Lecture 11 Assignment Questions

1. Why do computer systems need address binding during program execution?

2. Briefly describe the importance of *dynamic* address binding in a computer system.

3. What is *dynamic loading*? Briefly describe how the dynamic loading is related to *demand paging*.

4. Describe the term **page fault**. What happens if there is no free memory frame during a page fault (along with your answer, you should cover the details of the page table, including its **valid-invalid control bit**)?

5. (3 Points) Under what circumstances do **page faults** occur? Describe the actions taken by the operating system when a page fault occurs.

6. Briefly describe the situation in which the *page fault handler routine* of an OS needs a page replacement algorithm. Assume that a **page reference string** of a user process is "**12 3 2 4 2 5 3 4 5 3 2**" and **three** fixed memory frames are allocated for this process. Show the performance of **optimal**, **FIFO**, and **LRU** page replacement algorithms regarding their **page fault**.

7. Assume that a **page reference string** of a user process is "**2 3 2 1 4 2 5 3 4 5 3 2**" and three fixed memory frames are allocated for this process. Show the performance of **optimal**, **FIFO**, and **LRU** page replacement algorithms regarding their **page fault**.

8. A virtual memory (VM) system is shown in **Figure 4**. Based on the VM:

   (a). Why does the page table need the valid-invalid bit?

   (b). Assume **page no. 4** is selected for the subsequent execution. Briefly describe how the OS handles the situation.

   (c). Is any page replacement algorithm needed to solve the issue in (b)? Why? (d) Suppose there are 1M pages in the VM. Show the row size (no. of rows) of the page table.