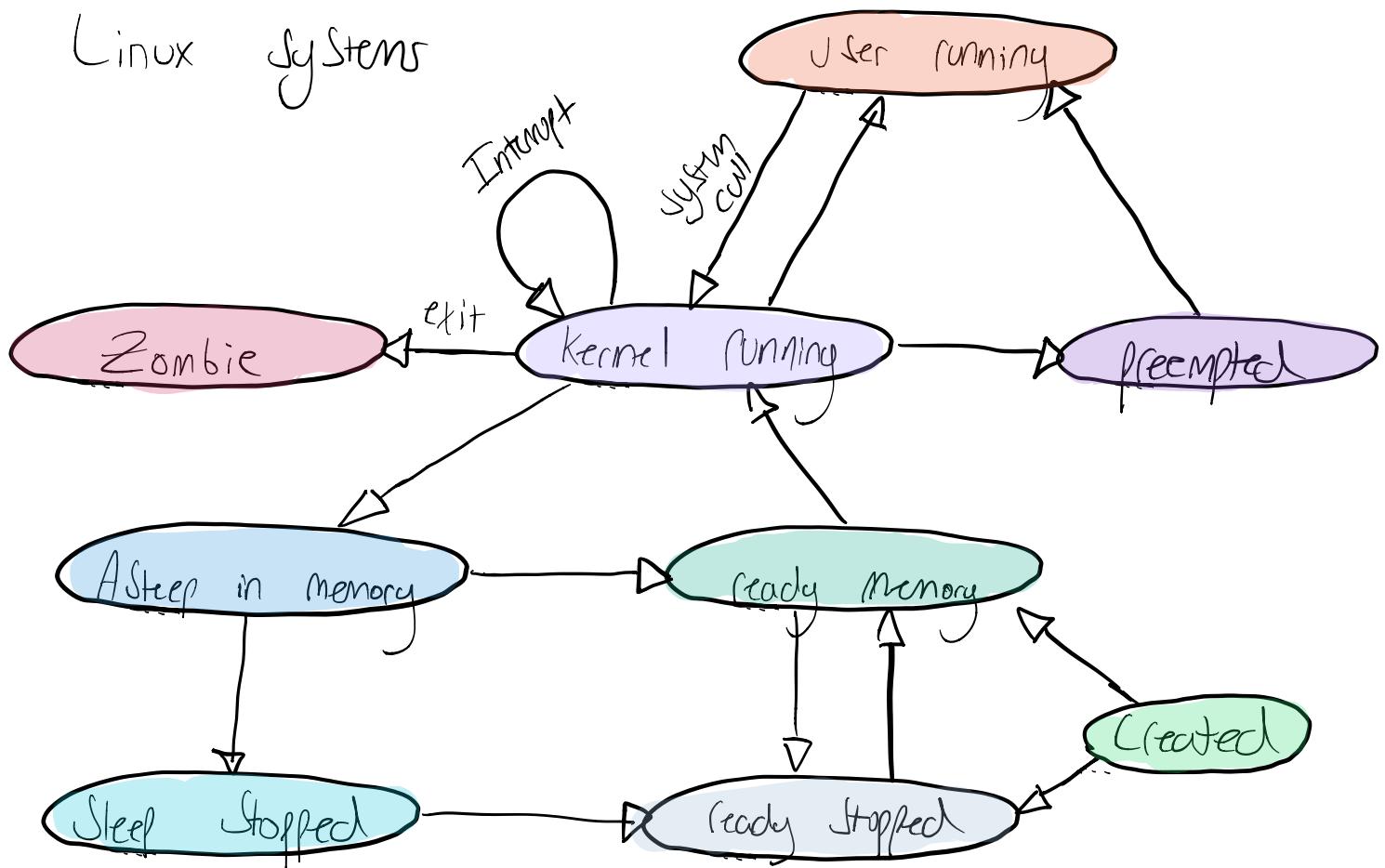


Linux Systems



- page fault — need to find data in memory.
- VMS - four modes of running
 - Kernel
 - User
 - Supervisor calls
 -



Chapter four

Threads - a piece of a process

② characteristics of a process

① something that owns resources

② a unit of dispatching

Process - something that owns resources

Thread - a unit of dispatching

- shares resources with process that it's a child

of.



MS-DOS - single thread of execution per process

Unix - multiple processes one thread each

Java - one process multiple threads

Windows, Solaris - multiple processes multiple threads

OS/2, Mach

Define process - unit of resource allocation, unit of protection

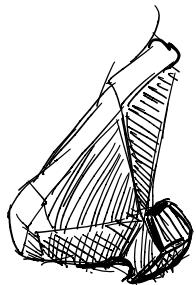
you set - virtual address space

protected access to resources

- other processes, I/O, file...

Within a process - Threads

- each thread has
 - A thread executes state
 - Shared thread context
 - an execution stack
 - Some for thread storage
 - access to memory and resources
 - shared by all threads



Two ways to do threads

- User level threads

- Supported by library
- in user address space
- Kernel is still single threaded
- Kernel provides no support
- Thread creation, scheduling management provided by user process

- Kernel level threads

- thread support built into O.S.
- Creation, scheduling, management, in kernel space
- Driver to create and manage
- If one thread blocks, system can dispatch multiple threads
- Multiprocessor can run threads on more than one processor concurrently.

Which language is more efficient C# or C++?

9/7

Day 8



Benefits of multithreading processes

1. Responsiveness

- seems like it is doing more because one thread can block, and another can continue to work

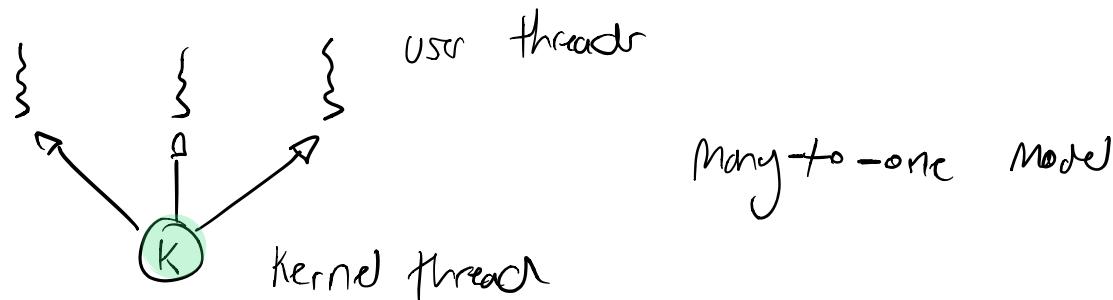
2. Resource Sharing

3. Economy

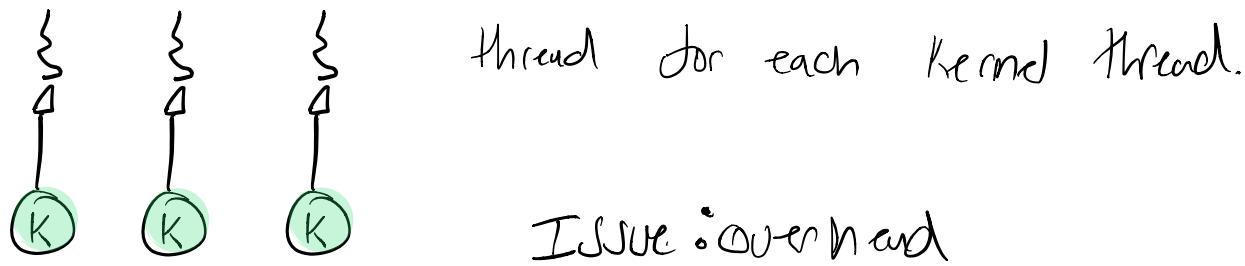
- easier to move threads over process.

4. Realize benefits of Multi processor architecture.

User level thread

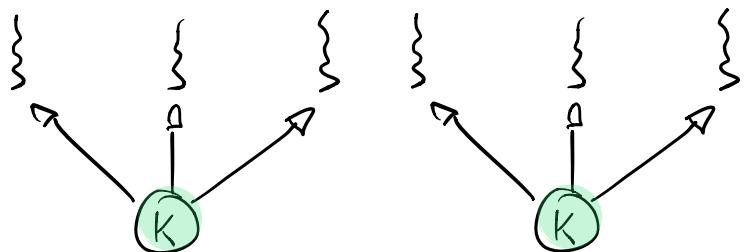


One to one Model



Many - to - Many Model

ie: Solaris, Irix, Unix



Next Friday we have to OS

Parallelism processing

- SISD

- Single instruction single data stream
 - SIMD
 - Single instruction multiple data
 - One program
 - All CPU run it
 - each work on it
 - different data.
 - MIMD - True parallel
 - Multiple instructions multiple data streams
 - Pipelining
 - An array of processor where each process does a part of the data.
 - example would be compiling.
- SMP - Symmetric Multiprocessing
- Kernel can run on any processor
 - each processor has its own scheduler
 - Issue:
 - Scheduling conflicts.
 - Shared memory.
 - Memory Management is complex
 - Kernel mode needs to be reentrant
 - May be running same module concurrent
 - Reliability & fault tolerance.