IHAB M.E.

# FILE ORGANIZATION

*Problem #1*

Consider a drive with the following features:

| Capacity | 9000MB |
| --- | --- |
| Average Seek time | 8msec |
| Spindle Speed | 10000rpm |
| Bytes per sector | 512 |
| Cluster size | 4096 |
| Sectors per track | 170 |
| Tracks per cylinder | 16 |
| Cylinders | 526 |

1. Suppose you have a file that is 8704 KB, divided into $34,000$ 256-byte records. What is the time cost given that the file will be accessed sequentially?

   Cluster size = 4096, and hence the cluster holds $\frac{4096}{256} = 16$ records, and $\frac{4096}{512} = 8$ sectors.

   The file is 8704 KB = 8704000 bytes, and hence: $\frac{8704000}{4096} = 2125$ .

   So, it is stored in $2125 \times 8 = 17000$ sectors, and hence $\frac{17000}{170} = \frac{\#\,of\,Sectors}{Sectors\,per\,track} = 100$ tracks.

   Spindle speed = 10000, and hence $\frac{1}{\frac{10000}{60 \times 100}} = 6ms$ and the rotational delay is half that = 3ms.

   So:

   Avg seek time = 8ms.

   Rotational Delay = 3ms.

   Track read time = revolution time = 6ms.

   Total time=17ms

   Number of tracks = 100.

   Total transfer time (sequentially) $= 100 \times 17ms = 1.7s$

2. What about randomly?

   Randomly only means accesssing each cluster individually, i.e: each record of the file is scattered between sectors.

   Cluster time $= \frac{cluster\,size}{track\,size} = \frac{4096}{170 \times 512} = 0.28ms$

   Total time = avg seek time + rotational delay + cluster read time

   $=8 + 3 + 0.28 = 11.28ms$

   Total transfer time (randomly) $= 34,000 \times 11.28ms = 383.52s$