CPT 122 – Introduction to computer Hardware

Module 3, Unit 1: Computer Computer Components and and Requirements

Assembling a computer system from individual components is a fundamental skill for anyone interested in computer hardware, maintenance, or custom-built systems. This unit will prepare you and guide you on what you need to know before assembling a computer system

Tools and Equipment

Screwdrivers

You will need both Phillips and flat-head screwdrivers.

Phillips screwdrivers have a cross-shaped tip for screws with a cross-shaped head, commonly used for securing components within the computer case.

Flat-head screwdrivers have a straight tip for screws with a slot-shaped head.

Tools and Equipment

Anti-static Wrist Strap

An anti-static wrist strap is essential to prevent electrostatic discharge (ESD) that can damage sensitive components.

ESD occurs when static electricity builds up on your body and can discharge unexpectedly when you touch a component, causing damage.

The strap connects you to a grounded metal object, allowing static electricity to safely discharge through the strap rather than through your computer.
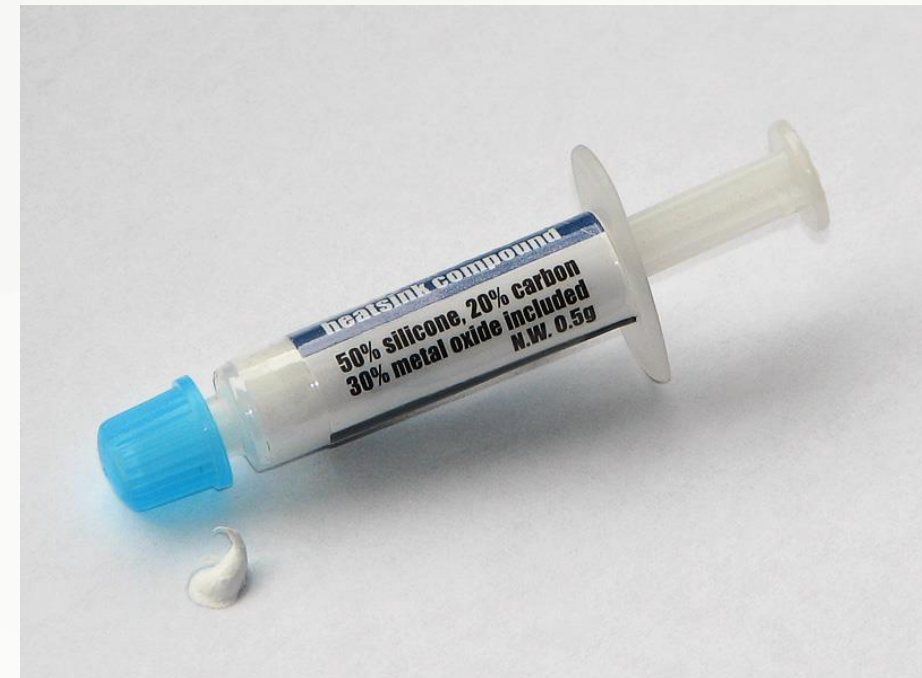
Tools and Equipment

Thermal Paste

Thermal paste is a thermally conductive compound that helps transfer heat from the CPU to the heatsink.

It fills the microscopic gaps between the CPU and heatsink, improving heat dissipation and preventing overheating.

Tools and Equipment

Cable Ties

Cable Ties help manage cables and keep the interior of the case tidy.

They have no mechanical and require an external mechanical fixation mechanism.

Small Size Cutting Machine

Small size cutting machine are essential in cutting the ends of these cable ties, a cutter like a plier, is essential.

Other alternatives are nipper, scissors, etc.

Safety Precautions: Prioritizing Safety

1 Electrostatic Discharge Prevention

Always wear an anti-static wrist strap while handling computer components to prevent ESD. Connect the strap to a grounded metal object, like the power supply case or a metal table, to dissipate static electricity.

2 Power Off Before Installation

Ensure the power supply is unplugged from the wall outlet before installing or removing any components. This prevents accidental electric shock and damage to your system.

3 Safe Handling of Components

Handle components with care, avoiding dropping or mishandling delicate parts. The motherboard, CPU, and RAM are particularly sensitive and can be damaged if handled improperly.

4 Clean Workspace

Maintain a clean and organized workspace to prevent dust and debris from contaminating components. A clean workspace also provides better visibility and helps avoid accidents.

Understanding the Case and Form Factor

Case Size
The case size refers to the physical dimensions of the computer case. Choose a case that fits your needs and desired size, whether it's a compact Mini-ITX or a full-sized ATX tower.

Form Factor
The form factor refers to the motherboard's size and layout that the case can accommodate. Common form factors include ATX, Micro-ATX, Mini-ITX, and Extended ATX. Make sure your chosen case supports the motherboard form factor you're using.

Compatibility
Ensure the case can accommodate the components you plan to install. Check the case specifications for supported motherboard form factors, drive bays, expansion slots, and maximum component dimensions.

Cable Management and Airflow
A well-designed case will provide ample space for cable management and facilitate proper airflow, which is crucial for cooling and preventing overheating.

Power Supply Unit (PSU): Powering Up Your System

Wattage
1

Calculate the total power requirements of your components, including the CPU, GPU, drives, and peripherals. Choose a PSU with sufficient wattage to power all your components and provide some headroom for future upgrades or overclocking.

Efficiency Rating
2

PSUs come with efficiency ratings like 80 Plus Bronze, Silver, Gold, Platinum, and Titanium. Higher efficiency ratings mean less power wasted and less heat generated. Choose a PSU with an efficiency rating that aligns with your budget and desired power savings.

Modularity
3

Modular PSUs allow you to detach unused cables, making cable management easier and improving airflow inside the case. Semi-modular PSUs have some fixed cables, while fully modular PSUs offer complete flexibility.

Connectors
4

Ensure the PSU has all the necessary connectors for your components. These include the motherboard (ATX power connector), CPU (EPS connector), GPU (PCIe connectors), storage drives (SATA power connectors), and peripherals.

Size and Form Factor
5

Make sure the PSU fits in your case. Standard ATX cases usually support ATX PSUs, while smaller form factor cases may require SFX or TFX PSUs. Check the dimensions and compatibility before purchasing.

Motherboard: The Foundation of Your System

1

Form Factor

The motherboard's form factor determines its size and layout. Ensure the motherboard form factor matches the case's form factor to ensure compatibility and proper fit within the case.

2

Socket Type

The CPU socket on the motherboard must match the socket type of your chosen processor. For example, Intel Core i7-9700K CPUs require a motherboard with an LGA1151 socket.

3

Chipset

The chipset on the motherboard determines its features and capabilities, such as the number of USB ports, SATA connections, PCIe lanes, and support for overclocking. Choose a chipset that aligns with your requirements.

4

RAM Support

Verify the type of RAM (DDR3, DDR4, etc.) and the maximum supported memory capacity and speed. Ensure it is compatible with your chosen RAM modules.

5

Expansion Slots and Ports

Consider the number and type of expansion slots (PCIe, M.2) and ports (USB, SATA, Ethernet, audio) available on the motherboard. These will determine the connectivity and expandability of your system.
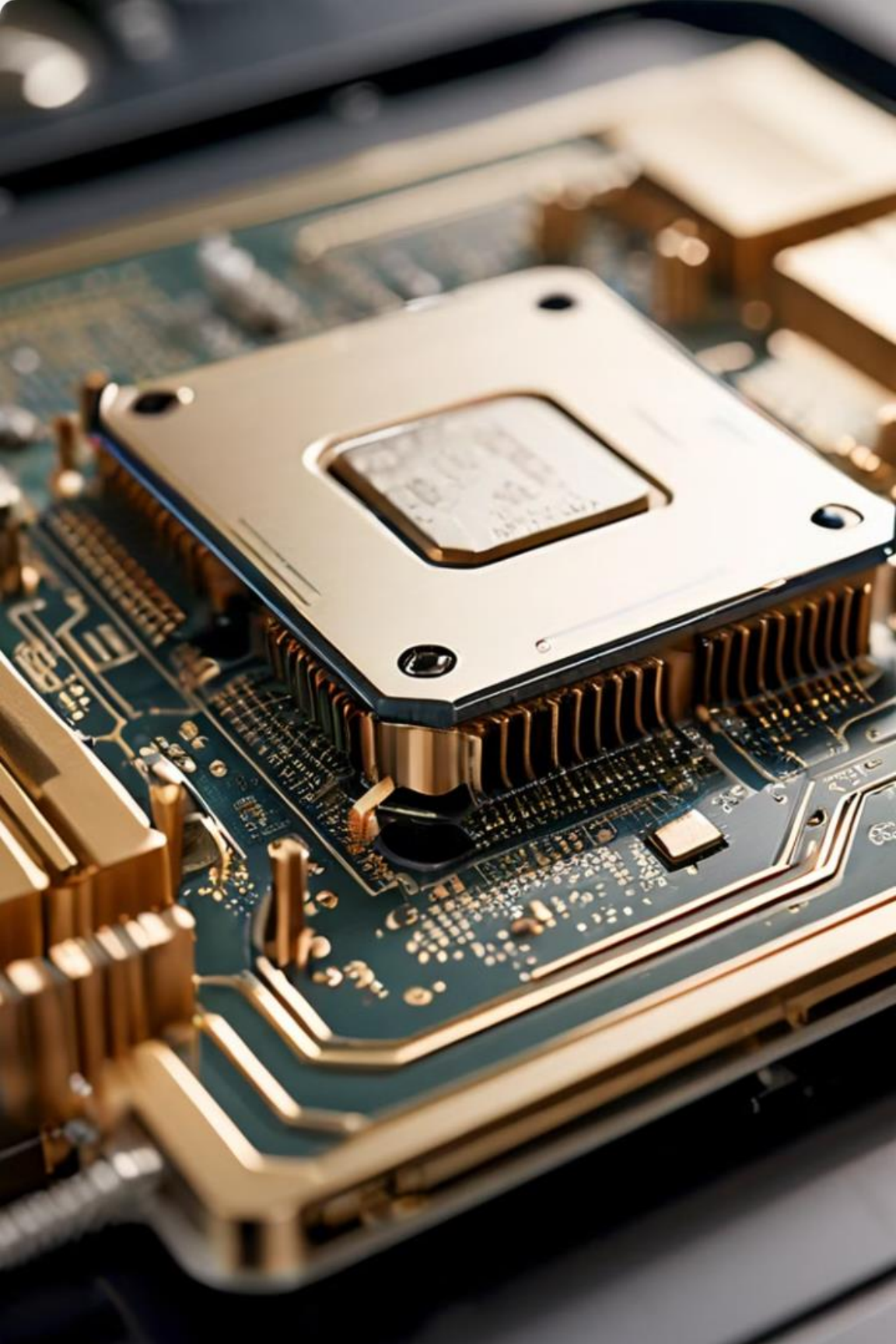
Central Processing Unit (CPU): The Brain of the System

Compatibility

Ensure the CPU is compatible with the motherboard socket. Check the motherboard specifications to confirm compatibility with the specific CPU model you have.

Handling with Care

Handle the CPU with care, holding it by the edges and avoiding touching the pins or contacts on the bottom. Static electricity can damage the CPU, so ground yourself by touching a metal object or using an anti-static wrist strap before handling it.

Wiring and Cable Management

Pay attention to the routing of cables and wires around the CPU area to avoid interference with the CPU cooler or fan. Proper cable management can improve airflow and help maintain optimal cooling performance.
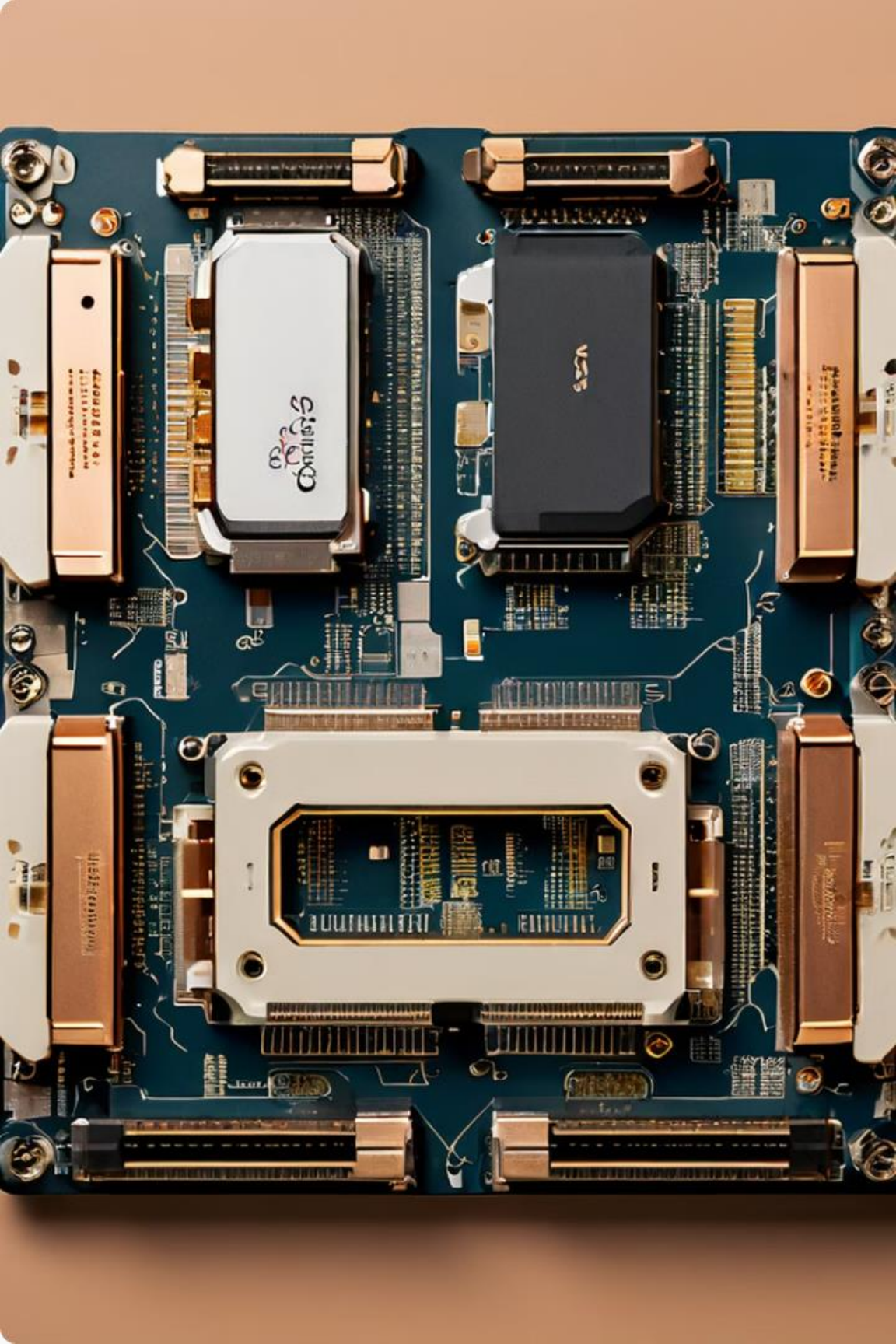
Memory (RAM): Boosting Performance

Compatibility	Ensure the RAM modules you have chosen are compatible with your motherboard. Check the motherboard specifications for supported RAM types, speeds, and capacities.
Matching Modules	For dual-channel or quad-channel configurations, use identical RAM modules with the same capacity, speed, and timings for optimal performance.
Static Precautions	Handle RAM modules with care and avoid touching the gold contacts on the bottom. Ground yourself before handling RAM to prevent damage from static electricity.

Storage Devices

It is important to understand the different types of storage devices available some key points to consider include;

✓ **Types of storage devices:** Choose between Disk Drives (HDDs) or Solid-State Drives (SSDs).

✓ **Capacity:** Consider your storage needs when selecting a drive, ensuring you have enough space for your operating system, applications, and files.

✓ **Speed:** SSDs are significantly faster than HDDs due to their lack of moving parts.

✓ **Form factor:** Storage devices come in different form factors, ensure that your case and motherboard support the form factor of the storage device you choose.