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## Comparative Study on Different Types of Computers

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**Bachelor of Science in Computer Science - 1**  
CIS 1102N (Group 6) | Introduction to Computing  
*Portfolio #6*

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## **Introduction**

This portfolio explores and analyzes the types of computers, focusing on their various distinctions, capabilities, and applications in specific fields. From rapid technological advancements, computers have transformed into a variety of systems designed for diverse purposes, from personal computers to industrial and scientific applications. This paper aims to present an in-depth comparison of several types of computers, ranging from supercomputers, mainframe computers, servers, workstation computers, to mini computers, and how each type is optimized for specific tasks, performance requirements, and environments in which it serves.

By examining the performance, architecture, and functionality of various computer systems, this study will provide an overview of the fundamental differences between them. It will explore how factors like processing power, storage capacity, energy efficiency, and portability distinguish each type of computer.

## **Discussion**

### **The Different Types of Computers**

#### **1. Supercomputers**

- Supercomputers are the most powerful computers made and are physically the largest. The systems are built to process huge amounts of data and the fastest ones process more than one trillion calculations per second. Some supercomputers can house thousands of processors. Supercomputers cost tens of millions of dollars and consume enough electricity to power dozens of homes. They are often housed in protective rooms with special cooling systems, power protection, and other security features (Trinity College Dublin, n.d.).

#### **2. Mainframe Computers**

- Mainframe computers are powerful computers used primarily by corporate and governmental organizations for critical applications. They offer high processing speeds and significant memory capacity but are more focused on reliability than raw speed.

#### **3. Mini Computers**

- A mini computer is a small, powerful, general-purpose computer. It has a limited amount of central memory and storage. They provide average processing speeds, enough for daily professional and personal tasks.

#### **4. Servers**

- Servers provide services such as hosting websites or managing databases. They offer scalable processing speeds and memory capacities, with the ability to handle multiple users or devices simultaneously. Servers have moderate power consumption and are designed for continuous operation. They are essential in data centers and cloud computing environments, supporting business and network operations.

## **5. Workstations**

- Workstation computers are high-performance systems used for technical and professional tasks. They have powerful processing speeds and ample memory capacity (16 GB to 128 GB), with higher power consumption than microcomputers. Workstations are ideal for professionals requiring advanced computing power for tasks such as graphic design or software development.

## **6. Microcomputers**

- Microcomputers, or personal computers (PCs), are the most common systems used for everyday tasks like browsing, gaming, and office work. They have moderate processing speeds and memory capacities (4 GB to 64 GB), with low power consumption. Microcomputers are suitable for personal and small business use.

## **Comparison and Contrast**

The most notable difference between these types of computers is processing speed and memory capacity. Supercomputers and mainframes are stronger in processing speed and memory, while a server or workstation will offer balance in terms of the application for which it is to be used. Power consumption varies significantly as well. Supercomputers and mainframes consume the most energy, while microcomputers are the most energy-efficient. The minimum usage of each type differs based on their intended applications, with supercomputers being suited for research, workstations for professional use, and microcomputers for personal computing. Ultimately, the choice of computer depends on the specific needs, with each type offering a unique set of advantages for different environments and tasks.

**Table**

Types of Computers	Name/Brand	Build	CPU	Memory	Processing Speed	Calculating Principle	Working Principle	Energy Consumption	Field of Use
Super Computers	Fugaku, RIKEN & FUJITSU	Room-Scale	48-cores Armv8.2-A SVE 512 bit	4.85 PB, HBM2 32 GiB, 1024 GB/s	48-cores, 2.0/2.2 GHz	> 488 Petaflops	Processes massive data in parallel using multiple processors and nodes interconnected for high-speed communication.	~30 MW	Medical and Drug Research, Environmental and Disaster Protection, Scientific and Technological Research
Mainframe Computers	IBM z16	60" x 24" x 48" x per frame	Up to 200 cores, ~22.5 Billion Transistors, IBM Telum Processor	40TB DDR4	Up to 200 cores, Up to 5.2GHz	> 200 teraflops	Processes information using advanced multi-core architecture.	20-30 KW per system	Banking, Finance, Healthcare, Fraud Detection and Data Analytics
Mini Computers	Apple Mac Mini M4	5cm x 12.7cm x 12.7 cm	Up to 12-core CPU, Apple Silicon M4	Up to 24GB of unified memory	Up to 8 Performance Cores and Up to 6 Efficiency Cores	~5 teraflops	It features up to 8 performance cores and 4 efficiency cores, and it is designed for handling more demanding applications and multitasking.	40 watts	General Computing, Work, and Personal Use
Server	Dell PowerEdge R740	3.4" x 17.08" x 29.03"	Up to two 2nd Generation Intel Xeon Scalable processors	24 DDR4 DIMM slots (3TB), Supports RDIMM /LRDIMM	up to 28 cores per processor, up to 3.8GHz	N/A	Utilizes multi-core processors that execute multiple threads simultaneously and are optimized by caching and memory bandwidth.	300 - 1200 watts	Hosting virtual machines, Database management, training/running AI and Machine Learning

Workstations	Apple Mac Studio M2	9.5cm x 19.7cm x 19.7cm	Up to 24-core CPU, Apple Silicon M2 Ultra	Up to 192GB of unified memory	Up to 16 Performance Cores and Up to 8 Efficiency Cores	Up to 20.8 teraflops	Utilizing its System-on-a-Chip design, integrating a powerful CPU, GPU, Neural Engine, and Unified Memory to efficiently handle tasks	370 - 400 watts	Video and Photo Production, 3D Modeling and Animation, Software Development, Machine Learning, and AI, Research, and Simulations
Micro Computers	Apple MacBook Air M1	1.61cm x 30.41cm x 21.24cm	Up to 8-core CPU, Apple Silicon M1	Up to 16GB of unified memory	Up to 4 Performance Cores and Up to 4 Efficiency Cores	Up to 2.6 teraflops	Uses a system-on-a-chip architecture, meaning that the CPU, GPU, RAM, and other components are integrated into a single chip, making it highly efficient.	30 watts	General Computing, Work, and Personal Use

Types of Computers	Sample Image	Description	Usage
Super Computer		<p><b>Fugaku:</b>            - A supercomputer developed by RIKEN and FUJITSU in Japan. It is designed for high-performance computing tasks and is known for its remarkable computational power. Recognized to be the world's fast supercomputer since 202.</p>	Medical and Drug Research, Environmental and Disaster Protection, Scientific and Technological Research
Mainframe Computers		<p><b>IBM z16:</b>            - A mainframe computer designed and developed by IBM. Optimized for enterprise workloads, providing reliability, security, and scalability for organizations.</p>	Banking, Finance, Healthcare, Fraud Detection and Data Analytics
Mini Computers		<p><b>Apple Mac Mini M4:</b>            - A powerful mini computer by Apple. This model provides significant performance despite its size which features a high-performing CPU and GPU.</p>	General Computing, Work, and Personal Use
Server		<p><b>Dell PowerEdge R740:</b>            - A rack server developed by Dell. Designed for high-performance computing and enterprise environments. It is known for its scalability,</p>	Hosting virtual machines, Database management, training/running AI and Machine Learning

		<p>reliability, and efficiency, offering businesses a versatile solution for demanding workloads.</p>	
Workstations	 A sleek, white Apple Mac Studio M2 Ultra computer, a compact desktop workstation, sits on a rustic wooden surface against a dark blue background.	<p><b>Apple Mac Studio M2 Ultra:</b>            - A high-performing workstation computer developed by Apple. Powered by the M2 Ultra chip, it is optimized for professional users, and offers exceptional processing power, energy efficiency, and advanced capabilities for demanding tasks.</p>	Video and Photo Production, 3D Modeling and Animation, Software Development, Machine Learning, and AI, Research, and Simulations
Micro Computers	 An open Apple MacBook Air M1 laptop is shown from a side-on perspective. The screen displays a colorful abstract wallpaper, and the keyboard is visible below.	<p><b>Apple MacBook Air M1:</b>            - A portable computer (laptop) designed by Apple. The first computers that included a System-On-A-Chip Architecture which offers significant improvements in performance and battery life. Ideal for everyday tasks, productivity, and light creative work.</p>	General Computing, Work, and Personal Use

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