

## **PORTFOLIO# 6**

### **Comparative Study on Different Types of Computers**

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#### **Introduction:**

We are living in an era where we cannot live without computers. A Computer is an electronic device that can accept data, process the data according to specified rules, produce results, and stores the results for future use operating under the control of instructions stored in its own memory. The computers are available in different types and specifications (Sooraj, A & Sooraj G., 2020). There are currently numerous varieties of computers, each intended for a certain use case or purpose, as a result of the diversity of computer systems. These consist of workstations for demanding jobs, mainframes for handling massive volumes of data, and minicomputers for little enterprises, resource management and hosting servers, and everyday microcomputers, commonly known as personal PCs. (Singh, 2024).

#### **Discussion:**

A comparative study of different types of computers highlights their unique features, capabilities, and applications. Supercomputers are the most powerful systems, designed for complex tasks like climate modeling, molecular simulations, and cryptographic analysis. They operate with immense processing power, handle massive datasets, and are primarily used in research institutions and government projects. Mainframe computers, while less powerful, are highly reliable and efficient for handling large-scale transactions, making them ideal for banking, government, and enterprise-level operations. Mini computers serve as a middle ground, offering moderate power for departmental tasks in small businesses, laboratories, and manufacturing. Servers, on the other hand, are designed to manage resources and provide services such as web hosting, database management, and cloud computing, playing a central role in IT infrastructure. Workstations cater to professionals in fields like engineering, animation, and scientific research, delivering high performance for resource-intensive tasks. Lastly, microcomputers, including desktops and laptops, are the most widely used due to their affordability and versatility, handling basic tasks like education, office work, and personal use. Overall, each type of computer is tailored to specific needs, balancing processing power, cost, and usability to address diverse applications.

**Table 1 :**

Types of Computers	Name/Brand	Build	CPU	Memory	Processing Speed	Calculating Power	Working Principle	Energy Consumption	Field of Use
Super computer	IBM Summit, Cray XC40	9 , 000 sq ft.	High-performance CPUs (e.g., IBM POWER9)	TBs of RAM, 2.4 million GB DDR4	4,608 nodes with 2 CPUs per node	Peta FLOPS	Parallel/Distributed, Procedures details utilizing parallel calculating throughout thousands of CPUs speeding up tasks completed between-nodes Communication .	Very high, 1-10 megawatts on average	Used for complex scientific simulations (e.g., weather prediction, climate modeling, molecular research), artificial intelligence, cryptography, and astrophysics. Essential for national security, space exploration, and big data analytics in fields like genomics.
Mainframe Computers	IBM Z Series	19 - inch rack	High-end (e.g., IBM z15) 5.2 GHz clock speed; Multi-core with 12 cores; 33 MB L3 cache	Up to 40 TB DDR4 RAM	Up to 190 processor cores per system	As much as about 12,000 MIPS moderate GFLOPS performance for Group Transaction loads	Works through centrally located handling, suited for high availability, fault tolerance as well as extensive	About 5-10 KW	Backbone of industries requiring large-scale transaction processing, such as banking (ATMs, financial records), government (tax systems, census), and airlines (ticketing,

										reservations . Handles multiple users simultaneously with reliability and security.
Mini Computers	HP	Desk-sized enclosure	HP Precision Architecture CPUs; 2.2 GHz clock speed; Moderate multi-core; Integrated cache	32 Mb to 1 GB	Based on the user's set up	~300 KIPS; ~20 MFLOPS for multi-user tasks	Applications for multiple users surroundings architecture, Facilitating concurrent handling of several tasks through sharing resources	1 - 2 KW	Supports small-to-medium businesses for inventory management, production control, and data collection. Commonly used in laboratories, research institutions, and educational setups for specific applications.	
Server	Dell PowerEdge, HP ProLiant	2U rack server (3.5 in x 17 in x 26 in)	Intel Xeon Scalable CPUs; 3.8 GHz clock speed; Multi-core with up to 28 cores; 1.5 MB cache per core	Up to 3 TB DDR4	Varies on the server configuration	10 TFLOPS for GPU tasks; ~10,000 MIPS for CPU-intensive workloads	Executes Server-client construction to provide supplies and offerings to clients' equipment Throughout a Network	300–800 W per server	Powers websites, applications, and databases. Used for hosting online services, cloud storage, email systems, gaming servers, and enterprise-level data sharing. Critical for IT	

									infrastructure in businesses and organizations.
Workstations	Dell Precision , HP ZBook	Tower form factor (6.5 in x 21.7 in x 17.5 in)	Intel Xeon W; 4.1 GHz clock speed; Multi-core with up to 28 cores; 66.5 MB L3 cache	Up to 1.5 TB ECC RAM	Up to 1.5 TFLOPS for GPU workloads	2,000–5,000 MIPS; Robust TFLOPS for 3D simulations and rendering	Created for one user activities, tailored for superior performance workloads like 3D rendering or engineering simulations.	3000 - 6000 KW	Used in professional fields like engineering (CAD/CAM), animation, 3D modeling, video editing, financial analysis, and scientific research. Optimized for intensive workloads requiring precision and speed.
Micro Computers	Dell Inspiron or , MacBook	Compact laptop (11.97 in x 8.36 in x 0.63 in)	Apple M1; 3.2 GHz clock speed; 8-core CPU, 7-core GPU; Unified L2 cache	Up to 16 GB LPDDR4X RAM	Moderate processing for personal use	0.5 TFLOPS for GPU; ~1,000 MIPS for general tasks	Methods details using an combined SOC (System on Chip). Optimizing authority and performance. for each day. computing.	30 W	Designed for general personal tasks such as word processing, browsing, education, multimedia, and basic office work. Widely used in homes, schools, and small businesses for day-to-day operations.

**Table 2 :**

Types of Computers	Sample Image	Description	Usage
Supercomputer		<p>Supercomputers are massive systems created especially to tackle difficult industrial and scientific problems. ( Gioiosa, 2017).</p> <p>Supercomputers quickly and effectively address extremely complicated, large-scale problems ( Horne, 2015).</p> <p>Most powerful, processes massive data quickly</p>	<p>Quantum mechanics, weather forecasting, and gas exploration and physical simulations are just a few of the computationally demanding tasks that these applications cover (Gioiosa, 2017).</p>
Mainframe Computers		<p>A mainframe computer is a potent device that enables businesses to run financial models, auto mate, processes, and increase profitability. (Ghoshal, 2004)</p> <p>Big, costly computers that can handle hundreds or thousands of users at once (MainframeWiki, 2018)</p> <p>Large, reliable for handling huge transactions.</p>	<p>Powerful servers providing data storage, software, processing, and hardware virtualization used for organizations (Winburn &amp; Wheeler, 2015).</p>

Mini Computers		<p>Medium-sized, for specific departmental tasks.</p> <p>Minicomputers are smaller less expensive, and less powerful than mainframes, but more expensive and more powerful than personal computers (Magoun, 2015).</p> <p>They are used for tasks that require moderate processing power , such as handling multiple users and running specific business or industrial applications (Encyclopedia Britannica, n.d.).</p>	<p>They are computers with radios attached that can do things like send emails, browse the Internet, take images, and run apps (Sammons, 2015).</p>
Server		<p>A server is a procedure that offers the client the services they have requested (Yadav &amp; Singh, 2009). Servers would result in a higher demand when more services are provided and clients are given services (Easttom &amp; Roberts, 2024).</p> <p>Manages data, hosts websites, and networks</p>	<p>Servers provides services such as authentication, security, web, mail, and printing since servers have many types. Also, one server is used when there is a small network and several when it is a large network (Easttom &amp; Roberts, 2024).</p>

Workstations		<p>Workstations are computers that are more advanced than a PC. They have more processing power, more main memory, more data storage space, a better interface, and display capabilities (Touma, 1993).</p> <p>High-performance, for professional tasks.</p>	<p>Communicates towards other machines using a network (Touma, 1993).</p> <p>Were used through the 1990s to various VR projects (Sherman &amp; Craig, 2003).</p>
Micro Computers		<p>Everyday personal or office computer.</p> <p>A microcomputer consists of various things, which are a microprocessor, program memory, data memory, and input-output module. (Ibrahim, 2014).</p>	<p>Microcomputers can be used in our everyday lives such as acquiring goods (Ibrahim, 2014).</p>

## Compare and Contrast:

### Mini Computer

- **Processing Speed:** Moderate, capable of handling departmental or mid-scale tasks but not as fast as servers or workstations.
- **Memory Capacity:** Ranges from megabytes (MBs) to a few gigabytes (GBs), sufficient for specific business or lab applications.
- **Power Consumption:** Moderate compared to mainframes and servers, making them suitable for medium-sized operations.
- **Minimum:** Compact design with mid-range processing power, bridging the gap between microcomputers and larger systems.
- **Usage:** Commonly used in small businesses, laboratories, and manufacturing environments for inventory management, data collection, and production control.

### Micro Computer

- **Processing Speed:** Moderate, designed for basic tasks like web browsing, word processing, and multimedia playback.
- **Memory Capacity:** Typically ranges from 4 GB to 64 GB, sufficient for personal and office applications.
- **Power Consumption:** Low, as they are optimized for efficiency and everyday use.
- **Minimum:** Small, lightweight, and affordable, making them accessible for general users.
- **Usage:** Used in homes, schools, and offices for basic computing needs such as education, entertainment, and administrative work.

### Workstation

- **Processing Speed:** High, equipped with powerful multi-core processors to handle professional-grade tasks such as 3D rendering, CAD design, and scientific modeling.
- **Memory Capacity:** Ranges from tens of GBs to terabytes (TBs), ideal for resource-intensive applications.
- **Power Consumption:** Moderate, balancing performance and energy efficiency for intensive workloads.
- **Minimum:** High-end hardware with advanced graphics and computational capabilities, built for precision and reliability.
- **Usage:** Primarily used in specialized fields like engineering, animation, video editing, and architecture, where high performance is essential.

### Server

- **Processing Speed:** High, designed to manage multiple tasks and client requests simultaneously, such as database queries or hosting websites.

- **Memory Capacity:** Typically ranges from several GBs to multiple TBs, supporting large-scale data storage and processing.
- **Power Consumption:** Moderate to high, depending on the server size, workload, and cooling requirements.
- **Minimum:** Built for durability and redundancy, featuring high-performance processors and fault-tolerant systems.
- **Usage:** Used for hosting websites, managing cloud services, handling enterprise-level applications, and supporting networks in organizations.

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