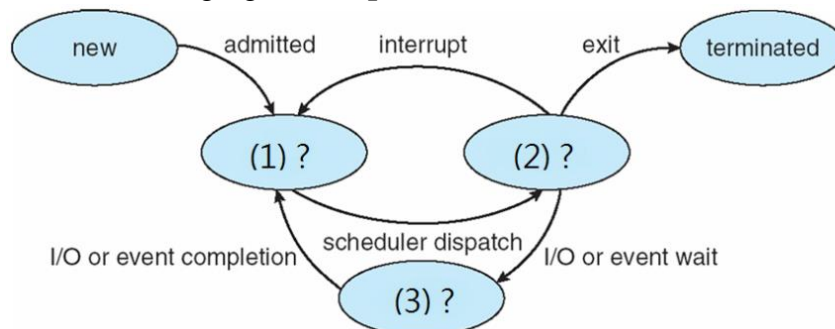


長庚大學103學年度第一學期 電機系博士班資工領域資格考試
科目：作業系統

1. There are a lot of functions and services provided by an OS to help users to efficiently use computers. For each of the services listed below, please indicate one drawback if the OS does not provide such a service.
 - (1) Virtual memory (5 pts)
 - (2) File system (5 pts)
 - (3) System protection by separating kernel and user modes (5 pts)
 - (4) Time-sharing and multi-tasking support (5 pts)

2. Please explain the difference between a program and a process. (10 pts)

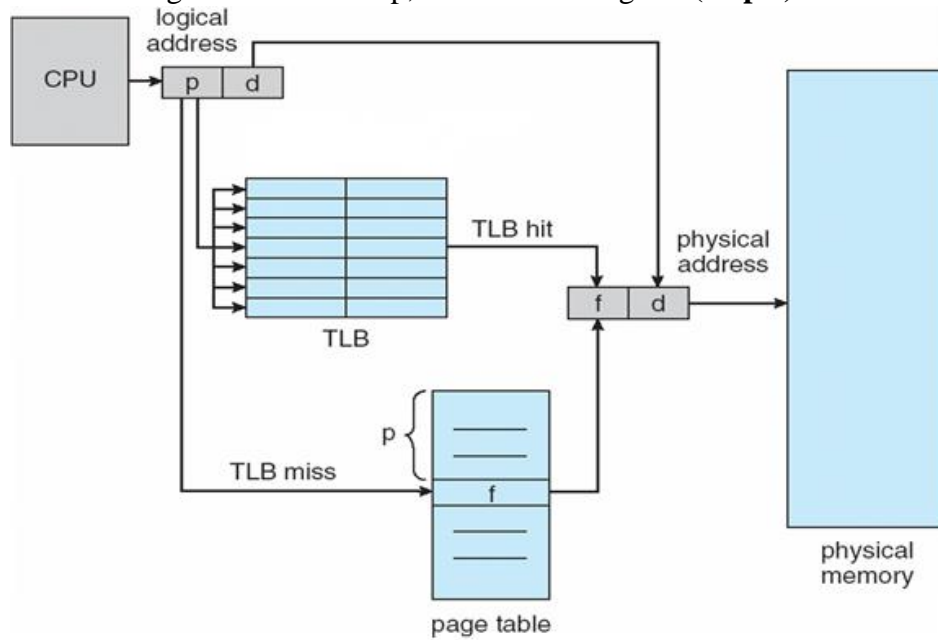
3. The possible states of a process are ready, running, and waiting. Please indicate the states of (1), (2), and (3) of the following figure. (15 pts)



4. Please illustrate the concepts about memory fragmentation by answering the following questions:
 - (1) Give an example to explain the external fragmentation. (5 pts)
 - (2) Give an example to explain the internal fragmentation. (5 pts)
5. For multi-threaded computing, please answering the following questions:
 - (1) What is the difference between creating a thread and creating a process? (5 pts)
 - (2) Provide an example program in which multi-threading does not provide better performance in a multi-core processor. (5 pts)

(Please read the next page)

6. This question is to evaluate your knowledge of memory paging. For a system with a page table and a TLB, as shown in the following figure, please (1) define what is TLB. (10 pts) (2) Please explain the meaning of the numbers p, d and f in the figure. (15 pts)



7. Please explain the following terminology:
- (1) Race condition (5 pts)
 - (2) CPU-bound process (5 pts)