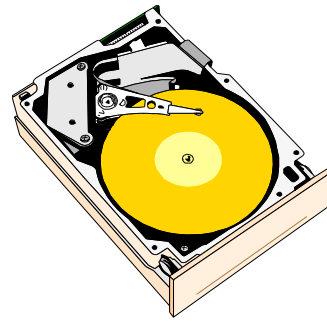


CS232 Disk/Bus example problems:



1) Assume a disk has the following specifications.

- An average seek time of 3ms
- A 6000 RPM rotational speed
- A 10MB/s average transfer rate
- 2ms of overheads for making a request

How long does it take to read a random 1,024 byte sector?

- The average rotational delay is:
- The transfer time will be about:
- The response time is then:

How long would it take to read a whole track (512 sectors) selected at random, if the sectors could be read in any order?

2) Assume the following system:

- A CPU and memory share a 32-bit bus running at 100MHz.
- The memory needs 50ns to access a 64-bit value from one address.

For this system, a single read can be performed in eight cycles or 80ns for an effective bandwidth of $(12.5 \times 10^6 \text{ reads/second}) \times (8 \text{ bytes/read}) = 100\text{MB/s}$.

If the memory was widened, such that 128-bit values could be read in 50ns, what is the new effective bandwidth?

What is the bus utilization (fraction of cycles the bus is used) to achieve the above bandwidth?

If utilization were 100% (achievable by adding additional memories), what effective bandwidth would be achieved?