CompTIA

CompTIA IT Fundamentals+ (Exam FC0-U61)

Module 3 / Unit 1 / System Components

Objectives

- Explain the way in which system components determine performance and how to specify an appropriate computer system
- Describe the types and functions of motherboards, processors, memory, and the expansion bus
- Explain the importance of a cooling system and the components used
- Identify the role of PC firmware and access the firmware setup program

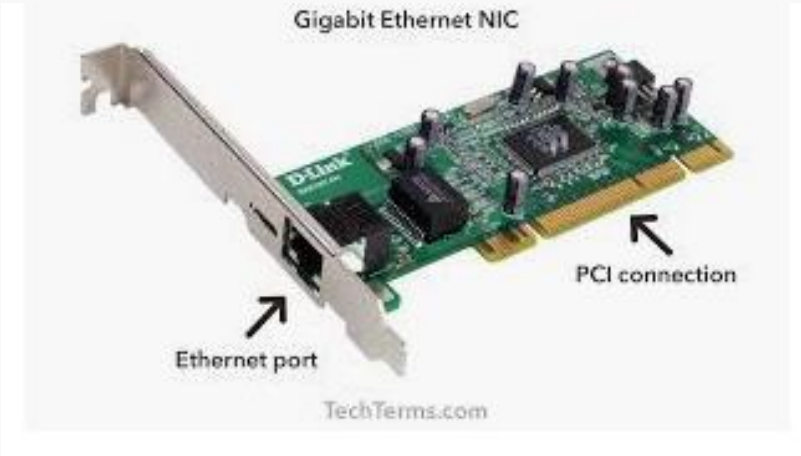
Selecting a Computer

- Key components for performance
- Central Processing Unit
- Memory (System RAM)
- Fixed disk
  - Hard Disk Drive (HDD)
  - Solid State Drive (SSD)
- Graphics Processing Unit (GPU)

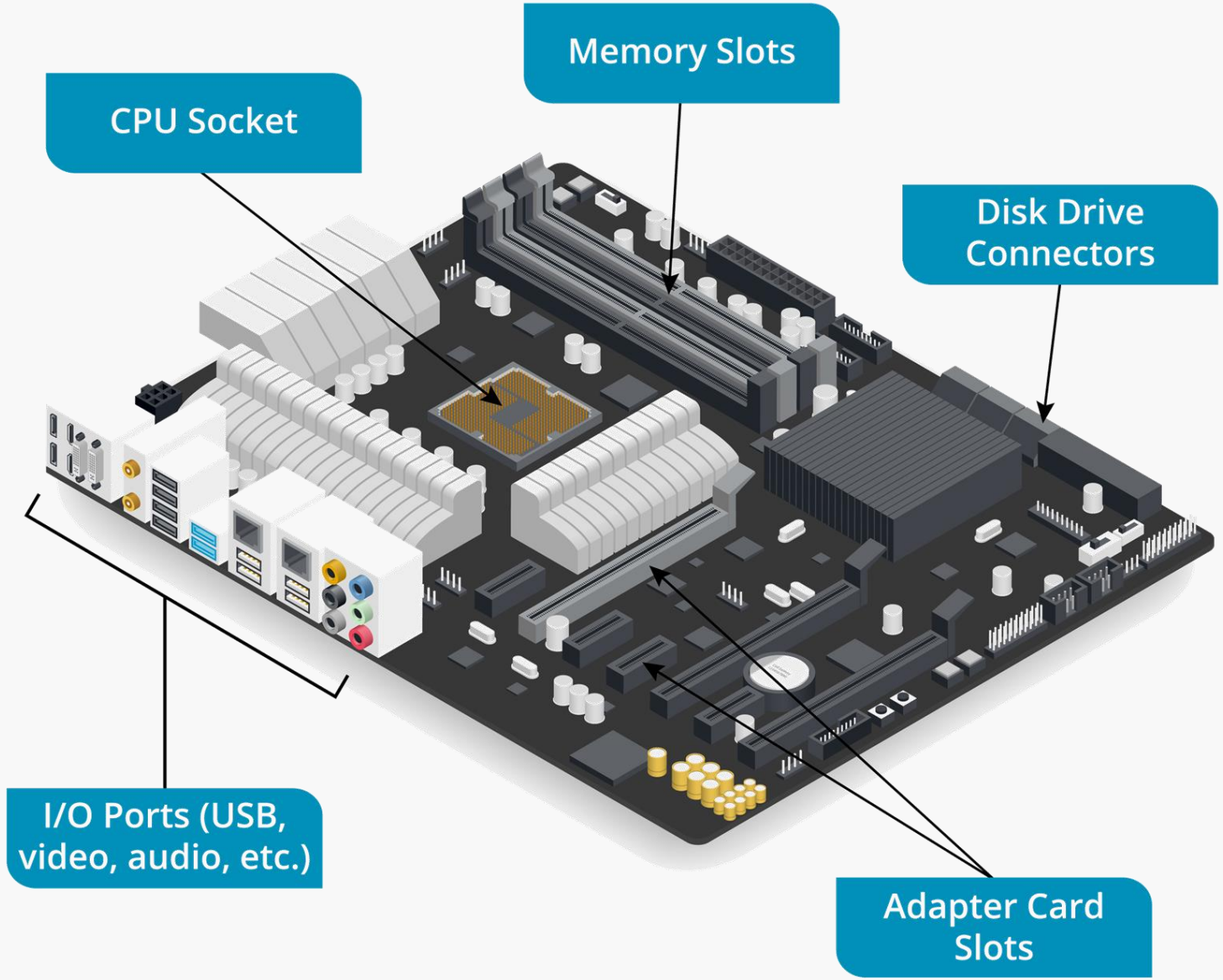
What type of component provides persistent storage?

Network Interface

- Wired network
  - Ethernet port (RJ-45)
  - Network Interface Card (NIC)
- Wireless network
  - Wi-Fi radio networking
  - Wireless access points



Motherboard Components



What computer component is most restrictive in terms of determining upgrade potential for a desktop computer?

True or false? A plug-in card is always required to support PC sound.

Processors

- Microprocessor/integrated circuit
- Central Processing Unit (CPU) is main processor in computer
- Intel versus AMD

Intel and AMD CPU Brands

- Core
- Pentium
- Celeron
- Atom
- Xeon

- Legacy—Athlon, Phenom, Sempron, Turion, AMD FX, Opteron
- Zen microarchitecture
- Ryzen/Threadripper and Ryzen Mobile
- Epyc

ARM CPUs

- ARM (Advanced RISC Machine) microarchitecture
  - Widely used on smartphones and tablets
  - ARM don’t make CPUs but license the designs
  - Apple A, Samsung Exynos, nVIDIA Tegra
- RISC stands for Reduced Instruction Set Computing
- RISC microarchitectures use simple instructions processed very quickly
- Complex (CISC) microarchitectures use more powerful instructions but process each one more slowly
- Intel's microarchitecture is CISC with RISC enhancements (micro-ops)

Features of Processors

- Control unit/pipeline
- Execution units
- Registers

Instruction Set (32- versus 64-bit)

- x86 instruction set

What is the main advantage of using a CPU in 64-bit mode?

  - x86 instruction set started in 1978 with 16-bit CPUs
    First 32-bit CPU with x86-32/IA-32 released in 1985
  - x86-64/x64 developed by AMD in 2003 (Intel refer to it as EM64T)

- 32-bit versus 64-bit CPU
  - 32-bit CPU can address up to 4 GB memory
  - 64-bit CPU can address up to 16 Exabytes (currently CPUs use a 48-bit address space (256 Terabytes)
  - 64-bit CPUs can run 32-bit operating systems and software
  - 32-bit CPUs CANNOT run 64-bit operating systems or software
- Most PC/laptop CPU models are now 64-bit

Clock Speed and Bus Speed

- Clock speed differentiates CPU models (premium models run faster)
- Front Side Bus between CPU and system memory is another important performance factor

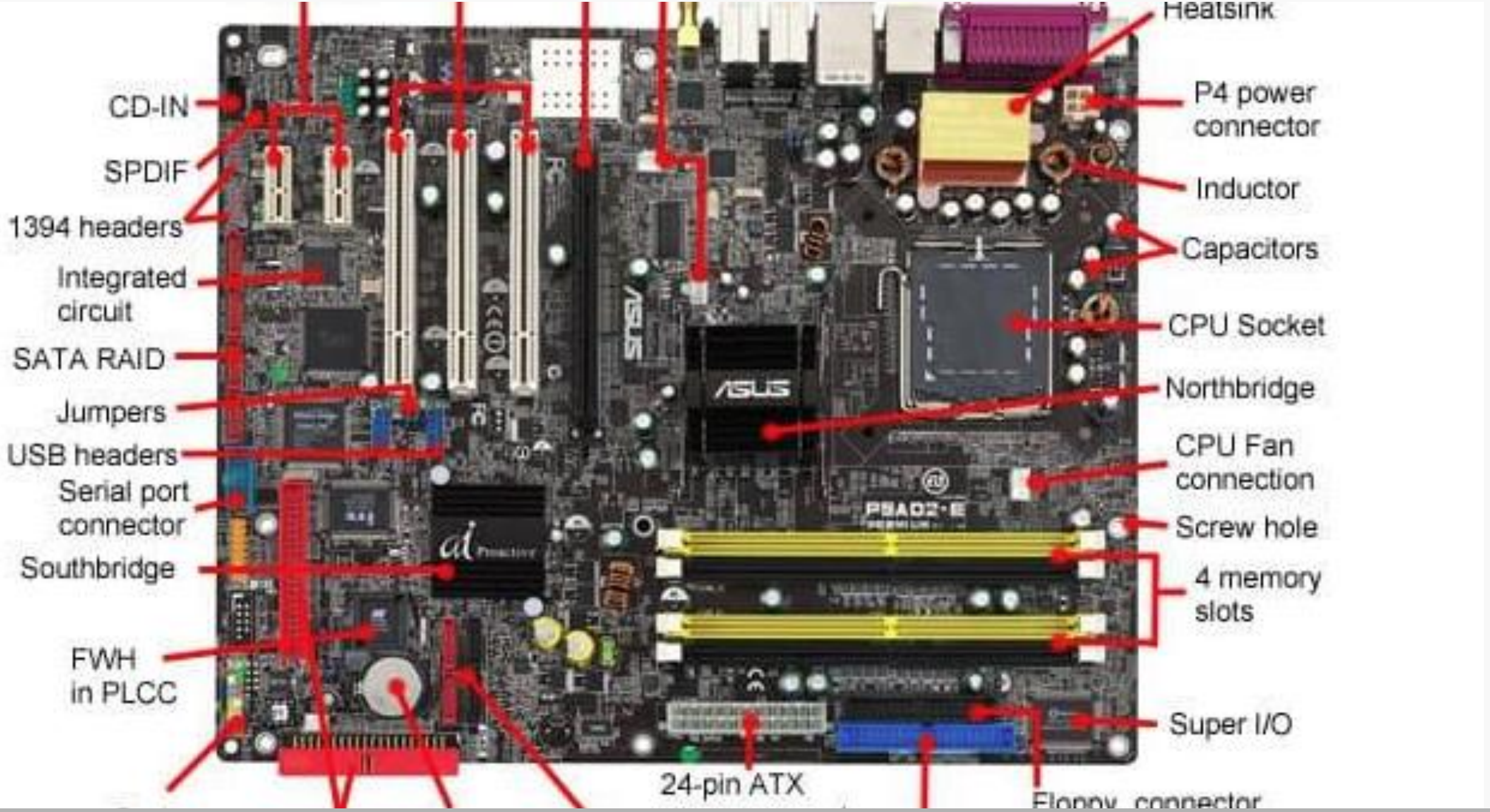
What is a typical speed for a modern CPU to run at?

Multiprocessing and Dual-core

- Symmetric Multiprocessing (SMP)
  - Providing multiple CPU sockets on the motherboard
  - Usually a feature of server systems
- Chip Level Multiprocessing (CMP)
  - Each CPU contains multiple “cores”
  - Each core works as a (more-or-less) independent CPU
  - 2-core, 4-core, and 8-core models available

System and Expansion Bus Technologies

- Motherboard is a printed circuit board with buses connecting processors
  - Data
  - Address
  - Timing
  - Power
- System bus (Front Side Bus) between CPU and system memory
- Expansion bus (Input/Output Bus) between CPU and other processors

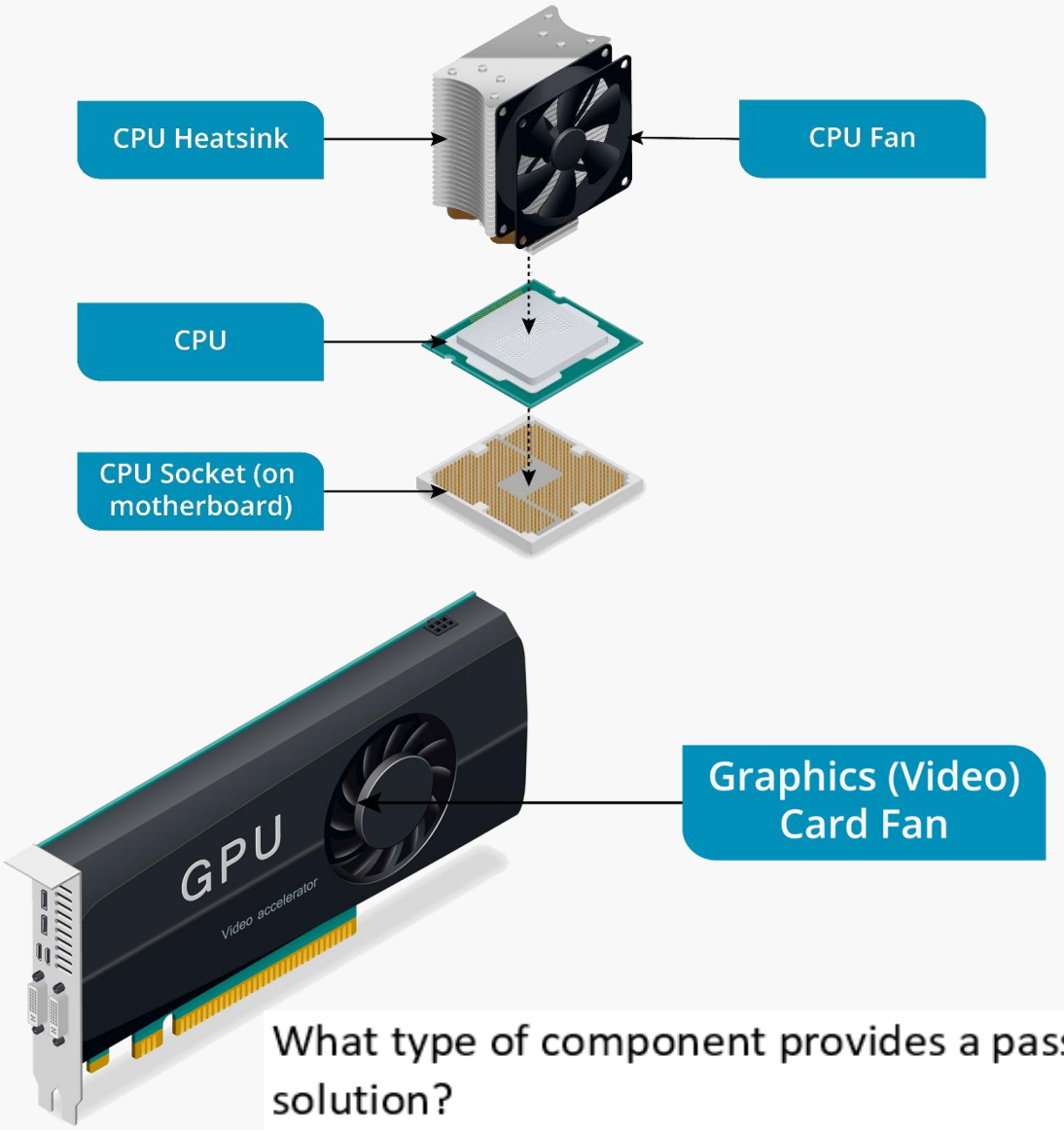

Heatsink
CD-IN
SPDIF
1394 headers
Integrated circuit
SATA RAID
Jumpers
USB headers
Serial port connector
Southbridge
FWH in PLCC
P4 power connector
Inductor
Capacitors
CPU Socket
Northbridge
CPU Fan connection
Screw hole
4 memory slots
Super I/O
24-pin ATX
Floppy connector

Expansion Bus Types

Bus	Bandwidth	Notes
PCI (32-bit)	133 MBps	Very old but still used on some desktops for compatibility; bandwidth is shared between all devices attached to the bus.
AGP	2133 MBps	Used for old graphics adapters only.
PCI Express (PCIe) 1.0	250 MBps per lane	Can use x1, x2, x8, or x16 lanes depending on the size of the slot; uses point-to-point links so each device gets the full bandwidth of the number of lanes it supports.
PCIe x16	4 GBps	Graphics adapters typically use x16 lanes.
PCIe 2.0	500 MBps per lane	Version 2 doubles the bandwidth per lane.
PCIe 2.0 x16	8 GBps	
PCIe 3.0	1 GBps per lane	Version 3 doubles the bandwidth per lane again.

You want to purchase a computer with a fast graphics interface. What type of expansion slot should you look for?

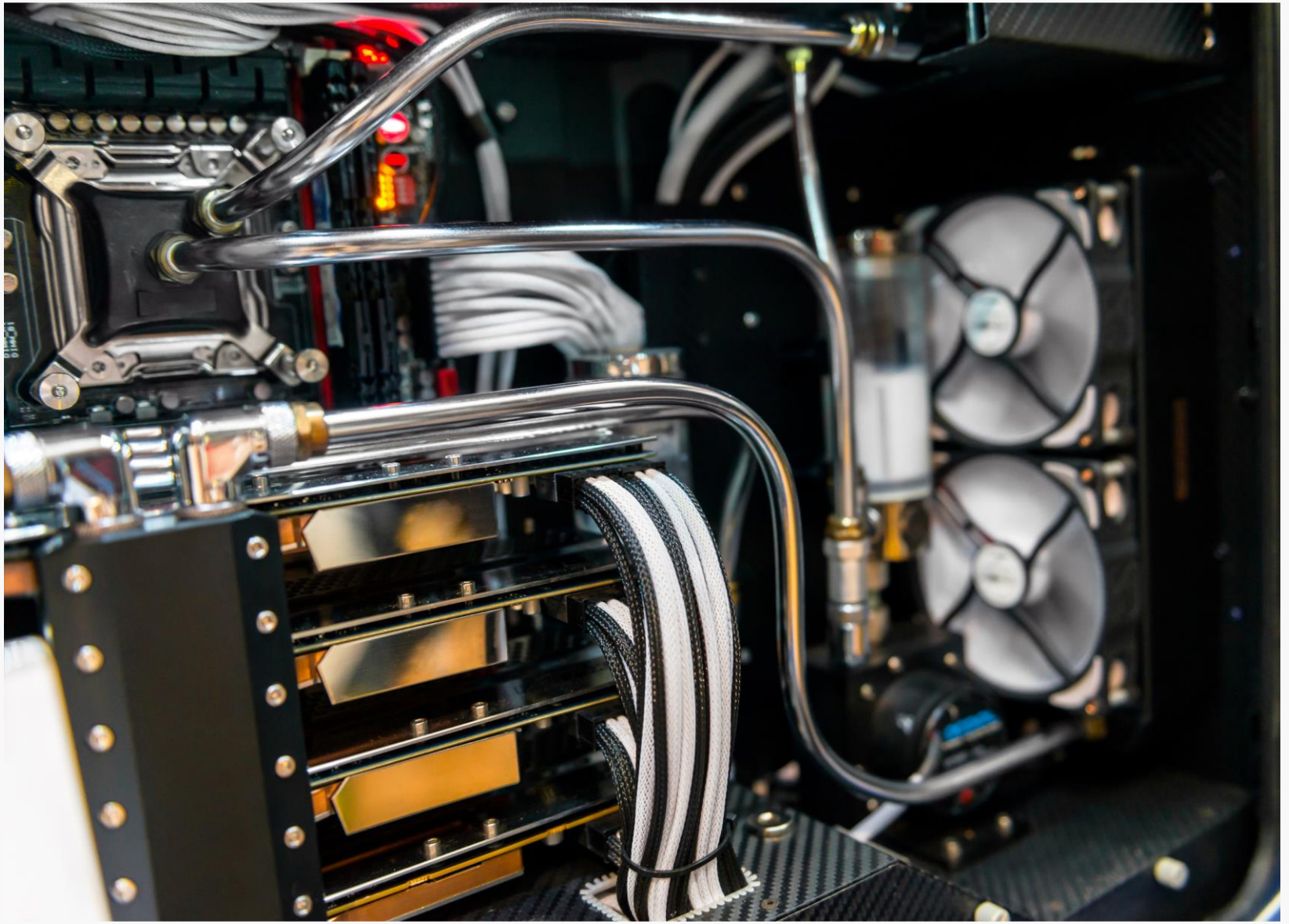
System Cooling



What type of component provides a passive cooling solution?

- Heatsinks and thermal paste
  - Passive cooling
  - Transfer heat by convection
- Fans
  - Active cooling (powered)
  - Dissipate warm air from component
  - Case fans draw cool air through front vents and expel warm air through back

Liquid-based Cooling Systems

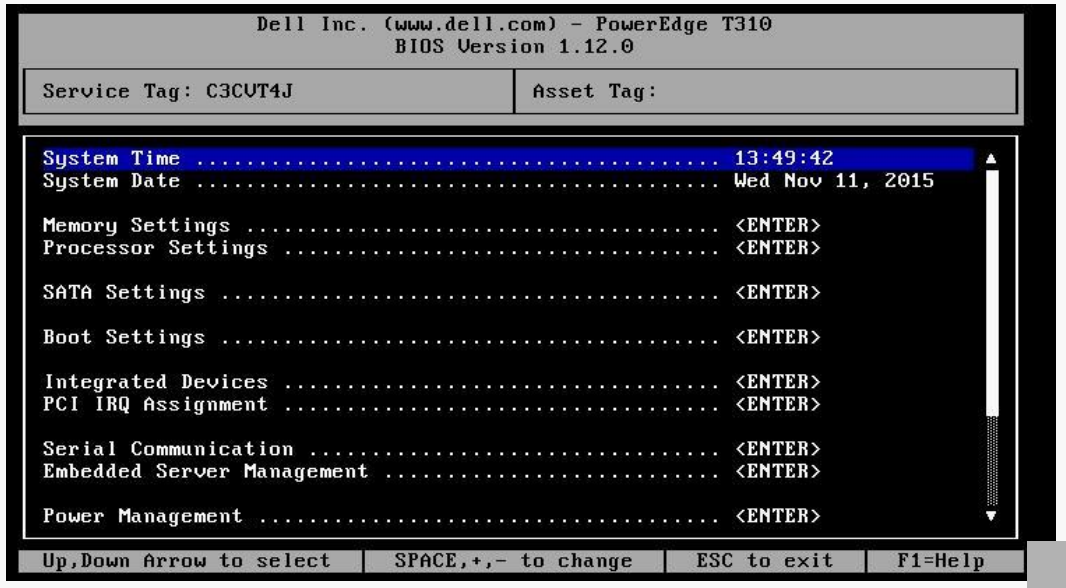


BIOS and UEFI System Firmware

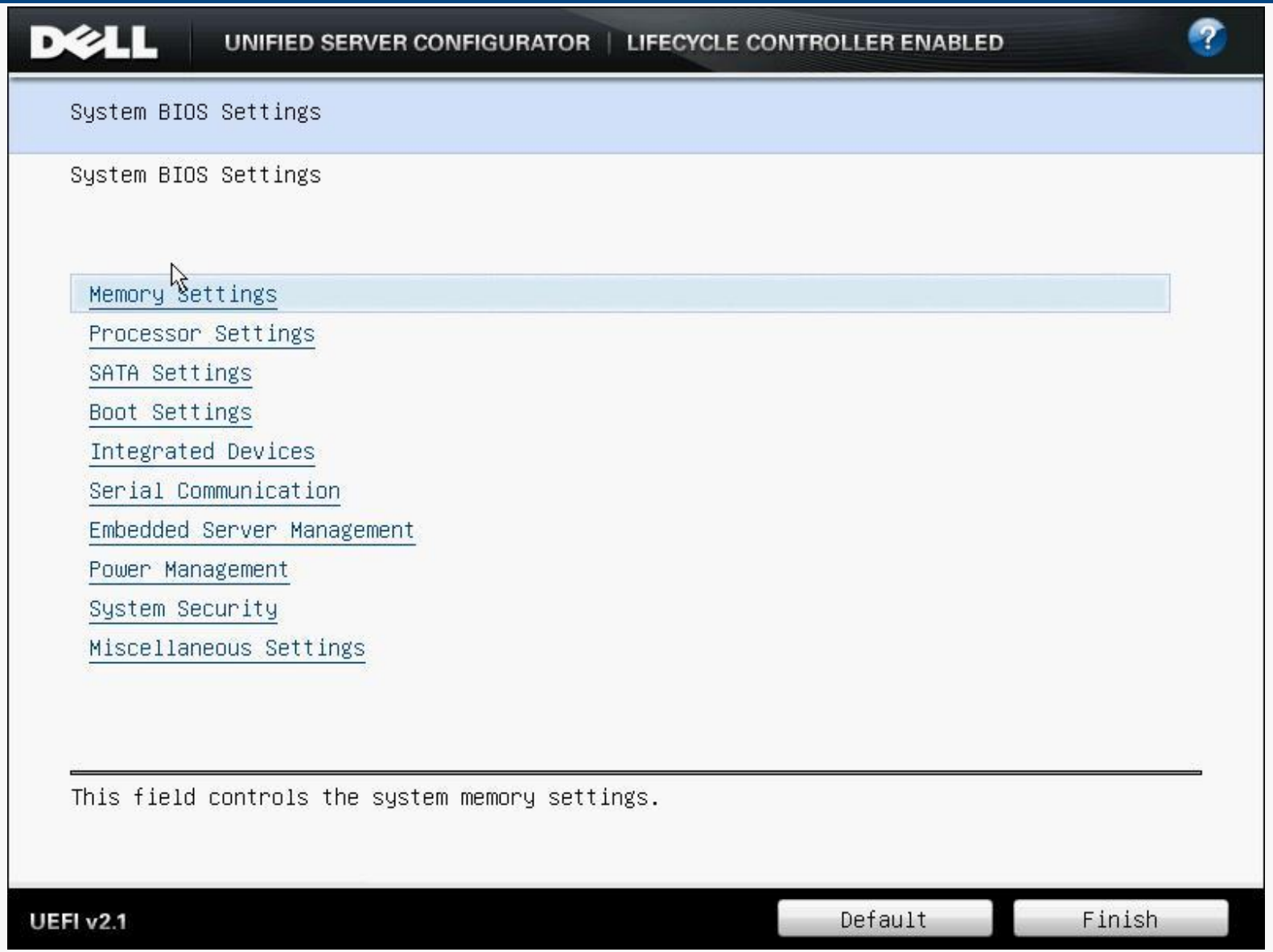
- Bootstrapping (booting)
  - CPU starts and initializes other components
  - Occurs before operating system loads
  - Controlled by PC firmware
- BIOS (Basic Input/Output System)
- UEFI (Unified Extensible Firmware Interface)

System Firmware Setup Program

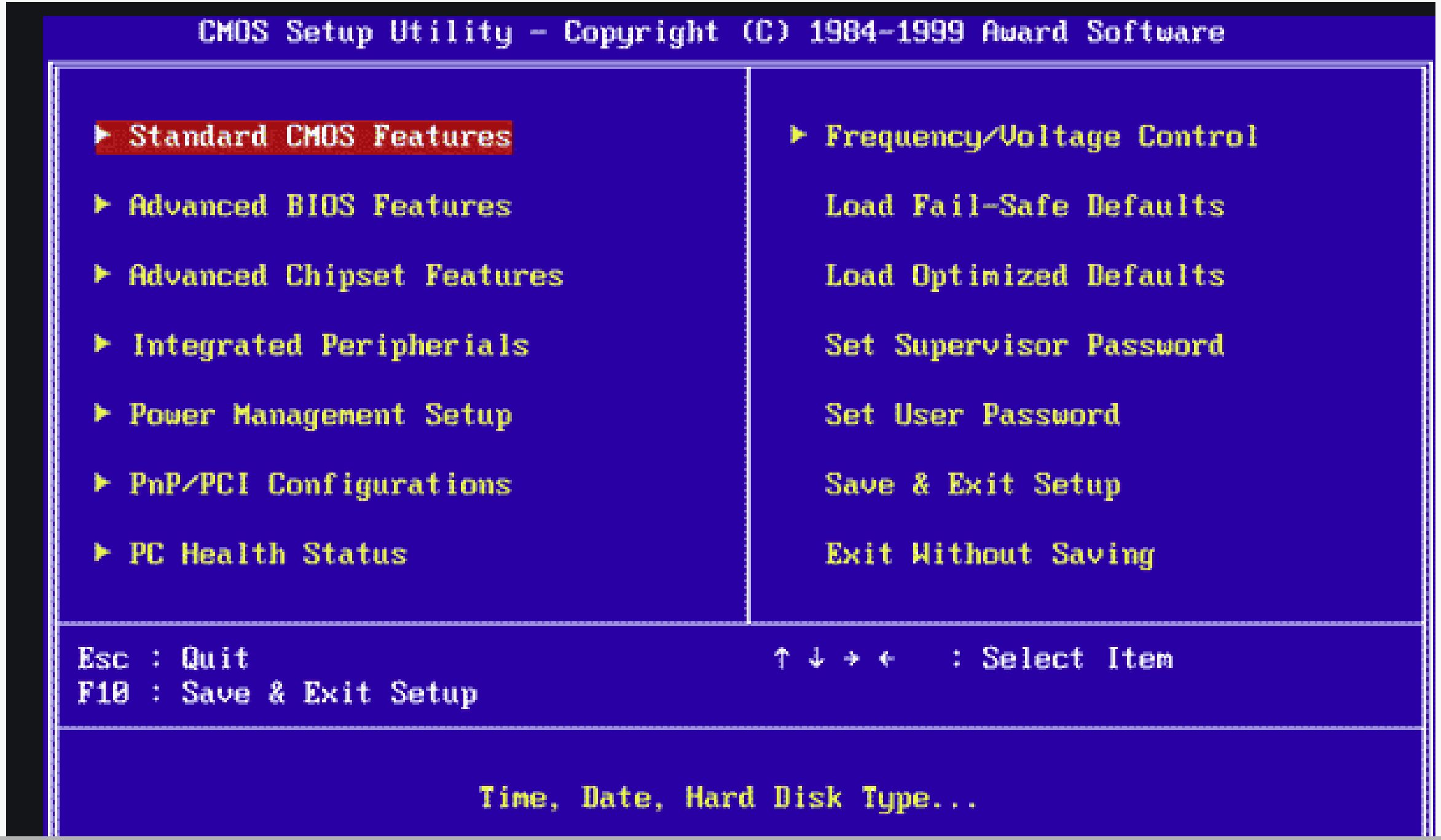
- Press a key during boot sequence—look at screen or refer to documentation
- Navigate using keyboard and ESC



UEFI Setup Programs



Both UEFI and BIOS are low-level software that starts when you boot your PC before booting your operating system, but UEFI is a more modern solution, supporting larger hard drives, faster boot times, more security features, and—conveniently—graphics and mouse cursors.


CMOS Setup Utility - Copyright (C) 1984-1999 Award Software
Standard CMOS Features
Advanced BIOS Features
Advanced Chipset Features
Integrated Peripherials
Power Management Setup
PnP/PCI Configurations
PC Health Status
Frequency/Voltage Control
Load Fail-Safe Defaults
Load Optimized Defaults
Set Supervisor Password
Set User Password
Save & Exit Setup
Exit Without Saving
Esc : Quit
F10 : Save & Exit Setup
↑ ↓ → ← : Select Item
Time, Date, Hard Disk Type...

Review

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