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COURSE NAME : 19CST201 – OPERATING SYSTEMS

II YEAR/ IV SEMESTER

UNIT – I OVERVIEW AND PROCESS MANAGEMENT

Topic: Process Scheduling

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Process Scheduling

☐ Maximize CPU use, quickly switch processes onto CPU for time sharing

☐ **Process scheduler** selects among available processes for next execution on CPU

☐ Maintains **scheduling queues** of processes

  ☐ **Job queue** – set of all processes in the system

  ☐ **Ready queue** – set of all processes residing in main memory, ready and waiting to execute

  ☐ **Device queues** – set of processes waiting for an I/O device

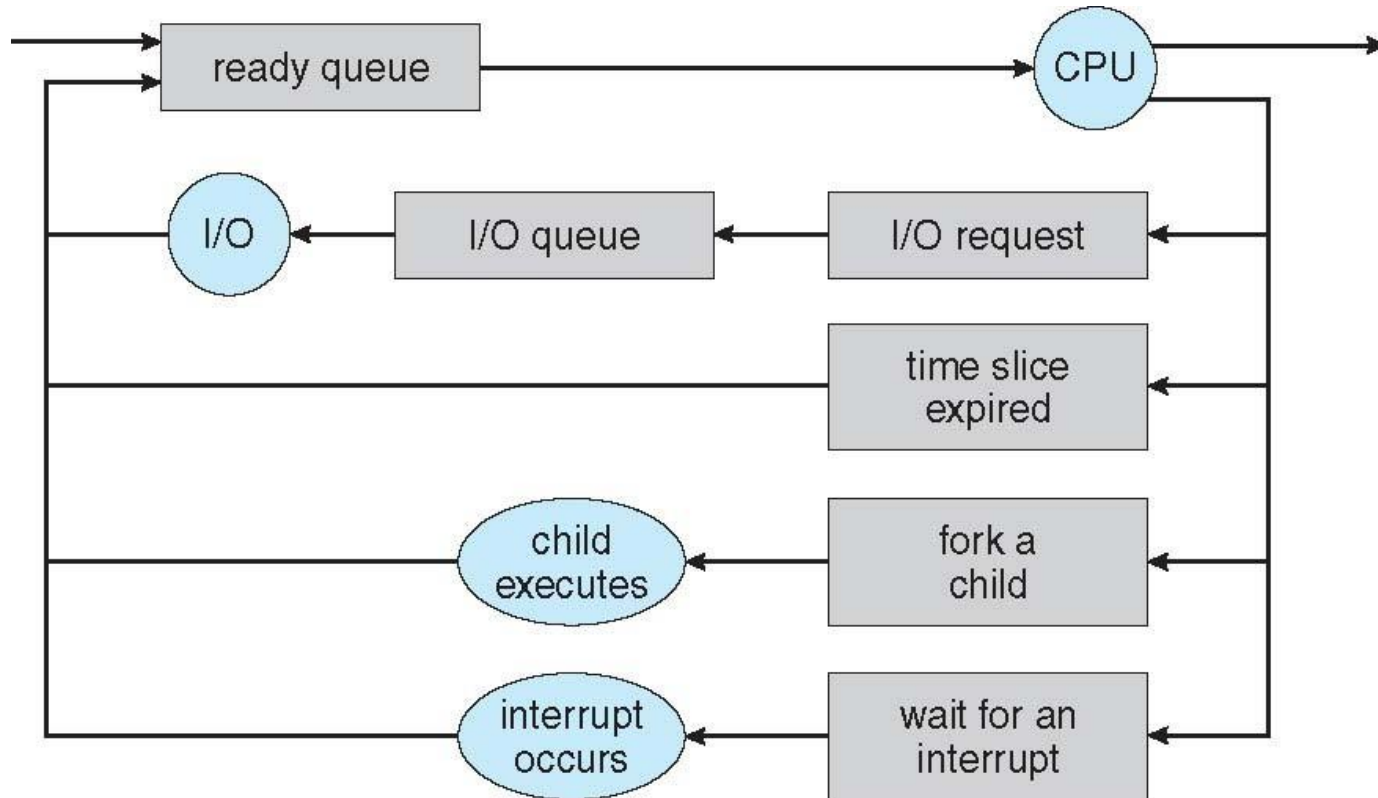 ☐ Processes migrate among the various queues
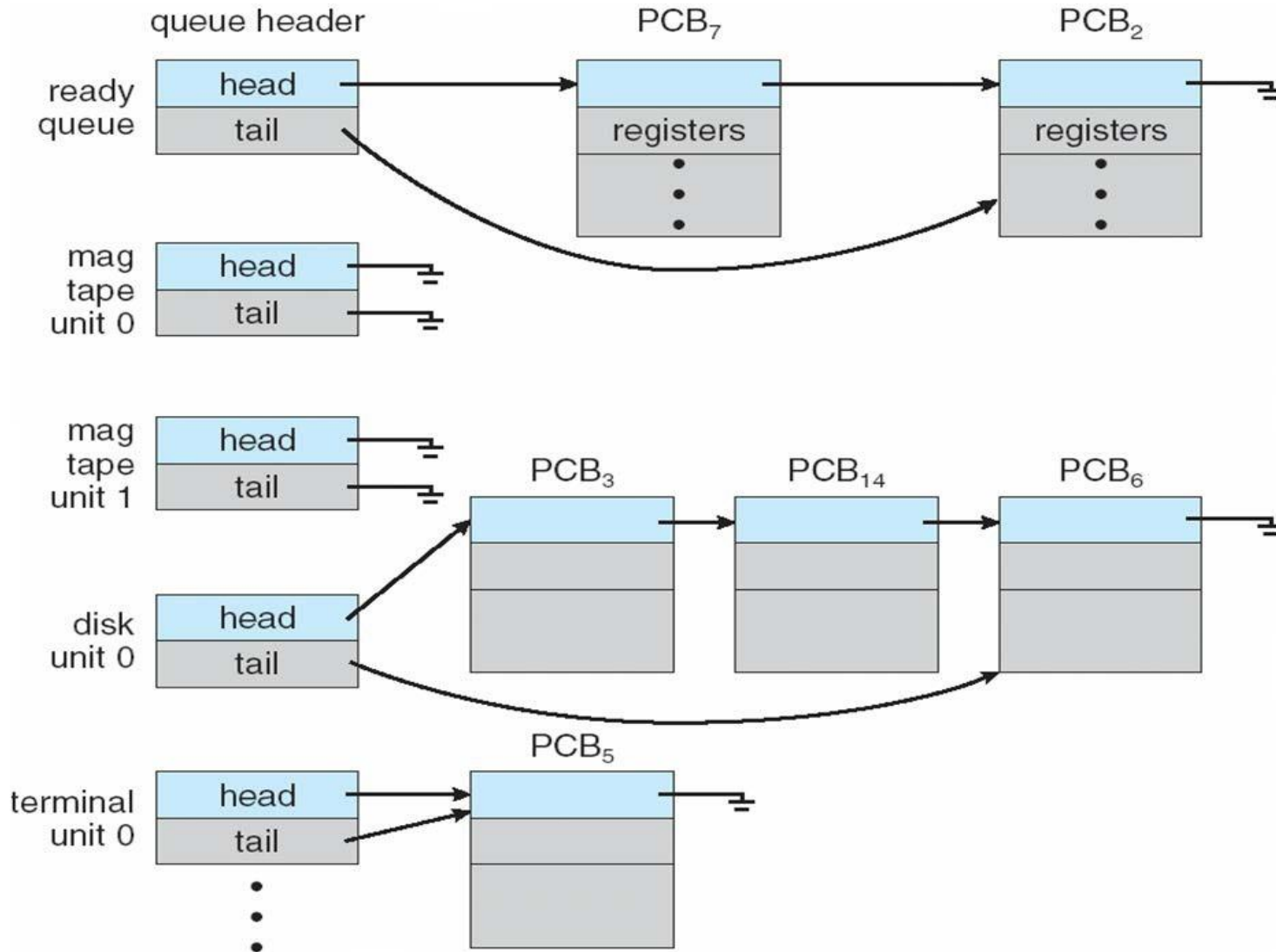
Representation of Process Scheduling

☐ **Queueing diagram** represents queues, resources, flows

Schedulers

- **Short-term scheduler** (or **CPU scheduler**) – selects which process should be executed next and allocates CPU

    - Sometimes the only scheduler in a system

    - Short-term scheduler is invoked frequently (milliseconds) $\Rightarrow$ (must be fast)

- **Long-term scheduler** (or **job scheduler**) – selects which processes should be brought into the ready queue

    - Long-term scheduler is invoked infrequently (seconds, minutes) $\Rightarrow$ (may be slow)

    - The long-term scheduler controls the **degree of multiprogramming**

- Processes can be described as either:

    - **I/O-bound process** – spends more time doing I/O than computations, many short CPU bursts

    - **CPU-bound process** – spends more time doing computations; few very long CPU bursts

- Long-term scheduler strives for good *process mix*

Addition of Medium Term Scheduling

☐ **Medium-term scheduler** can be added if degree of multiple programming needs to decrease

    ☐ Remove process from memory, store on disk, bring back in from disk to continue execution: **swapping**
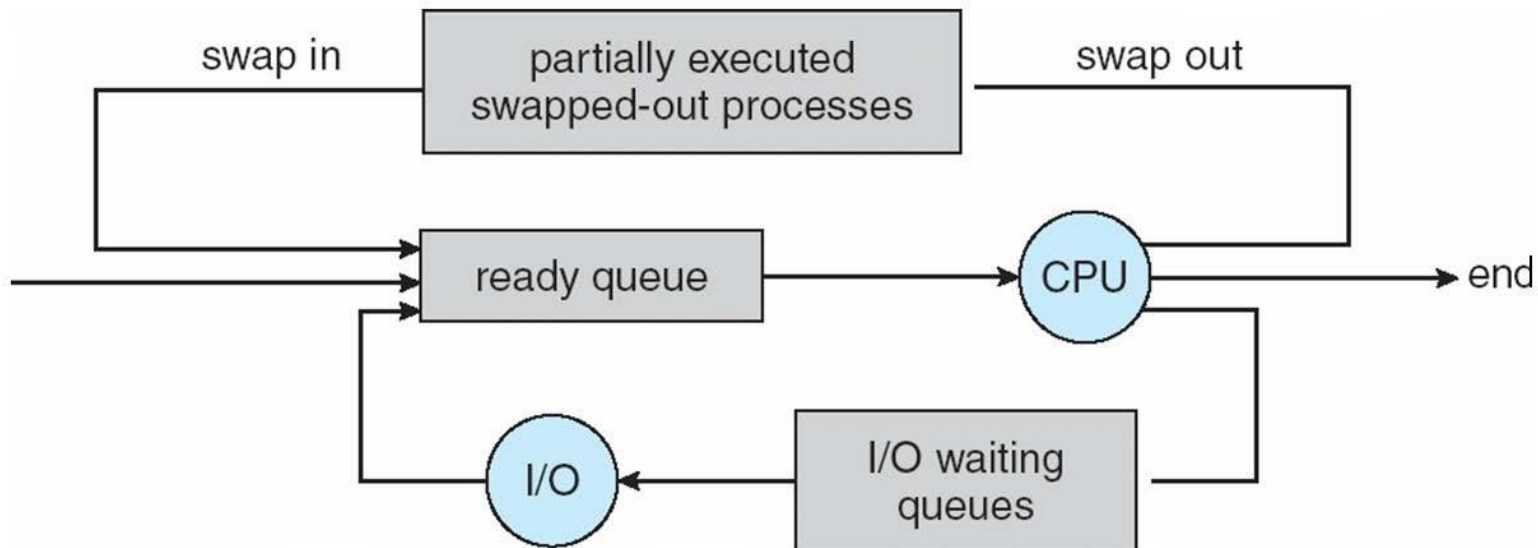
Context Switch

☐ When CPU switches to another process, the system must **save the state** of the old process and load the **saved state** for the new process via a **context switch**

☐ **Context** of a process represented in the PCB

☐ Context-switch time is overhead; the system does no useful work while switching

   ☐ The more complex the OS and the PCB ➔ the longer the context switch

☐ Time dependent on hardware support

   ☐ Some hardware provides multiple sets of registers per CPU ➔ multiple contexts loaded at once

REFERENCES

TEXT BOOKS:

T1   Silberschatz, Galvin, and Gagne, "Operating System Concepts", Ninth Edition, Wiley India Pvt Ltd, 2009.)

T2.   Andrew S. Tanenbaum, "Modern Operating Systems", Fourth Edition, Pearson Education, 2010

REFERENCES:

R1   Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.

R2   Harvey M. Deitel, "Operating Systems", Third Edition, Pearson Education, 2004.

R3   Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.

R4.   William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011