

CSc 360

Operating Systems

Page Allocation

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1

Review

- Page replacement
 - FIFO
 - optimal
 - LRU
 - LRU approximation

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2

Page buffering

- Keep a pool of free pages
 - speed up swapping in desired pages
 - no need to wait a page *becomes* free
- Keep a list of modified pages
 - synch with disk when paging is idle
 - reduce overhead when swapping out
- Reuse “clean” pages from the pool
 - on page fault, check free pool first

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3

Page allocation

- A process needs *minimum* number of pages
 - e.g., IBM 370: 6 pages to handle SS MOVE
 - instruction is 6 bytes, might span 2 pages
 - 2 pages to handle **from**
 - 2 pages to handle **to**
- Two major allocation schemes
 - fixed allocation
 - priority allocation

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4

Fixed allocation

- Equal allocation
 - M free pages
 - N requesting processes
 - allocation: $\text{floor}(M/N)$ each
 - some processes may request less than M/N
- Proportional allocation
 - each process requests s_i ; all request $S = \sum s_i$
 - allocation: $s_i / S * M$

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5

Priority allocation

- Allocation proportional to priority
 - higher priority process gets more pages allocated *when* necessary
- On page fault
 - select for replacement one of its frames.
 - select for replacement a frame from a process with lower priority number
- Global vs local replacement

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Prevent thrashing

- Thrashing
 - more time on paging than executing
 - busy I/O, idle CPU
 - more processes admitted, more page faults
 - more processes in thrashing!
- Why thrashing
 - paging: explore locality
 - thrashing: locality explored too much!

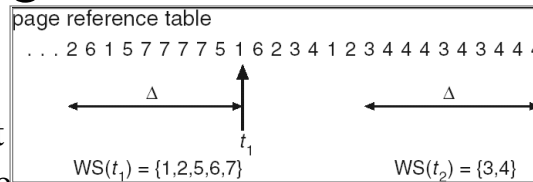
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7

Working-set model

- Prevent thrashing
 - local replacement
 - sufficient provisioning
 - working-set model
 - working-set window
 - most recent page references
 - working-set size (WSS)
 - number of unique page references
 - when $\sum WSS_i > M$, reduce multiprogramming!



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8

This lecture

- Page allocation
 - allocation algorithms
 - thrashing and thrashing prevention
- Explore further
 - OSC7 Section 9.8 and 9.9

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9

Next lecture

- File systems
 - read OSC7Ch10

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10