Chapter 10: Computer Design

Complete CompTIA A+ Guide to PCs, 6e
Chapter Objectives

• To select computer components based on the customer's needs
• The components best suited for a particular computing environment
• How to design for specific computer subsystems, such as the video or storage subsystem
CompTIA A+ Exam Objectives Covered in This Chapter

801-1.9: Evaluate and select appropriate components for a custom configuration to meet customer specifications or needs.

801-5.2: Explain environmental impacts and the purpose of environmental controls.

801-5.3: Given a scenario, demonstrate proper communication and professionalism.
Computer System Configurations

- Graphics/CAD/CAM
- Gaming PC
- Audio/Video Editing PC
- Virtualization PC
- On the Road
- HTPC (Home Theater PC)
- Home Server
- Industrial Computer
- Thick Client
- Thin Client
Motherboard Considerations

- Motherboard Form Factor
- Chipset
- Whether the CPU is included or needs to be purchased separately
- CPU Size
- Motherboard Socket Size
- Nanotechnology used with the processor and/or chipset (22nm, 32nm, 45nm, etc.)
- CPU Cooling
- RAM
- Number and type of I/O (input/output) ports
- Traditional BIOS or UEFI (replacement for traditional BIOS)
Power Supply Considerations

- Enough power cables for video cards
- Number and type of power cables (SATA, Molex, PCIe, fan)
- Overvoltage, overcurrent, undervoltage, and short-circuit protection
- Total wattage
- MTBF (Mean Time Between Failures)
- Form factor
- Wattage for the 12-volt line
- Quietness
- Warranty
# Case Considerations

<table>
<thead>
<tr>
<th>Consideration</th>
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<tbody>
<tr>
<td>Size (ATX, micro-ATX, BTX, ITX, mini-ITX, etc.)</td>
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<tr>
<td>Type (desktop or tower) and physical dimensions</td>
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<tr>
<td>Number and type of front panel ports</td>
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<tr>
<td>Number and placement of fans</td>
<td></td>
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<tr>
<td>Cable management</td>
<td></td>
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<tr>
<td>Number of expansion slots (need to match or come close to how many are on</td>
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<tr>
<td>the motherboard)</td>
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<tr>
<td>Number and type of accessible drive bays, including internal or external</td>
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<tr>
<td>Outside texture and design (metal, aluminum, plastic, acrylic, see-through)</td>
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<tr>
<td>Ease of cover removal</td>
<td></td>
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<tr>
<td>Method of securing expansion cards (screw, plastic tab, single plastic bar)</td>
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<tr>
<td>Ability to lock case panels to deter entry</td>
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Storage Considerations

- Internal Connectivity
- Internal Power
- Internal Physical Size
- External Connectivity
- External Power
- Storage Technology
- Special Storage Considerations
- Hard Drive Speed
- Optical Drive Capability
- Optical Drive Technology
- Drive Buffers
- PATA Considerations
- External Considerations
Audio Considerations

- Number of Speakers
- Microphone
- 2.0 or 2.1
- Port Connectivity
- Sound Card
- Cabling
Display Considerations

- Size/Aspect Ratio
- Number of Displays
- Type of Display
- Display Conferencing Features
- Contrast Ratio
- Video Adapter
Mobile Devices

- Laptop
- Netbook
- Tablet PC
- Smartphone
One of the most difficult tasks a technician faces is dealing with people who are angry, upset, or frustrated. This is a common issue for those who come to help or try to troubleshoot a problem over the phone.

Realize that not only do customers want their computer problems fixed, they sometimes just need to vent and be heard.

When dealing with an irate customer, you want to stay calm and maintain your professionalism. Once the customer has calmed down a bit, more information about the problem can be gleaned with less anger mixed into the conversation.

Consider customers’ points of view and never forget that they are the ones who must use the devices that you repair.
Review computer system configurations for different computer uses and recommended components. The specific types of custom configurations on the exam include the following computer types: (1) graphic/CAD/CAM design, (2) audio/video editing, (3) virtualization, (4) gaming, (5) home theater, (6) standard thick client, (7) thin client, and (8) home server.

Be able to explain the purpose of specific components, such as enclosures and air filters, and how they are used as environmental controls.

The exam has very specific criteria for proper communication and professionalism. A specific part of this section is dealing with a difficult customer or situation. Remember to avoid arguing with the customer and/or being defensive. Do not minimize the customer's problem. Avoid being judgmental. Clarify customer statements by asking open-ended questions (which allows the customer to freely explain the situation) to narrow the scope of the problem and by restating the issue or question to verify your understanding.
Chapter Summary

• A graphic/CAD/CAM computer needs multiple powerful multi-core processors, maximum RAM, a high-end video card with maximum RAM and GPU, a large display/multiple displays, a large-capacity hard drive(s), SSD, and a good input device(s).

• A gaming PC needs a multi-core processor, a large amount of RAM, a sound card and speakers, additional system cooling, a large display and/or multiple displays, and good input/output devices.

• An audio/video editing PC needs multiple powerful multi-core processors, maximum RAM, a good video card with maximum RAM and GPU, a sound card, a fast and large-capacity hard drive, dual displays, and a good input device(s).

• A virtualization computer needs multiple powerful multi-core processors, maximum RAM, multiple fast hard drives, an SSD, and a 1Gbps NIC.

• A mobile computer is commonly a laptop with lots of RAM and an SSD, mobile tablet, smartphone, and possible devices such as a projector, thermal printer, portable speakers, or headphones with noise cancellation.

• An HTPC has a small form factor with quiet internal devices, a surround sound card, a TV tuner or cable card, and HDMI video output.
• A home server has a medium to large case, multiple powerful multi-core processors, lots of RAM, RAID, server applications such as media streaming, file sharing, print sharing, and a 1Gbps NIC.

• Processors and chipsets are created using a specific nanotechnology. Common technologies used are 22, 32, and 45nm. The smaller the number, the less space for the same number of transistors.

• When designing a motherboard, the CPU size and motherboard CPU socket must match.

• The power supply, motherboard, and case form factors must match.

• Power supplies must have the correct amount of wattage, wattage for a specific power level, and an appropriate number/type of power cables.

• Air filters and enclosures can help in environments where airborne particles are a concern.

• When designing for internal devices, use PATA or SATA and have the correct power connector. Ensure that an internal connector is available.
When designing for external connectivity, ensure that a USB, eSATA, eSATAp, or IEEE 1394 port is available; ensure that enough power is provided to power the device through the port or use an external power supply; and ensure that not too many devices share the same cable, which can affect performance.

For audio, ensure that the correct number and type of input/output ports are available.

For common usage, the 2.0 two channel audio subsystem is used. A 2.1 audio subsystem adds a subwoofer as a third output device for lower frequencies.

Display design should include physical space consideration, type of display, features that might be integrated into the display such as a microphone or camera, a video port, and memory/GPU/additional power requirements.

Mobile designs include all the same major components as a desktop system plus 802.11 and Bluetooth wireless capabilities, as well as integrated input devices such as a keyboard and touchpad.