

CS 421

Virtual Memory

(1)

Idea: Don't restrict the size of a process' virtual address space to the size of physical memory

Implementation: Use memory as a cache, backed by a swap device/file
≡ HDD/SSD

Demand Paging - only a process' active pages are in RAM.

Inactive pages are on the swap device

Design Issues

- ① Keeping Effective Access time (EAT) low
- ② Determining frame allocation to process
- ③ Determining the subset of active pages to keep in RAM
- ④ Minimizing swap-out time

Access Times

In Human Terms

| | | |
|-----|-------|----------------|
| RAM | 80 ns | 1 min |
| SSD | 80 μs | 16 hrs, 40 min |
| HDD | 15 ms | 70 weeks |

Terminology

Page Fault Rate - the probability of a page fault (miss)

Present bit - a bit added to the page table entry record to indicate that a page is in a frame

Page Fault - Attempt to access a page that isn't present

Dirty Bit - a bit added to the page table entry record to indicate that a page has been modified

④

What Happens During a Pay Fault?

- Class exercise to work-out
the steps.