**UECS1013 Introduction to Computer Organisation and Architecture**

**Tutorial 10**

1. Consider a disk with an average seek time of 4ms, rotation speed of 15,000-rpm and 512-byte sectors with 500 sectors per track. Assume that the seek time between neighboring tracks are negligible. Suppose we wish to read a file 1.28MB, answer the following questions:
   1. Compute the total *transfer* time (in ms).

Sector x time to transfer one sector

Transfer rate = bytes per sector x sectors x rpm

512bytes x 500 x 15000rpm

384 000 0000 bytes/minute

64 000 000 bytes per second

64mb/s

Time to transfer one sector = bytes per sector / transfer rate

512bytes/64mb/s

=0.000008second

=0.008ms

Sector for files = file size /sectpr size 1.28mb/512b = 2500 sector

Total transfer time = sector x time to transfer 1 sector

= 2500 x 0.0008 = 20ms

* 1. Assuming that the file are stored in contiguous sectors of adjacent tracks, compute the total time to retrieve the file.

Total retrieval time = average seek time(4ms) + total latency time + total transfer time

Average latency time = 0.5 x time to finish one rotation

= 0.5/ RPM

= 0.5/15000 minutes

=60 x 0.5 x 15000seconds

=0.002 seconds

=2ms

Total latency time (latency needs to be computed each time)

Average latency time x no of tracks

2ms x 5 tracks

10ms

Total transfer time = 20ms

Total retrieval time = 4ms +10ms + 20ms

* 1. Compute the worst case scenario (in ms) to retrieve the file where the file is scattered at distant sectors.

Total access time (worst case scenario)

Sector x (average seek tim + average latency time +transfer time for 1 sector)

2.500 x (4ms +2ms + 0.0008ms) = 1.5020ms

* 1. What is the conclusion that you can derive from questions Q1(b) and Q1(c)?

The order inn which sectors are rad from the disk has a tremendous effect on IO performance. A file should be stored as compact into the hard disk

1. Specify the difference between Constant Angular Velocity (CAV) and (Multiple Zone Recording) MZV.

CAV No of bits per track is constant > read intent is the same for all tracks

MZV no of bits in the after track are more than the inner tracks > read interval is shorter(read frequency is faster) for the outer tracks

1. Consider a magnetic disk drive with 8 surfaces, 512 tracks per surface and 64 sectors per track. Sector size is 1KB. The average seek time is 8ms and the time required to move to the next adjoining cylinder is 1.5ms. The drive rotates at 3600 rpm..
   1. What is the disk capacity?
   2. What is the average rotational latency (in ms)?
   3. What is the transfer time for a sector (in ms)?
   4. Estimate the access time (in ms) to retrieve a 5MB file. Assume that the file is stored in **successive** *cylinders* and *sectors* in each surface.