

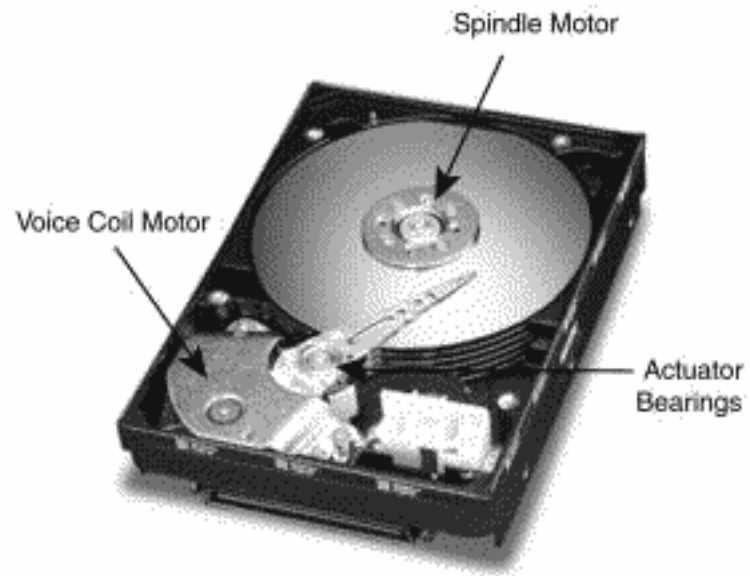
Simple server

```
while (true) {  
    wait for message  
    data = read(name)  
    send data  
}
```

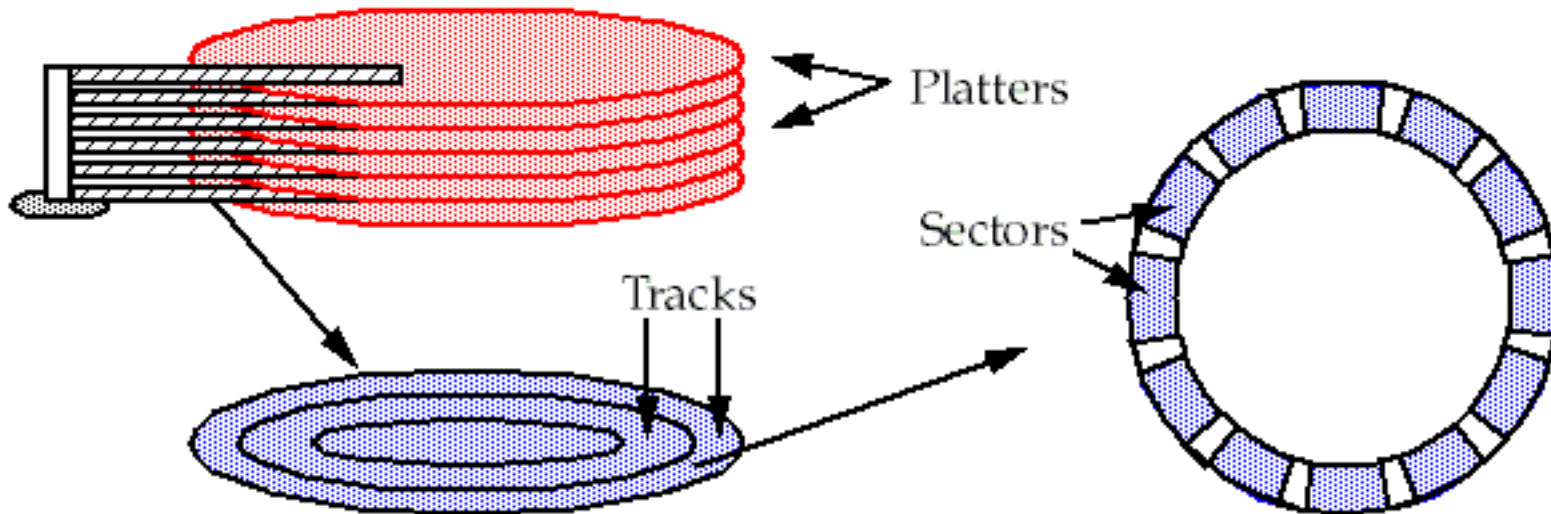
Hitachi 7K400



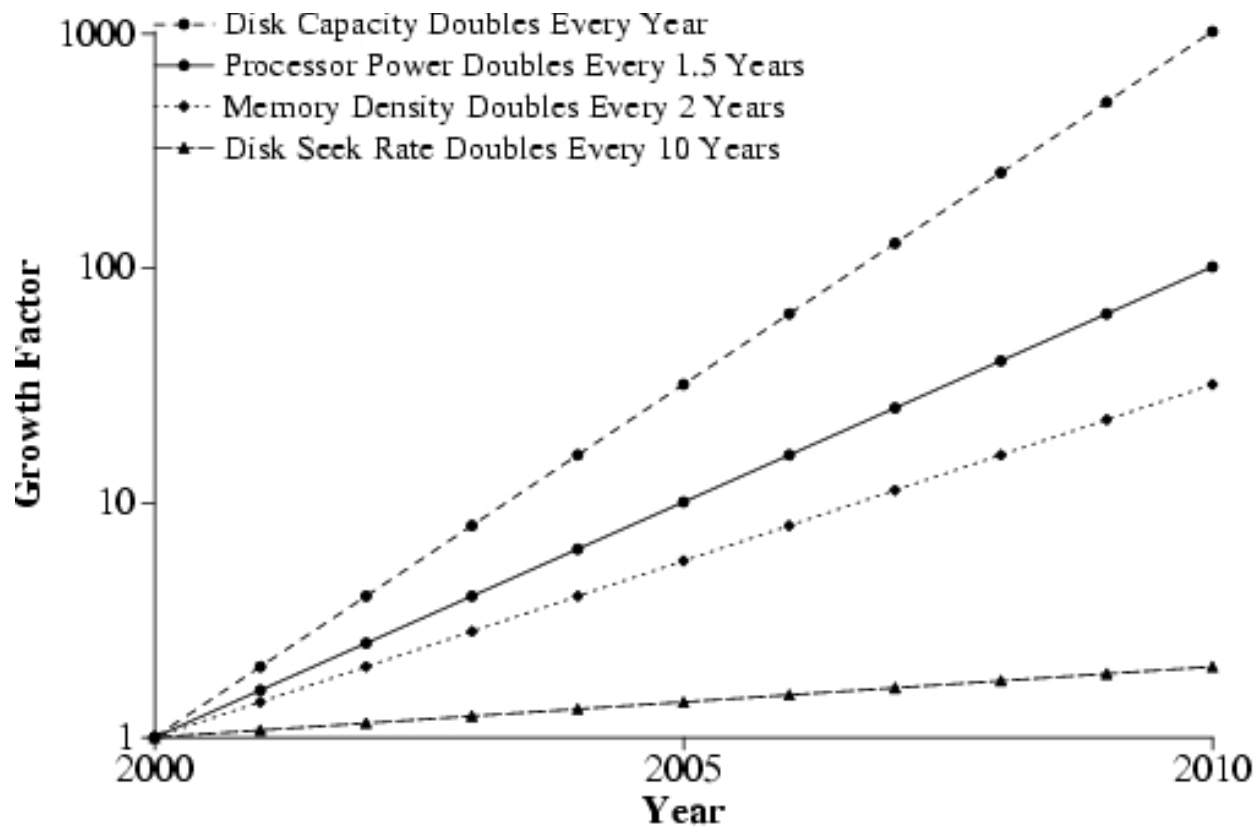
Inside a disk



Top view



I/O bottleneck



Hypothetical Effects of Dissimilar Doubling Rates Over a Decade

Important numbers

- Latency:
 - 0.00000001 ms: instruction time (1 ns)
 - 0.0001 ms: DRAM load (100 ns)
 - 0.2 ms: LAN network
 - 10 ms: random disk I/O
 - 25 ms: Internet east -> west coast
- Throughput:
 - 1000 MB/s: DRAM
 - 100 MB/s: LAN (maybe 1000 MB/s)
 - 100 MB/s: sequential disk
 - 1 MB/s: random disk I/O