

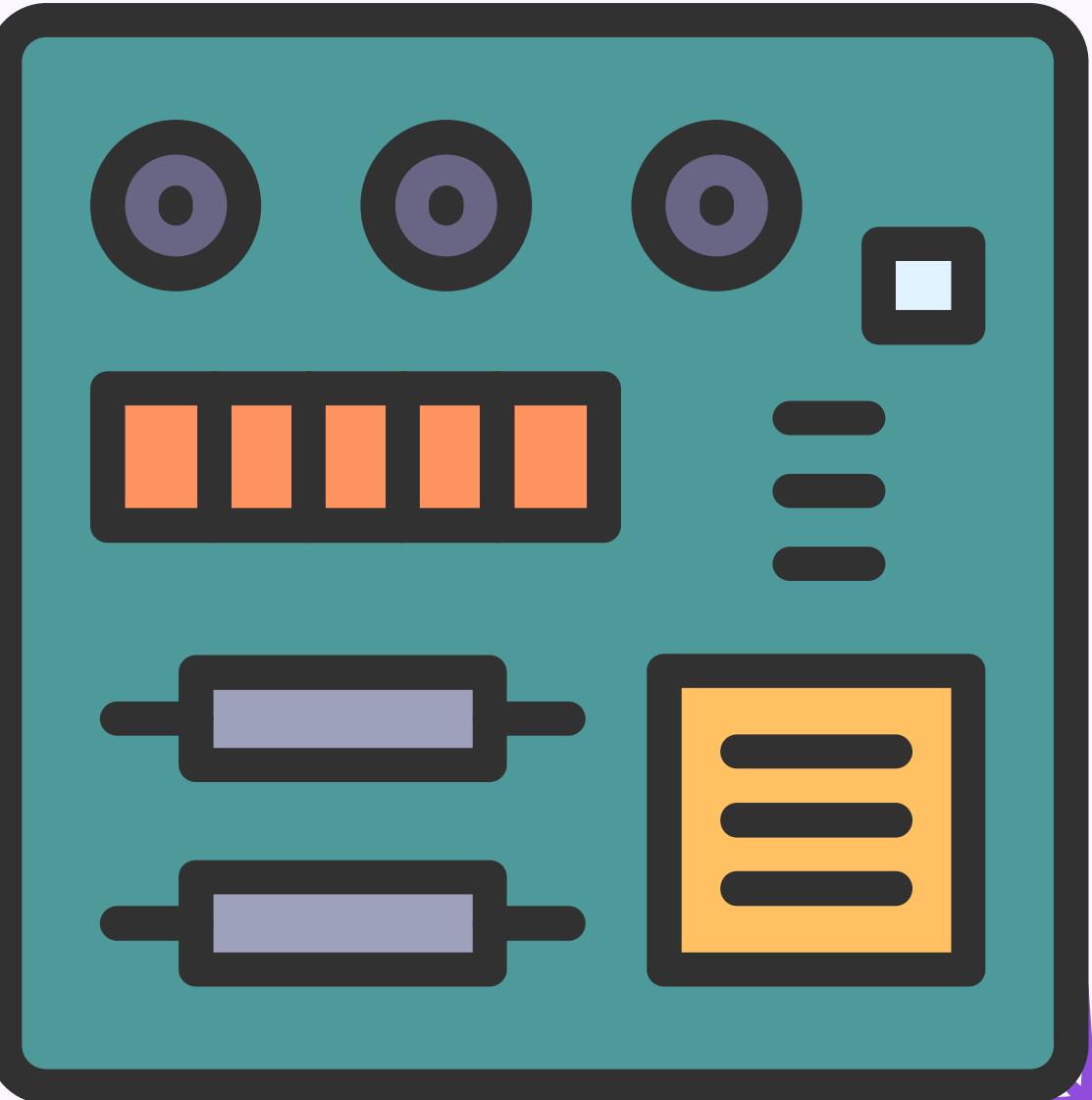
# Motherboards

CIS 1102N: Portfolio #5

# Introduction

What is a motherboard? The motherboard is the foundational part of any computer, serving as the central hub or backbone that connects all important hardware. Its components include the central processing unit (CPU), expansion slots, and system memory (RAM), it also manage data flow and power distribution to all parts of the system

The most important part of a motherboard is its form factor. This what sets the industry standard that dictates the board's physical measurements, the format of its parts, the location of its mounting holes, and the type of power supply it uses. The most important choice is the form factor in a PC build, as it determine case compatibility, expansion potential, and the system's overall footprint.



# The standards

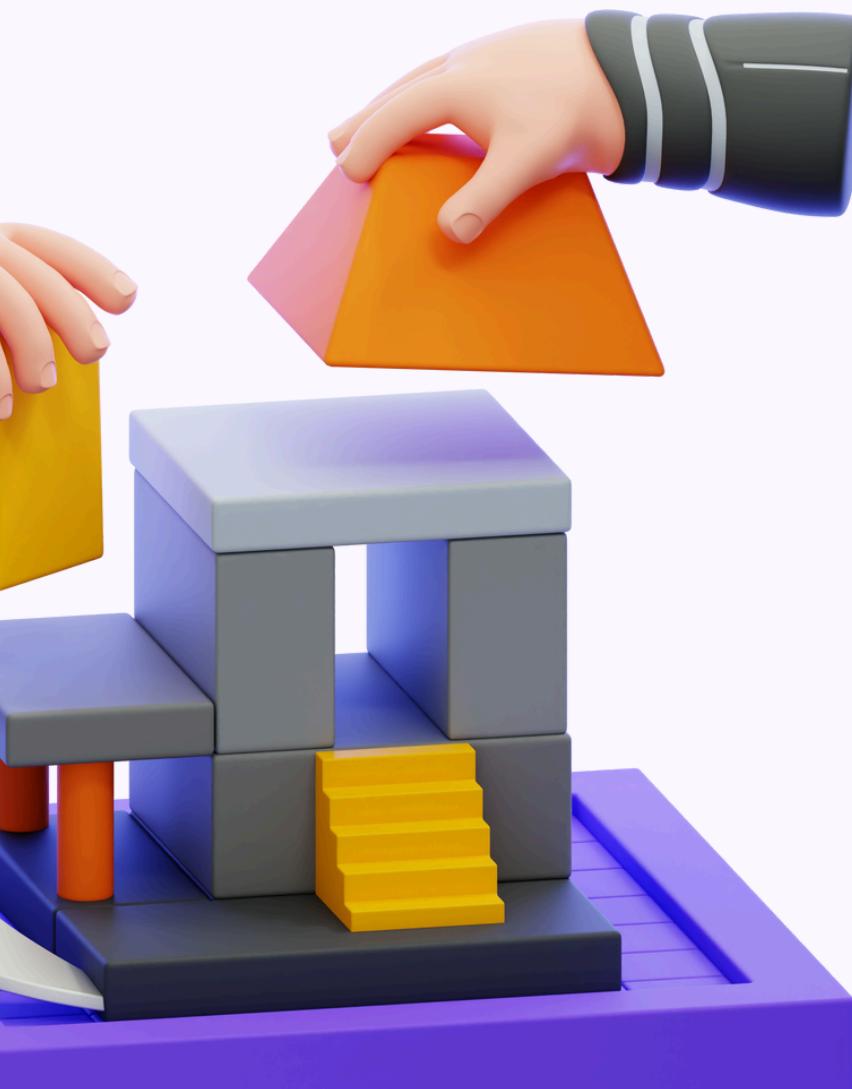
While dozens of types have existed, the modern computer community is dominated by three primary standard types: ATX, Micro ATX, and Mini-ITX. Additionally, we will also discuss the E-ATX and important legacy/obsolete types for historical context.

The trio represents the vast majority of consumer-grade motherboards. The major trade-off among the tree is size versus features.



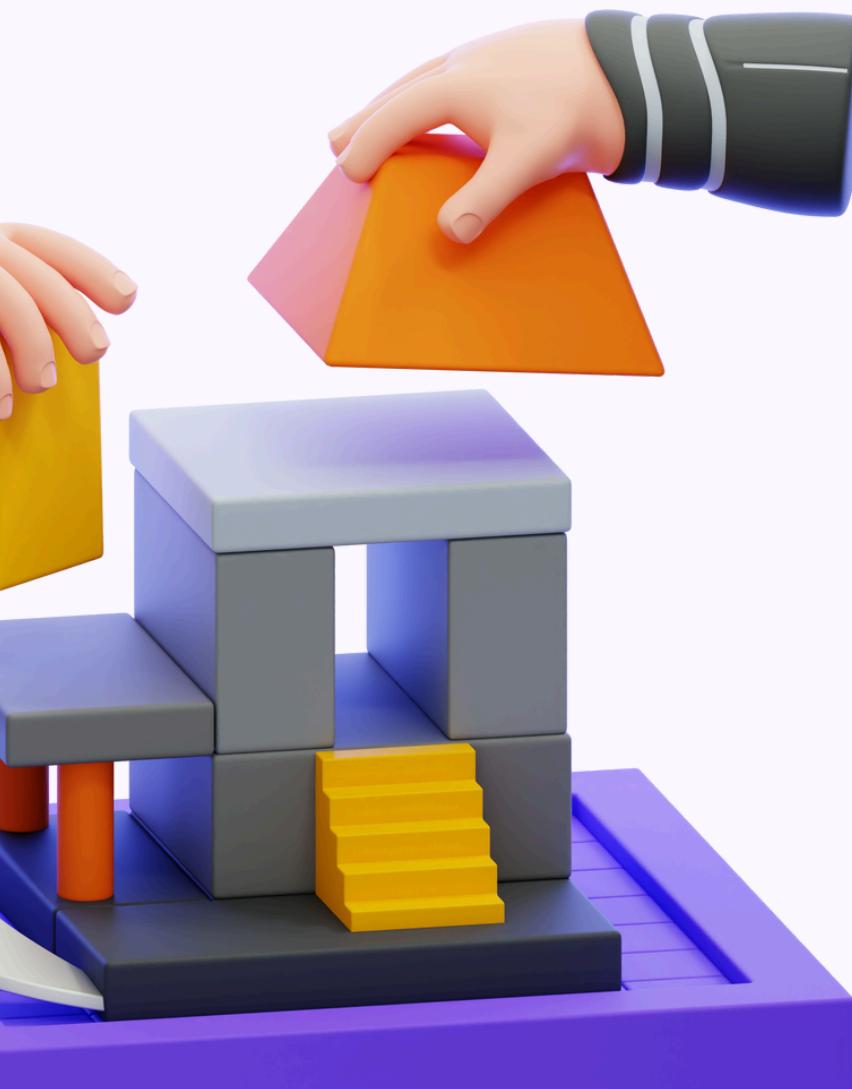
# Standard-ATX

The long standing industry standard for full-sized desktop PCs. It has a size of 12 x 9.6 inches. ATX offers the most expandability, typically featuring 3-7 PCIe slots, allows for one or more graphic cards including additional expansion card, capture cards, or high-speed. It provides 4 RAM slots, features. Robust number of 4-8+ SATA ports and often 2-3 M,2 slots for high speed SSDs. This is the default choice for gamers, content creators, and general desktop users who uses the maximum flexibility and future-proofing.



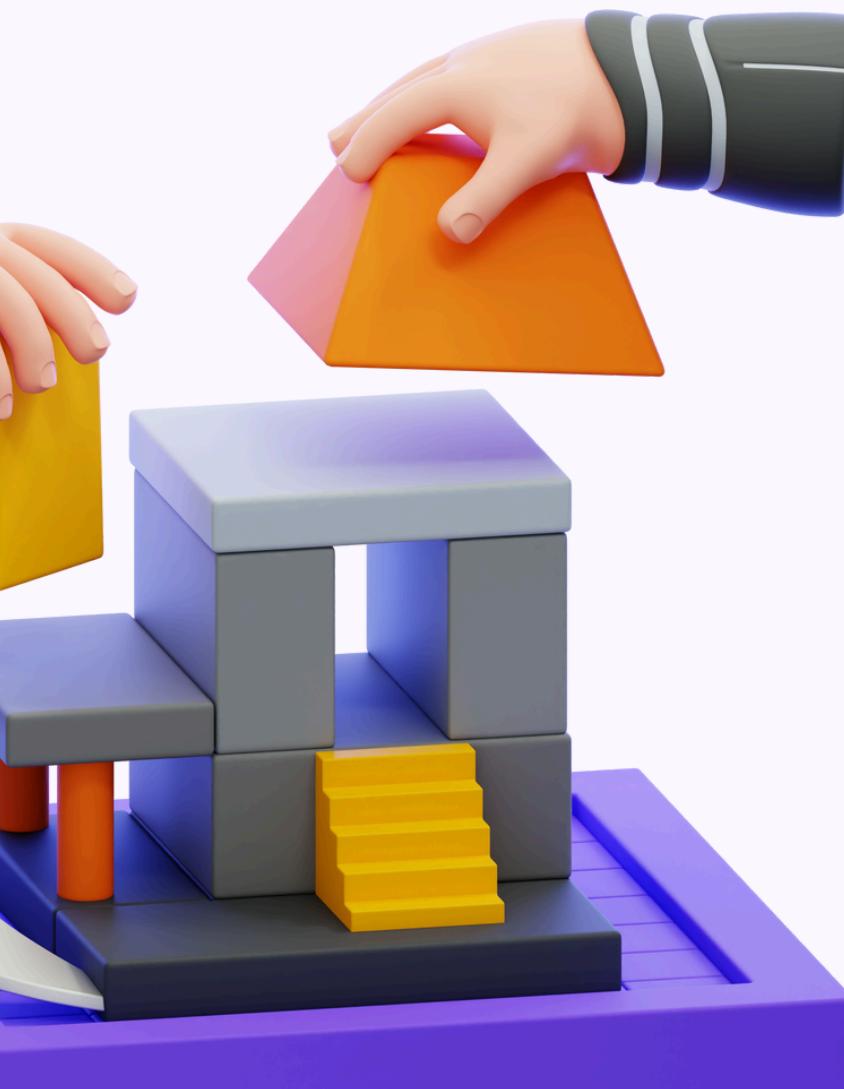
# Micro-ATX

The middle ground choice, with a size of 9.6 by 9.6 inches, it has the same width as ATX but is shorter. It compromises on expansions, offering only 1-4 PCIe slots, although is already sufficient for a primary graphics card and one or two other small cards. This typical contains 4 RAM slots, offering the same potential with the standard ATX. It has slightly reduced, but still ample number of ports. Ideal for budget-to-mid range builds and compact mini tower cases. Offers near full ATX usage set at a lower cost and in a smaller package.



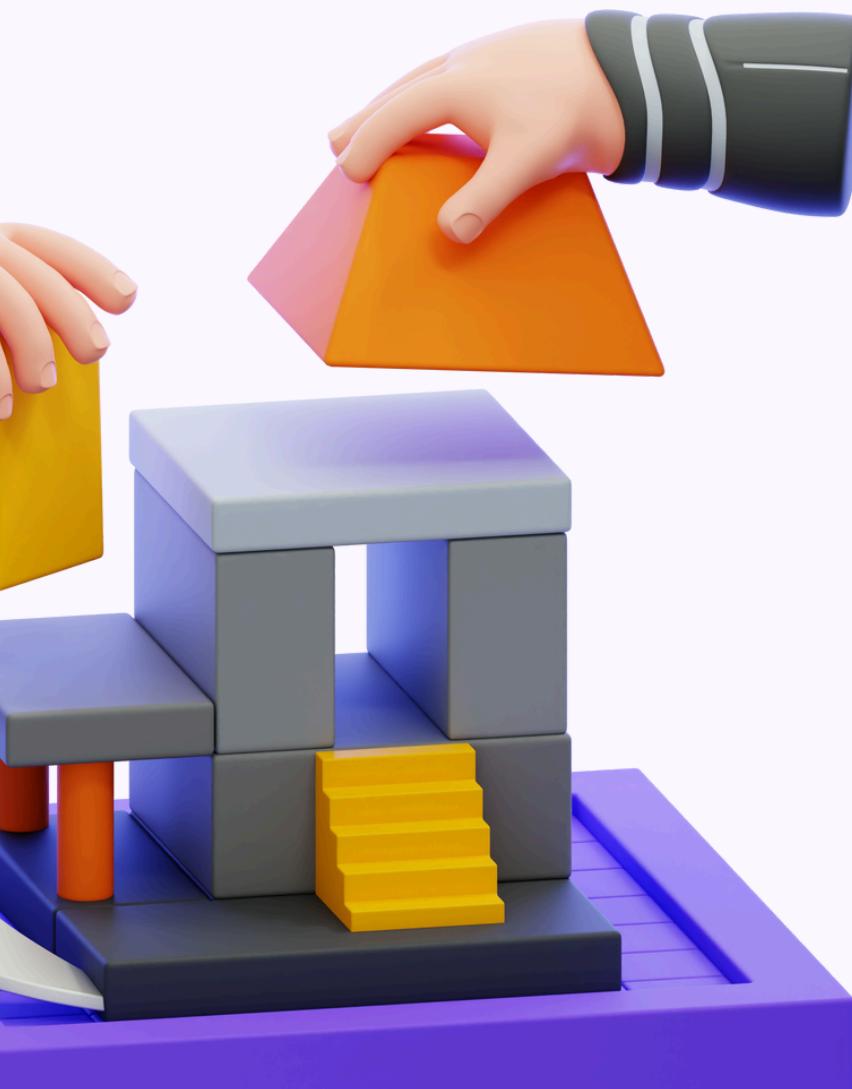
# Mini-ITX

The specialist form factor designed for Small Form Factor (SFF) builds. 6.7 by 6.7 inches, with expansion as its biggest trade-off. It has only one PCIe slot, which is reserved for the graphics card. There is no room for other add-in cards. It also only limited to 2. RAM slots. Due to space constraints, it has the fewer ports. This is exclusively for SFF or mini PCs, where space is primary concern. To make up for the lack of PCIe slots, these boards often come with premium built-in features, such as WI-FI and bluetooth.



# Extended-ATX

The enthusiast class, larger than ATX, though dimensions vary. E-ATX boards are designed for high-end PCs and workstation/server builds. The extra surface it provides is used for dual CPU sockets to run two processors simultaneously. It has 8 or more RAM slots for massive memory capacities, 4-8 PCIe slots for multiple graphics cards and other high-bandwidth hardware. Includes 8-12+ SATA ports and a numerous M.2 slots. The main uses for E-ATX are for professional workstations for 3D rendering or scientific computing, and high-end server applications.



# Obsolete & Legacy

## AT Motherboard

The predecessor to ATX from the 1980s and 90s. It was physically large and had an outdated design. Its major drawback was the lack of an integrated rear I/O panel; ports like serial and parallel were connected via ribbon cables to brackets on the case. It used legacy BIOS and IDE connectors instead of SATA.

## BTX

Balance technology extended is an Intel-led standard from the mid-2000s designed to replace ATX. Its main target was to improve thermal management by creating a straighter path for airflow across the CPU and graphics card. It became obsolete due to its failure to gain market adoption.



# Extended-ATX

The enthusiast class, larger than ATX, though dimensions vary. E-ATX boards are designed for high-end PCs and workstation/server builds. The extra surface it provides is used for dual CPU sockets to run two processors simultaneously. It has 8 or more RAM slots for massive memory capacities, 4-8 PCIe slots for multiple graphics cards and other high-bandwidth hardware. Includes 8-12+ SATA ports and a numerous M.2 slots. The main uses for E-ATX are for professional workstations for 3D rendering or scientific computing, and high-end server applications.



Motherboard	build	cpu-socket	memory slots	chipsets	BIOS	PCI Slots	SATA	Built-in features
AT Motherboard	Legacy	1 Socket	2-4 slots	Legacy (e.g., Intel 440)	Legacy BIOS	5-8 slots (ISA, PCI)	0 (Used IDE ports)	Keyboard port, serial/parallel ports (via headers)
ATX Motherboard	Modern Desktop	1 Socket	2-4 slots	Varies (e.g., AMD B650, Intel Z790)	UEFI	3-7 PCIe slots	4-8 ports	Rear I/O panel (USB, Audio, LAN), M.2 slots
BTX Motherboard	Obsolete Desktop	1 Socket	2-4 slots	Obsolete (e.g., Intel 915)	Legacy BIOS / UEFI	3-7 slots (PCI, PCIe)	2-6 ports	Rear I/O, improved thermal path
Extended-ATX Motherboard	Workstation/Server	1-2 Sockets	4-8+ slots	Varies (e.g., AMD TRX50, Intel W790)	UEFI	4-8 PCIe slots	8-12+ ports	Advanced networking (10Gb LAN), M.2, high-end audio
LPX Motherboard	Legacy (Slim)	1 Socket	2-4 slots	Legacy (e.g., Intel 440LX)	Legacy BIOS	1-3 slots (on a riser card)	0 (Used IDE ports)	Built-in serial/parallel/VGA ports on board

Motherboard	Build	Cpu slots	Memory slots	Chipsets	BIOS	PCI slots	SATA	Builtin Features
Micro-ATX Motherboard	Modern Desktop	1 Socket	2-4 slots	Varies (e.g., AMD A620, Intel B760)	UEFI	1-4 PCIe slots	2-6 ports	Rear I/O, M.2 slots (fewer than ATX)
Mini ITX Motherboard	Small Form Factor (SFF)	1 Socket	2 slots	Varies (e.g., AMD B650I, Intel Z790I)	UEFI	1 PCIe slot	2-4 ports	Rear I/O, M.2 (often 1-2), Wi-Fi/Bluetooth
Mini-ATX Motherboard	Obsolete (Compact)	1 Socket	2-4 slots	Obsolete (e.g., VIA)	Legacy BIOS	1-4 slots (PCI, AGP)	2-4 ports	Rear I/O
Pico BTX Motherboard	Obsolete (SFF)	1 Socket	1-2 slots	Obsolete (e.g., Intel 915)	Legacy BIOS	1 PCIe slot	1-2 ports	Basic I/O, designed for small/embedded systems
Standard ATX Motherboard	Modern Desktop	1 Socket	2-4 slots	Varies (e.g., AMD B650, Intel Z790)	UEFI	3-7 PCIe slots	4-8 ports	Rear I/O panel (USB, Audio, LAN), M.2 slots

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# Thank for listening!!

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