

Operating Systems Concept

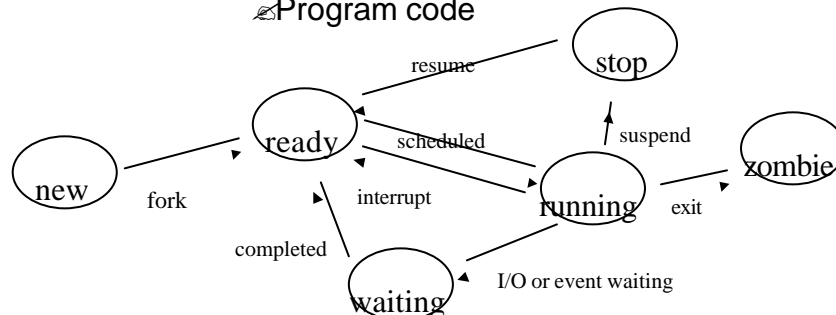
- ✍ What is an operating system?
- ✍ Operating system architecture
- ✍ Process concept
- ✍ CPU scheduling
- ✍ Memory management
- ✍ File and I/O systems



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Process Concept

- ✍ Process
 - ✍ An active entity
 - ✍ The corresponding passive entity
 - ✍ Program code



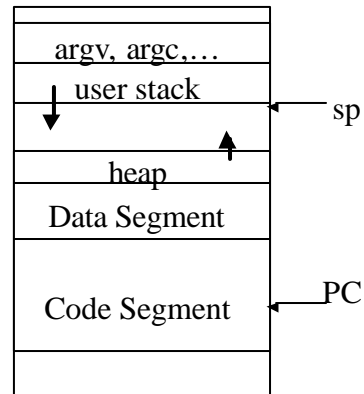
* "Operating system concept", Silberschatz and Galvin, Addison Wesley, pp. 89-97, p 126.
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Process Concept

Process Image in Memory

System Resources

- Program Counter (PC)
- Process Status Register
- Stack Pointers (sp)
- Memory
- etc.



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Process Concept

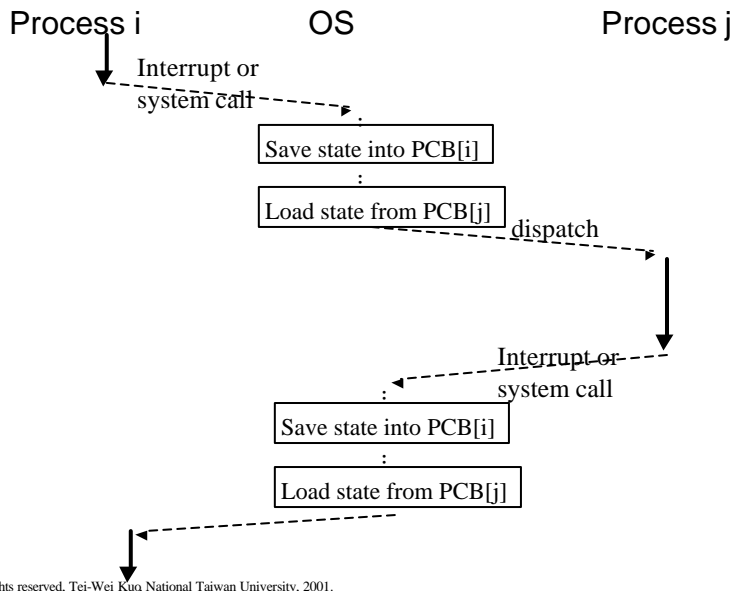
Process Control Block

```
Struct PCB {  
    char p_pid;  
    char p_pri;  
    char p_ppid;  
    int pc; /* program counter */  
    ...  
    int rq_former, rq_next; /* for ready queue*/  
    int files[NFILE];  
} PCB[NPROC];
```

- major queues:
 - I/O queues
 - ready queue

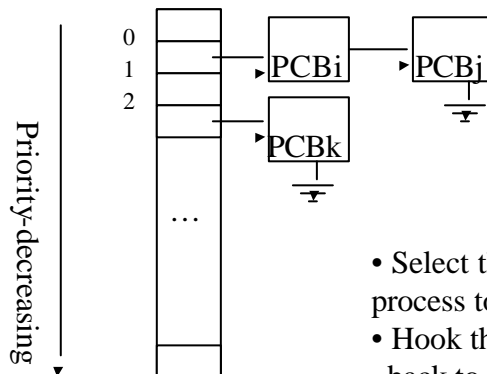
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Process Concept



Process Scheduling

A Ready Queue



- Select the highest-priority process to run and de-queue it!
- Hook the running process back to the ready queue!

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Context Switching – Necessary Overheads for Multiprogramming

Def.

- ✍ Switch the CPU from one process to another process
 - ✍ Save the state (or called context) of the running process
 - ✍ Reload the state of the ready process

Context Switching Time

- ✍ Hardware-dependent!
 - ✍ Multiple register sets!
 - ✍ Special hardware instructions!

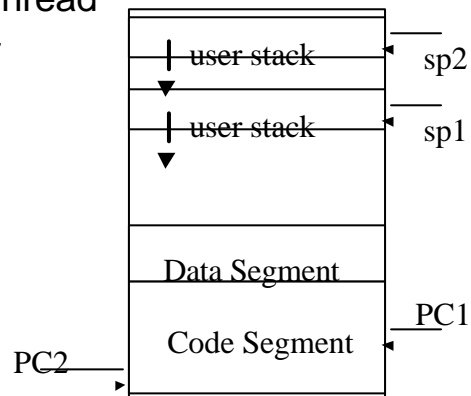
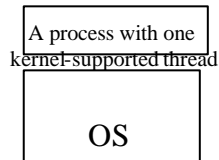
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Process Concept

Kernel-Supported Thread

- ✍ A program counter
- ✍ A register set
- ✍ A stack space

User-Level Thread



* “Operating system concept”, Silberschatz and Galvin, Addison Wesley, pp. 103

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Process Concept

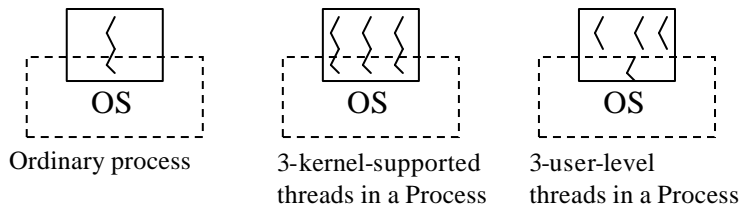
☞ Thread – Lightweight process

☞ An ordinary process contains one thread!

☞ Types

☞ Kernel-Supported Threads

☞ User-Level Threads



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