

Types of Computer Systems

6.1.2 Evaluate the resources available in a variety of computer systems.

Mainframes are computers used primarily by large organisations for important matters and large data processing.

Has thousands of cores for the *processor*.

Has vast amounts of *primary memory* and *secondary memory*.



Servers are a computer program or a device that provides functionality for clients, which are other programs or devices.

Can have 3-4GHz *processor*, as it is made up of multiple high spec PCs in parallel. '

Has big capacity for *primary memory*

Has terabytes per machine for *secondary memory*



Personal Computers (PCs) are a multi-purpose computer designed to be used by one person at a time.

Has a single *processor* but *multiple cores*, so 1-4GHz *speed*

Has 2-16GB of *primary memory*

Has 256GB to 2TB of *secondary memory*

Sub-laptops or *subnotebooks* is a class of laptop computers that are smaller and lighter than a typical notebook.

Has single or multiple *core processor*, so 1-2GHz *speed*

Has 1-16GB of *primary memory*

Has 16-128GB of *secondary memory* in SD



Cell phones or mobile phones, are a portable telephone that can make and receive calls over a radio frequency link while the user is moving within a telephone service area.

Has single or multi-core *processor*

Has 1-3GB of *primary memory*

Has limited *secondary memory*, but can be upgraded with SD card

Tablet computer is a portable personal computer, typically with a mobile operating system and LCD touchscreen display processing and a rechargeable battery. It is a single thin, flat package and lacks the capabilities that some other computers might have.

Has single or multi-core *processor*

Has 1-4GB of *primary memory*

Has limited *secondary memory*, but can be upgraded with MicroSD card

Personal digital assistant (PDA) are a variety mobile device that functions as a personal information manager.

Has single core *processor*, less than 1GHz *speed*

Has limited *primary memory* (<500MB)

Has limited *secondary memory* (<128MB)

Problems with Insufficient Resources

6.1.4 Describe the possible problems resulting from the limitations in the resources in a computer system.

Batch processing is when programs are batched together and then run as a group with minimal user interaction. Batch process jobs can run without user intervention and can be start up on their own with sufficient resources. Batch jobs are stored during working hours and then executed whenever the computer is idle. Batch processing is useful when the job requires the computer for an extended period of time. A batch job continues until completion or until an error occurs.

e.g. Credit card customers receive a bill at the end of each month instead of receiving a bill whenever they buy something. Batch processing is present in this because all of the data for purchases are collected and held until the bill is processed as a batch at the end of the billing cycle.

Multiprogramming is when more than one program is loaded into the main memory. One program will be executed by the CPU while all the others wait their turn. Once the first program is either done or does not have the required resources to run it (e.g. waiting for a peripheral), the program is stored away and the second program runs. This process is continued until all programs have finished running. The programs are not simultaneously executed, but it appears that all the programs are executing at the same time. The main purpose of multiprogramming is to maximize the use of CPU time.

Multitasking is multiprogramming but more general. Multitasking loads tasks, which are smaller parts of a program, onto memory. Each task is performed simultaneously and share a common processor. Because tasks are smaller than programs, they are completed quicker. Multitasking allows the user to perform more than one computer task at a time.

Multiprogramming and multitasking systems are **CPU time sharing systems**. Time-sharing is when the processor's time is shared among multiple users simultaneously. The illusion of parallelism is achieved when multiple jobs are executed by the CPU by switching very frequently between them. The tasks in each program are completed quickly by the CPU, making the programs seem like they are running at the same time.

Multiprocessing is processing multiple programs at the same time using more than one computer processor. Multiprocessing specifically refers to the hardware that is used when processing. A system can have more than one CPU core, making it a multiprocessing system.

A system can be multiprogramming, multitasking and multiprocessing at the same time. Multitasking and multiprogramming refer to the software.

Multithreading is executing different parts of a program, called threads, concurrently. The program can be executed at the same time without interfering with each other. The thread that is being executed does not need to know the context of the other threads. In a multithreading system, several threads can share one CPU core or run in parallel in a multi-core system.

Multithreading is used in applications with a GUI. Without multithreading, if a requested task needed a long time to complete, the GUI would freeze until the task was completed. Multithreading would make the GUI responsive, allowing a better experience.

Multi-access is a system in which several users are permitted to have apparently simultaneous access to a computer. The computer system may execute a number of programs and the connected users can interact with these programs.

A **multi-access** system must have the following characteristics:

- Ability to communicate with multiple users and take input from them
- Concurrent execution of programs with the ability to instantly switch from executing the program of one user to another
- Ability to quickly find and make data stored on the hard disks available
- Ability to protect data from unauthorized access