

CSCI 3357: Database System Implementation
Homework Assignment 2
Due Friday, September 13

1. Consider a single-platter disk containing 50,000 tracks and spinning at 7200rpm. Each track holds 500 sectors, and each sector contains 512 bytes.

- a) What is the capacity of the platter?
- b) What is the average rotational delay?
- c) What is the maximum transfer rate?

2. Consider an 80 GB disk drive spinning at 7200 rpm with a transfer rate of 100 MB/sec. Assume that each track contains the same number of bytes.

- a) How many bytes does each track contain? How many tracks does the disk contain?
- b) If the disk were spinning at 10,000 rpm, what would the transfer rate be?

3. Make the following two modifications to the SimpleDB class `Page`.

- a) The methods `setInt`, `setBytes`, and `setString` do not check that the specified value will fit into the byte buffer at the specified offset. If it doesn't, the `ByteBuffer` class will throw an `IndexOutOfBoundsException` exception. Modify these methods so that they write the specified value only if it fits. If the value does not fit, the methods should print a descriptive message and ignore the request. For example, if the capacity of the page's byte buffer is 400 bytes, then the call `p.setInt(398, 12)` should print the following message:

ERROR: The integer 12 does not fit at location 398 of the page

Note: To get the capacity of a `ByteBuffer` object, call its `capacity()` method.

- b) Currently, the class writes a string as a "blob" of bytes, prepended by an integer denoting the length of the blob. Modify the method `setString` so that it instead writes each individual character of the string, followed by the delimiter character `'\0'`. Modify the method `getString` analogously.

You should use the `ByteBuffer` methods `getChar` and `putChar` to read and write each character. Note that these methods encode each character using two bytes, regardless of the specified charset. Thus you will also need to modify the page's `maxLength` method.

NOTE: You need to re-create the demo university database, because the database you created for hw0 stores string values differently.