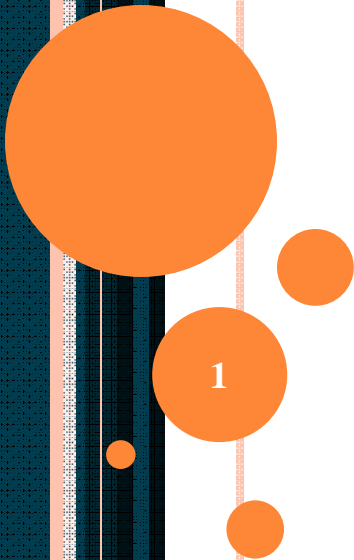


PRINCIPLES OF OPERATING SYSTEMS



LECTURE- 5

Principles of Operating Systems

PROCESSES

Outline

- Process Concept
 - Process Scheduling
 - Operations on Processes
 - Cooperating Processes
 - Threads
 - Interprocess Communication
-

Process Concept

- An operating system executes a variety of programs
 - batch systems - jobs
 - time-shared systems - user programs or tasks
 - job and program used interchangeably
 - Process - a program in execution
 - process execution proceeds in a sequential fashion
 - A process contains
 - program counter, stack and data section
-

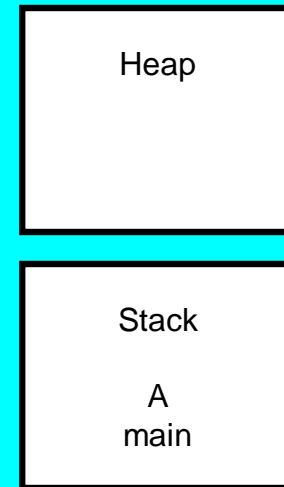
Process =? Program

```
main ()
{
    ...i
}
A() {
    ...
}
```

Program

```
main ()
{
    ...i
}
A() {
    ...
}
```

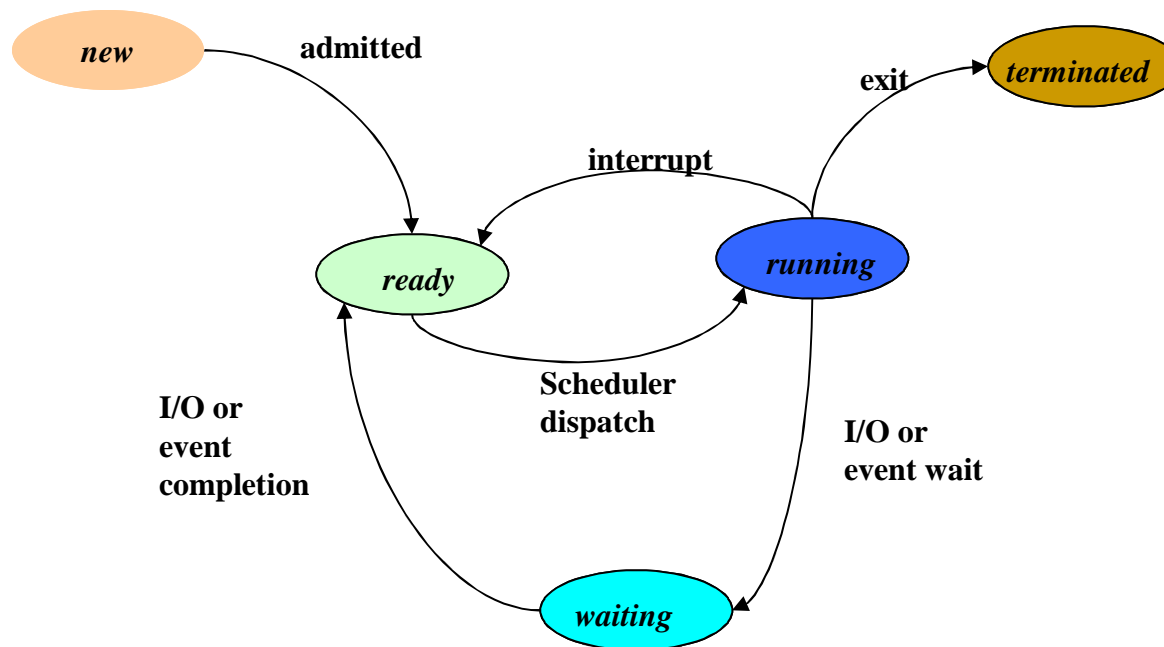
Process



- More to a process than just a program:
 - Program is just part of the process state
 - I run emacs on lectures.txt, you run it on homework.java – Same program, different processes
- Less to a process than a program:
 - A program can invoke more than one process
 - cc starts up cpp, cc1, cc2, as, and ld

Process State

- A process changes state as it executes.

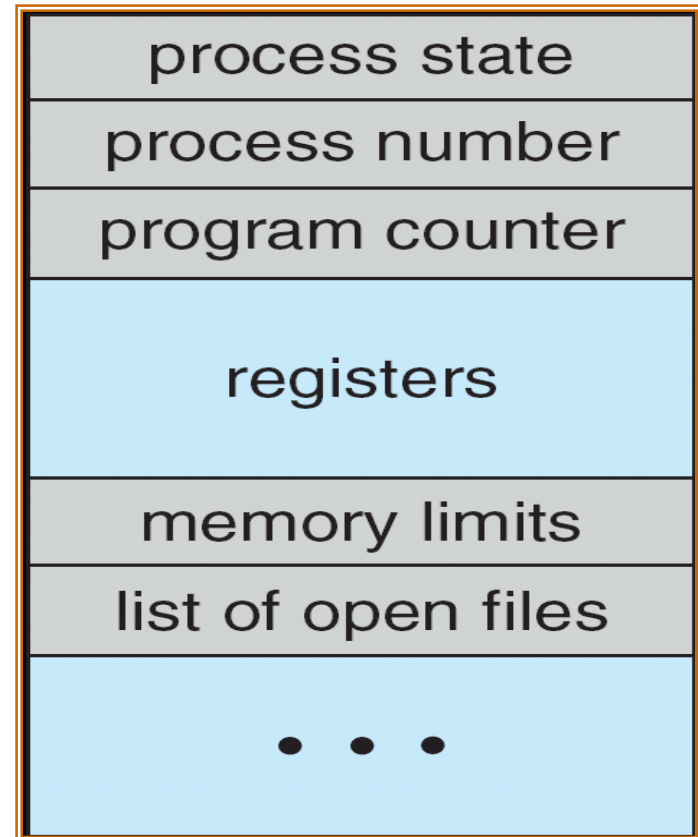


Process States

- New - The process is being created.
 - Running - Instructions are being executed.
 - Waiting - Waiting for some event to occur.
 - Ready - Waiting to be assigned to a processor.
 - Terminated - Process has finished execution.
-

Process Control Block

- Contains information associated with each process
 - Process State - e.g. new, ready, running etc.
 - Process Number – Process ID
 - Program Counter - address of next instruction to be executed
 - CPU registers - general purpose registers, stack pointer etc.
 - CPU scheduling information - process priority, pointer
 - Memory Management information - base/limit information
 - Accounting information - time limits, process number
 - I/O Status information - list of I/O devices allocated



Process
Control
Block