Contents

1 Hard Disk Drives

1.1 I/O Time: Doing The Math

1.1.1 represent I/O time as the sum of three major components:

$$T_{I/O} = T_{seek} + T_{rotation} + T_{transfer}$$

1.1.1.1 rate of I/O (RI/O),

is easily computed from the time. Simply divide the size of the transfer by the time it took:

$$R_{I/O} = \frac{Size_{Transfer}}{T_{I/O}}$$

1.1.2 random workload.

1.1.2.1 Assuming
each 4 KB read occurs at a random location on disk, we can calculate how long each such read would take.

1.1.2.2 HDD specs

	Cheetah 15K.5	Barracuda
Capacity	300 GB	1 TB
RPM	15,000	7,200
Average Seek	4 ms	9 ms
Max Transfer	125 MB/s	105 MB/s
Platters	4	4
Cache	16 MB	16/32 MB
Connects via	SCSI	SATA

1.1.2.3 On the Cheetah:

$T_{seek} = 4\ ms,\ T_{rotation} = 2\ ms,\ T_{transfer} = 30\ microsecs$

1.1.2.4 The average seek time
(4 milliseconds) is just taken as the average time reported by the manufacturer;

1.1.2.5 The average rotational delay
is calculated from the RPM directly. 15000 RPM is equal to 250 RPS thus, each rotation takes 4 ms.

1.1.2.6 the transfer time
is just the size of the transfer over the peak transfer rate; here it is vanishingly small (30 microseconds;

1.1.2.7 TI/O for the Cheetah
roughly equals 6 ms.

1.1.2.8 To compute the rate of I/O,
just divide the size of the transfer by the average time, RI/O for the Cheetah under the random workload of about 0.66 MB/s.