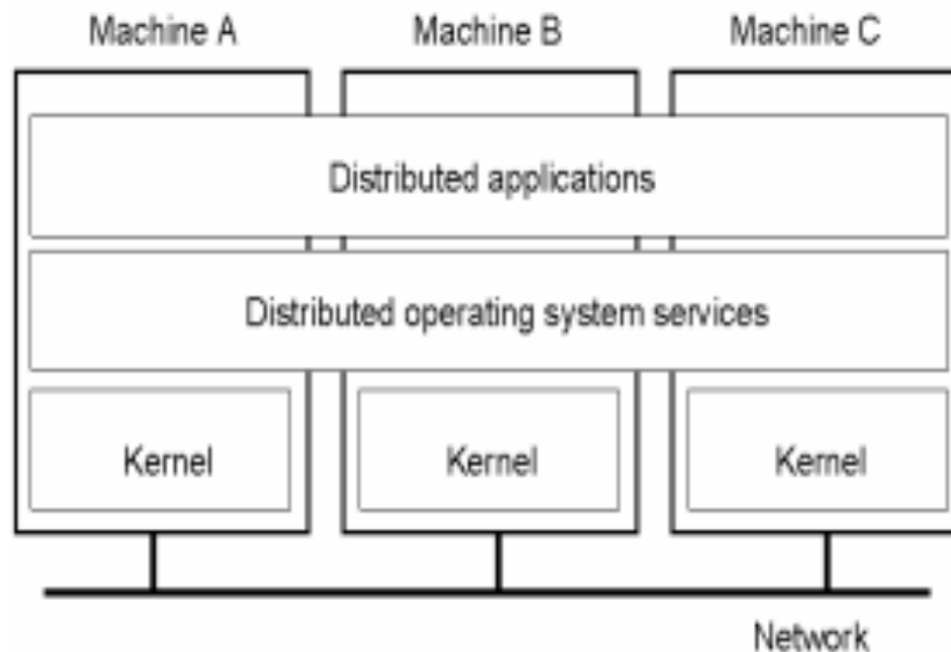# DISTRIBUTED OPERATING SYSTEM: PROCESS AND THREAD MANAGEMENT

Prepared by Sumaya Mahdi Ibraheem

Student number: 163106436

Distributed Operating System (DOS)?

- DOS is a collection of independent computers that appear to the users of the system as a single computer.

Machine A	Machine B	Machine C

Distributed applications

Distributed operating system services

| Kernel	Kernel	Kernel

Network

Process and Thread?

- <u>Processes</u> are programs in execution

- <u>Sequential process</u>: contains single thread of execution

- <u>Concurrent process</u>: simultaneous interacting sequential processes (asynchronous, each has its own address space; this is called **heavy-weight processes**)

- Process may <u>spawn new</u> processes (subprocesses)

Process and Thread?

- When <u>process and subprocess share a common address space</u>, but each has its <u>local state</u> this is called **either light-weight processes or user threads**

- Threads are like little mini-processes (May need synchronization to control access to shared variables).

Heavyweight Process HWP & Lightweight Process LWP
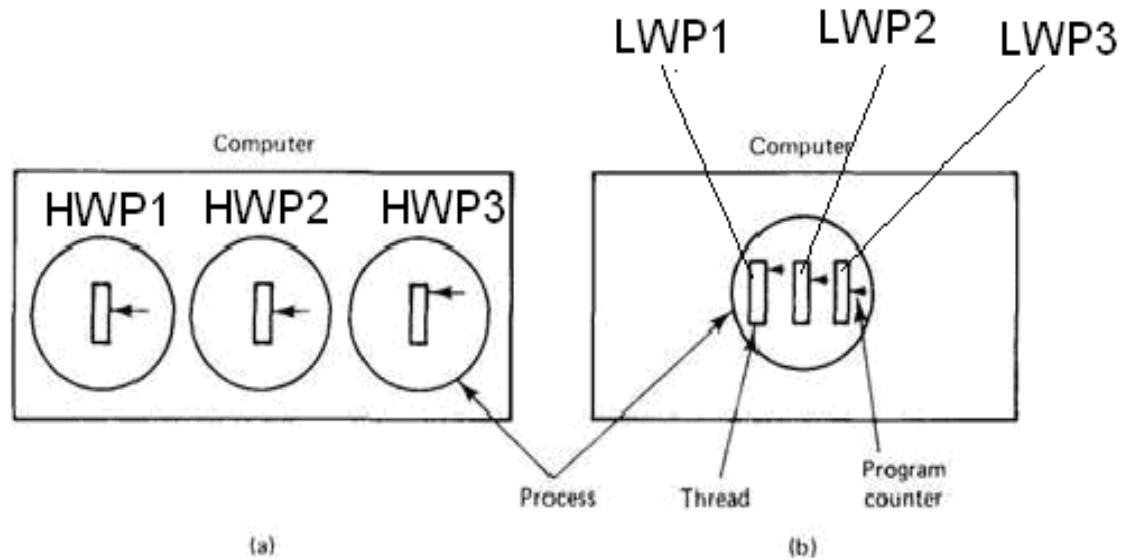
Why use Threads?

- Large number of multiprocessors needs many computing entities so DOS divided one process into many threads

- With threads, an application can avoid per-process overheads (*updating PCB needs time)*

- Thread creation, deletion, switching cheaper (less time) than processes

- Easy sharing

Primitives of a typical thread package:

- Thread management (creation, suspension, termination) by <u>thread run time library</u>.

- Set thread priority and other thread attributes by thread <u>run time library</u>.

- Synchronization and communication support *(Message Passing*, monitors *by system call or by shared mem …)*

DOS: Implementing a Threads library Package

- **A Thread Library** provides an extremely simple implementation for creating, destroying and scheduling threads.

- <u>**Functions of Library are:**</u>

  1 - <u>Allocate memory</u> to set up a thread stack.

  2- <u>Context Switching thread</u> (CPU context + thread management info)

  3- <u>Create thread structure (TCB)</u> to represent thread.

  4- <u>Thread-local Storage</u>

DOS: Implementing a Threads library Package
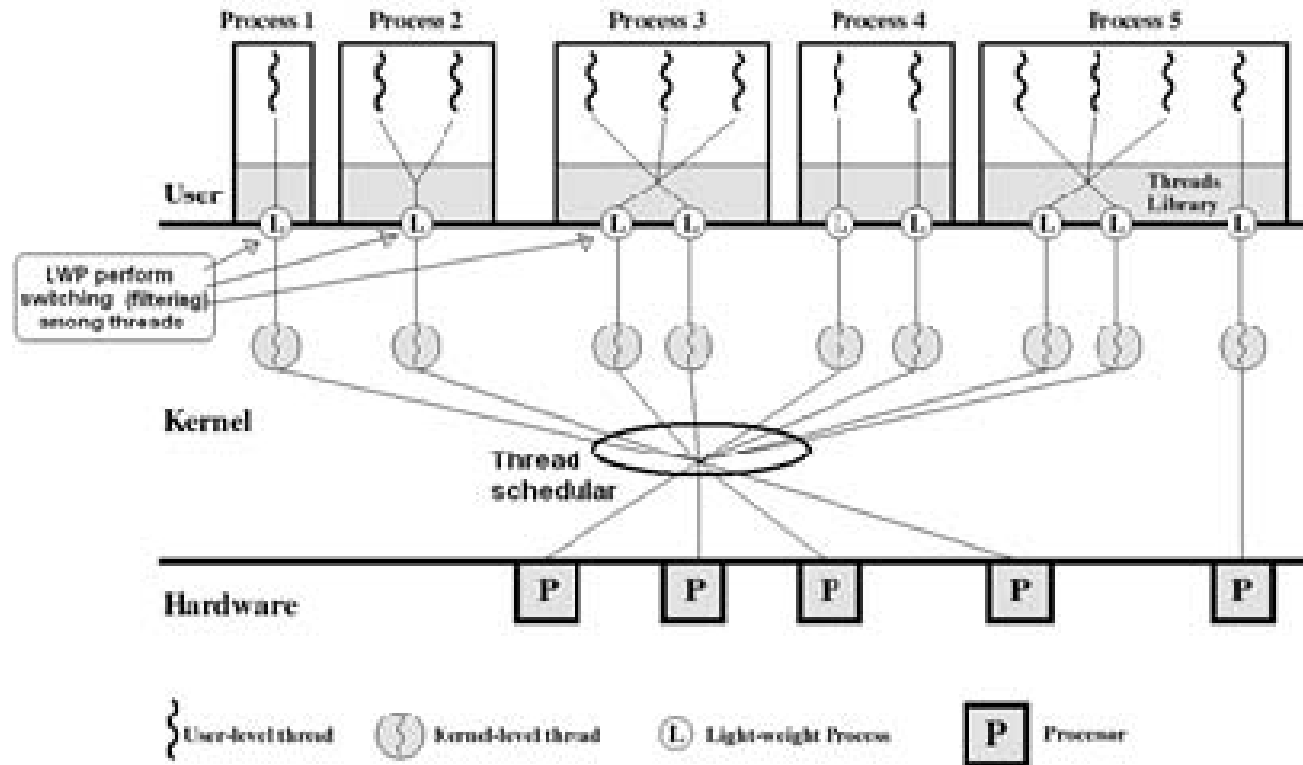
Solaris LWPs

DOS: Implementing a Threads library Package

- Only on a multiprocessor (DOS) do threads actually run in parallel.

- There is <u>no protection between threads</u> because :

- it is impossible,

- and it should not be necessary.

Reference

- Andrew S.Tanenbaum, Marten Van Steen, Distributed Systems Principle and Paradigm, CreateSpace Independent Publishing Platform; 2 edition, Book, February 26, 2016.

- J. Lelli, D. Faggioli, T. Cucinotta, G. Lipari, An experimental comparison of different real-time schedulers on multi-core systems, The Journal of Systems and Software, Elsevier, 2012.

Thank you..

Any Questions?