北科 90 OS.

Question:

List and describe the objectives that must be considered in the design of a job scheduling discipline.

Ans.

良好的排序job，應當滿足：

1. 公平（Fairness）：確保每一個行程（threading）皆能公平使用CPU。

2. 效率（Efficiency）：使CPU百分之百忙碌。

3. 回應時間（Response time）：反應給使用者的時間縮到最小。

4. 回轉時間（Turnaround and Waiting time）：批次工作等待要使用的時間縮至最短。

5. 單位工作量（Throughput）：單位時間內能同時處理的工作增加。

三種排程方式

Long-term scheduler (job scheduler):

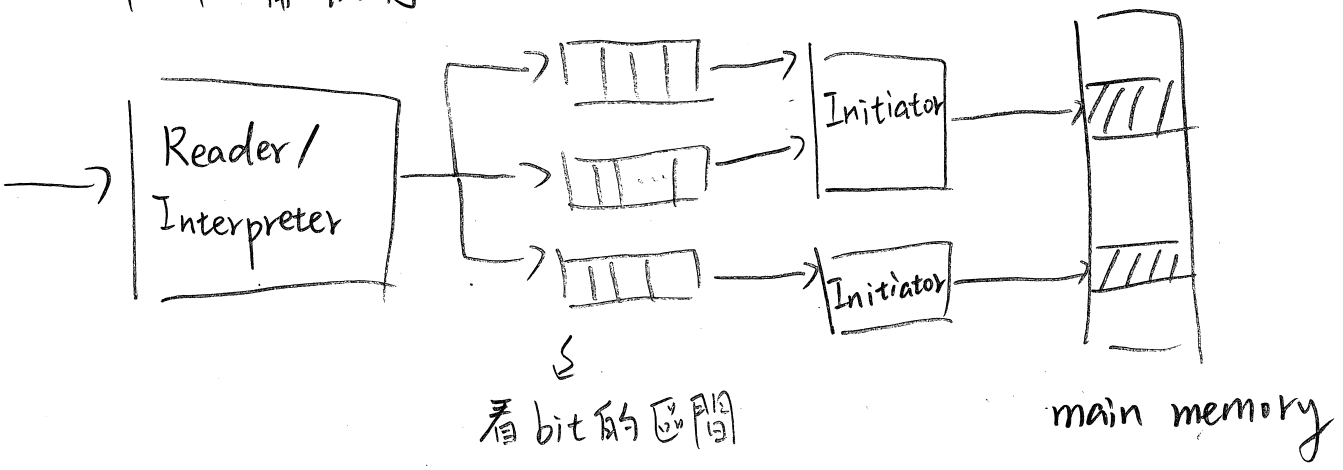
Should ensure a mix of IO intensive and CPU intensive processes are loaded into memory for execution.

Controls the number of processes in memory (page fault frequency, working set model).

Only executes when a process enters or leaves the system.

決定OS:

1. 從工作堆中(Job Pool)挑出Job，載入它們到記憶體中準備執行。



2. 執行的頻率不高
3. 可以控制 multiprogramming degree.
4. 可以調合 I/O Bound 與 CPU Bound Processes 之適當比例組合。
   - I/O Bound → 大量 I/O operator
   - CPU Bound → 大量 CPU operator.

5. 在批次系統中常用，但在分時系統、即時系統下不使用。

Medium-term scheduler:

A process may be swapped out of memory even though it has not completed.

The process is then swapped back in later and execution continues.

決定OS:

當 memory 空間不足或某 process 之 storage time (指 process 待太久) quantum 超過，則其會將某些 process 暫時 swap out 到 disk，稍後等到 memory 有空間，將其 swap in 並回復當初 swap out 時的狀態，然後繼續執行。

Short-term scheduler:

Select one of the ready to execute processes and allocates the CPU to it. This process runs until its timeslice or quantum expires, or it blocks for some other reason.

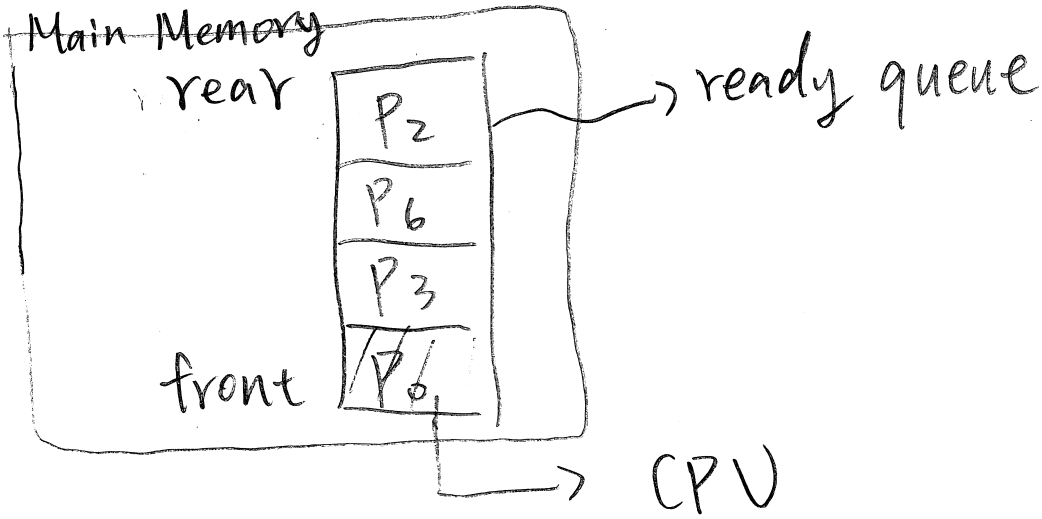
Executes after each quantum (ie. often (經常執行的job)), therefore must be fast and simple.

The currently running process is preempted and control of the CPU given to another process (context switching)

決定OS：

又稱 CPU Scheduling or Process scheduling

1. 從 ready queue 中，根據 priority 高的 process 優先獲得 CPU 控制權。



2. Batch System, Time-Sharing System, 及 Real-Time System 皆要使用。

* Time-Sharing 中，常用 CPU Time Slice (RR) way 來 Scheduling Processes.