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Portfolio Number 5: Comparative Study on Different Types of Motherboards

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## Introduction

A motherboard is one of the most important components in a computer. As it is called the "spine" of the computer, just like the spine in our human body which is a significant support to how we anatomically operate, the motherboard has a significant purpose to the structure of the computer. With the motherboard's presence, all other components, from the smallest CPU to the biggest Graphics Cards, can operate and can work for the computer. This component serves as both housing and as a bridge for all components. As a housing, the motherboard holds the other components in place. While it may also be for connectivity purposes, the placement in which they are placed in allows them to stay in place and stay always connected with each other, unless there is a presence of physical interference. For example, the CPU is held in place by the motherboard which not only allows it to be connected at all times, it has a part which allows the CPU to avoid falling off. As the bridge for all components, the motherboard serves as the hub for all these other components. These said components are connected to the motherboard in which they will work as one to make the computer run, and all this is because of the power of the motherboard.

A motherboard not only houses the components and connects them, but the motherboard also houses the peripherals of used by the computer. All modern motherboards contain USB slots, headphone/earphone jacks, and many more which allows not just internal hardware parts to be connected to it, but also the external hardware parts. This shows that the motherboard handles almost all hardware processes in the computer, both internally and internally, and processes them into the complex thing that is the computer.

It is not an understatement to say that without the motherboard, the computer would literally not exist. The motherboard allows a variety of things to happen to the computer. It is essential that without it, all these other components would be rendered "useless" as well the entire computer system not existing in the first place. With the technology evolving, the motherboard needs to handle more complex and more advanced processes, hence, it must also advance on its own to keep up with the demands of the users, the companies, and the other components, hence, we have motherboards ranging from the simpler AT motherboards until the more standardized and frequently used ATX motherboards.

## Discussion

Throughout the years, motherboards have evolved in order to keep up with the demands of not just the users, but also for the other components. Motherboards have turned from something that is only used to run computers into something that enables a lot of things, such as servers, systems, and many more. With this in mind, there are various aspects that one has to consider in order to be see which motherboard fits right for your needs as different variants have different specializations, different features, and are much better than the others.

First off, the Advanced Technology Motherboards or the AT Motherboards. This type of motherboard is one of the oldest of the variants, being developed in 1984, it is one of the first few motherboards used by many. As expected, while being functional, the features it gives are relatively dated, hence, being used less frequently in the modern day. On the contrary, we can see some features being continued for the preceding types of motherboards.

The next one is the Advanced Technology Extended Motherboards or the ATX Motherboards, which was the first upgrade from the AT motherboards. This type of motherboard is a step up from what AT motherboard with it being more reliable as well as being more power efficient than the AT motherboards. Other than that, there wasn't really much of a big impact, but ATX motherboards are more advanced than the AT motherboards.

The Balanced Technology Extended or the BTX motherboard was a motherboard developed by Intel themselves, meaning, most models of this type of motherboard are generally limited to only being compatible with Intel chipsets. While there are BTX motherboards that are compatible with AMD, it is limited and that is one of the reasons for its failure. Alongside incompatibilities, the BTX failed to reach the audience as it was clear that ATX motherboards are better in overall performance. While BTX has better cooling, it was clear that ATX would be better.

The Extended ATX (EATX) Motherboards are ATX motherboards that have been improved both in size and their functionalities. The primary difference between these 2 are the sizes, but the adjustment of sizes allowed the EATX motherboards to be a step up from the standard ATX as it allows more space for more functionalities and better performance options to be implemented.

The Low-Profile Extension or LPX Motherboard was a popular motherboard back in the 1990s. According to the name itself, its goal was to reduce the size and the cost of desktop computers. While it was not a motherboard that stood out, there was also nothing bad out from it, hence, despite being no longer used in today's age, its principles and design goals have influenced other motherboard designs, hence, making it still somewhat relevant for today's motherboard market.

The Micro-ATX Motherboard, from the name itself, was an ATX motherboard that was reduced in size for compactness. From the size of 304 mm x 244 mm from the ATX, the Micro-ATX Motherboard has managed to shrink it down to 244 mm by 244 mm. For compactness, it is a great option as the reduction of size did not sacrifice any functionality as enough expansion slots are provided in order to get close to a full ATX Motherboard.

The Mini Information Technology Extended Motherboard or the Mini-ITX Motherboard is an even smaller motherboard sizing at around 170 mm x 170 mm in size. This makes it even more compact than the Micro-ATX Motherboard. It is a compact sized motherboard that is specifically designed for computer builds that require full-featured capabilities in a compact sizing. They are quite popular with the general consumers as well as industrial computing systems.

The Mini-ATX from the name itself, is yet again a smaller variant of the ATX Motherboard. This motherboard is even more compact than the Micro-ATX with it having the size of around 284 mm by 208 mm. And the same as the Micro-ATX, despite its size, it still provides ample expansion slots for it to be comparable to standard ATX Motherboards.

The Pico-BTX is the smaller variant of the BTX Motherboard. From the size of the BTX being 325 mm x 266 mm, it was reduced to 203 mm x 266 mm. It essentially functions quite the same as the BTX motherboard despite its size, but just like the BTX, there are more preferred motherboard form factors which makes the Pico-BTX just shy of being a popular and widely used motherboard.

**The page below shows the table for comparison.**

Form Factor	Build	CPU Slots	Memory Slots	Chipsets	BIOS	PCI Slots	SATA	Built in Features
AT Motherboard	305 mm by 280 mm	Since it is a relatively old motherboard, it supports older Intel and AMD CPUs with limited cores and features.	It has the typical 2-4 slots for Memory	This motherboard can either use an Intel or AMD chipset depending on the model. As for its type, it can either be northbridge or southbridge like most older motherboards.	It utilizes the Legacy BIOS which is commonly used by older motherboards	Like most motherboards, there are about 4 PCI slots available for AT Motherboards.	SATAs were invented in 2003, hence, AT Motherboards did not have any SATA connections	It has 2 nearly identical 6-pin power connectors, and it has Industry Standard Architecture (ISA) busses aside from the PCI slots.
ATX Motherboard	305 mm by 244 mm	The CPU slot is located near the top, with memory slots nearby. This positioning allows expansions slots to be positioned below, followed by connectors, power supply, and other peripherals.	It has 4 or more memory slots	This motherboard can also use either Intel or AMD chipset. Like most modern computer, use Platform Control Hub (PCH)	ATX Motherboards can either use Legacy BIOS or Unified Extensible Firmware Interface (UEFI)	2 or more slots for dual graphics card	6 or more SATA connections	ATX standards promote the use of power supplies with high efficiency ratings, supports high performance components, multiple expansion slots, and efficient cooling. They also have a wide range of compatibility for computer cases and components.
BTX Motherboard	325 mm by 266 mm	It has one CPU slot that is position at a 45 degrees angle, it measures 18 by 23 mm For a better ventilation	The typical 4 Memory Slots	Northbridge chipset which allows for better airflow and better cooling than ATX. They are also widely incompatible with AMD as BTX were developed by Intel.	Essentially has the same BIOS as an ATX Motherboard	Can support up to 7 PCI or expansion slots	There are about 2 – 6 SATA connectors in a BTX motherboard.	The BTX motherboards, compared to ATX, has a better airflow, better stability in terms of build as well as reduced latency.
Extended-ATX Motherboard	344 mm by 330 mm	The EATX Motherboard's CPU supports dual channel for some models	There are about 4 - 8 slots for EATX	The E-ATX, just like the ATX motherboards, is compatible with both Intel and AMD chipsets	Just like the ATX motherboard, it utilizes an UEFI BIOS.	Has multiple slots for expansion and has 4-8 PCI-E	Just like the standard ATX, it has a lot with it having 6 – 8 SATA ports.	Massive amount of space to install memory, more expansion ports for GPU, the size allows the board to cool components and offer the

								ability to overclock.
LPX Motherboard	229 mm by 330 mm	The CPU slot is located near the chipset and the memory slots which ensures the motherboard's proper access to power delivery and management systems.	The typical 4 slot for the memory	LPX Motherboards are generally compatible with both AMD and Intel chipsets	It most likely utilizes Legacy BIOS due to it being commonly used for older motherboards.	Due to the goal of compact design, the LPX motherboard had 1 PCI slot and 1-2 ISA slots which are mounted to the riser card.	This motherboard, like the AT motherboard, was developed and was popular in the 1990s and was last used in 1998, which was prior to SATA's development, hence, this has no SATA.	It uses a riser card, has different placement of video, parallel, serial, and PS2 ports compared to other motherboards. It is much slimmer than computers using a Baby-AT motherboard.
Micro-ATX Motherboard	244mm by 244mm	The CPU slot in a micro-ATX is a CPU socket. It is compatible with specific CPU models.	4 slots	Just like the standard ATX-Motherboard, the Micro-ATX motherboard is compatible with both Intel and AMD chipsets.	ATX Motherboards can either use Legacy BIOS or Unified Extensible Firmware Interface (UEFI)	Often 1 or 2 PCI slots	Modern Micro-ATX motherboards have at least 4 SATA connectors.	Micro-ATX offer enhanced power delivery, support for DDR4 RAM for high speeds, Integrated Wi-Fi 6 and USB ports, and PCIe 4.0 for faster data transfer.
Mini-ITX Motherboard	170 mm by 170 mm	The CPU in mini-ITX motherboards is on board, meaning, it is embedded into the circuit.	It contains 2 memory slots	It is compatible with both Intel and AMD chipsets	The Mini-ITX motherboard, just like all other modern motherboards, utilizes UEFI BIOS	It has 1 PCI Express slot, and it has a PCI slot that can support 2 devices with the use of a riser card	Mini ITX motherboards offer 5 or more SATA connectors, often providing 6	It has CD-ROM and DVD-ROM drives available, it consumes less power, is backwards compatible with cases for Micro-ATX and other ATX variants, it has cross-platform support.
Mini-ATX Motherboard	284 mm by 208 mm	Mini-ATX generally have one CPU socket with them designed to accommodate to full-size processors, the same with standard ATX motherboards	2 – 4 memory slots	The same as with other ATX motherboards, it is compatible with both AMD and Intel chipsets.	The same with all other ATX motherboards, it utilizes UEFI BIOS	Usually has 2 or 4 PCI slots	Mini-ATX motherboards usually have around 4 - 6 SATA connectors depending on the model.	They are compact compared to regular ATX while outputting similar or roughly similar results, it still provides enough expansion

								slots despite its size, and they are also compatible for a lot of cases and components.
Pico-BTX Motherboard	203 mm by 266 mm	Like the BTX motherboard, the CPU slot of a Pico-BTX motherboard is also rotated at a 45-degree angle	Only 1-2 Memory Slots	Northbridge chipset which allows for better airflow and better cooling than ATX. They are also widely incompatible with AMD as BTX were developed by Intel.	Essentially has the BIOS as an ATX or a Micro-ATX motherboard and the BTX motherboard	Can only support 1-2 PCI or expansion slots	Pico-BTX generally has 2 SATA ports, sometime even fewer.	The Pico-BTX motherboards, like the BTX motherboards has a better airflow, better stability in terms of build as well as reduced latency.
Standard-ATX Motherboard	305 mm by 244 mm	The CPU slot is located near the top, with memory slots nearby. This positioning allows expansions slots to be positioned below, followed by connectors, power supply, and other peripherals.	4 or more slots	This motherboard can also use either Intel or AMD chipset. Like most modern computer, use Platform Control Hub (PCH)	ATX Motherboards can either use Legacy BIOS or Unified Extensible Firmware Interface (UEFI)	2 or more slots for dual graphics cards	6 or more SATA connectors (Minimum of 4)	ATX standards promote the use of power supplies with high efficiency ratings, supports high performance components, multiple expansion slots, and efficient cooling. They also have a wide range of compatibility for computer cases and components.

**Note: Both ATX Motherboard and Standard ATX Motherboard refer to the same thing**

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