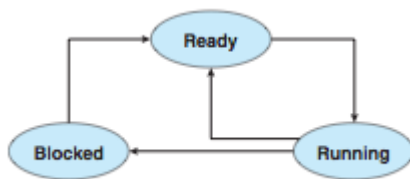


Assignment 9

1 Problem 1

[20 points] 9.2 A simplified view of thread states is Ready, Running, and Blocked, where a thread is either ready and waiting to be scheduled, is running on the processor, or is blocked (for example, waiting for I/O). This is illustrated in Figure 9.30. Assuming a thread is in the Running state, answer the following questions, and explain your answer:



- Will the thread change state if it incurs a page fault? If so, to what state will it change?
- Will the thread change state if it generates a TLB miss that is resolved in the page table? If so, to what state will it change?
- Will the thread change state if an address reference is resolved in the page table? If so, to what state will it change?

1.1 Answer

- Yes, it will change its state from Running to Blocked
- Not a necessary condition. Because a TLB miss is happened, it may not cause page fault, the processor where the thread belonged to may not be blocked as well but if the page fault is still happened it will change to Blocked state.
- No. Because no IO operation is needed if the address reference is resolved.

2 Problem 2

[10 points] 9.4 What is the copy-on-write feature, and under what circumstances is its use beneficial? What hardware support is required to implement this feature?

2.1 Answer

Copy-on-write: When two processors are accessing the same text section in a program, it is efficient to use a common set of pages. A copy must be waited to make until a write operation taken to allow the two programs to individually access the different copies.

It is very beneficial When execute a program with high percentage of read only operation. The hardware support required to implement a write protection bit in the page table and TLB entries, and it will cause a trap to OS if a process attempts to write a page with the write protection bit is set.

3 Problem 3

[10 points] 9.19 What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?

3.1 Answer

When the degree of the multiprogramming is too high and too few pages required by processors, it will spend more time swapping than executing.

The system can detect thrashing by monitor CPU utilization, the degree of multiprogramming and paging activity.

Thrashing can be eliminated by reducing the degree of multiprogramming.