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Computer architecture means construction/design of a computer. A computer system may be organized in different ways. Some computer systems have single processor and others have multiprocessors. So based on the processors used in computer systems, they are categorized into the following systems.

1. Single-processor system

2. Multiprocessor system

1. Single-Processor Systems:

Some computers use only one processor such as microcomputers (or personal computers PCs). On a single-processor system, there is only one CPU that performs all the activities in the computer system. However, most of these systems have other special purpose processors, such as I/O processors that move data quickly among different components of the computers. These processors execute only a limited system programs and do not run the user program. Sometimes they are managed by the operating system. Similarly, PCs contain a special purpose microprocessor in the keyboard, which converts the keystrokes into computer codes to be sent to the CPU. The use of special purpose microprocessors is common in microcomputer. But it does not mean that this system is multiprocessor. A system that has only one general-purpose CPU, is considered as single-processor system.

2. Multiprocessor Systems:

In multiprocessor system, two or more processors work together. In this system, multiple programs (more than one program) are executed on different processors at the same time. This type of processing is known as multiprocessing. Some operating systems have features of multiprocessing. UNIX is an example of multiprocessing operating system. Some versions of Microsoft Windows also support multiprocessing.

Multiprocessor system is also known as parallel system. Mostly the processors of multiprocessor system share the common system bus, clock, memory and peripheral devices. This system is very fast in data processing.

Types of Multiprocessor Systems:

The multiprocessor systems are further divided into two types;

(i). Asymmetric multiprocessing system

(ii). Symmetric multiprocessing system

(i) Asymmetric Multiprocessing System (AMS):

The multiprocessing system, in which each processor is assigned a specific task, is known as Asymmetric Multiprocessing System. For example, one processor is dedicated for handling user's requests, one processor is dedicated for running application program, and one processor is dedicated for running image processing and so on. In this system, one processor works as master

processor, while other processors work as slave processors. The master processor controls the operations of system. It also schedules and distributes tasks among the slave processors. The slave processors perform the predefined tasks.

(ii) Symmetric Multiprocessing System (SMP):

The multiprocessing system, in which multiple processors work together on the same task, is known as Symmetric Multiprocessing System. In this system, each processor can perform all types of tasks. All processors are treated equally and no master-slave relationship exists between the processors.

For example, different processors in the system can communicate with each other. Similarly, an I/O can be processed on any processor. However, I/O must be controlled to ensure that the data reaches the appropriate processor. Because all the processors share the same memory, so the input data given to the processors and their results must be separately controlled. Today all modern operating systems including Windows and Linux provide support for SMP.

It must be noted that in the same computer system, the asymmetric multiprocessing and symmetric multiprocessing technique can be used through different operating systems.

3. Clustered Systems:

Clustered system is another form of multiprocessor system. This system also contains multiple processors but it differs from multiprocessor system. The clustered system consists of two or more individual systems that are coupled together. In clustered system, individual systems (or clustered computers) share the same storage and are linked together, via Local Area Network (LAN).

A layer of cluster software runs on the cluster nodes. Each node can monitor one or more of the other nodes over the LAN. If the monitored machine fails due to some technical fault (or due to other reason), the monitoring machine can take ownership of its storage. The monitoring machine can also restart the applications that were running on the failed machine. The users of the applications see only an interruption of service.

Types of Clustered Systems:

Like multiprocessor systems, clustered system can also be of two types

(i). Asymmetric Clustered System

(ii). Symmetric Clustered System

(i). Asymmetric Clustered System:

In asymmetric clustered system, one machine is in hot-standby mode while the other machine is running the application. The hot-standby host machine does nothing. It only monitors the active server. If the server fails, the hot-standby machine becomes the active server.

(ii). Symmetric Clustered System:

In symmetric clustered system, multiple hosts (machines) run the applications. They also monitor each other. This mode is more efficient than asymmetric system, because it uses all the available hardware. This mode is used only if more than one application be available to run.

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