

長庚大學105學年度第二學期 電機系博士班資工領域資格考試
科目：作業系統

1. There are two approaches to implement the inter-process communication within operating systems: message passing and shared memory. Please explain the advantages and disadvantages of message passing and shared memory. **(10 pts)**
2. There are two different types of OS kernels, monolithic kernels and microkernels. Please explain the advantage and disadvantage of monolithic kernels, and provide an example of monolithic kernels. **(10 pts)**
3. Please explain the difference between a program and a process. **(10 pts)**
4. To provide some web services for multiple clients, we prefer to create multiple threads instead of multiple processes. In this case, please provide the advantage of using multiple threads. **(10 pts)**
5. For round robin process scheduling, properly defining the size of the time quantum is a very important design issue. What is the problem if the size is too small? What is the problem if the size is too large? **(10 pts)**
6. Synchronization is a fundamental support provided by operation systems to allow multiple processes and/or threads to access shared data. Peterson's Solution is a well known example provided by OS textbooks. For the second version of Peterson's Solution, as follows, please explain the problem for using the code for processes P_i and P_j . **(10 pts)**

Initially, $flag[i]=flag[j]=false$

P_i :

do {

$flag[i]=true;$
 $while (flag[j]) ;$

critical section

$flag[i]=false;$

remainder section

} while (1);

P_j :

do {

$flag[j]=true;$
 $while (flag[i]) ;$

critical section

$flag[j]=false;$

remainder section

} while (1);

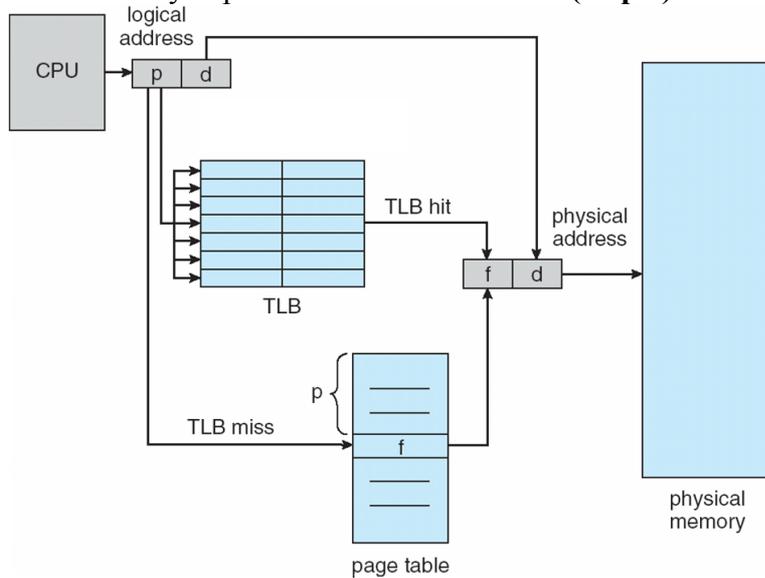
7. To manage the deadlock problem, we can do deadlock prevention or deadlock avoidance. Please explain deadlock prevention in detail. **(10 pts)**

8. For the thrashing in operating systems, please answer the following questions:

(1) Please define the thrashing problem in operating systems. **(5 pts)**

(2) How can an operating system avoid thrashing? **(5 pts)**

9. The following figure shows the paging hardware with TLB. Please define p, d, and f in the figure. Please briefly explain the function of TLB. **(10 pts)**



10. Many operating systems provide the support of virtual memory. With virtual memory, we can further do demand paging to start a process without loading all data and binary of the program into the main memory. Now, please explain the problem if operating systems do not support virtual memory. **(10 pts)**