1 Operating System

- Process
- Threads
- CPU Scheduling
- Process Synchronization
- Dead Locks
- Memory Management
- Virtual Memory
- File System
- I/O System
- Disk Management
- Protection
- Security

2 Process

- a program in execution
- an asynchronous activity
- manifested by Process Control Block
- Entity to which processor can be assigned
- the dispatchable unit

3 Process Table

Pointer
Process State
Process Number
Program Counter
Registers
Memory Limits
Open Files

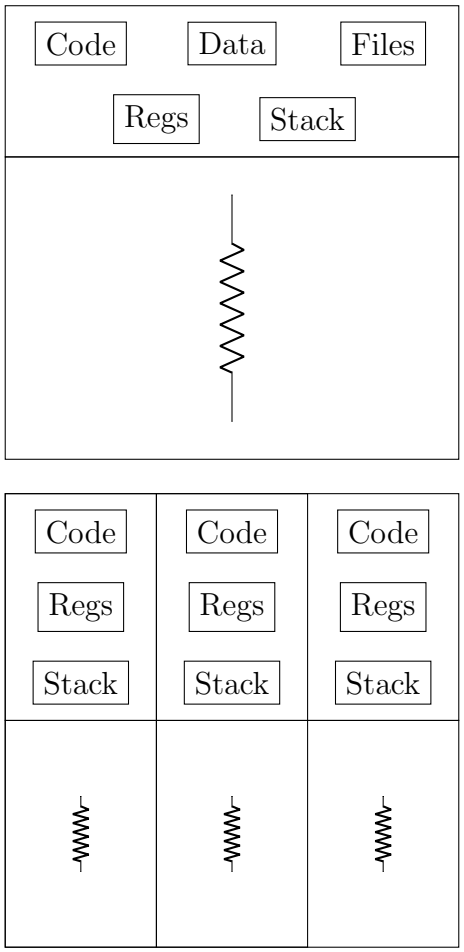
4 Process State Transition

5 Threads

- Single Sequence Stream within a Process
- Processes are used to group resources together and threads are the entities scheduled for execution on the CPU

6 Threads - Advantages

- Responsiveness
- Resource Sharing
- Economy
- Utilization of MultiProcessors Architectures



7 CPU Scheduler

- Select a process for execution and allocate CPU

Scheduling Decision will require following Transitions :

- running → waiting
- running → ready
- waiting → ready
- terminate

8 Scheduling Types

- pre-emptive : I shall not take CPU from a process untill it release that process
- non pre-emptive : I can take CPU from process if such priority demands

9 General goals of CPU Scheduling

- Fairness
- Policy Enforcements
- Efficiency
- Response-Time
- Turn Around Time
- Thoughtput

10 Dispatcher

The dispatcher should be as fast as possible, since it is invoked in every process switch .

dispatch latency should be minimum .

11 Scheduling Criteria

- CPU Utilization
- Thoughput (number of processes completed per unit time)
- Turn Around time (the time between the submission and completion)
- waiting time
- response time

12 CPU Scheduling - Scheduling Types

- FCFS Scheduling
- SJF Scheduling
- Priority Scheduling
- Round-Robin Scheduling
- Multi-Level Queue Scheduling
- Multi-Level Feedback Queue Scheduling

13 Process Synchronization-Critical Section Problem

A Solution to the Critical Section Problem must satisfy the following three requirements .

- Mutual Exclusion
- Progress
- Bounded Waiting

Mutual Exclusion $\overset{\text{means}}{\Longrightarrow}$ in the critical section at a time one and only one process can get an entry .

Bounded Waiting $\overset{\text{means}}{\Longrightarrow}$ Process **X** requesting to enter the critical section and another Process **Y** is entering critical section too , how many times Process **X** should denied should have UpperLimit and that Knows as **Bounded Waiting**

14 DeadLock

A Process or thread is in the state deadlock if it is waiting for a particular event that will not occur .