

# Page Faults

**Read/write/execute protection bits** : operation not permitted on page

- ➔ The TLB traps to the OS and the OS usually will send fault back up to process, or might be playing games e.g., copy on write, mapped files (coming later in this lecture)

**Invalid bits** : 2 possible reasons

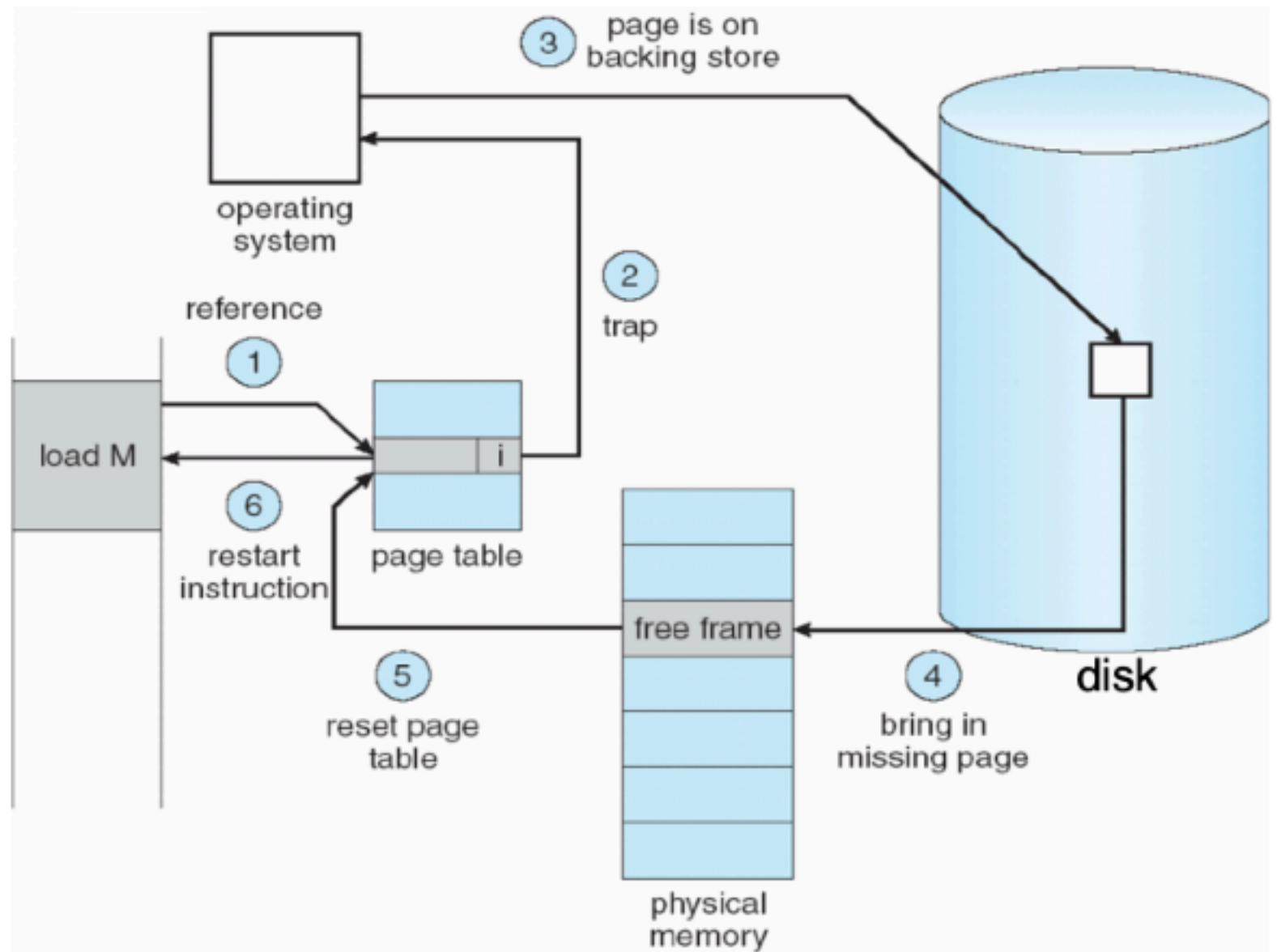
1. Virtual page not allocated

- ➔ The TLB traps to the OS and the OS sends fault to process (e.g., segmentation fault) TLB traps to the OS (software takes over)

2. Virtual page is allocated in the address space but swapped on disk

- ➔ The TLB traps to the OS and the OS sends allocates frame, reads from disk, maps PTE to physical frame

# Page Faults



1. When the OS evicts a page, it sets the PTE as invalid and stores the location of the page in the swap file in the PTE
2. When a process accesses the page, the invalid PTE causes a trap (page fault)
3. The trap will run the OS page fault handler
4. Handler uses the invalid PTE to locate page in swap file
5. Reads page into a physical frame, updates PTE to point to it
6. Restarts process