Alexandria University
Faculty of Engineering
Comp. & Comm. Engineering
CC373: Operating Systems

جامعة الاسكندرية
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برنامج هندسة الحاسب والاتصالات
مادة نظم التشغيل

Sheet10
IO MANAGEMENT AND DISK SCHEDULING

1) List and briefly define three techniques for performing I/O.
2) What is the difference between logical I/O and device I/O?
3) What is the difference between block-oriented devices and stream-oriented devices?
   Give a few examples of each.
4) Why would you expect improved performance using a double buffer rather than a single buffer for I/O?
5) What delay elements are involved in a disk read or write?
6) Briefly define the disk scheduling policies illustrated in Figure 11.7.
7) Briefly define the seven RAID levels.
8) Considering Table 11.2
   a) Perform the same type of analysis as that of Table 11.2 for the following sequence of disk track requests: 27, 129, 110, 186, 147, 41, 10, 64, 120. Assume that the disk head is initially positioned over track 100 and is moving in the direction of decreasing track number.
   b) Do the same analysis, but now assume that the disk head is moving in the direction of increasing track number.
9) Calculate how much disk space (in sectors, tracks, and surfaces) will be required to store 300,000 120-byte logical records if the disk is fixed sector with 512 bytes/sector, with 96 sectors/track, 110 tracks per surface, and 8 usable surfaces. Ignore any file header record(s) and track indexes, and assume that records cannot span two sectors.
10) Consider the disk system described in the previous problem, and assume that the disk rotates at 360 rpm. A processor reads one sector from the disk using interrupt-driven I/O, with one interrupt per byte. If it takes 2.5 μs to process each interrupt, what percentage of the time will the processor spend handling I/O (disregard seek time)?
11) Repeat the preceding problem using DMA, and assume one interrupt per sector.
12) It should be clear that disk striping can improve the data transfer rate when the strip size is small compared to the I/O request size. It should also be clear that RAID 0 provides improved performance relative to a single large disk, because multiple I/O requests can be handled in parallel. However, in this latter case, is disk striping necessary? That is, does disk striping improve I/O request rate performance compared to a comparable disk array without striping?
13) Consider a 4-drive, 200 GB-per-drive RAID array. What is the available data storage capacity for each of the RAID levels, 0, 1, 3, 4, 5, and 6?

How to submit the homework assignments?

- Solve the sheet individually without looking up the solution on the Internet. The sheet is to practice; it is a learning tool not an exam.
- Assignments are to be **handwritten**.
- Papers are to be scanned (I like camscanner app). Put all images in a pdf file (camscanner does that for you)
- Use MS Teams to submit
    - o Your filename should be your user id