

# 操作系统原理

Operating System Principle

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# 5-5 多级队列 多级反馈队列

# Multilevel Queue

## 多级队列

按进程的属性来分类，如进程的类型、优先权、占用内存的多少,每类进程组成一个就绪队列，每个进程固定地处于某一个队列，如

- Ready queue is partitioned into separate queues (就绪队列分为) :
  - foreground (interactive) (前台) [交互式]
  - background (batch) (后台) [批处理]
- Each queue has its own scheduling algorithm (每个队列有自己的调度算法)
  - foreground – RR
  - background – FCFS
- Scheduling must be done between the queues (调度须在队列间进行) .

### 1

Fixed priority scheduling; i.e., serve all from foreground then from background. Possibility of starvation

(固定优先级调度，即前台运行完后再运行后台。有可能产生饥饿)

### 2

Time slice – each queue gets a certain amount of CPU time which it can schedule amongst its processes; e.g., 80% to foreground in RR 20% to background in FCFS

给定时间片调度，即每个队列得到一定的CPU时间，进程在给定时间内执行；如，80%的时间执行前台的RR调度，20%的时间执行后台的FCFS调度

# Multilevel Queue Scheduling

## 多级队列调度

highest priority



lowest priority



# Multilevel Feedback Queue

## 多级反馈队列调度

存在多个就绪队列，具有不同的优先级，各自按时间片轮转法调度

各个就绪队列中时间片的大小各不相同，优先级越高的队列时间片越小。

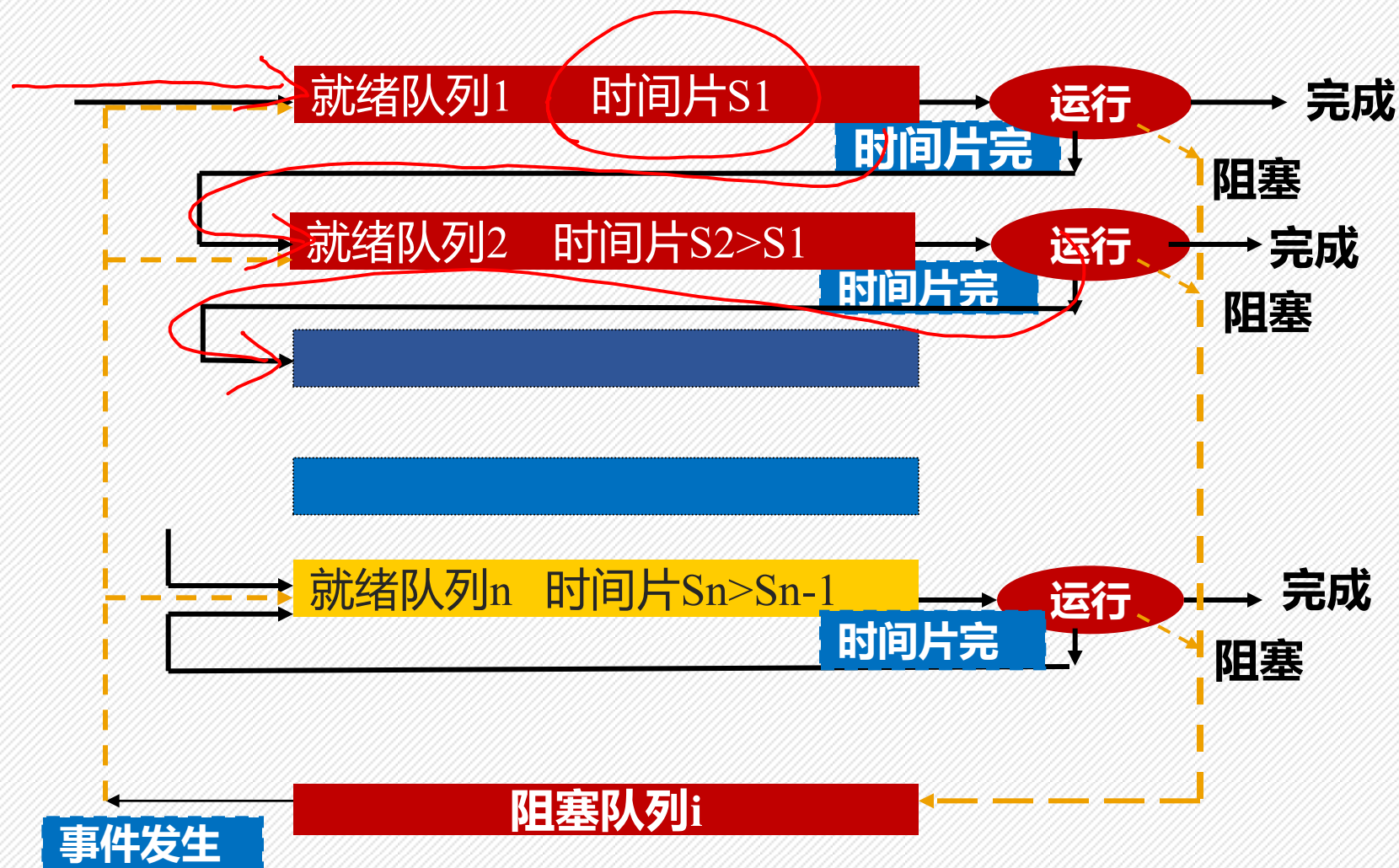
允许进程在队列之间移动

当一个进程执行完一个完整的时间片后被抢占处理器，**被抢占的进程**优先级降低一级而进入下级就绪队列，如此继续，直至降到进程的基本优先级。而一个进程从阻塞态变为就绪态时要提高优先级

最后会将I/O型和交互式进程留在较高优先级队列

# Multi-level feedback queue

图：多级反馈队列





# Multi-level Feedback Queue

## 多级反馈队列调度

A process can move between the various queues; aging can be implemented this way (进程能在不同的队列间移动；可实现老化) .

Multilevel-feedback-queue scheduler defined by the following parameters (多级反馈队列调度程序由以下参数定义) :

number of queues (队列数)

scheduling algorithms for each queue (每一队列的调度算法)

method used to determine when to upgrade a process (决定进程升级的方法)

method used to determine when to demote a process (决定进程降级的方法)

method used to determine which queue a process will enter when that process needs service (决定需要服务的进程将进入哪个队列的方法)

# Multilevel feedback Queues

## 多级反馈队列调度

