"Threads"

Presented By

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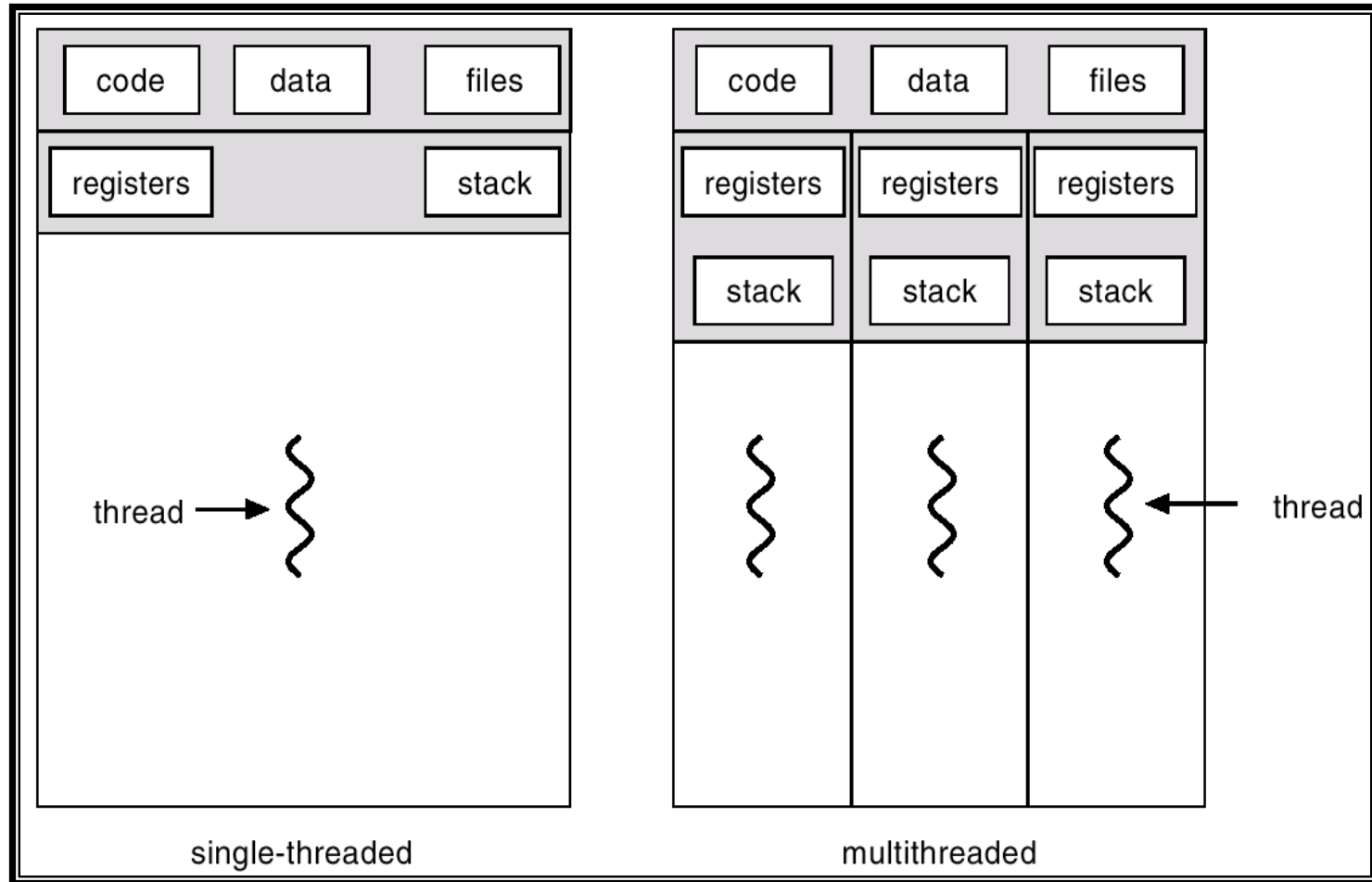
DEPARTMENT OF COMPUTER ENGINEERING

The Thread

- Thread is light weight process

- A *thread* is a basic unit of CPU utilization, consisting of a program counter, a stack, and a set of registers, (and a thread ID.)

- Traditional system (heavyweight) processes have a single thread of control
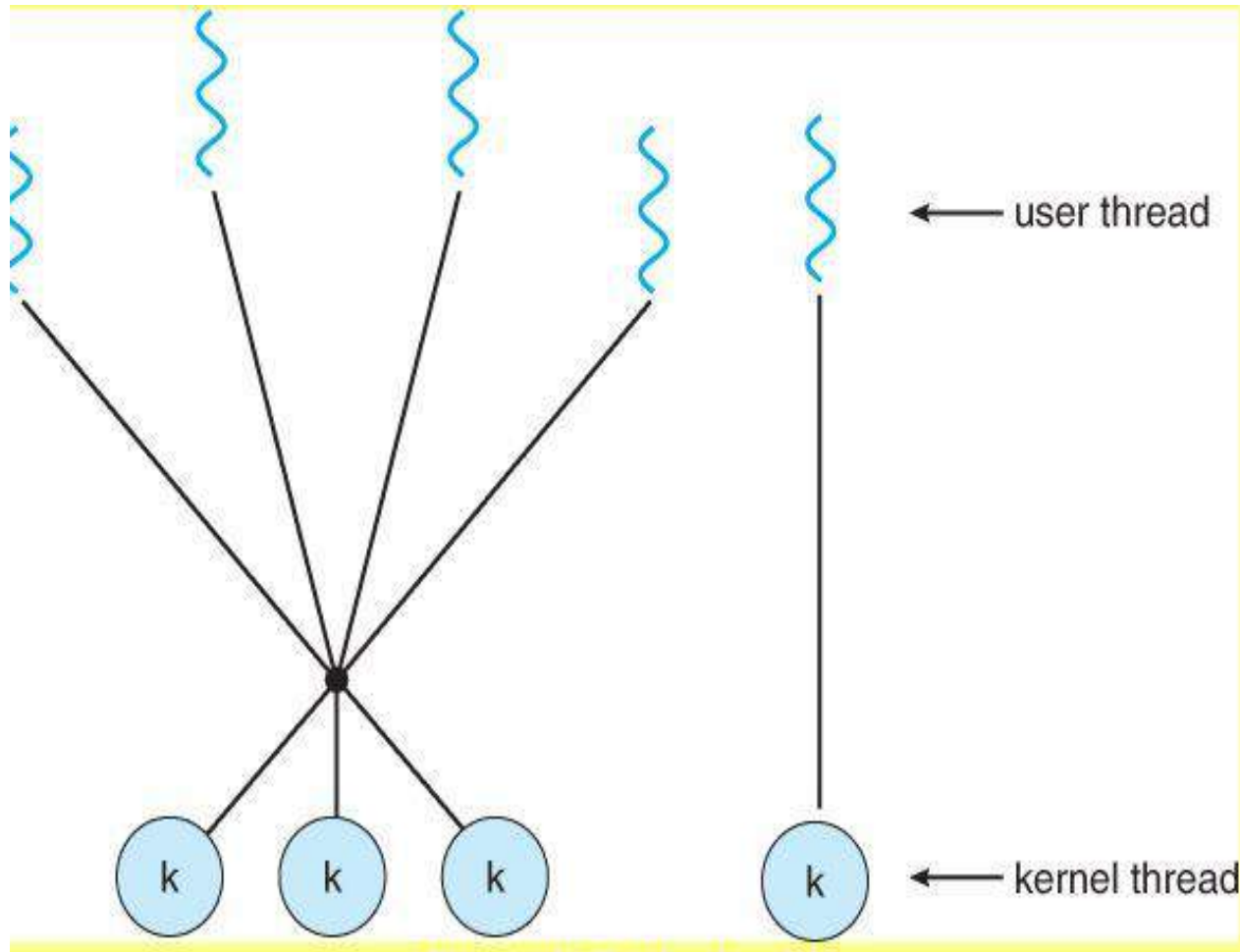
    Example ?

code	data	files
registers		stack

thread →

single-threaded

code	data	files
registers	registers	registers
stack	stack	stack

← thread

multithreaded

The Thread Benefits

- Responsiveness

- Resource Sharing

- Economy

- Utilization of MP Architectures

Two Level Model

Threads

User Threads

- Thread management done by **user-level threads library**

- Examples
  - POSIX *Pthreads*
  - Mach *C-threads*
  - Solaris *threads*

- Supported by the Kernel

Kernel Threads

- Examples
  - Windows 95/98/NT/2000
  - Solaris
  - Tru64 UNIX
  - BeOS
  - Linux

User Level Thread

- All thread management is done by the application

- The kernel is **not aware** of the existence of threads

- Thread switching does not require kernel mode privileges (and is thus faster)

- **Scheduling** is application specific (can thus be more efficient)

Kernel Level Thread

- Kernel maintains information for the process and the threads

- Kernel can **schedule** different threads of the same process to different processors

- **Switching** between threads requires the kernel

- Kernel threads can simplify context switch of system functions

Multithreading Models

- One-to-One

- Many-to-One
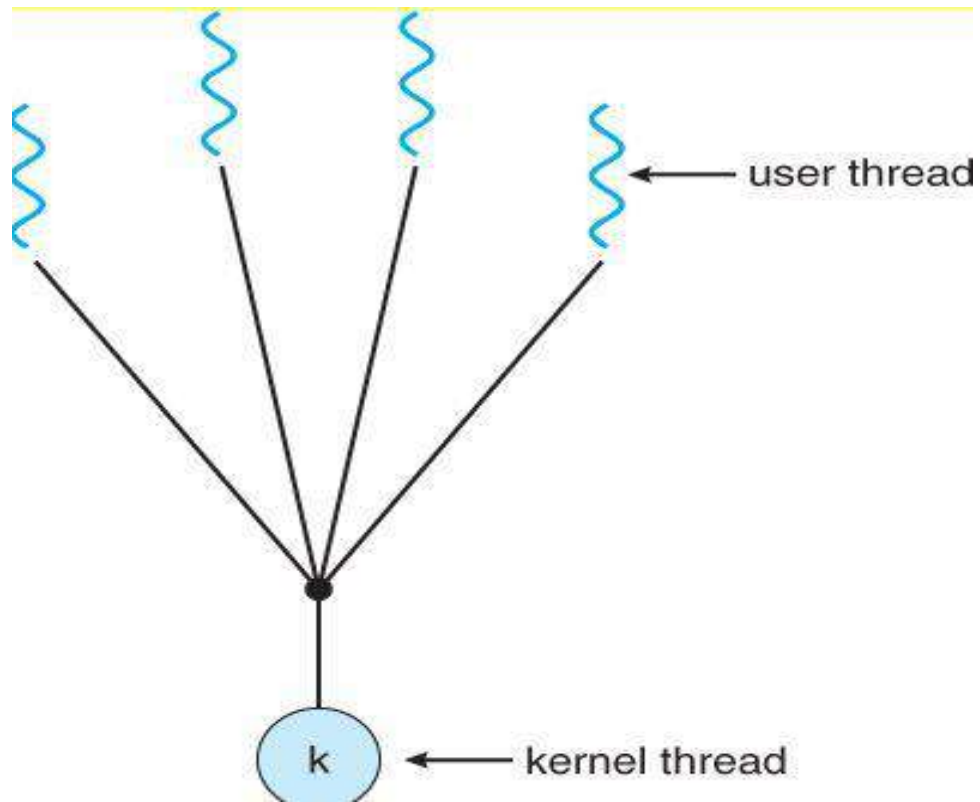
- Many-to-Many

One to One
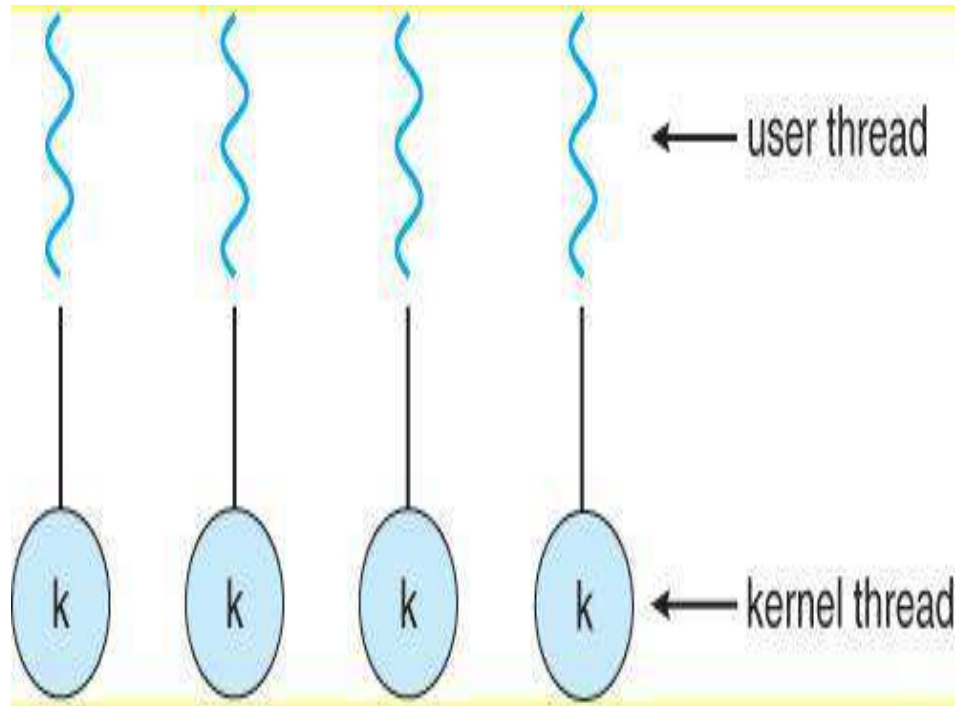
- **Examples:**
  Solaris Green Threads
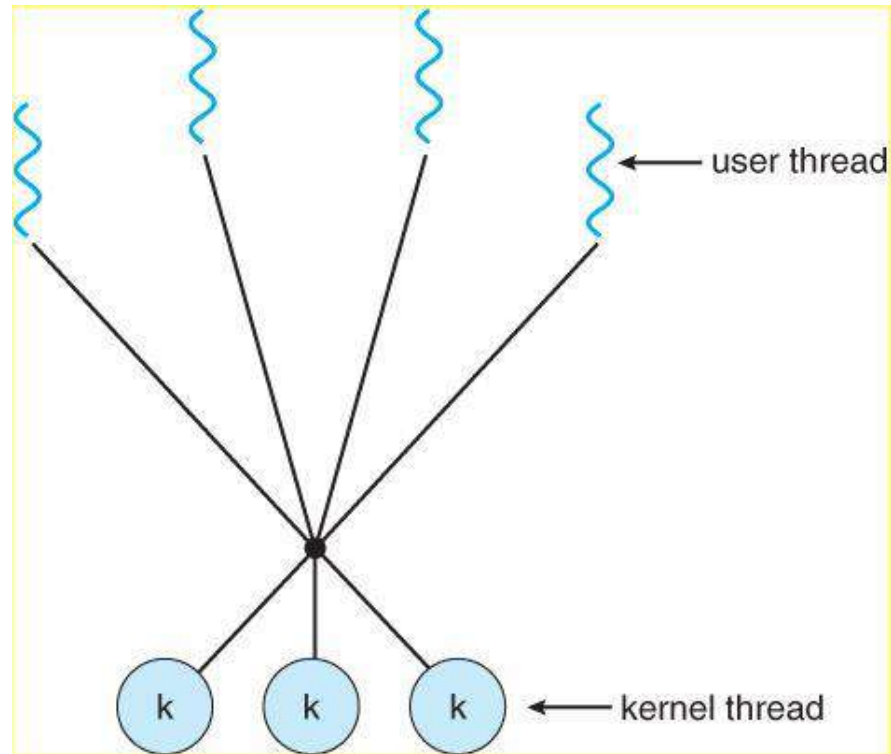 GNU Portable Threads

Many to One

- **Examples:**
- Windows 95/98/NT/2000
- Linux

Many to Many

- **Examples**
    - Solaris 9
    - Solaris Prior
    - True 64 Unix

Single and Multicore Programming

Concurrent Execution on Single core

- Intel Pentium 4 – 670
- Intel Core Solo T1350
- AMD Athlon 64 FX55
- AMD Sempron LE-1250

Parallel Execution on Multicore System

Examples Multicore processor

- Intel Core 2 Duo E6755

- AMD Athlon X2 6400+ dual-core processor.

- Intel I3, I5, I7

• Thank you.....