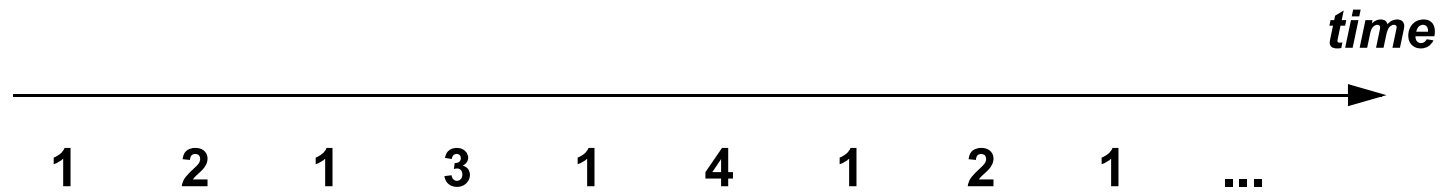


Replacement Strategies in Paged Virtual Memory: FIFO versus LRU

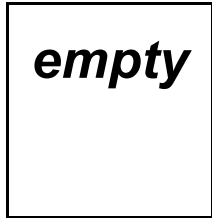


“Reference String”

**= sequence of virtual page numbers
in the access order of a process**

1.) FIFO: Content of a main memory with 2 page frames

1 2 1 3 1 4 1 2 1 ...



main memory is initially empty

1.) FIFO: Content of a main memory with 2 page frames

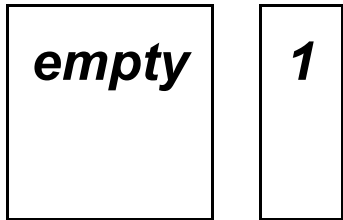
process accesses page 1 → **page fault:** *page 1 is not in main memory*

1 2 1 3 1 4 1 2 1 ...

empty

1.) FIFO: Content of a main memory with 2 page frames

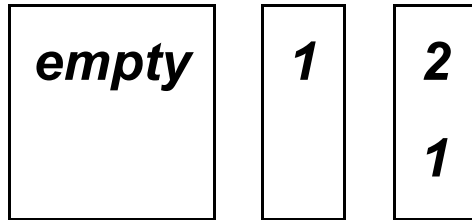
1 2 1 3 1 4 1 2 1 ...



page 1 is loaded into main memory

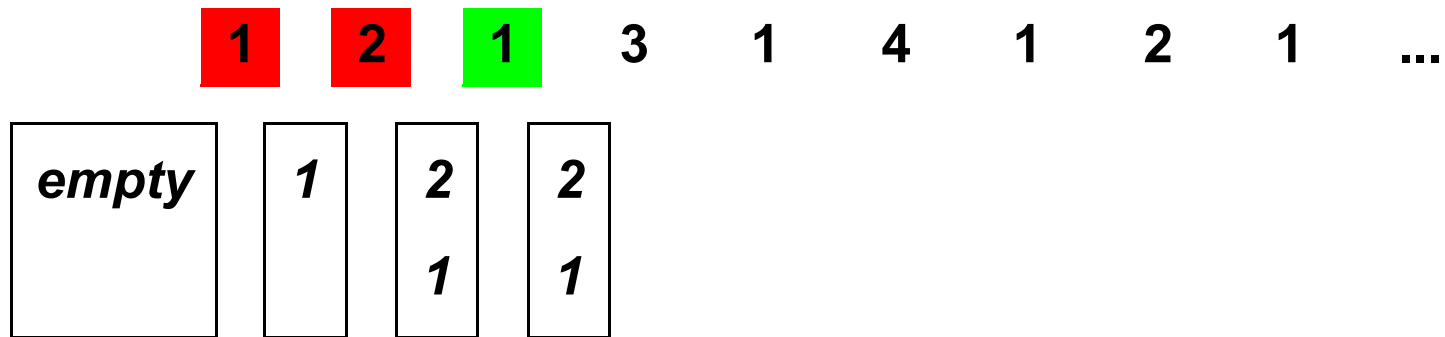
1.) FIFO: Content of a main memory with 2 page frames

1 2 1 3 1 4 1 2 1 ...



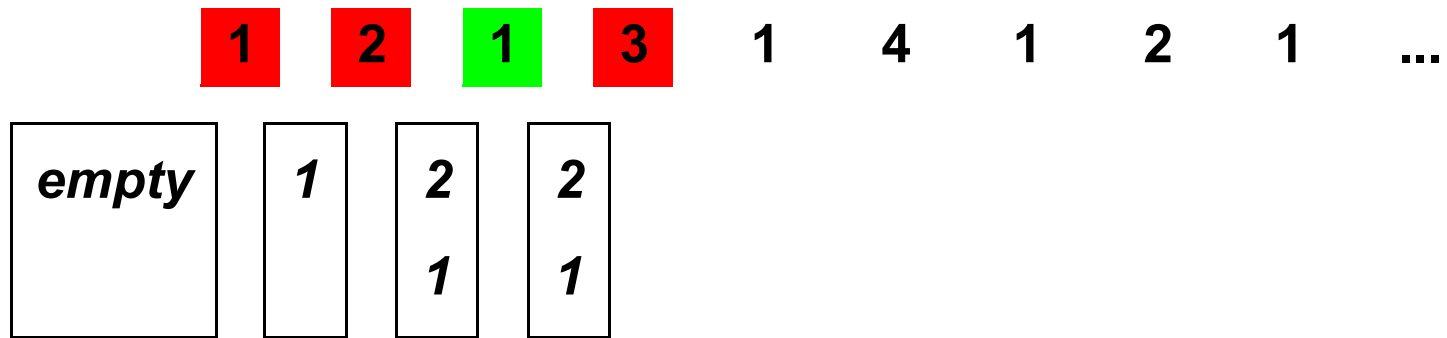
next page fault: page 2 is loaded into main memory

1.) FIFO: Content of a main memory with 2 page frames



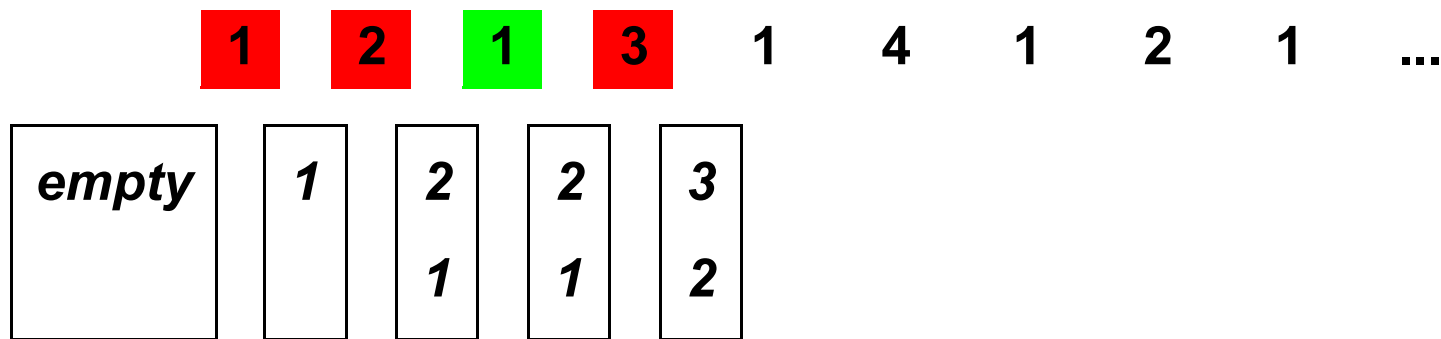
no page fault: *main memory content remains unchanged*

1.) FIFO: Content of a main memory with 2 page frames



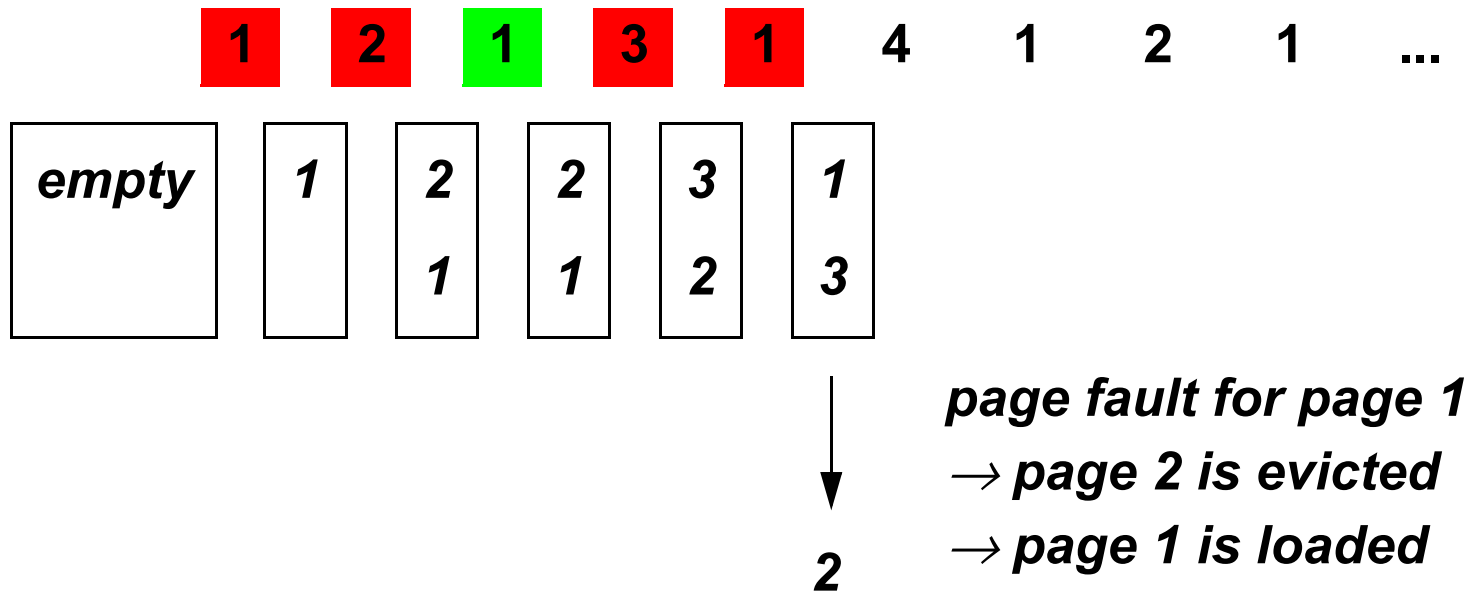
*page fault: page 3 is not in main memory
main memory is full!*

1.) FIFO: Content of a main memory with 2 page frames

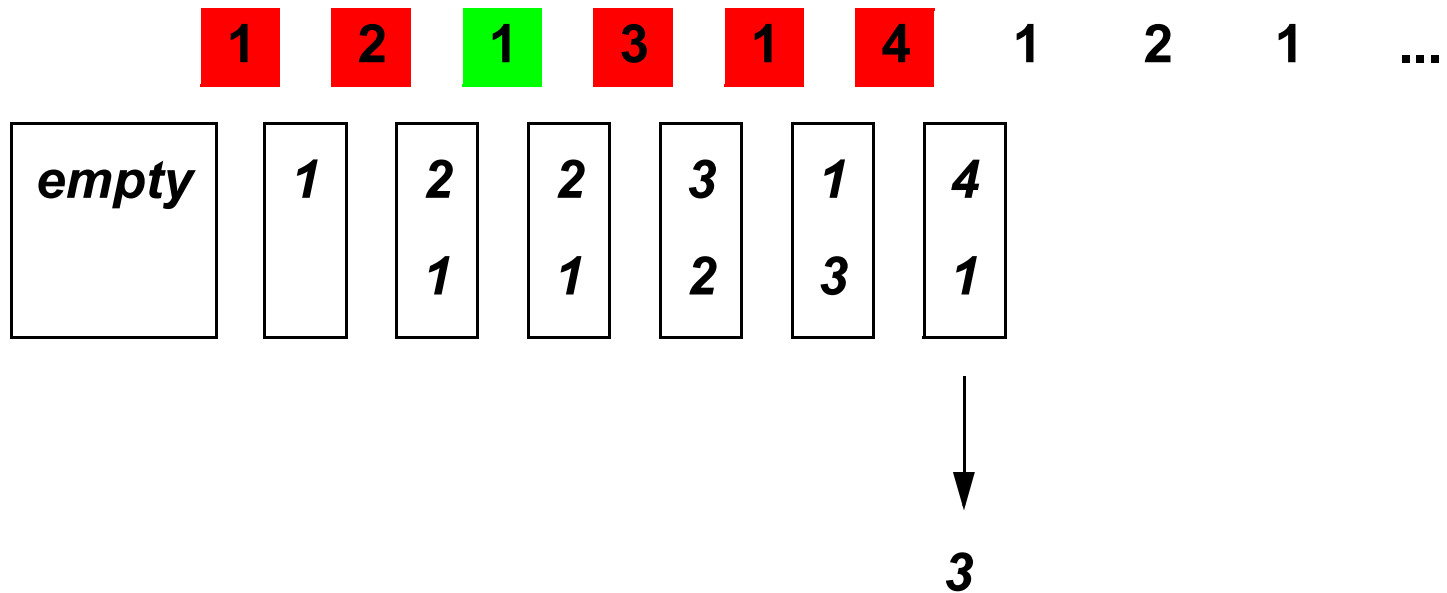


*page 1 is evicted to hard disk
(as selected by FIFO:
page 1 is longer in main memory than page 2)
page 3 is loaded*

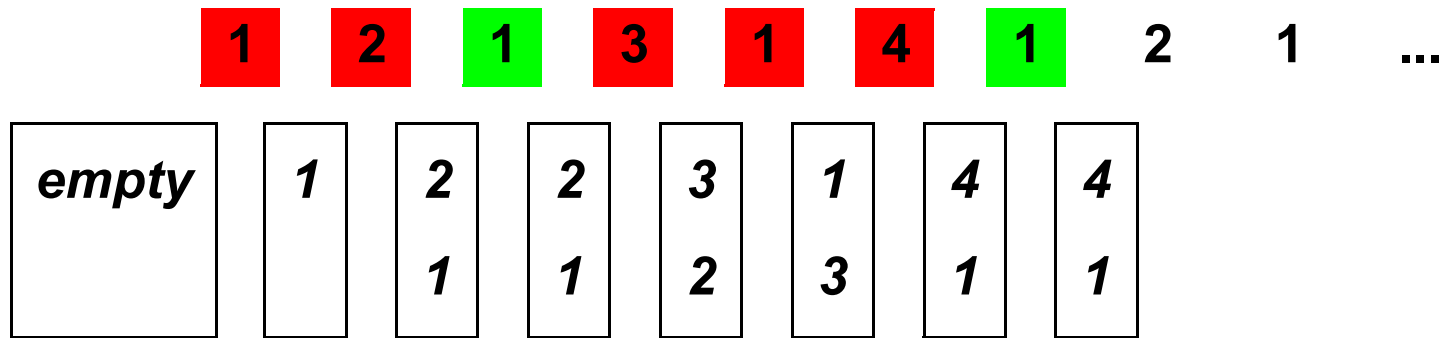
1.) FIFO: Content of a main memory with 2 page frames



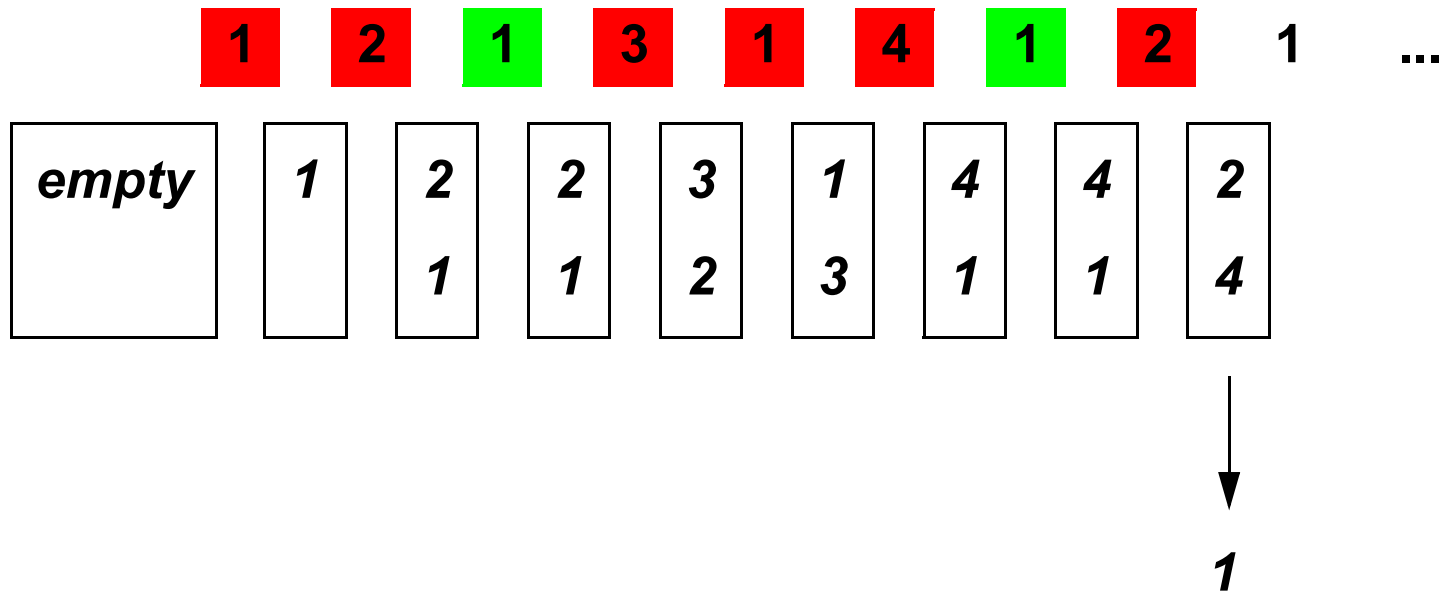
1.) FIFO: Content of a main memory with 2 page frames



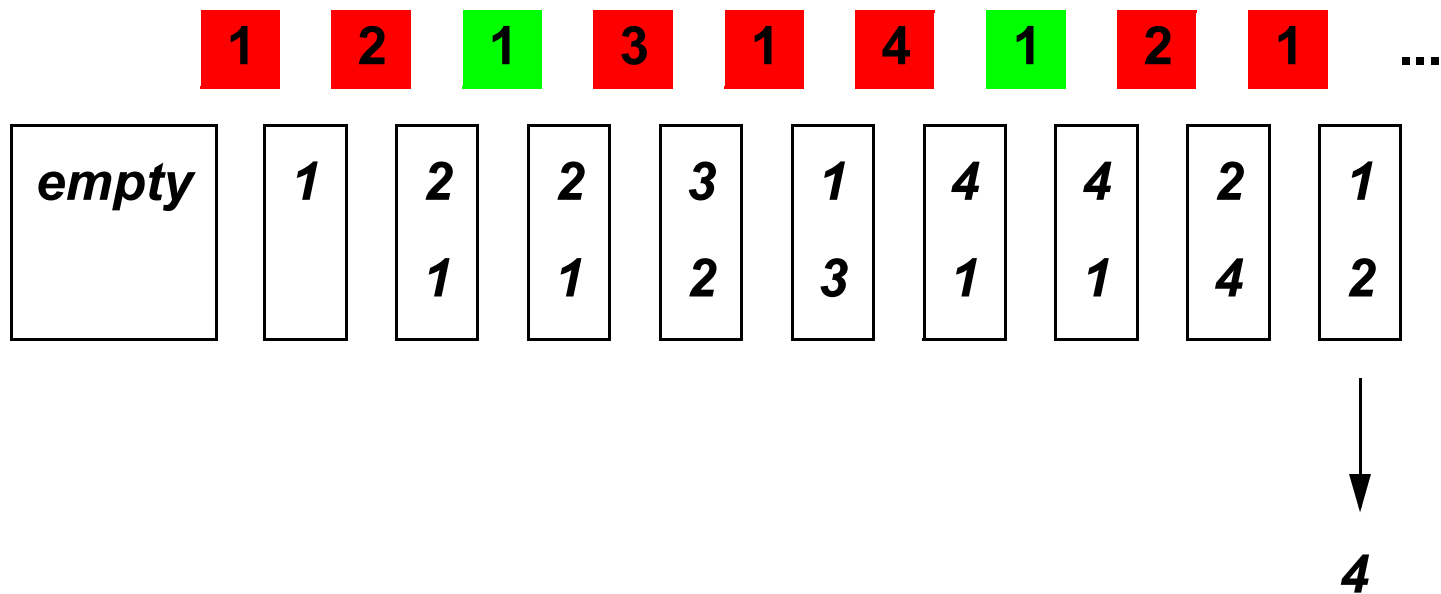
1.) FIFO: Content of a main memory with 2 page frames



1.) FIFO: Content of a main memory with 2 page frames



1.) FIFO: Content of a main memory with 2 page frames

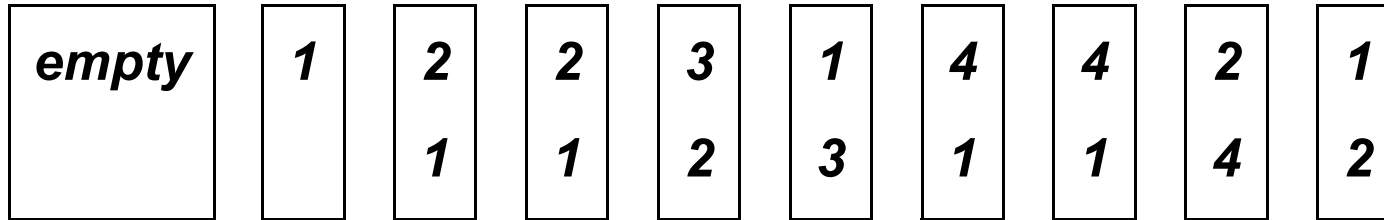


1.) FIFO: Content of a main memory with 2 page frames

7 page faults,

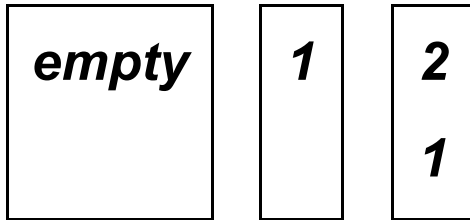
3 faults for page 1 which is in heavy use!

1 2 1 3 1 4 1 2 1 ...



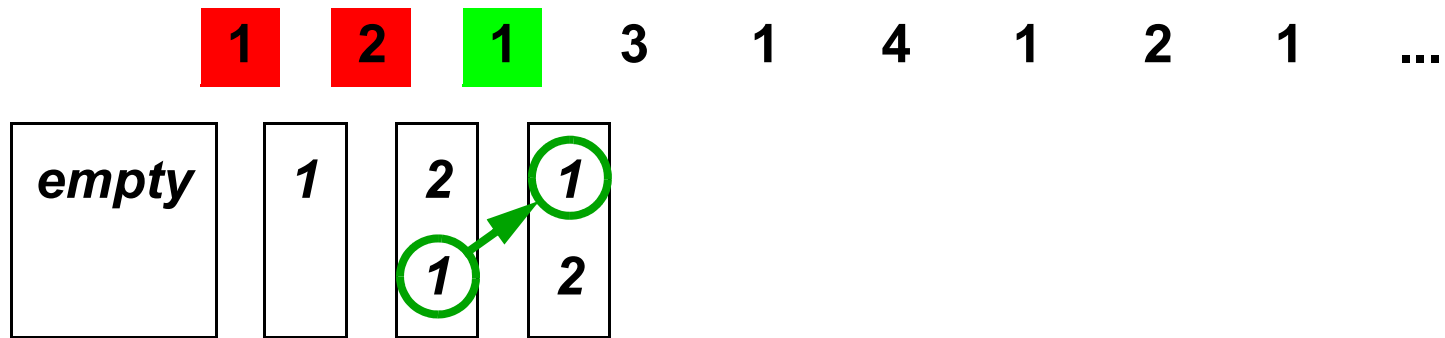
2.) LRU: Content of a main memory with 2 page frames

1 2 1 3 1 4 1 2 1 ...



as with FIFO: two initial page faults to fill main memory

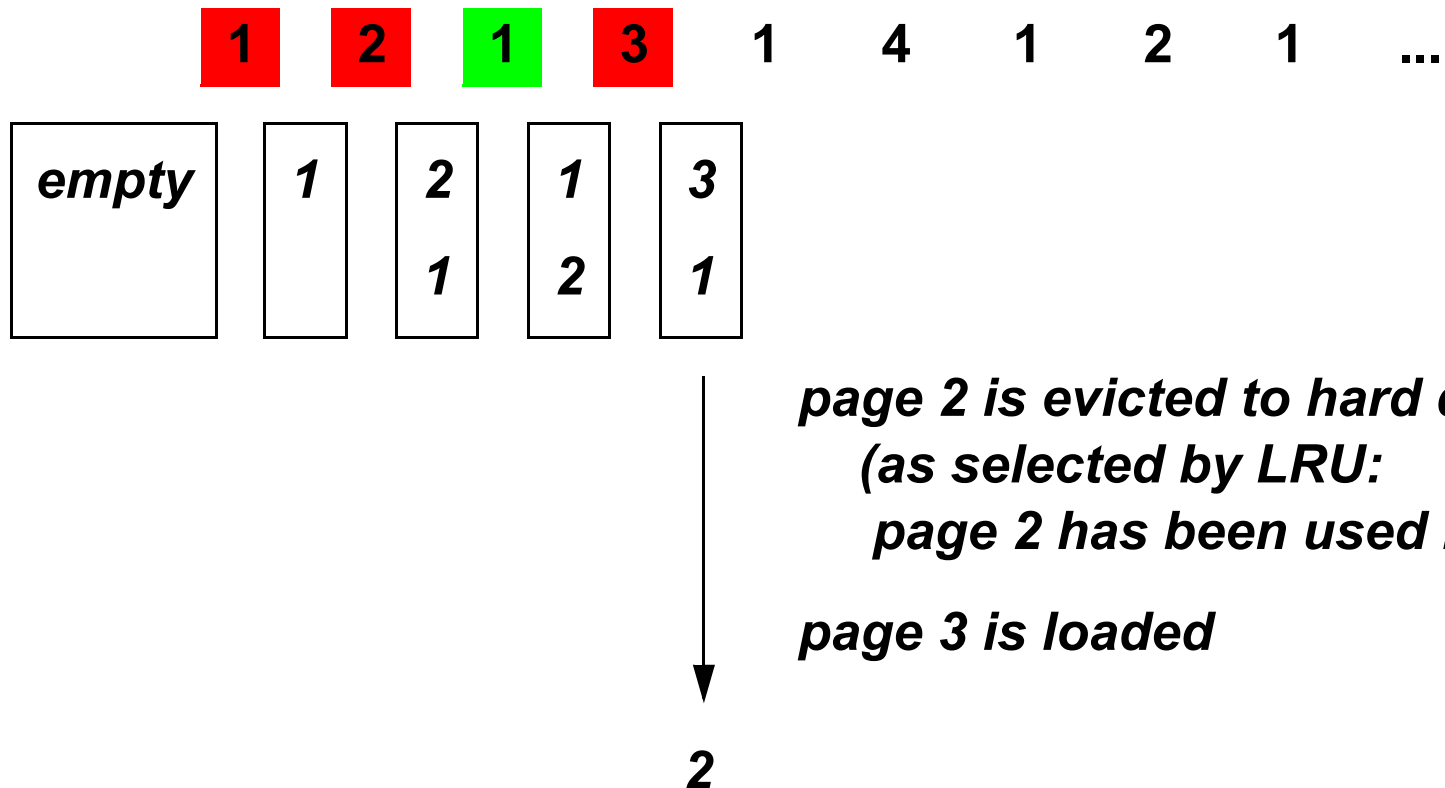
2.) LRU: Content of a main memory with 2 page frames



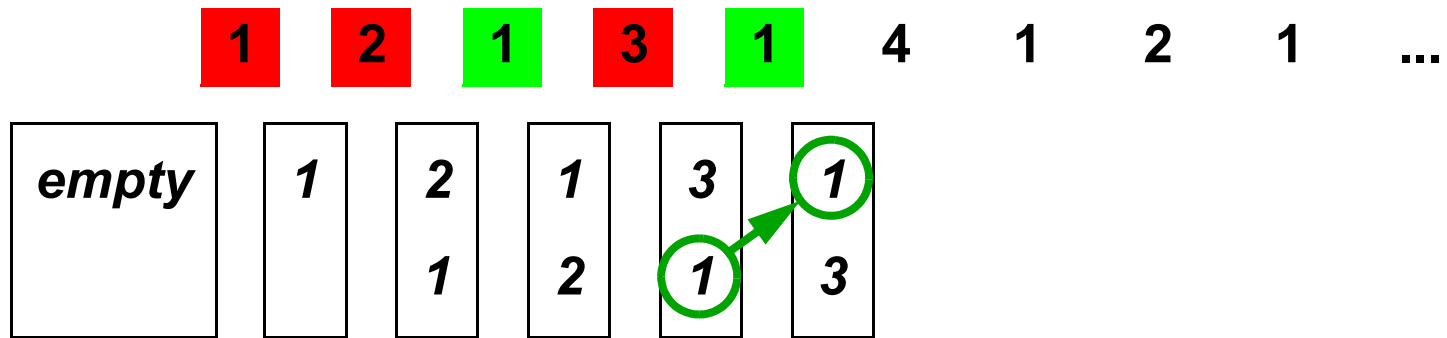
as with FIFO: no page fault

additionally: page 1 gets a better chance to stay in main memory because of its recent usage

2.) LRU: Content of a main memory with 2 page frames

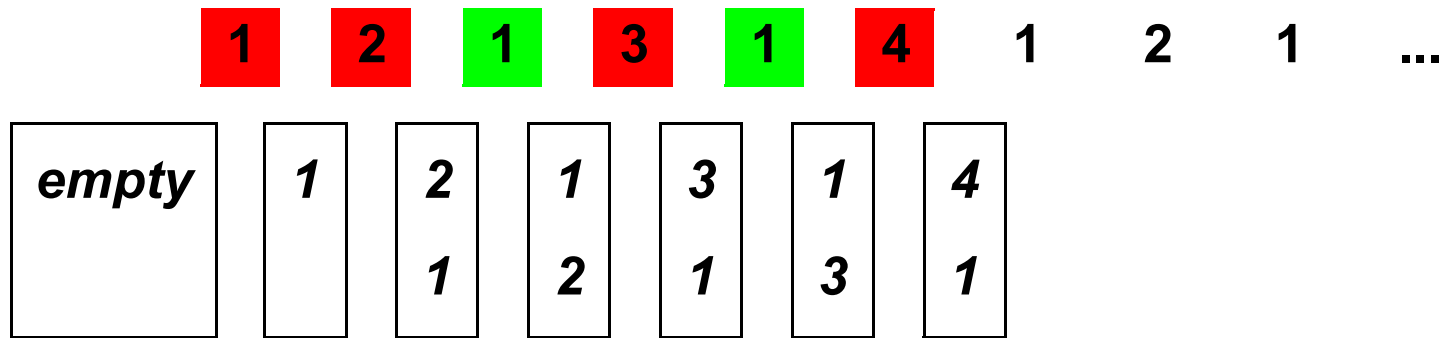


2.) LRU: Content of a main memory with 2 page frames

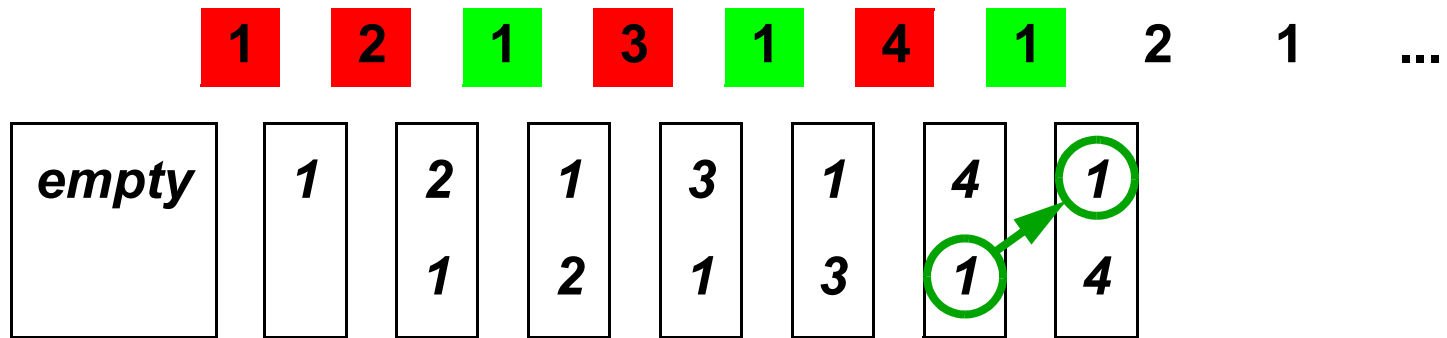


***no page fault for page 1!
(in contrast to FIFO)***

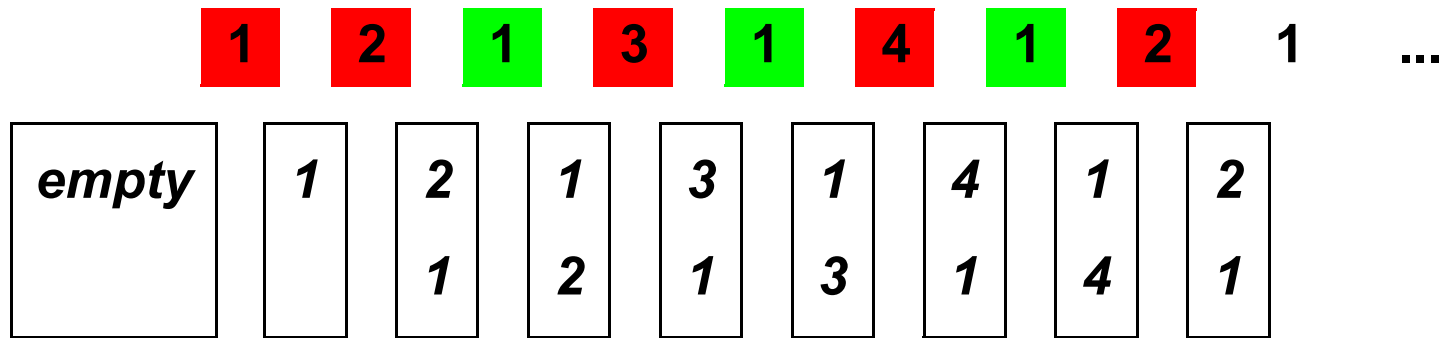
2.) LRU: Content of a main memory with 2 page frames



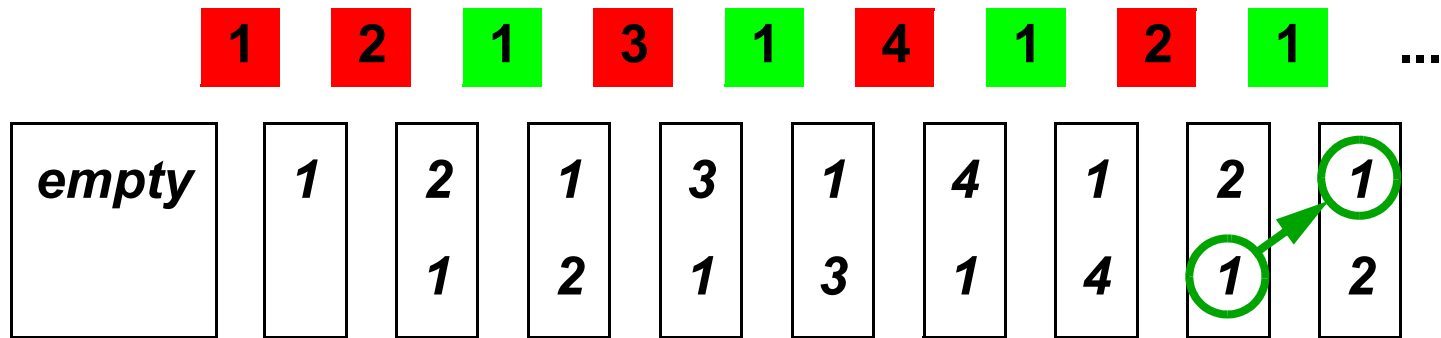
2.) LRU: Content of a main memory with 2 page frames



2.) LRU: Content of a main memory with 2 page frames



2.) LRU: Content of a main memory with 2 page frames



2.) LRU: Content of a main memory with 2 page frames

5 page faults (FIFO: 7 page faults),
for page 1: only the single initial fault!

