Cram Guide for Exam 220-301 A+ Core Hardware

Domain 1 Installation, Configuration, and Upgrading

Identify the names, purpose, and characteristics, of system modules.

1. System modules refer to items like Motherboard, Firmware, Power supply, Processor, Memory, Storage devices, Display devices, Adapter cards, Ports, Cases and Riser cards.
2. Instructions written to a ROM chip and are unchangeable under any circumstances are called firmware.
3. Riser card occupies less space and is ideal for small desktop chassis.

Identify basic procedures for adding and removing field-replaceable modules for desktop systems.

4. Modules should be in an antistatic bag before use.
5. After replacement, go to Device Manager to check and see if it is working.
6. Beware of ESD (Electrostatic Discharge) – can damage the integrated circuits. Use anti-static wrist and ankle straps whenever possible.
7. The procedures are: uninstalling your current device's drivers, removing your current device, installing your new device, and installing the new device 's drivers.
8. Many portable computers use proprietary components.
9. Type I cards are 3.3mm thick and have a single row of connectors.
10. Type II cards are 5mm thick and have two rows of connectors.
11. Type III cards are up to 10.5mm thick and have four rows of connectors.

Identify typical IRQs, DMAs, and I/O addresses, and procedures for altering these settings when installing and configuring devices.

12. When you install a new device, it is assigned an IRQ number to allow the CPU to know which device is interrupting and requesting service.
13. Some devices may share an IRQ as long as they do not attempt to interact with the CPU at the same time.
14. DMA channels allow certain types of devices to bypass the CPU and access main memory directly.
15. Two devices cannot share a single DMA channel.
16. The CPU uses the I/O address to send a command to the device. In theory, each device can have only one I/O address.
17. You need to memorize the IRQ numbers and the I/O addresses.

Install and configure server hardware devices.

18. << Memory Addressing >>.
    - COM1 3F8-3FFh
    - COM2 2F8-2FFh
    - COM3 3E8-3Efh
    - COM4 2E8-2Efh
    - LPT1 378-37Fh
    - LPT2 278-27Fh
19. << IRQ's >>.
    0 System Timer
    1 Keyboard
    2 Cascade to IRQ 9
    3 Com2 / Com4
    4 Com1 / Com3
    5 Available - sound card or LPT2
    6 Floppy Disk Controller
    7 Parallel Port - LPT1
    8 Real-time clock
    9 Redirected IRQ2 / Cascade
    10 Available
    11 Available
    12 PS/2 Mouse
    13 Math Coprocessor
    14 Hard Disk Controller
    15 Available
20. << DMA >>.
    0 DRAM refresh
    1 Sound card
    2 Floppy disk drive
    3 ECP or EPP parallel port
    4 DMA controller
    5 Sound card
    6 Available
    7 ISA IDE Hard Drive Controller

Identify the names, purposes, and performance characteristics, of standardized/common peripheral ports, associated cabling, and their connectors.

21. You need to know the following ports and cables: Serial, Parallel, USB and IEEE 1394 Firewire.
22. Both USB and Firewire are hot-swappable serial interfaces, but the later provides much higher bandwidth.
23. USB ports can supply power to the USB devices. IEEE 1394 is primarily used for video capture applications.
24. Both serial and parallel ports can accommodate DB25 connectors.
25. Nowadays the PS/2 connector is for connecting mouse only.

Identify proper procedures for installing and configuring common IDE devices.

26. Make sure the master and slave jumpers are properly set.
27. Each IDE channel can support two IDE devices. You have 2 channels on each motherboard.
28. For performance reason, CDROM and hard drive should be on different channels.

Identify proper procedures for installing and configuring common SCSI devices.

29. The SCSI interface is a shared-bus configuration that supports a wide variety of peripherals, but the actual controllers are built into each SCSI device.
30. Each device on the SCSI chain must be identified by a unique ID number.
31. A SCSI device must not use the same ID number as another.
32. SCSI-1 allows for 8 devices to be connected to a single SCSI cable. SCSI-2 supports up to 16 devices.
33. Both ends of the SCSI chain must be terminated with resistors to prevent signal reflections.

Identify proper procedures for installing and configuring common peripheral devices.

34. Common peripheral devices may include Modems and transceivers, External storage, Digital cameras, PDAs, Wireless access points, Infrared devices, Printers, UPS (Uninterruptible Power Supply) and suppressors, Monitors...etc. You need to have the corresponding drivers handy during configuration.
35. Devices like scanners, printers, camera ...etc mostly support USB connections.
36. As a safety measure, turn off the power of the computer before installing these devices.

Identify procedures to optimize PC operations in specific situations.

37. Use RAID to increase disk subsystem performance. RAID 0 / Data Striping interleaves data across multiple drives, while RAID 5 / Data Striping additionally stores parity bits from two drives on a third drive for fault tolerance. They are both fast.
38. Fast CPU and high capacity hard drives require extensive cooling.
39. Not all OS support dual CPU configuration. Win 2000, WinXP and most Linux distributions do support dual CPUs. Win 98 and Win ME do not.

Determine the issues that must be considered when upgrading a PC.

40. Hardware compatibility is one thing – will the new device work with your existing hardware? Also, do you have the driver for your legacy devices?
41. OS support is another issue – did you check the hardware compatibility list of your OS?

Domain 2 Diagnosing and Troubleshooting

42. Recognize common problems associated with each module and their symptoms, and identify steps to isolate and troubleshoot the problems.
43. Always make sure that the CPU cooling fan is running smoothly.
44. RAM errors always show up in the same address. Errors caused by drivers or other hardware tend to show up in multiple different memory areas.
45. For other devices, always check the power, cable connectivity and BIOS settings. Also check to see if there is any IRQ / DMA / IO address conflicts.

Identify basic troubleshooting procedures and tools, and how to elicit problem symptoms from customers.

46. In order to determine whether it is a hardware or software problem, you must gathering information from user regarding the environment of use, the symptoms/error codes, and the situation when the problem occurred. The key to success is problem isolation.

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Domain 3 PC Preventive Maintenance, Safety, and Environmental Issues

Identify the various types of preventive maintenance measures, products and procedures and when and how to use them.

47. Regularly clean the contacts of your components with denatured alcohol.
48. Plastic surfaces can be cleaned with mild soap and water.
49. Use non-static vacuum to get the dust out of your PC.
50. Use UPS and surge protector to protect against power sags and power surges.

Identify various safety measures and procedures, and when/how to use them.

51. Ground yourself to prevent the effects of ESD by touching the exterior of the computer power supply.
52. Never touch the high voltage capacitors in the power supply, monitors and printers.
53. Don't wear anti-static wrist strap when working on the CRT. Ideally, unplug and discharge the CRT before doing anything on it.

Identify environmental protection measures and procedures, and when/how to use them.

54. Portable batteries and toner cartridges have hazardous chemicals. CRTs have hazardous leads. They should either be recycled or be treated as hazardous waste.

Domain 4 Motherboard/Processors/Memory

Distinguish between the popular CPU chips in terms of their basic characteristics.

55. CISC(complex instruction set computer) CPU uses microcode to execute very comprehensive instruction set. X86 is CISC based.
56. RISC (reduced instruction set computer) CPUs keep instruction size constant and small, thus capable of executing instructions very fast. Power PC is RISC based.
57. Some processors have 2 levels of caches while the latest processors have 3.
58. Superscalar architecture allows the circuitry for each stage of the pipeline to be duplicated so that multiple instructions can pass through in parallel.

Identify the types of RAM (Random Access Memory), form factors, and operational characteristics.

59. Extended Data Out (EDO) RAM is common in most earlier Pentium PCs.
60. Synchronous DRAM (SDRAM) is common in the earlier Pentium II PCs and is tied to the system clock speed.
61. Rambus DRAM (RDRAM) is a proprietary DRAM technology developed by Rambus that supports memory speeds of up to 3.2Gbps.
62. Synchronous Link DRAM (SLDRAM) is an enhanced version of SDRAM memory that uses a multiplexed bus to transfer data at a much higher rate than SDRAM.
63. In the 486 era we have 30-pin SIMM and 72-pin SIMM as the mainstreams. DIMM had replaced SIMM as the memory module standard for Pentium / Pentium II computers. The latest proprietary RIMM connectors have a form factor similar to DIMMs but have 184 pins compared to a DIMM's 168.

Identify the most popular types of motherboards, their components, and their architecture (bus structures).

64. AT is a motherboard patterned after the original IBM PC AT motherboard.
65. Baby AT is a smaller version of AT and is used mostly in smaller desktop PC.
66. ATX is similar in size to the Baby AT but allows for easier installation of full-length expansion cards. It is now the industry standard.
67. Micro ATX is a smaller form of ATX for use mainly in book size PC.
68. AGP operates at the speed of the processor bus, which can be at least two times faster than the PCI clock speed.
69. Most motherboards have one AGP slot only. You use AGP port only for graphic display. Other boards use PCI.

Identify the purpose of CMOS (Complementary Metal-Oxide Semiconductor) memory, what it contains, and how and when to change its parameters.

70. CMOS is a separate block of memory made from very low power consumption material and is used to store basic information about the PC's configuration.
71. The clock, CMOS RAM and battery are usually built into a single chip.
72. You can change its parameters by entering into the BIOS setup program during system boot.

Domain 5 Printers

Identify printer technologies, interfaces, and options/upgrades.

73. Dot matrix printers print characters by forming a group of hard-wire pins into the pattern of human readable characters and striking the entire pin group through a ribbon, thus forming the character on the paper.
74. Inkjet printers produce relatively higher quality prints without the noise of the dot-matrix printers by heating ink into steam and jetting it onto the paper. It is popular because of reasonable prices.
75. Laser printers produce very high-quality outputs at very high price tags. You may improve laser printer throughputs by upgrading the memory.
76. Most laser printers have network interfaces. HP Jet Direct is a popular example.
77. Most printers in the market support parallel or USB interfaces. Serial printers are not common these days.

Recognize common printer problems and techniques used to resolve them.

78. Common printer problems include paper jam, paper feeding problems, and other print quality issues.
79. Printing of garbage characters signals printer driver problems.
80. Cleaning the printer regularly can prevent most physical problems.

Domain 6 Basic Networking

Identify the common types of network cables, their characteristics and connectors.

81. Patch Cables can connect computers to UTP faceplates or patch panel to hubs. They should be kept as short as possible.
82. Crossover Cables can connect two network devices together. They are the same as patch cables except that two pairs of wires were switched before the RJ45 connector was crimped.
83. RJ45 is the most popular type of connector. You use it with UTP (unshielded twisted pair) cable.
84. Fiber optics requires different types of cables and switches and is more common for campus backbone network.

Identify basic networking concepts.

85. The bus topology has a single cable that connects all workstations on the LAN. If one computer goes down, the entire network goes down.
86. In a token ring network, an electronic token is passed around the network for transmitting data. There is no contention for the network, but performance is poor.
87. A star network has a central point (hub or switch) that connects all workstations on the LAN. If there is a break in a cable, only the computer on the involved segment is affected. It is the most popular LAN topology nowadays.
88. A mesh network has multiple paths to the same destination. It is very costly to build and maintain.

Identify common technologies available for establishing Internet connectivity and their characteristics.

89. Internet connectivity may be made through modem dialup, DSL, ISDN and cable TV system.
90. Modem dialup is slow and unreliable. DSL gives abundant dedicated bandwidth. ISDN has stable performance but is slower (but more costly) than DSL. Connections through cable TV system can be fast, but the bandwidth is shared.
91. Offices that need persistent connections can go for a T1 line or a lower cost fractional T1. In Europe the corresponding standard is known as E1.
92. Multiple computers can share a single internet connection through hardware router or software (such as Windows ICS and Wingate).

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