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Portfolio Number 6: Comparative Study on Different Types of Computers

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## Introduction

In the modern age of technology, countless gadgets and devices have been created that has shaped the way we approach the different tasks in our lives. From the simple everyday tasks that makes it more convenient for us to the field of profession that each of us are in. One of these technologies, is the computer. Britannica (N.D) defines modern computers as automated electronic machinery used in our day-to-day life. These devices have the capabilities to a lot of things that normal human computations isn't able to do such as processing large amounts of information, handling a large sum of data, and a lot more things that makes tasks and jobs easier to do. With the current market for computers evolving, it has turned into a process of seeking for better and more reliable systems each time, with companies upgrading to better and faster computers. Computers are without a doubt, an essential to the world of technology. They are the key to accessing other technological devices, and the key to be able to create them. It offers so much more than mere tasks as they have grown to be more and more useful in various fields. With the current society now, majority of the professional work relies on computers, and it is understandable as the amount of possible work to do has heightened with the help of this device. Research, Data Management, and Analysis are only but a fraction of what is possible with computers.

We define phones as essential in our daily lives as they offer a variety of purposes and fixes a lot of inconveniences in our life, but imagine a phone but bigger, and more powerful, albeit less portable. Even indirectly, the convenience of computers is felt by the general public. Xiao and Guo (2020) states that the convenience of computers is the simplest as their real functions are not directly felt by us, for instance, we can feel the convenience from the fields of automation, aerospace, medicine, health, scientific research, and criminal investigation, just to name a very few. It is an undisputed fact that computers are the key for society's future. Whether it is the small conveniences to the big and lifestyle changing, computers will be with humanity, helping for all its development.

## Discussion

Computers are not limited to one thing; they define much more things. There are various examples of computers, such as the Supercomputers, Mainframe Computers, Minicomputers, Servers, Workstations, and Micro Computers, there are more types as computers can go deeper, but the main topic of the discussion will be those 6 types. With the rise of the age of computers, they have, in a way, separated themselves from each other in which they specialize themselves in an area or field of study.

Firstly, we have the Supercomputer. Supercomputer is currently the fastest and the most powerful type of computer in the modern age. This term is used to classify the fastest high-performance systems available with its capacity to do so much more than what a normal computer can. This computer is generally very expensive; hence, its use is usually limited to government-funded research that require high-speed computations that normal computers are not able to reach, but as the prices of these supercomputers declined, more businesses have utilized this system for their own use. Common applications for this type of computer include mathematical models, complex phenomena such as climates and weather, space studies, nuclear weapons and reactors, chemical compound research, cryptology, and many more. (Britannica, N.D).

Britannica (N.D) states that mainframe computers are digital computers designed for high-speed data processing that utilizes the use of input or output units such as large-

capacity disks and printers. This type of computer is the one usually found in businesses and large companies with its most common application being its application as payroll computations, accounting, business transactions, information retrieval, airline seat reservations, and scientific and engineering computations. It is less powerful than supercomputers but is still able to perform high speed calculations that is sufficient for businesses due to its price difference with supercomputers (Britannica, 2019).

The next type of computer is the minicomputer which is defined as the middle system between the Supercomputer and Mainframe Computer to the regular Personal Computers. It is smaller and less powerful and expensive than the former, but more expensive and more powerful than the latter. They were popularized in the 1960s and 1970s due to their abilities to do high speed calculations as well such as for scientific and engineering computations, business transactions, file handling, and database management, but eventually lead to its decline in popularity in the 1980s and 1990s as it was replaced with more powerful personal computers and workstations (Britannica, 2019).

Next is the Server which is also called as a network computer. Servers are computers that process the requests of clients and work on the computations in line with what the client wants to achieve. There are various uses for servers as they are flexible in what the owner can do, whether it is for storing data or for managing other devices, the server can do a lot of things that one desires to do (Britannica, 2024).

The workstation is a type of computer that is designed for a single user which has more advanced capabilities than what regular personal computers can do. It is used by companies due to its powerful abilities such as graphics capabilities, large storage capacity, and a powerful CPU that can enable high level computations and tasks. They are much more capable at rendering; hence, they are often chosen for professional settings (Britannica, 2019).





Lastly, we have microcomputers which are electronic devices with a microprocessor as its CPU. Originally, it was used to define personal computers, particularly, small digital computers in which the CPU is contained on a single integrated conductor chip. Most common microcomputers of the modern age are the laptops and desktops, but others also consider Tablets, Smartphones, and single-board computers such as the Raspberry Pi as well as microcontrollers such as Arduino and Beagle Board as microcomputers (Britannica, 2016).



Table of Comparison:

Type of Computer	Name/Brand	Build	CPU	Memory	Processing Speed	Calculating Power	Working Principle	Energy Consumption	Field of Use
Supercomputer	Frontier Supercomputer	372 square meters (4 004 sq ft)	<p>It has a base clock of 2.0 GHz up to 3.7 boosted clock</p> <p>The CPU includes 64 cores and 128 threads</p> <p>Has up to 128 mb L3 cache</p>	It has 9.2 Petabytes of memory (Half Bandwidth Memory and Half DDR4), 37 petabytes of node-local storage and 716 petabytes of center-wide storage	It is powered by one AMD Optimized 3 <sup>rd</sup> Gen EPYC with 64 cores and base clock speed of 2.0 GHz and 3.7 GHz boost clock.	The frontier supercomputer reached 1.102 exaflops of sustained performance on high Performance Linpack (HPL) and reached 6,88 exaflops in AI performance. MIPS is not usually used to measure the performance of modern supercomputers	This type of computer, unlike normal computers, has multiple CPUs that is grouped into nodes which includes a processor or a group of processors (symmetric multiprocessing) – and memory block. This allows supercomputers to be better at containing data and networking.	It can consume up to 40 megawatts at its peak	This type of computer is used in identifying next-generation materials. Its stronger capacities and specifications allow scientists and researchers in identifying next-gen materials.
Mainframe Computer	IBM Z16 Mainframe Computer	2.5 square meters (27 sq ft)	<p>It has a clock of 5.2 GHz</p> <p>2.5 million Instructions per Second</p> <p>It has 8 cores per CPU in which one system has CPUs, totaling to 256 cores</p> <p>The Telum Processor has 22 billion transistors</p> <p>32 Mb Cache per core</p>	Its maximum physical memory size depends on the number of Central Processor Complex (CPC) drawers with each drawer having at least 10 TB of storage for at least 40TB of storage for a system.	It has the Telum processor, in which each drawer has 8 and each system has 32 has 8 cores, allows it to have a speed of 5.2 GHz	The IBM Z16 main computer achieved a ratio an MIPS ratio of 2.5 MIPS with heavy workload and steadily goes down to 1 as the workload lightens. Its AI accelerator allows it to have a maximum capacity of 200 TeraFLOPS.	Mainframe computers contain networks, crypto, storage, and compression cards that have their own processors and memory, alongside system assist processors which speeds up data transfer, as well as processors for running Linux, Java, and other workloads.	The IBM can consume up to 10,378 watts but may vary depending on the workload.	It is used in a variety of fields such as banks, airlines, retailers, finance, government, healthcare, utilities, and many more due to its reliability, availability, and serviceability.
Minicomputer	ASUS NUC 14 Pro	The tall chassis has the dimensions 117 x 112 x 54 mm, while the slim chassis has 117 x 112 x 37 mm dimension	<p>It has a clock of 1.4 GHz</p> <p>It has a total of 16 cores</p> <p>24 Mb Intel Smart Chip</p>	It supports 2 Small Outline Dual In-line Memory Module (SO-DIMM) and up to DDR5-5600 which speed up to 5600 MHz	It can be in a variety of CPU, but the highest one is using the Intel Core Ultra 7 Processor 165H which has 16 cores and a speed of 1.4 GHz	There is currently no public statement in regards with this system's FLOP units and/or MIP units	Minicomputers, much like regular computers, use microprocessors for processing information. It uses an eight bit but has a rather limited memory.	It comes with a power supply of up to 120 watts. It usually hovers around 8-9 watts on standby and up to 88 watts while under load.	This type of computer was used for scientific and engineering computations, business transaction processing, file handling, as well as database management.
Server	Cisco UCS X-Series	Its dimensions are 1.71 in, x 14.92 in x 10.15 in. (4.3 cm x 37.9 cm x 25.8 cm) and weighs 8.5 lb. (3.9 kg)	<p>It has a clock speed from 3.0 GHz up to 5.8 GHz</p> <p>It consists of 40 cores per processor, totaling to 80 cores</p> <p>Has 60 MB cache</p>	It contains 32 256GB DDR4 Memory, totaling up to 8 terabytes of main memory	It has 2 3 <sup>rd</sup> Gen Intel Xeon Scalable Processors in which each consists of 40 cores	There is currently no public statement in regards with this system's FLOP units and/or MIP units	A server's process has different processes. First is receiving the request of a client, which then the server receives that data and applies the necessary computations, and then sends back the data	The testing shows that the Cisco UCS X-Series has a power consumption of 1,010 Watts of power.	Servers can be used in any field, even personally, but it is mainly used by large companies like online gaming servers in which servers are utilized to host game sessions, managing player interactions, synchronizing the game data, connecting

							requested by the client.		players worldwide, and many more.
Workstations	HP Z2 G9 Tower Workstation	Its dimensions are height: 14" (356 mm), width: 6.7" (169 mm), and depth: 15.2" (385 mm)	It has clock from 3.0 GHz up to 5.8 GHz  It has 24 cores and 32 threads  26 Mb Intel Smart Cache	This workstation can support up to 128 GB or memory	It can support up to the Intel Core i9-13900K Processor which has 24 cores with 3.0 GHz up to 5.8 GHz	There is currently no public statement in regards with this system's FLOP units and/or MIP units	Workstations are like normal computers which utilize the Central Processing Unit to process the virtual information. Aside from that, workstations offer a higher level of multithreaded performance than standard PCs with their more powerful processors.	The power supply of the workstation can come with the 500 watts up to 700 watts	Workstations are used by industries or fields that require higher performance computers than regular PCs, such as the creative field in which 3d design, animation, video editing, content creation, and rendering, which requires powerful components, are needed.
Micro Computers	Small scale computers, such as the Asus ZenBook S14	Its dimensions are Width: 31.03 cm (12.22")  Depth: 21.47 cm (8.45")  Height: 1.19 (0.47")	It has a clock of 2.2 GHz  Has 8 cores and 8 threads  And has 12Mb cache	Its main memory is one 32GB LPDDR5X Memory	It features a Intel Core Ultra 7 Processor 258V 32 GB which has 8 cores and 2.2 GHz up to 4.8 GHz	The Neural Processing Unit (NPU) of the Asus ZenBook S14 achieved 47 trillion of operations per Second (TOPS)	This type of microcomputers (laptops) works the same way a normal computer, using the CPU and the other hardware components, only being less powerful at times.	As it comes with a 65W power adapter, it can consume up to 65 W when plugged in but can vary a lot when unplugged.	This microcomputer is used by the general public and have no specific fields, but are widely used for fields that require convenience to computer access, such as entrepreneurship, academic, etc.

Table of Classification

Type of Computer	Sample Image	Description	Usage
Supercomputer		Supercomputers are the fastest computers. They are capable of very high-speed computations that they are only used when necessary.	Supercomputers are used by the government for things such as next gen research and experiments that require calculations that normal computers are not capable, such as new discoveries, computing complex phenomena, etc.
Mainframe Computer		Mainframe computers are also considered as high-speed computers second to supercomputers. While being less powerful, it can still be able to perform high speed calculations.	For its price which is less than a supercomputer, this is used by businesses for a lot of purposes such as computations, accountancy, business transaction processing, and many more possible things.
Minicomputer		Minicomputers are the middle-ranged computers being less powerful and expensive than supercomputers and mainframe computers but being more powerful than the average personal computers. They are also smaller than regular sized computers but can still deliver high-end performances.	Minicomputers were used by businesses back in the 1960s and 1970s for their high-end ability to do calculations, computations, transactions, processing, etc. It eventually lost popularity as it was replaced with more powerful systems, capable of doing more.
Server		Servers, also known as network computers, are designed to process the request of a client, do the necessary processing, and then send back the data to a user.	Servers have a lot of uses such as data storage, managing other devices, connecting multiple users to a single network, and many more. It is a flexible type of computer with a wide variety of possible usage.

Workstation		Workstations are computers that is designed for users to do more advanced capabilities that regular personal computers. It has a lot of powerful capabilities in many fields.	This type of computer has a variety of uses in different fields as it can perform high end calculations, rendering, a large storage capacity, and many more, hence why they are mostly used in a professional setting.
Microcomputer		Microcomputers are computers that we use in our day-to-day life. They aren't necessarily low-end computers, but compared to the other types, they are the slowest ones in terms of overall performance. Microcomputers can range from personal computers, to laptops, to even microcontrollers.	Microcomputers are what we use in our daily life in order to complete simple tasks. Unlike the other computer types, this type of computer is designed to help the user complete tasks that is only necessary for the average person such as web browsing, file manipulation, file creation, and many other things that we do in our personal computers, laptops, and even in our phones.

Compare and Contrast

A.) Minicomputer

The minicomputer has a processing speed of 1.4 GHz, having a memory capacity of up to 32 GB of DDR5 Memory. It usually consumes about 88 watts of power under workload. This type of computer can be used to run businesses as this was used in various fields or areas of study due to its price to performance ratio.

B.) Microcomputer

The microcomputer can have a processing speed of 2.2 GHz up to 4.8 GHz, depending on what type of microcomputer you are using and its components. Most microcomputers, specifically laptops, can have up to 32 GB or memory in which the type will depend on the model. A laptop's power consumption depends on a lot of variables, but once plugged in, it usually consumes about 65 watts. Laptops are used a lot, from the field of academic to running managing businesses, as they do not require high-end calculations and the fact that laptops are portable.

C.) Workstation

Workstations can reach the processing speed of 3.0 GHz up to 5.8 GHz and has the ability to reach 128 GB of memory capacity. It consumes a lot of power, hovering around 500 watts to 700 watts depending on the workload. This type of computer is usually used in professional settings due to its high-end capabilities as compared to personal computers and laptops.

D.) Server

Servers have a processing speed of 3.0 GHz to 5.8 GHz and a main memory capable of reaching up to 8 terabytes of main memory. It can consume about 1,010 watts of power as it is a multi-purpose computer that can be used in a lot of things due to its versatility, from data sharing, device connections and management, web hosting, and many other things that can do.

## **Conclusion**

In the world of computers, there really isn't one device that you can point at and say that you want that device to do all the work. At the end of the day, it all boils down to how you want to use it and if you can afford. You must know first on what really you want to do with that computer and examine yourself, is it good enough, or is it too good for it. While we can get a powerful computer for simple tasks, is it really worth the price? For managing a small business, do you really need a mainframe computer? Or settling for workstations would be sufficient? At the end of the day, while supercomputers can do anything, one does not really need to own it. Having a computer good enough to achieve your goals and tasks is what matters, hence, the reason why there are various types of computers. They are there to cater to you need without financial sacrifices or without having the burden of loud and powerful computers around. If you really need it and if you are willing to invest in it, then that is when you can upgrade as most of the time, having a workstation, or even just laptops are good enough for regular users. To sum it all up, if you can and you really need it, or if you really want it, then go for it as it can be beneficial. But if you can't, it is not a big deal as upgrades are only there for maximum efficiency and power. If your current system can keep up with your demands, goals, and tasks, then it is absolutely alright to stick with it.

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