Operating Systems (COMP2006)

CURTIN UNIVERSITY
Computing Discipline
School of Electrical Engineering, Computing and Mathematical Sciences

Worksheet 9

1. State the advantages and disadvantages of placing functionality in a device controller rather than in the kernel.

2. How does DMA increase system concurrency?

3. Describe circumstances under which blocking I/O should be used

4. Describe circumstances under which the non-blocking I/O should be used

5. Why not just implement non-blocking I/O and have processes busy-wait until their device is ready?

6. When are caches useful? What problems do they solve? What problems do they cause? If a cache can be made as large as the device for which it is caching, why not make it that large and eliminate the device?

7. What is the main different between a cache and a buffer?

8. For each of the following I/O scenarios, would you design the OS to use buffering, spooling, caching, or a combination? Would you use polled I/O, or interrupt driven I/O? Give reasons for your choices
    a. A mouse is used with a graphical user interface
    b. A tape drive on a multitasking OS (assume no device pre-allocations is available).
    c. A disk drive containing user files.
    d. A graphics card with direct bus connection, accessible through memory-mapped I/O.

9. Why might a system use interrupt driven I/O to manage a single serial port, while polling I/O to manage a front-end processor, such as a terminal concentrator?

10. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.

    Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms?

a. FCFS.
b. SSTF.
c. SCAN.
d. LOOK.
e. C-SCAN.
f. C-LOOK.

11. Explain why SSTF scheduling tends to favour middle cylinders over the innermost and outermost cylinders.

12. Briefly explain the differences among the six levels for RAID, showing how each improve reliability, access time, and I/O rate.

13. RAID level 3 is able to correct single-bit errors using only one parity-drive. What is the point of RAID level 2?