CST 334: Operating Systems

Dr. Glenn Bruns

# Lab: Hard drives

Solve the following problems with paper and pencil. You can use a calculator, but not the web.

1. What is 45 inches in cm? There are 25.4 mm in an inch. Solve using dimensional analysis.
2. Convert 75.2 mph into units of meters/second. There are 5280 feet in a mile, and 3.28 feet in a meter. Solve using dimensional analysis.
3. Suppose I travel 4.2 miles in 15 minutes. What is my average speed in feet per second? Solve using dimensional analysis.
4. What can I expect for average rotational delay with a 5400 RPM disk drive? Give the answers in units of milliseconds. Use dimensional analysis.
5. Which would you expect to be faster:

* 20 random writes, each of 16K bytes (each of which is sequential)
* a single, sequential write of 200 MB

First, guess which you think would be faster. Next compute estimated times for the two cases, using the following assumptions:

* 7200 RPM drive speed
* average seek time of 3 ms
* transfer rate of 120 MB/sec

1. The speed of light is 3.0 x 1010 cm/sec. Express this speed in km/hr. Use dimensional analysis.
2. If you still have time, solve the problems on this page: <http://www2.ucdsb.on.ca/tiss/stretton/Basic_skills/Dimensional_Analysis_Contents.htm>
3. If you still have time, follow the links on the bottom the page on the previous problem to get even more practice.
4. If you still have time: a particle moves through a gas at a speed of 15 km/s. How far will it move in 5.5 s? Use dimensional analysis.