

操作系统原理

Operating System Principle

田丽华

3-4 调度

01

Job queue – set of all processes in the system.
作业队列 - 在系统中的所有进程的集合

02

Ready queue – set of all processes residing in main memory,
ready and waiting to execute.
就绪队列 - 在主内存中的, 就绪并等待执行的所有进程的集合

03

Device queues – set of processes waiting for an I/O device.
设备队列 - 等待某一I/O设备的进程队列

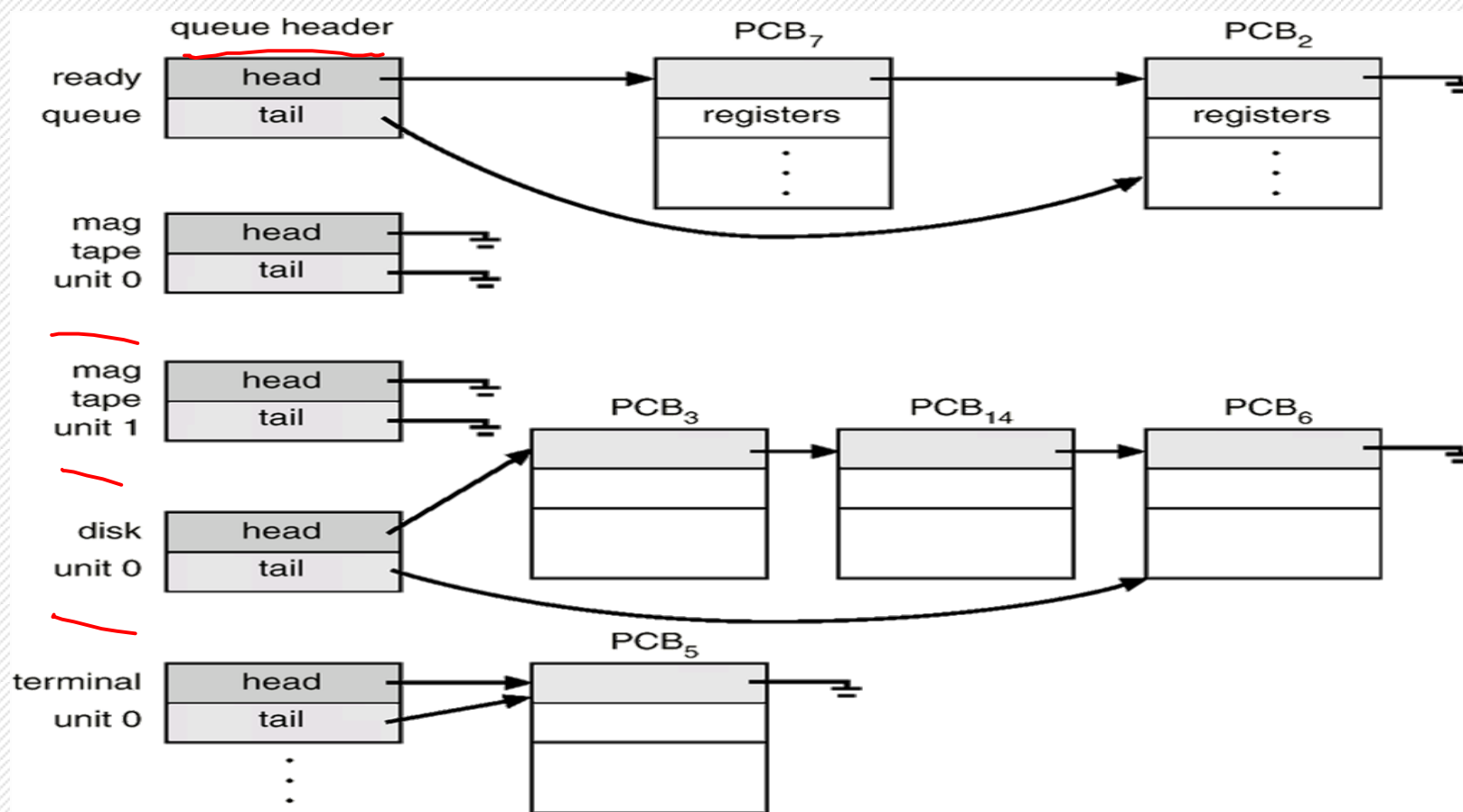
Process migration between the various queues.

在各种队列之间进程的迁移

Process Scheduling Queues

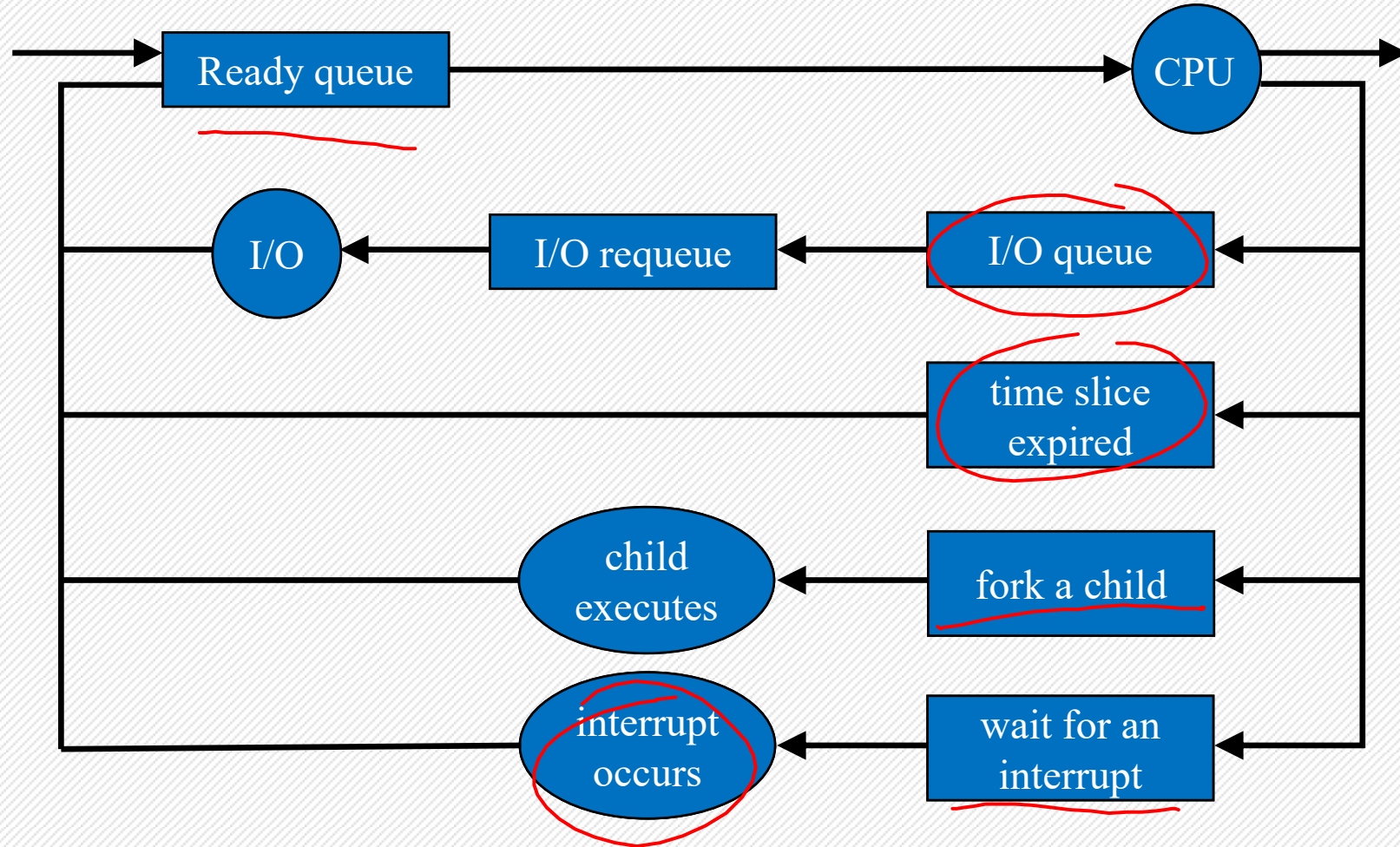
进程调度队列

Ready Queue And Various I/O Device Queues 就绪队列和各种I/O设备队列



Representation of Process Scheduling

进程调度的描述



Queueing-diagram

Schedulers调度

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

长程调度（或作业调度） - 选择可以进入就绪队列的进程

Controls the degree of multiprogramming

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

短程调度（或CPU调度） - 选择可被下一个执行并分配CPU的进程

调度(Cont.)

- Short-term scheduler is invoked very frequently
(milliseconds) \Rightarrow (must be fast). 短程调度切换频率高
- Long-term scheduler is invoked very infrequently
(seconds, minutes) \Rightarrow (may be slow). 长程调度不快
- The long-term scheduler controls *the degree of multiprogramming*.
长程调度控制了多道程序的“道”

调度(Cont.)

1

Processes can be described as either:

进程可以用下列方式描述:

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

I/O型进程 - 花费I/O 时间多于计算,
许多短CPU处理

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

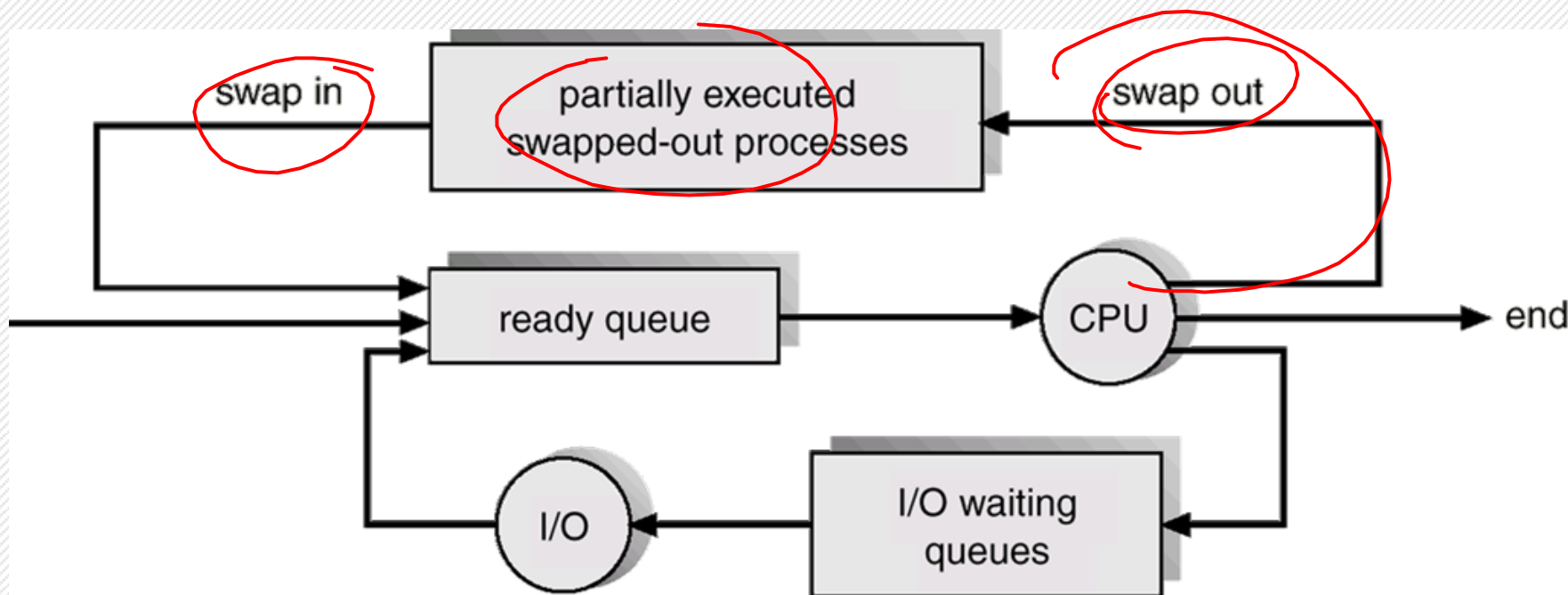
CPU 型进程 - 花费更多时间于计算, 许多长CPU处理

2

Long-term scheduler controls the process mix of I/O-bound process and CPU-bound process

Addition of Medium Term Scheduling

中程调度

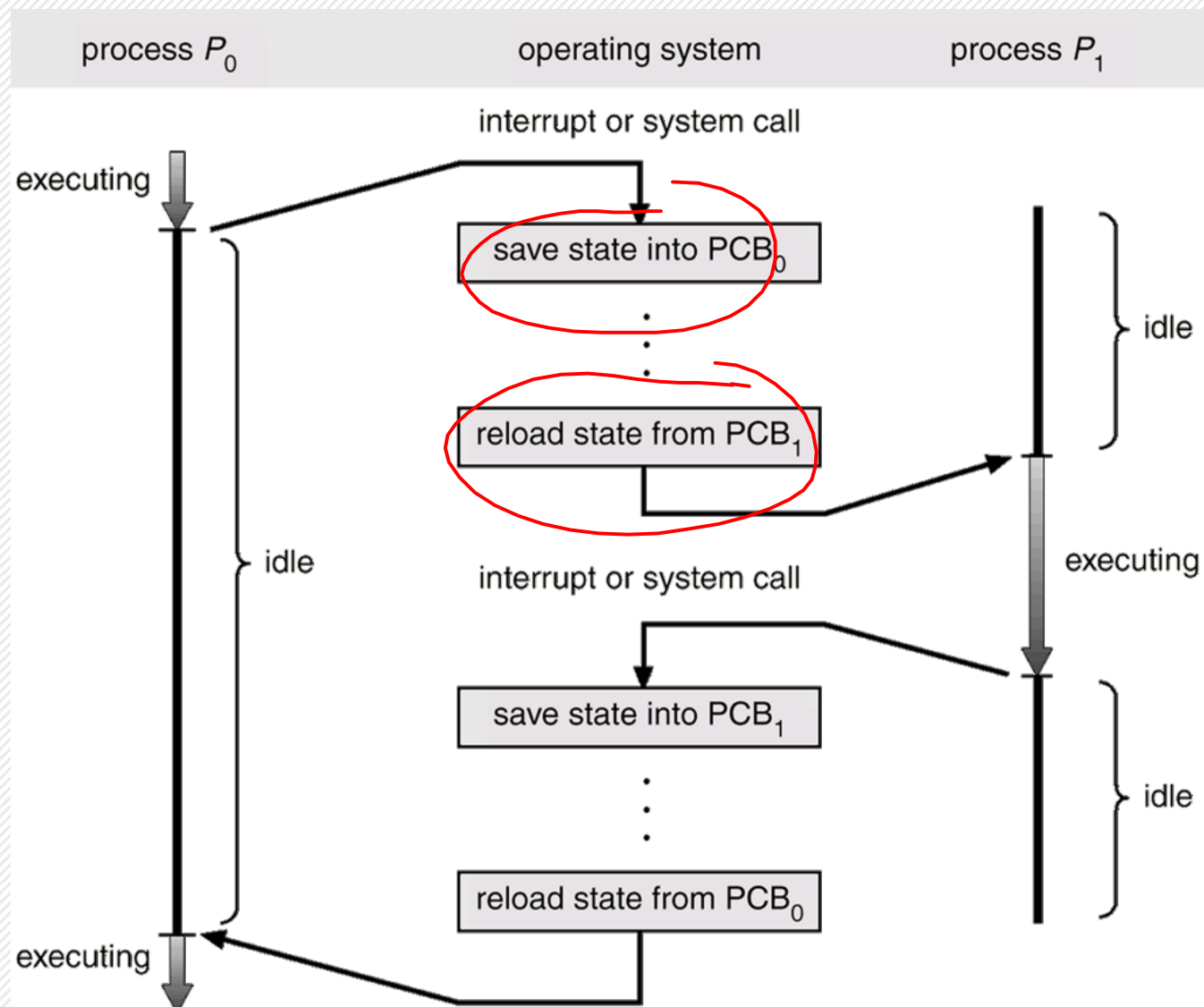


swapping

为了缓和内存紧张的情况，将内存中处于阻塞状态的进程换至外存上（挂起），降低多道程序的度。当这些进程重新具备运行条件时，再从外存上调入内存。

CPU Switch From Process to Process

进程间CPU的切换





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.

当CPU切换至另一个进程时，系统必须保存旧进程状态并为新进程调入所保留的状态



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

上下文切换的时间开销较重；在切换时，系统没有做有用的工作



Time dependent on hardware support.

时间取决于硬件的支持