Types of Motherboards

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Introduction to Computing

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Introduction

Motherboards are necessary hardware used to connect all circuitry into one functioning component. Where, as stated by Ozsahin et al. (2021), motherboards are a physical component of the computer system, specifically it is a printed circuit board that utilizes each and every component of the computer, exemplifying the fact that each and every distinct piece of hardware is interconnected through the motherboard.

Discussion

As illustrated in the table, the following types of motherboards' form factors are identified, and its specifications including its size dimensions, number of Central Processing Unit (CPU) slots, number of memory slots, its application in the real world, allowed BIOS (whether it is Unified Extensible Firmware Interface, UEFI or Legacy), Number of Peripheral Component Interconnect Express (PCIe) Slots, Number of Serial Advance Technology Attachment (SATA) ports allowed for use and, if applicable, its type (Hard drives or Solid-State Drives), and together with its built-in features.

Advanced Technology eXtended (ATX) motherboards were developed by Intel in 1995, replacing the older, and slower AT motherboards. Where its dimensions measure up to 12 inches by 9.6 inches. It includes 1 CPU Socket, up to 4 memory slots, Up to 2 to 3 PCIe slots with a bandwidth of 16x, allowing for the use of graphics card units with 16 high-way lanes for high-performance transfer of graphics. It also supports up to 4 to 8 SATA Ports, including NVMe M.2 and SSDs. ATX motherboards also support both UEFI and Legacy BIOS. With features including Wi-Fi Support, HDMI and Display Ports, USB Ports, Ethernet Connectivity, and CPU-Overclocking depending on the model of the ATX motherboard. ATX motherboards are commonly used for personal computers (PCs) at home, for office desktops, or for workstations (*ATX: Advanced Technology eXtended - Uncover the Advantages*, 2023).

Subsequently, as per Lolvvv (2023), Extended-ATX (or E-ATX) motherboards measure up to 12 inches by 13 inches with 1 CPU slot for standard E-ATX setups and 2 CPU slots for professional setups. It also includes up to 8 memory slots, and supports UEFI BIOS for the newer models, where Legacy BIOS is said to have started to be phased out for the newer models, with up to 8 PCIe slots and 6 to 8 ports. With the high demanding tasks, it also requires high capacity storage with 6 to 8 SATA ports. Extended-ATX motherboards are used for high-performance tasks, commonly used in servers, and demanding simulations.

Thereafter, with the Micro-ATX motherboard measuring up to 9.6 by 9.6 inches, this motherboard has 1 CPU slot and can carry up to 4 memory slots, with the minimum of 2 slots. It

can support both Legacy or UEFI BIOS, with up to 1 or 2 PCIe slots of 16x bandwidths. It can support up to 4 to 6 SATA Ports and is compatible with HDMI, or Display Ports. This motherboard also features Wi-Fi connectivity. Because of its small design, it is commonly used for small and efficient desktop builds, and home theater PCs, which is essentially a small computer used for streaming entertainment services. Ultimately, its purpose saves space while not decreasing efficiency (*Why MicroATX Builds Are the Future of Compact PC Gaming*, 2023).

Following with the Mini-ITX motherboard measuring up to 6.7 by 6.7 inches featuring 1 CPU socket, up to 2 memory slots, 1 PCIe slot, and up to 2 to 4 SATA ports. The Mini-ITX motherboard supports UEFI or Legacy BIOS and includes everything a micro-ATX motherboard has except it is smaller and has lesser memory slots and PCIEe slots. It is also used for small personal computer setups and is a much more versatile option for smaller desktop builds (*ITX: Advantages of Using ITX Motherboards & Liquid Cooling in an ITX System*, 2023).

Lastly, we have the Mini-ATX motherboard with a size of up to 5.9 by 5.9 inches with 1 CPU socket. It features up to 2 memory slots, 1 16x bandwidth PCIe slot, 2 SATA Ports, and supports Legacy or UEFI BIOS, and is commonly developed as small form factor (SFF) devices such as the home theater setups used for streaming entertainment purposes. Its features include Wi-Fi connectivity, HDMI and Display Port connections, Storage (SATA), and USB ports. (*Mini-ATX: Compact Power for Efficient Builds*, 2023)

Consequently, it is evident that each motherboard has its specific purpose, from use, to variety, and all the way to versatility, it serves as the very backbone of the entire computer system. Without it, each hardware would not function as intended, much like that of the human spine, where the human nervous system connects to and reaches to every part of the human body. The motherboard acts as the spine of the computer system, and links to each and every single piece of hardware in order for the entire system to function.

Table 1. Specifications of Motherboards

Form Factor	**Build**	**CPU Slots**	**Memory Slots**	**Application**	**BIOS**	**PCIe Slots**	**SATA**	**Built-In Features**
ATX Motherboard	Up to 12 inches x 9.6 inches	1 slot	Up to 4 slots	Desktop, Personal Computers	Legacy, Unified Extensible Firmware Interface (UEFI)	2 to 3 slots (x16 bandwidth)	4 to 8 Ports	CPU Socket, Memory Slots, PCIe Slot, Ethernet Port, Wi-Fi, USB Port, Supports CPU-Overclocking, HDMI Port, Display

								Port
Extended-ATX Motherboard	Up to 12 inches x 13 inches	1 to 2 slots	Up to 8 slots	High-performance tasks, Servers, Demanding Applications	UEFI (Newer Models)	8 slots	6 to 8 Ports	CPU Socket, Memory Slots, PCIe Slots, WiFi,, Ethernet Port, USB 4.0 Ports, Supports CPU-Overclocking, HDMI Port, Display Port
Micro-ATX Motherboard	Up to 9.6 inches x 9.6 inches	1 slot	Up to 2 to 4 slots	Small Form Factor	Legacy, UEFI	1 to 2 slots (x16 bandwidth)	4 to 6 Ports	CPU Socket, Memory Slots, PCIe Slot, Ethernet Port, USB Port, USB-C Port, Wi-Fi 6, Supports CPU-Overclocking, HDMI Port, Display Port
Mini-ITX Motherboard	Up to 6.7 inches x 6.7 inches	1 slot	Up to 2 slots	Small Form Factor	Legacy, UEFI	1 slot (x16 bandwidth)	2 to 4 Ports	CPU Socket, Memory Slots, PCIe Slot, Ethernet Port, Integrated Wi-Fi, Ethernet Port, M.2 Storage, Slot, HDMI Port, Display Port
Mini-ATX Motherboard	Up to 5.9 inches x 5.9 inches	1 slot	Up to 2 slots	Small Form Factor	Legacy, UEFI	1 slot (x16 bandwidth)	2 Ports	CPU Socket, Memory Slots, PCIe Slot, Ethernet Port, Wi-Fi, M.2 Storage Slot, HDMI Port, Display Port, USB Port

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