPS = RJ11 & RJ45

= FIBER = MULTIMODE NOT AS FAR AS SINGLEMODE < SC LC ST

= MESH = most Redundant topology

STANDARDS

- IEEE =
  - IEEE 1394 = a @ 400Mbps b @ 800Mbps c @ media
  - Paralell 36 pin centronix printer — IEEE 1284
  - IEEE 802.11 =  (A) = NO PLAY
  - IEEE 802.15.1 = BLUETOOTH = 2.4 GHz = AFH = PAN
  - IEEE 802.3 = ETHERNET = CSMA/CD = 100M

TCP/IP		OSI	level
Application		Application	7
		Presentation	6
		Session	5
Transport	PORT	Transport	4
Internet	IP	Network	3
Network access	MAC	Data link	2
		Physical	1

- CONFIGURE NIC = IP, SUBNET MASK, DEFAULT GATEWAY } DHCP. } ALTERNATE IP SETTINGS.

- LINK LIGHTS // APIPA // HOME - WORK - PUBLIC NETWORK TYPE.

⊛ FORCE A DHCP IP LEASE

1. IP CONFIG Release
2. IP CONFIG Renew

- CONFIGURE WIRELESS ROUTER — USE DEFAULT GATEWAY IP
  - LOG ON, CHANGE DEFAULT PASSWORDS

- NAT = NETWORK ADDRESS XLATION = PRIVATE IP TO PUBLIC

WIRELESS ENCRYPTION

- WEP / WPA / WPA2 / TKIP
  - WEP: WEAK
  - WPA: TEMP SOLUTION
  - WPA2: GOV GRADE
  - TKIP: WEP PATCH; AUTO NEGOTIATES NEW KEY EVERY FEW MINUTES

- DISABLE SSID BROADCAST
- MAC ADDRESS FILTERING
- SELECTING CHANNEL. (USE SNIFFER APS FOR SMARTPHONES)

IPCONFIG CMDS
ipconfig /?

/all
/release /renew
/flushdns = Emties dns
/registerdns = refreshes DHCP Lease
/displaydns = shows DNS cache

ping cmds
ping /?

-t = continuous ping
-a = resolve address to host name

net cmds

netstat = active TCP connections
net /? @ net help

VPN = Virtual Private Network = must have a VPN client (3rd party SW) & access to the internet.

ISP CONNECTION TYPES

* ADSL = faster download than upload.

ISP CONNECTION TYPES (CONT.)

= WiMAX = IP BASED 4G technology for internet for mobile devices = IEEE 802.16e SUPPORTS MAN sized network.

= Fixed WiMax = Point to Point
Mobile WiMax = Mobile. like Wifi w/ higher speeds & longer range

Cellular Technologies

1G = Analog

2G = Digital Voice

2.5G = Digital voice, text, pics

3G = Digital voice, text, video

3.5G = Faster

4G = Fasterer w/ IPV6

User can log onto the local network but cannot access the internet?

WRONG DEFAULT GATEWAY

- if not, tracert to see where signal stops!

Ch. 7

LAPTOP / DESKTOP

Component	LAPTOP	DESKTOP
MBOARD	PROPRIETARY	AT/ATX/NLX/BTX/LPX
EXPANSION SLOT	MINI PCI	PCI PCIe ISA AGP
RAM	SODIMM	SIMM DIMM RIMM

- what can you do w/ a dual purpose keyboard on a laptop? Numlock etc...

LAPTOP DISPLAYS

- LCD = inverter (DC to AC for backlight) (CCFL technology = cold cathode Floresent lamp)
- LED = uses DC backlight.
- OLED = no backlight / expensive
- PLASMA = more pwr / heat

* ACPI replaced APM but may need to be enabled in BIOS.

S0 = All on
S1 = CPU RAM on
S2 = RAM on = ~~sl~~
S3 = RAM slow = sleep / suspend
S4 = All off - data saved to HDD = hybernate
S5 = All off - no save

PCMCIA CARDS

	Size	thickness
TYPE I =	85.6 mm X 54	3.3 mm
II =	85.6 mm X 54	5 mm
III =	85.6 mm X 54	10.5 mm

Express card 34 — 75 X 34 mm

Express card 54 — 75 X 54 mm

CRU's — CUSTOMER REPLACABLE UNITS.
- BATTERY
- RAM

FRU's — FIELD REPLACABLE UNITS.
- MBOARD
- DISPLAY

LAPTOP HDD = 1.8 OR 2.5 IN ← cert

- BEFORE DOING MAINT REMOVE AC & DC PWR
- DATA OR SW MAINT = DO BACKUPS.

Ch. 8 MOBILE DEVICES

- replacable mobile device components = Battery / MemCard / SIM
  subscriber ID module
- Capacitive touch screen = body changes the electrical field
- resistive touch screen = 2 layers = pressure changes
- slide / swipe = move between screens
- double touch = zoom in & out
- long touch = to select items.
- scroll = scroll items that are too large for the screen
- Pinch to zoom out
- Spread to zoom in

- Android (google) = apps from Google play / Amazon / T Mobile etc...
  ↳ Open source = Free OS developement / contribution / mod
- ; OS = (Apple) Apps from AppleStore (NOT OPEN source)
- Side loading = getting apps from a source other than the internet (root, jailbreak, bluetooth)

- wifi = uses less pwr & passes more data than cellular

- accelerometer = changes view between portrait & landscape automatically by reading censors.

2G = GSM = CDMA = ; Den = PDC
3G = CDMA 2000 = EV-DO = TD = SCDMA = FOMA
4G = MOBILE WiMAX = LTE (4GLTE)

- SMS = text
- MMS = VIDEO
- PACKET SWITCHING = ACCESSING INTERNET
- MIME = allows me to have text/pics/docs in my SMTP
- SSL = allows me to xfer it securely

- You can crossplatform sync. For example itunes is an apple app that can be sync on android.

- Android = google drive > storage of data > calendar, auto mail, contacts are B/U
- iOS = iCloud

- YOU MUST BE CONNECTED TO CELLULAR WIFI TO REMOTE WIPE OR REMOTE LOCK AN iPhone.

- You can't schedule a virus scan on an iPhone but you can on Android.

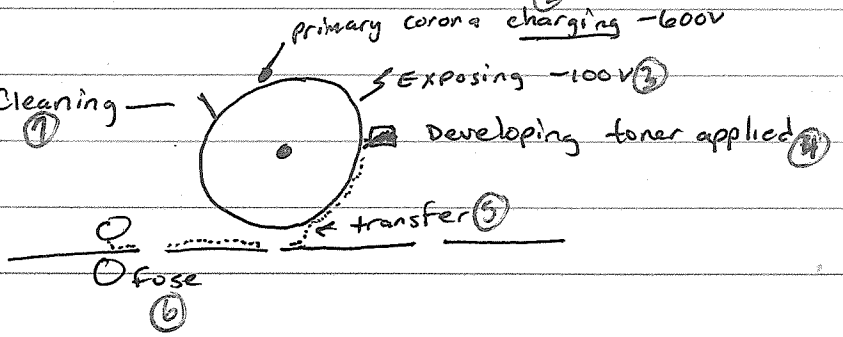
- Mobile device apps run in a "sandbox" to protect the user.

- Rooting or Jailbreaking = like changing the BIOS

ANDROID = Root
iOS = Jailbreaker

Ch. 9 Printers

① Printers - Processing = PS/PCL converted to bitmap / stored on memory
② Charge - Charging = Pri Corona (-600V) removes latent image
③ Extra - Exposing = laser writes (-100V) creating latent image
④ During - Developing = toner applied to new latent image
⑤ The - Transfering = toner is applied to charged paper (2nd corona)
⑥ Fuser - toner pressed & melted to paper
⑦ Cleaning - excess toner removed from drum



- IMPACT = DOT MATRIX = DAISY WHEEL = NLQ PRINTHEAD 9/24 PIN = Carbon COPY
- INKJET = PIEZOELECTRIC = thermal = ink wet when fresh = nozzles clog
- SOLID INK = ink must be melted / slow warm up / vibrant color images
- THERMAL = chemically treated paper
- DYE SUBLIMATION = photo printer / photo paper solid sheets of ink that change to gas (Sublimating) clear overcoat.

Ch. 10 security

- INTERNAL THREATS
- EXTERNAL THREATS
- PHYSICAL & DATA SECURITY.

- VIRUS = PROGRAM WRITTEN W/ MALICIOUS INTENT
- WORM = SELF REPLICATING
- TROJAN = HIDDEN IN SW / pretends to do one thing / does another.
- phishing = pretends to represent legit org.
- adware = unwanted ads
- spyware = monitors / reports
- grayware = tries to get you to unknowingly give out PII.
- DOS = Denial of service
  - ↳ Ping of Death = series of repeated pings designed to crash recving device
  - ↳ email bomb = large qty of bulk email designed to crash server
- DDOS = distributed DOS = uses many infected computers "zombies"
- SPAM = unsolicited email
- social engeneer = tries to gain access by tricking

TCP/IP ATTACKS

- SYN FLOOD = RANDOMLY OPENS TCP PORTS
- Spoofing = gains access by acting like trusted computer
- Man in middle = inserts false trafic into data between host.
- replay attack = gets username/pwords to be used later
- DNS poisoning = changes DNS records. on a machine

- ROOTKIT = gains full access to a system & can hide from antivirus

- permission propagation = everything in a folder gets the permissions assigned to the folder.

- TPM = Trusted platform module = chip on MBoard used to encrypt your HDD. TPM is required to use Bitlocker & is specific to a computer.

- HASH ENCODING = SHA, MD5, DES = Protects data during transmission using an HASH Algorythm.

- DMZ = Safe zone for apps/user/guest accts etc... (outside network)
  ↳ also can use port fwd rules inside my network

- lusrmgr.msc = local user manager = guest acct/employee acct termination

Ch. 11

- Persistent Data = stored on local HDD, internal HDD or optical drive (nonvolitile)

- Volitile Data = RAM / CACHE / REGISTRIES also data in transit between storage & CPU.
  (no pwr = no data)

- CYBERLAW = Circumstances in which data (evidence) is collected (details) ALL RULES WE MUST FOLLOW

- First Response = procedures for those who collect cyber evidence.

801 Simulation list

- List Motherboard components
- Pick components for a gaming / HTPC / Thickclient / virtual
- Match video connectors to their name.
- secure a wireless router
- matching wireless securities

---

802 sim list

- schedule 2 files to print from windows task scheduler at different times. (study)

* VISHING = voice phishing

- create partitions in disk mngt.
- will not boot → bootrec /fixboot or bootrec /fixmbr

802

* Steps to correct Malware attack

1. Quarantine (get it off the network)
2. Disable Restore (possibly delete old Restore points)
3. Remediate (fix or remove malware)
4. Enable Restore
5. Create a new Restore point
6. Educate user

- ROOT KIT VRS ANTIVIRUS = ROOT KIT CAN HIDE FROM ANTIVIRUS SW.

- TROUBLESHOOTING STEPS (MATCHING)

- Setup an ALTERNATE IP CONFIGURATION FOR A CUSTOMER. (ALL INFO IS GIVEN)

** SET UP WORK EMAIL ON A SMART PHONE
≡ BEWARE ≡ THE COMPANY POLICY ON THIS SIMULATION STRICTLY FORBIDS PERSONAL DEVICES ON THE COMPANY NETWORK. ≡ DISABLE THE WIFI & EDUCATE USER ONLY. VERY TRICKY, ALL INFO IS GIVEN for setup, read fine print.