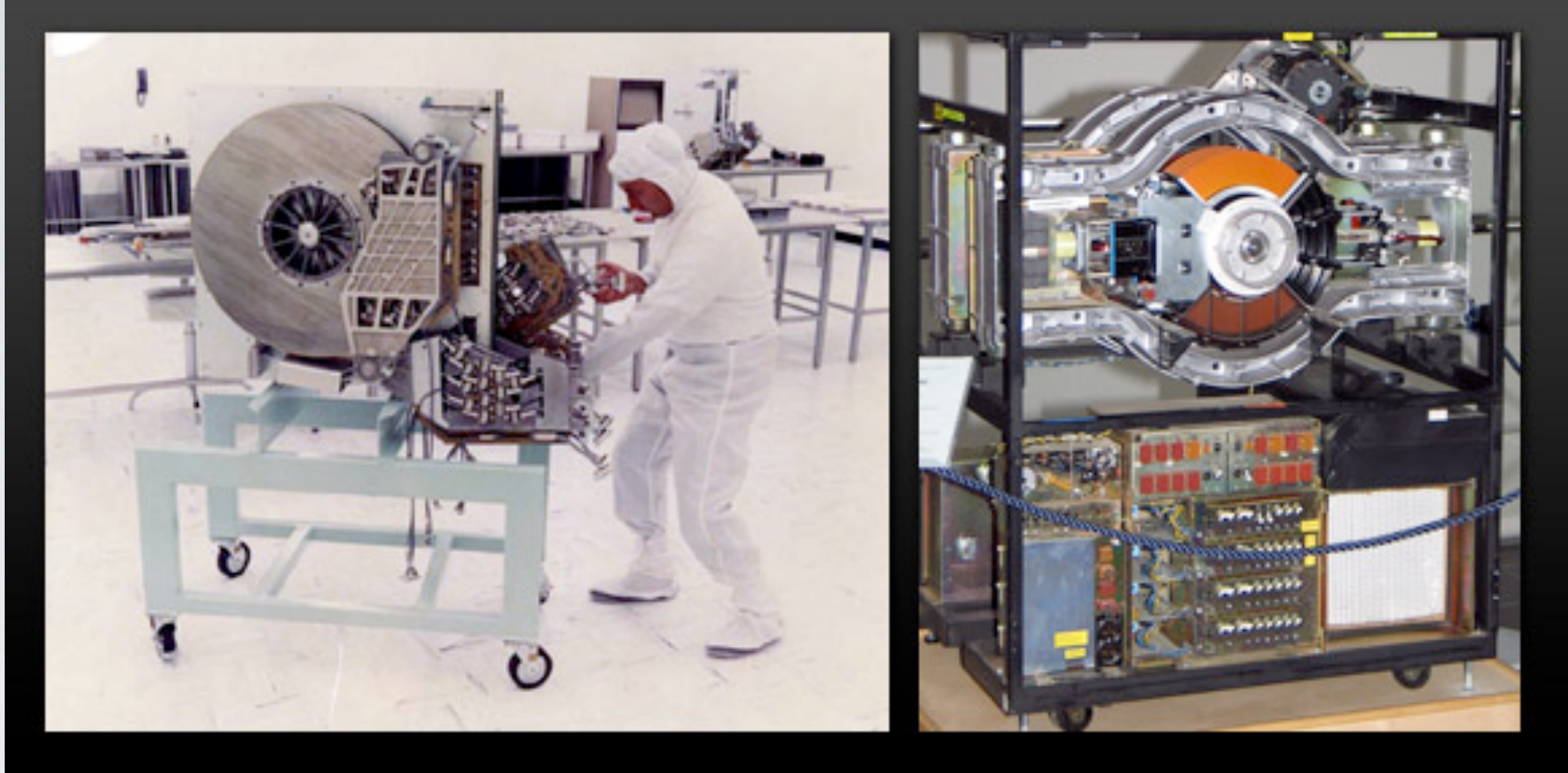
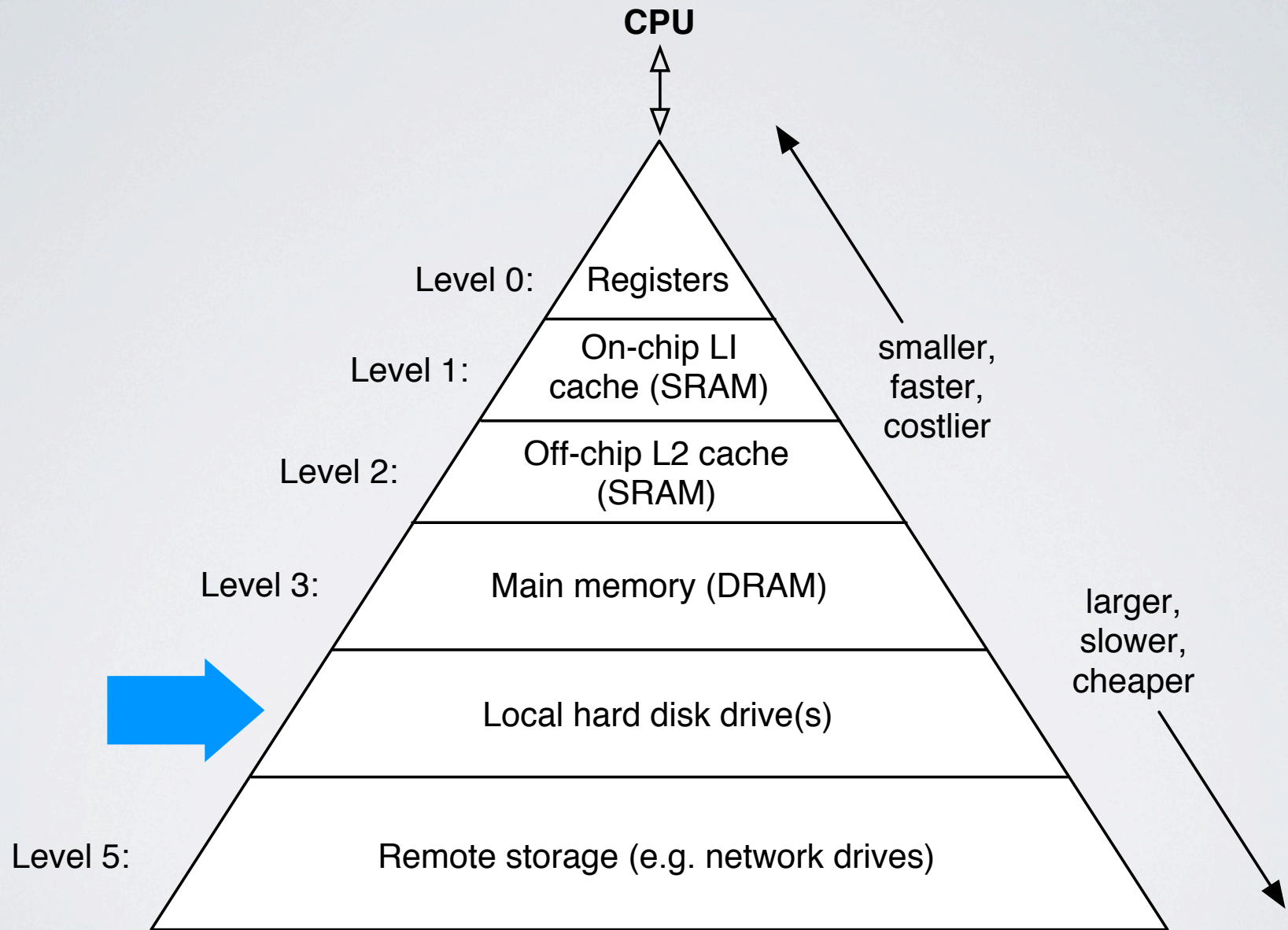


Disks

CS450 : Saelee



permanent mass-storage



High level goals (kernel)

- Use for swap space, when needed
- Provide file system abstraction
 - Scalable & Efficient
 - Modular independence?
- Minimize HDD I/O

Disk scheduler goals

- Maximize I/O throughput
- Minimize waiting / response time
- Possible conflict with other schedulers

robustness?

cross-cutting concern
(later)

varying HDD geometries

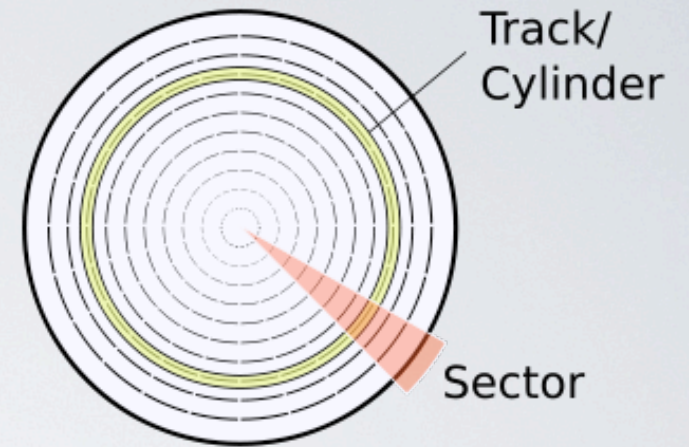


rotating magnetic platters



solid state drives

focus on “traditional” HDDs



Cylinder, Head, Sector (CHS)

Problem: low density
in outer tracks

Logical Block Addressing (LBA)

New problem: missing disk
geometry metadata

Disk access times

$$\mathbf{S + R + T}$$

S: seek time
(tracking/head movement)

R: rotational latency
(constant angular velocity)

T: transfer time
(typically negligible)

also, “spin-up” time
discount for extended I/O

Disk head scheduling

given requests B_1, B_2, B_3, \dots
what seek order?

First Come First Serve
(FCFS)

Shortest Seek Time First (SSTF)

Nearest Block Number First
(NBNF)

“Elevator” Algorithms



SCAN

track from center to edge
and back again

variant: C-SCAN
“circular” tracking

variant 2: F-SCAN
“freeze” request queue

LOOK

reverse direction when no
more requests

variant: C-LOOK, F-LOOK

Demo

Disk head
scheduling simulator
from [http://
vip.cs.utsa.edu/
simulators/](http://vip.cs.utsa.edu/simulators/)

SSDs?

no spin-up
no seek/rotation time
no fragile read/write head
low power consumption

expensive!

slower write times
limited write cycles
⇒ complex write leveling

SSDs: long-term
implications?