



Kemerburgaz university

**MULTITASKING AND MULTITHREADING ON
A MULTIPROCESSOR WITH VIRTUAL
SHARED MEMORY**

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Introduction

In a modern computing system, there are usually several concurrent application processes which compete for (few) resources like, for instance, the CPU. As we have already the Operating System (OS) and amongst other duties, OS is responsible for the effective and efficient allocation of those resources. Generally speaking, the OS module which handles resource allocation is called scheduler. On the basis of the type of OS to be realized, different scheduling policies may be implemented such as:

- Multitasking
- Multithreading
- Multiprocessing

MULTITASKING

Multitasking, in an operating system, is allowing a user to perform more than one computer task at a time. The operating system is able to keep track of where you are in these tasks and go from one to the other without losing information. Almost all of today's operating systems can do multitasking. When you open your Web browser and then open Word at the same time, you are causing the operating system to do multitasking.

Being able to do multitasking doesn't mean that an unlimited number of tasks can be juggled at the same time. Each task consumes system storage and other resources. As more tasks are started, the system may slow down or begin to run out of shared storage

ADVANTAGES OF MULTITASKING

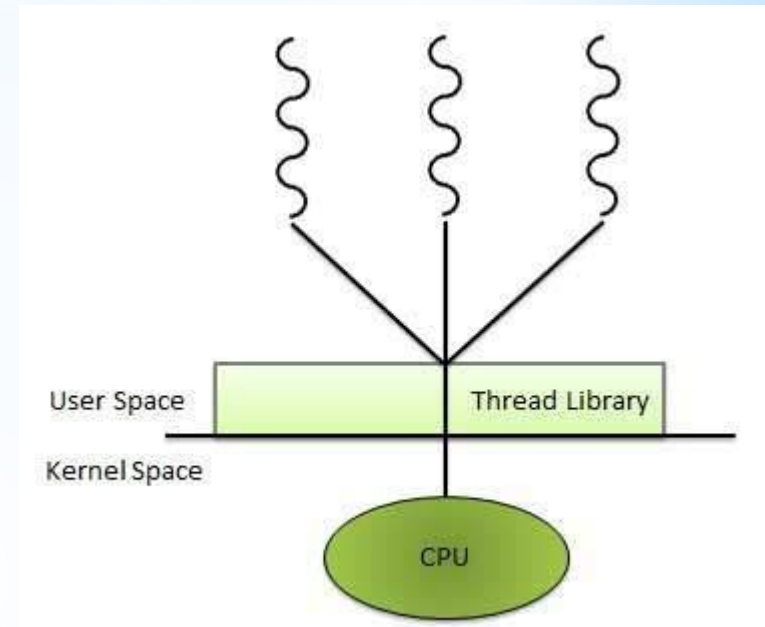
- i. multi tasking operating system saves time.
- ii. increases uses productivity.
- iii. easy data transfer to different windows
- iv. increases the CPU utilization

Example: listening Song, playing game, work in MS word, excel and other



MULTITHREADING

Multithreading is the ability of a program or an operating_system process to manage its use by more than one user at a time and to even manage multiple requests by the same user without having to have multiple copies of the programming running in the computer. Each user request for a program or system service (and here a user can also be another program) is kept track of as a thread with a separate identity.



As programs work on behalf of the initial request for that thread and are interrupted by other requests, the status of work on behalf of that thread is kept track of until the work is completed.

ADVANTAGES OF MULTITHREADING

- 1. Responsiveness** - One thread may provide rapid response while other threads are blocked or slowed down doing intensive calculations.
- 2. Resource sharing** - By default threads share common code, data, and other resources, which allows multiple tasks to be performed simultaneously in a single address space.
- 3. Economy** - Creating and managing threads (and context switches between them) is much faster than performing the same tasks for processes.
- 4. Scalability** - A single threaded process can only run on one CPU, no matter how many may be available, whereas the execution of a multi-threaded application may be split amongst available processors.

MULTIPROCESSING

▶ An operating system capable of supporting and utilizing more than one computer processor.

▶ **more than one CPUs that can be shared**

Below are some examples of multiprocessing operating systems.

Linux

Unix

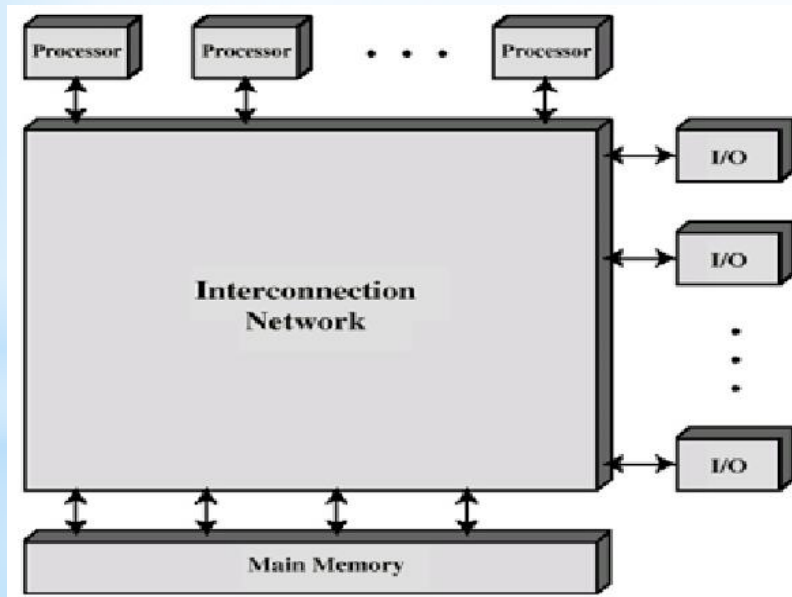
Windows 2000

There are two types of multiprocessors on the way their memory is organized.

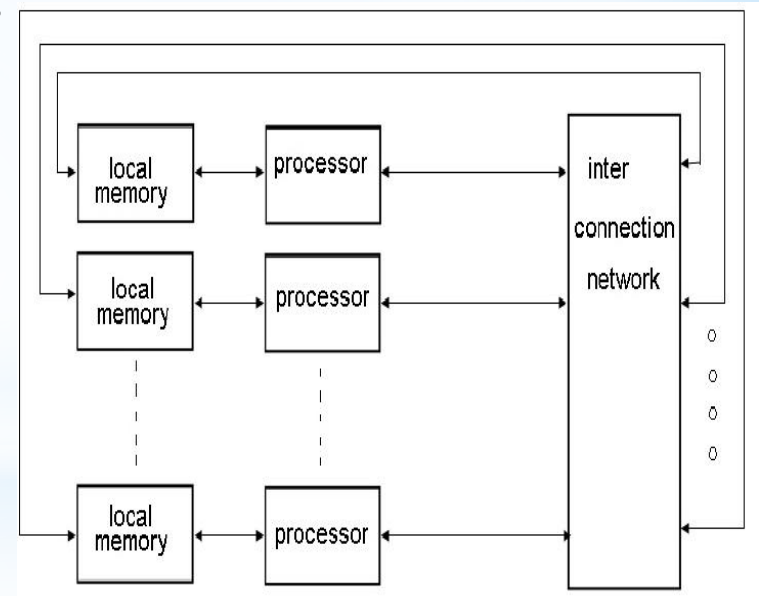
1. Tightly coupled multiprocessors.
2. Loosely coupled multiprocessors

MULTIPROCESSING (Cont.)

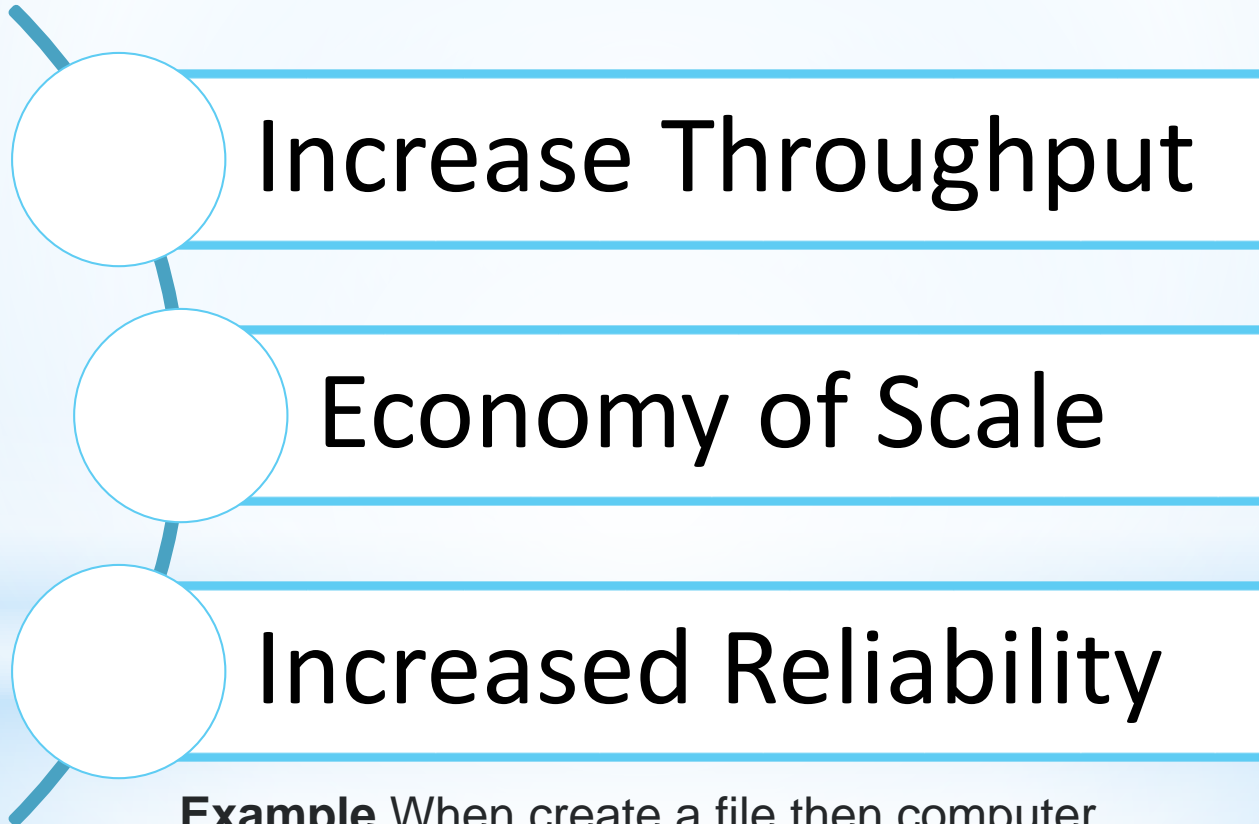
- In **tightly coupled** main memory is shared by all processors i.e. “HIGH DEGREE OF RESOURCE SHARING”.
- .Entire system is controlled by single O.S. that provides interaction between processors & their programs at the job ,task ,file and data element levels



- In **loosely coupled** multiprocessor each processor has its own memory.
- The access to remote memory attached to other processors takes longer time due to added delay through the interconnection network.



ADVANTAGE OF MULTIPROCESSING



Example When create a file then computer takes Time and date default.

Multiprocessor with Virtual Shared-Memory

Previous attempts have been made to bridge the gap between the ease of programming and legacy support of SMM systems and the economies of cluster hardware. These include distributed shared memory (DSM) libraries such as Ivy or Treadmarks, which provide a limited illusion of shared memory to applications, provided that the programmer uses the primitives supplied by the library.

vNUMA, for virtual NUMA, is a virtual machine that presents a cluster as a virtual shared-memory multiprocessor. It is designed to make the computational power of clusters available to legacy applications and operating systems.

Multiprocessor with Virtual Shared-Memory(cont.)

The use of virtualization to bridge the gap between SMM systems and workstation clusters. We present vNUMA (“virtual NUMA”), a virtual shared-memory multiprocessor built from a cluster of commodity workstations. A hypervisor runs on each node of the cluster and manages the physical resources. A single virtualized instance of an OS, such as Linux, is then started on the cluster. This OS and its applications executes on a virtual NUMA machine with many virtual CPUs.

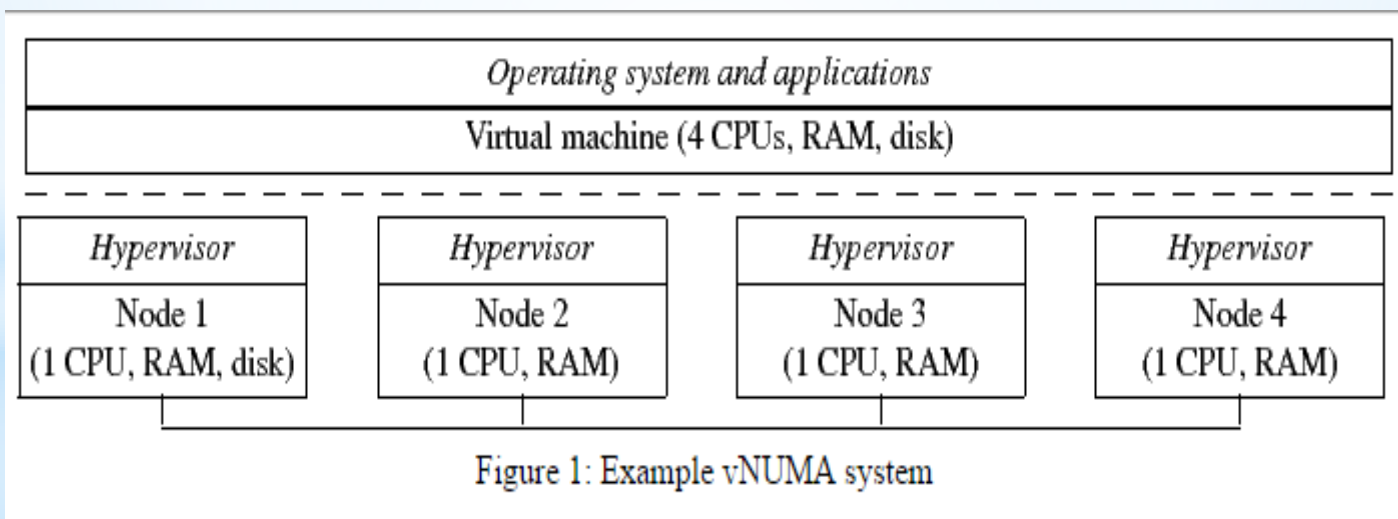


Figure 1: Example vNUMA system

**Thank you for
listening**