

Question

For the following disk, give the expected, worst, and best case total times for a single block. There is no cache.

6000 RPM

100 tracks/surface

100 blocks/track

Seek time is 2ms overhead + 0.1ms per track covered (including first and last)

(The quiz given in section asked for “transfer times for a single block,” which may have been confusing since one component of the total time is the transfer time.)

Answer

On average, we expect to seek across 1/2 of the disk, or 50 tracks. This gives a seek time of $2+0.1*50=7$ ms. The disk is spinning at 6000 RPM or 100 RPS, meaning we expect to wait 1/2 of one rotation or 5ms for rotational delay. The transfer time is 1/100th of a rotation (since there are 100 blocks/track), or 0.1ms.

| | Seek | Rotation | Transfer | Total |
|----------|------|----------|----------|-------|
| Expected | 7 | 5 | 0.1 | 12.1 |
| Worst | 12 | 10 | 0.1 | 22.1 |
| Best | 0 | 0 | 0.1 | 0.1 |

Note that the expected seek of 1/2 the disk appears to be incorrect (though it is the universally used value). As Ben H. has pointed out, 1/3 is probably the statistically correct value.