CPUs

Chapter 3

Episode: **What Is a CPU?**

Objective(s): Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

Episode Description

The Central Processing Unit (CPU) is quite possibly the most critical component of a PC. But what tasks does the CPU deal with, and how does it go about handling them? Let's dig into the core features of a CPU.

Key Terms

- 0:49 - Central processing unit (CPU)
- 3:01 - on=1, off=0
- 4:18 - Machine language
- 6:10 - Intel 8088 code
- 7:22 - Clock

Quick Review

- A central processing unit (CPU) runs programs
- Every CPU has internal features to process commands
- Every CPU runs code based on a specific machine language
- CPUs use pipelines (cores) to optimize the processing of commands

Episode: **Modern CPUs**

Objective(s): Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

Episode Description

The modern processor is loaded with features that you need to know in order to excel as a PC technician. Let's examine some of the modern CPU's abilities and get hands-on with a tool that has become a necessity when dealing with central processing units.

Key Terms

- 0:35 - Clock speed and cores
- 1:00 - 1 hertz (1 Hz) = 1 cycle per second
- 1:04 - 1 megahertz (1 MHz) = 1 million cycles per second, 1 gigahertz (1 GHz) = 1 billion cycles per second
- 1:30 - CPU cores are multiple processors on one chip
- 2:15 - Objective term - Single-core

Key Terms

- 2:42 - Objective term - Multi-core
- 3:10 - Quad-core
- 4:02 - Objective term - Advanced RISC (Reduced Instruction Set Computing) Machine (ARM) chip
- 4:46 - Accelerated Processing Unit (APU)
- 5:30 - CPU-Z

Quick Review

- The capability of a CPU is measured via clock speed and cores
- Modern CPUs support advanced features such as multi-cores
- ARM chips operate using a Reduced Instruction Set Computing (RISC) methodology
- Accelerated Processing Units (APUs) are CPUs with graphics cards built in

Episode: **32-Bit vs. 64-Bit Computing**

Objective(s): Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

Episode Description

As technology evolves, the industry sets standards to define milestones. There is possibly no standard more prolific than 32-bit (x86) and 64-bit (x64) computing. Every piece of hardware and software released in the last three decades follows either the 32-bit or 64-bit standard.

CPU Instruction Set Architectures

Instruction Set Architecture (ISA)	Supports 32-bit applications?	Supports 64-bit applications?
X86	Yes	No
X86-64	Yes	Yes
x64	No	Yes

Key Terms

- 0:18 - Objective term - x86 and x64
- 2:48 - Objective term - x86
- 2:48 - Instruction Set Architecture (ISA)
- 3:05 - Objective term - x64
- 3:12 - Intel Architecture, 32-bit (IA-32)

Quick Review

- x86, x86-64, x64, and IA-32 all support different Instruction Set Architectures (ISAs)
- Almost all modern hardware and software supports 64-bit systems and are backwards compatible with 32-bit systems
- x64 systems offer greater data handling, improved graphics performance, and better security

Episode: **Choosing the Right CPU**

Objective(s): Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

CompTIA A+ (220-110x)
Mike Meyers and Steve Nicholson

Episode Description

Choosing a CPU that meets all of your needs is one of the most important decisions that you will make when building your PC. The wrong choice can mean a computer that does not perform the needed tasks or quickly becomes outdated. Since we have already learned about CPU features such as multi-cores and clock speed, let's discuss choosing the right CPU for the job at hand.

Key Terms

- 0:34 - What type of system to you want?
- 1:01 - What's the primary use of the computer?
- 1:38 - How long do you want this system to last?
- https://pcpartpicker.com/

Quick Review

- CPUs designed for laptops come with features to help with power consumption and battery usage
- Higher-end CPUs offer more cores and a faster clock speed
- Intensive tasks such as 3D gaming and video editing benefit from CPUs with extra cores
- Some CPUs are unlocked and can be overclocked

Episode: **CPU Generations and Architecture**

Objective(s): Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

Episode Description

By now you are probably wondering what that alphabet soup of letters and numbers alongside a CPU name means. Understanding the nomenclature of CPU models will ensure that you fully understand how they work. In this video, we are going to learn about the different generations and their corresponding CPU architecture.

Key Terms

- 1:23 - Objective term - Intel
- 1:23 - Objective term - Advanced Micro Devices, Inc. (AMD)
- 3:37 - Objective term - Multithreading

Intel Generation Timeline

- https://techgamesnews.com/cpus/intel-processor-generations-timeline-and-evolution/

Quick Review

- Intel and AMD are the main brands for CPUs
- The higher a CPU's tier, the better the performance
- The generation gives a good indicator of the CPU's age
- The model refers to the performance of the CPU
- The suffix denotes whether the CPU is unlocked or has integrated graphics

Episode: **CPU Cooling**

Objective(s): Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

Episode Description

While anything that uses electricity generates some heat, no other piece of hardware in our PC generates more heat than the CPU. Keeping temperatures under control is one of the keys to a system's longevity. Let's beat the heat and learn all about CPU cooling.

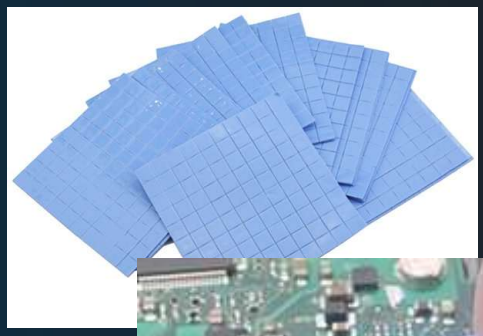
Key Terms

- 1:25 - Objective term - Overheating
- 1:30 - Objective term - Intermittent shutdown
- 1:37 - Objective term - Heat sink
- 2:44 - Objective term - Fans
- 3:19 - Objective term - Thermal paste
- 3:26 - Thermal paste comes in silicone-based, ceramic-based, carbon-based, metal-based and liquid metal-based
- 9:47- Objective term - Thermal pads
- 10:41 - Objective term - Liquid cooling

Intel's Method on How to Apply Thermal Paste

- https://www.intel.com/content/www/us/en/gaming/resources/how-to-apply-thermal-paste.html

Thermal Pads



Source: https://www.newegg.com/p/pl?N=100&d=CPU%20heatsink

Quick Review

- Heat sinks use metal fins and pipes to passively transfer heat
- Thermal paste and pads are both used to fill in gaps and provide better thermal conductivity between CPU and heat sink
- There are numerous sizes of fans and radiators to choose from
- Liquid cooling has higher thermal transfer capabilities than air-cooling

Episode: **Installing and Troubleshooting a CPU**

Objective(s):

Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

Core 1: 5.1 Given a scenario, apply the best practice methodology to resolve problems.

Episode Description

Every computer needs a CPU. The installation steps are straightforward but should be handled with care to prevent damage. Additionally, some form of cooling is required.

Key Terms

- 0:21 - Make sure to use electrostatic discharge (ESD) protection
- 0:26 - Handle sensitive equipment carefully
- 0:54 - Intel CPUs use Land Grid Array (LGA)
- 1:24 - Zero-insertion force (ZIF)
- 2:22 - AMD CPUs use Pin Grid Array (PGA)
- 3:59 - Objective term - Step 1: Identify the problem

Key Terms

- 4:25 - Objective term - Step 2: Establish a theory of probable cause (question the obvious)
- 4:46 - Objective term - Step 3: Test the theory to determine the cause
- 5:03 - Objective term - If the theory is not confirmed, re-establish a new theory or escalate
- 5:13 - Objective term - Step 4: Establish a plan of action to resolve the problem and implement the solution

Key Terms

- 5:24 - Objective term - Refer to the vendor's instructions for guidance
- 5:41 - Objective term - Step 5: Verify full system functionality and, if applicable, implement preventive measures
- 6:11 - Objective term - Step 6: Document the findings, actions, and outcomes

Quick Review

- Always use ESD prevention methods when handling CPUs
- Pin Grid Array (PGA) and Land Grid Array (LGA) are the two most common types of CPU sockets
- The Zero-insertion force (ZIF) mechanism is used to secure the CPU into the motherboard's CPU socket
- When troubleshooting a non-functional CPU, first check all connections and make sure the fan, heat sink, and CPU itself are seated properly before proceeding