

CS1356 Introduction to Information Engineering

Homework 7

Read textbook 3.4 and answer the following questions

1. What are computers' resources? And how does an OS manage them?
2. Why cannot an OS grant the printing requests to process B when process A is using it?
3. What is a **flag**? And how to use it to control the printer allocation?
4. What is the problem of using flags to track the resource allocation? Give a scenario that when the flag system is used, process A can still get the permission of using the printer while the printing job of process B hasn't finished.
5. Why can **disabling interrupt** prevent the flag problem mentioned in 4?
6. Why can the **test-and-set instruction** prevent the flag problem mentioned in 4?
7. What is a **semaphore** in software systems?
8. What is a **critical region**? What is the **mutual exclusion** requirement? How to use a semaphore to protect a critical region?
9. What is the **deadlock** problem? Give an example to illustrate this problem.
10. What are the three necessary conditions of causing a deadlock? (We will add the fourth condition in class.)
11. How to attack a deadlock problem? Which condition is removed? Give an example of how to do it.
12. How to avoid a deadlock? Which conditions are removed? Give two examples.
13. What is **spooling**? How does it prevent multiple processes to use a printer?

14. How can a file manager do if multiple processes request a file simultaneously?

15. Do all four question and exercises of section 3.4

Read textbook 3.2 about the memory manager part and answer the following questions

1. Why is a memory manager more complicated on a multitasking environment, comparing to it on a single task environment?
2. If the physical memory is not big enough, what can a memory manager do?
3. What is the **paging** technique? What is a **page**? Why to use it?
4. What is **virtual memory**?