Page Replacing Algorithms

Paging

 The mapping from virtual to physical address is done by the memory management unit (MMU) which is a hardware device and this mapping is known as paging technique.

Page Replacement Algorithms

 In an operating system that uses paging for memory management, a page replacement algorithm is needed to decide which page needs to be replaced when new page comes in.

Page Fault

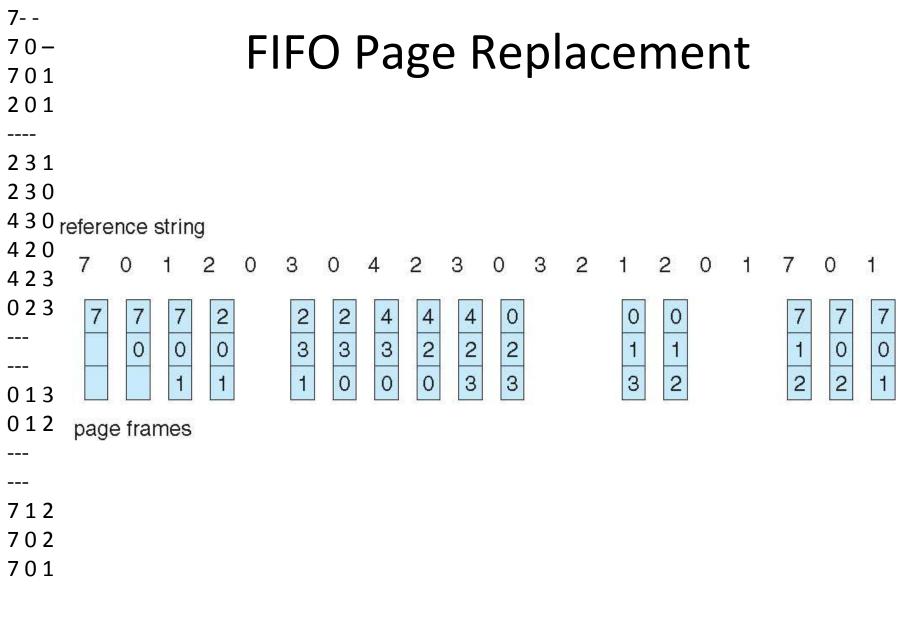
 A page fault happens when a running program accesses a memory page that is mapped into the virtual address space, but not loaded in physical memory.

First-In-First-Out (FIFO) Algorithm

- Reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5
- 3 frames (3 pages can be in memory at a time per process)

4 frames

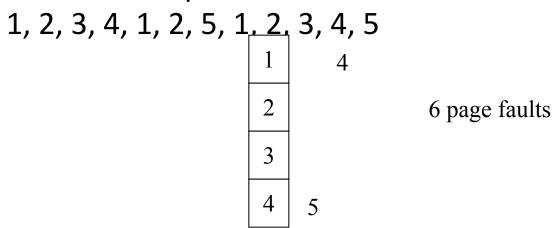
• Belady's Anomaly: more frames ⇒ more page faults



Page fault: 15

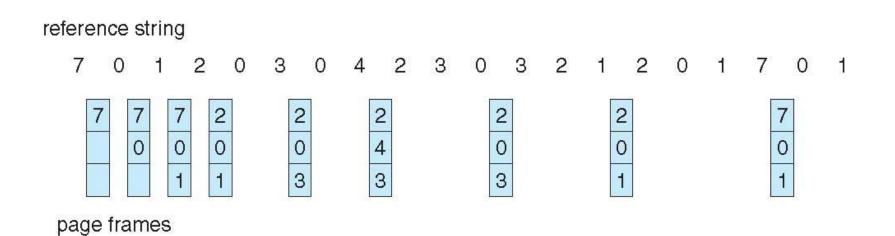
Optimal Algorithm

- Replace page that will not be used for longest period of time
- 4 frames example



- How do you know this?
- Used for measuring how well your algorithm performs

Optimal Page Replacement



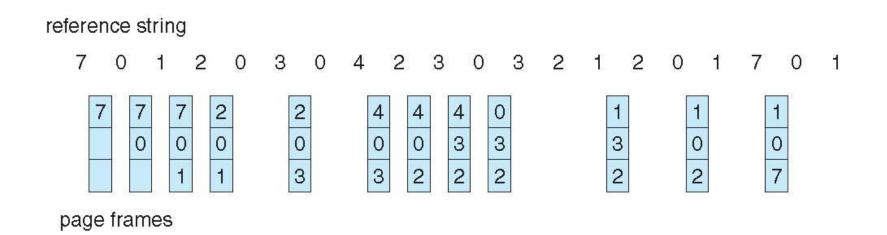
Least Recently Used (LRU) Algorithm

• Reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

1	1	1	1	5
2	2	2	2	2
3	5	5	4	4
4	4	3	3	3

- Counter implementation
 - Every page entry has a counter; every time page is referenced through this entry, copy the clock into the counter
 - When a page needs to be changed, look at the counters to determine which are to change

LRU Page Replacement



THANK YOU!