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Chapter 2 PC Assembly

Class	CompTIA A+
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Importance	☐
Materials	
Packet Tracer	
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Study Schedule (Class notes)	
Type	Lecture

- Assemble the computer
  - Install the power supply
  - Select the case and fans
  - Select a power supply
  - Install the CPU
  - Install the RAM
  - Install the Motherboard
    - Select the motherboard
    - Select the CPU and CPU cooling
    - Select the RAM
  - Install internal drives
    - Select hard drives
    - Select optical drives
    - Install the hard drive
    - Install the optical drive
  - Install the adapter cards
    - Select the adapter cards
  - Select additional storage
    - Select a media reader
  - Install the cables
    - Connect the internal power cables

Assemble the computer

Install the power supply

1. Open the computer case
2. Align the screw holes on the power supply with the mounts on the computer case
3. Screw the power supply into place

Select the case and fans

The choice of motherboard and external components influences the selection of the case and power supply.

The motherboard form factor must be matched with the correct type of computer case and power supply.

Select a power supply

Power supplies typically provide voltages of 3.3V, 5V, and 12V. It convert AC input to DC output voltages.

Install the CPU

1. Orient the CPU to the CPU socket
2. Place the CPU into the CPU socket
3. Lock the CPU in place
4. Apply thermal paste to the CPU
5. Install the heatsink
6. Secure the heatsink

Install the RAM

1. Open the RAM slot levers
2. Orient the RAM stick to motherboard slot
3. Lower the RAM stick into the slot

4. Press down firmly to lock in the RAM stick

Install the Motherboard

1. Align the motherboard in the correct direction
2. Locate the standoffs
3. Install standoffs in the computer case
4. Align I/O plate to back of computer case
5. Lower motherboard into place
6. Install the screws into the standoffs

Select the motherboard

When you select a replacement motherboard, make sure that it supports the CPU, RAM, video adapter, and other adapter cards. The socket and chipset on the motherboard must be compatible with the CPU. The motherboard must accommodate the existing heat sink and fan assembly when reusing the CPU. Pay attention to the number and type of expansion slots.

Data travels from one part of a computer to another through a collection of wires known as the bus. The bus has two parts. The data portion of the bus, aka the data bus, carries data between the computer components. The address portion, aka the address bus, carries the memory addresses of the locations where data is read or written by the CPU.

The bus size determines how much data can be transmitted at one time. A 32-bit bus transmits 32 bits of data at one time from the processors to RAM, or to other motherboard components, while a 64-bit bus transmits 64 bits of data at one time. The speed at which data travels through the bus is determined by the clock speed, measured in MHz or GHz.

PCI expansion slots connect to a parallel bus, which sends multiple bits over multiple wires simultaneously.

Select the CPU and CPU cooling

Intel and AMD sockets

Intel Socket	Architecture
775	LGA
1155	LGA
1156	LGA
1150	LGA
1366	LGA

AMD Socket	Architecture
AM3	PGA
AM3+	PGA
FM1	PGA
FM2	PGA
FM2+	PGA

Intel Socket	Architecture
2011	LGA

The **front-side bus (FSB)** is the path between the CPU and the Northbridge. It is used to connect various components, such as the chipset, expansion cards, and RAM.

Processors are further classified as 32-bit and 64-bit. The primary difference is the number of instructions that can be handled by the processor at one time.

Select the RAM

- **Unbuffered memory** is regular memory for computers.
- **Buffered memory** is specialized memory for servers and high-end workstations that use a large amount of RAM. These memory chips have a control chip built into the module. The extra controller chip reduces RAM speed.

Install internal drives

Select hard drives

Internal drives usually connect to the motherboard with SATA while external drives connect with USB, eSATA, or thunderbolt. Legacy motherboards may only offer the IDE or EIDE interface.

Most internal HDDs are available in the 3.5 inch form factor, however 2.5 inch drives are becoming popular. SSDs are generally available in the 2.5 inch form factor.

Select optical drives

Optical device	Read CD	Write CD	Read DVD	Write DVD	Read Blu-ray	Write Blu-ray	Rewrite Blue-ray
CD-ROM	✔	✘	✘	✘	✘	✘	✘
CD-RW	✔	✔	✘	✘	✘	✘	✘
DVD-ROM	✔	✘	✔	✘	✘	✘	✘
DVD-RW	✔	✔	✔	✔	✘	✘	✘
BD-ROM	✔	✘	✔	✘	✔	✘	✘
BD-R	✔	✔	✔	✔	✔	✔	✘
BD-RE	✔	✔	✔	✔	✔	✔	✔

Install the hard drive

Slightly hand-tighten all the screws before tightening any of them with a screw driver.

Install the optical drive

1. From the font of the case, choose the drive bay that you want to hold the drive. Remove the faceplate from that bay if necessary.
2. Position the optical drive so that it aligns with the 5.25 inch drive bay opening at the front of the case.
3. Insert the optical drive into the drive bay so that the optical drive screw holes align with the screw holes in the case.
4. Secure the optical drive to the case using the proper screws.

- Optical drives are installed from the front of the case.
- It is recommended to hand-tighten drive mounting screws prior to using a screwdriver.
- Modern motherboards do not provide the IDE interface for internal storage devcies.
- The SATA interface can be used to connect HDDs, SSDs, and optical drives.

Install the adapter cards

1. Find an empty PCIe x16 slot on the case and remove the small metal cover.
2. Align the video adapter card to the appropriate expansion slot on the motherboard.
3. Press down gently on the video adapter card until it is fully seated.
4. Secure the video adapter card mounting bracket to the case with the appropriate screw.

Select the adapter cards

- Graphics card
- Sound card
- Storage controller: it can be integrated or added as an expansion card. They allow for the expansion of internal and external drives for a computer system. Storage controller can also provide fault tolerance or increased speed. If the customer wants to implement RAID 5, a RAID storage controller with at least three drives is needed.
- I/O card
- NIC: network interface card
- Capture card

Two types of expansion slots

- Peripheral component interconnect (PCI) is available to support older expansion cards.
- PCI Express (PCIe): x1, x4, x8, and x16.

Select additional storage

Select a media reader

- Secure digital (SD): 2TB
- MicroSD: smaller version of SD
- MiniSD: A version of SD between the size of an SD and a microSD.
- CompactFlash: 128GB; it is often used as storage of **video cameras**.
- Memory stick: proprietary flash memory used in cameras, MP3 players, and hand-held video game systems.
- xD: Picture card.

Install the cables

Connect the internal power cables

1. Align the 24-pin ATX power connector to the socket on the motherboard.
2. Gently press down on the connector until the clip clicks into place.
3. Align the 4-pin auxiliary power connector to the socket on the motherboard.
4. Gently press down on the connector until the clip clicks into place.
5. Align the CPU fan power connector to the socket on the motherboard.
6. Gently press down on the connector until the clip clicks into place.

Connect the internal data cables

1. Align the SATA cable and plug one end into the motherboard socket
2. Align the other end of the SATA cable and plug it into the smaller SATA port on the drive.

Install the front panel cables

1. Plug the power cable into the system panel connector in the location marked PWR_SW
2. Plug the reset cable into the system panel connector in the location marked RESET.
3. Plug the power LED cable into the system panel connector in the location marked PWR_LED.

4. Plug the drive activity LED cable into the system panel connector in the location marked SPEAKER.
5. Plug the USB cable into the USB connector.
6. Plug the audio cable into the audio connector.

System panel connectors:

1. Power button: turns the computer on or off.
2. Reset button: restarts the computer without turning it off
3. Power LED: it remains lit when the computer is on
4. Drive Activity LEDs: it remains lit or blinks when the system is reading or writing to hard drives.
5. System speaker: The motherboard uses a case speaker to indicate the computer's status.
6. Audio