

Exercises Week 4: Storage and Buffer Management

Exercise 4.1

Explain the following terms briefly:

- a. HDD sectors (= blocks)
- b. HDD tracks
- c. HDD cylinders

Exercise 4.2

List the advantages and disadvantages of SSDs over HDDs.

Exercise 4.3

Determine whether each of the following statements is true or false.

- a. Each frame in the buffer pool is the size of a disk page.
- b. The dirty bit is used to track the popularity of the page.
- c. When using the LRU policy, the reference bits are used to give pages a “second chance” to stay in memory before they are replaced.

Exercise 4.4

Consider that you have a buffer pool that can hold three pages. There are 26 pages in the database on disk, labelled as A, ..., Z. Consider each of the sequences of page requests (access patterns) below and calculate the number of I/Os that would be used for the LRU, MRU, and Clock replacement policies. (Spaces in the access patterns are only for readability.) Assume that:

- You start with an empty buffer pool each time;
- For Clock, the frame pointer starts with frame 0 each time;
- No page is written on (made dirty);
- The page is pinned and immediately unpinned each time; and
- The timestamp is updated each time the page is pinned (for LRU and MRU).

Access Pattern	LRU	MRU	Clock
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ABC DAB CD			
JKL MLJ NK			