

# Chapter - 6

## **VIRTUAL MEMORY IMPORTANT QUESTIONS**

# 1.What is Virtual Memory ?

Virtual memory is a memory management technique that allows the execution of processes which may not be completely in memory .The main advantage of this scheme is that user program can be larger than the physical memory.

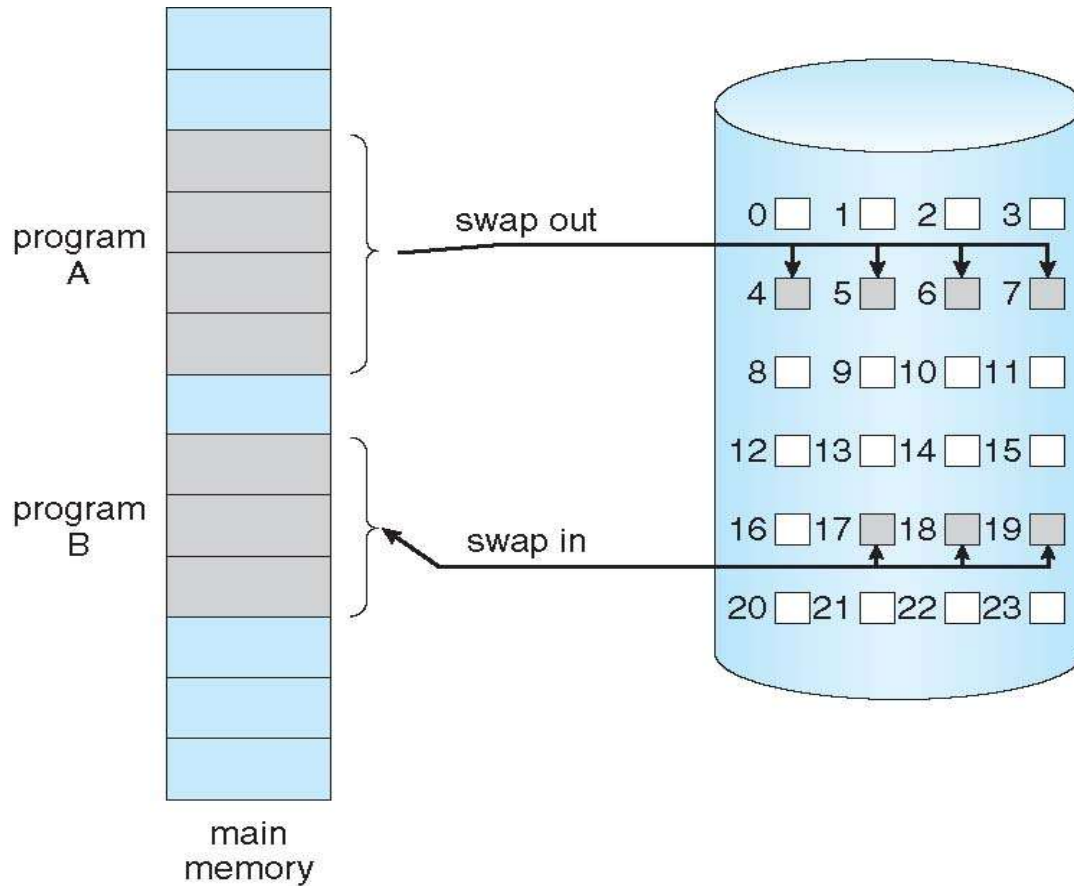
The operating system keeps only those parts of the program in memory which are required during execution. The rest of it kept on the disk.

- Virtual memory can be implemented via:
  - Demand paging
  - Demand segmentation

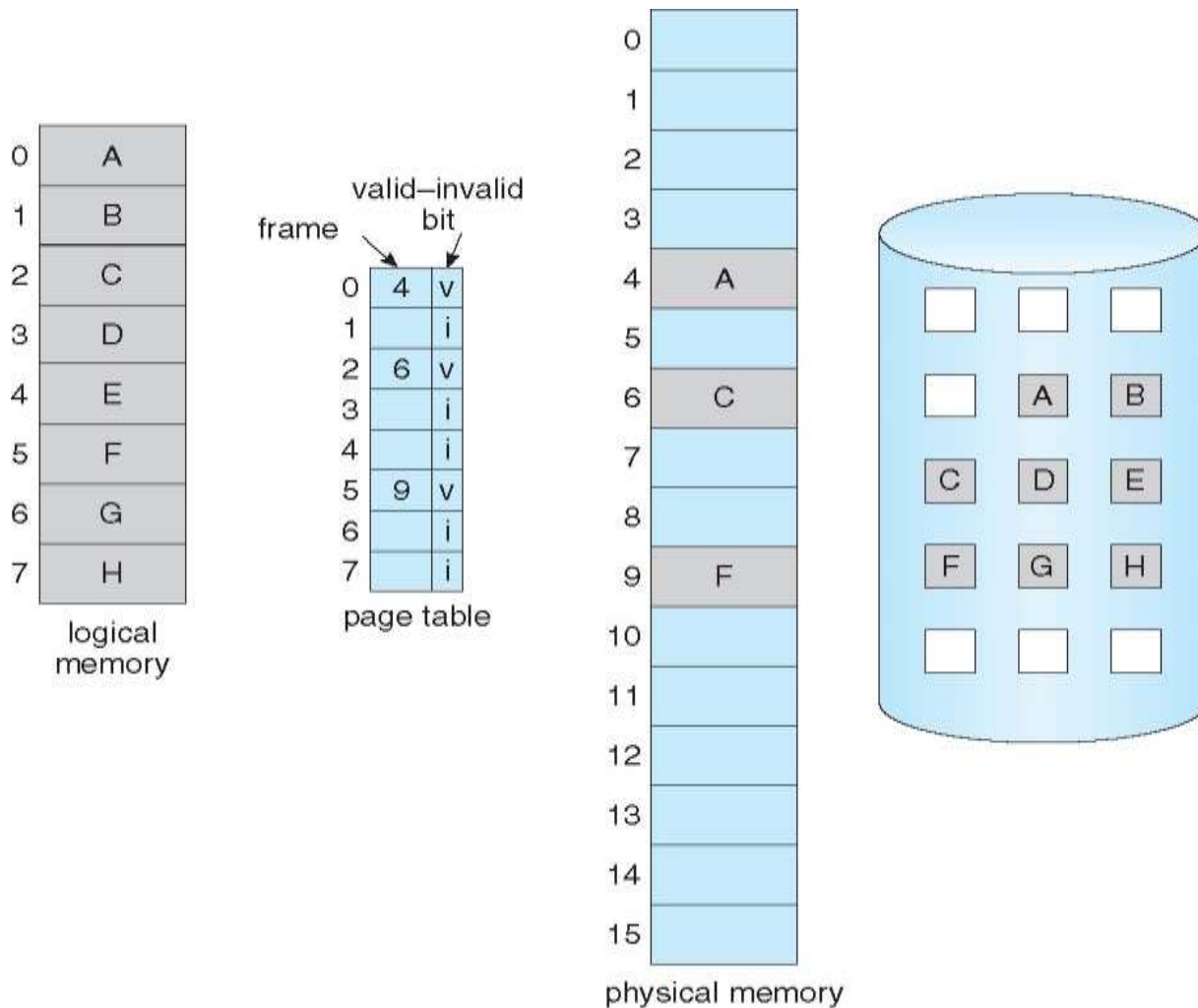
## 2. Explain the concept of Demand Paging

- Demand paging system loads pages only on demand.
- Processes reside in a disk
- When a process needs to be executed, it is swapped into the memory.
- Instead of swapping the entire process , only lazy swapper is used.
- A lazy swapper brings only the necessary pages into the memory.

# Demand paging



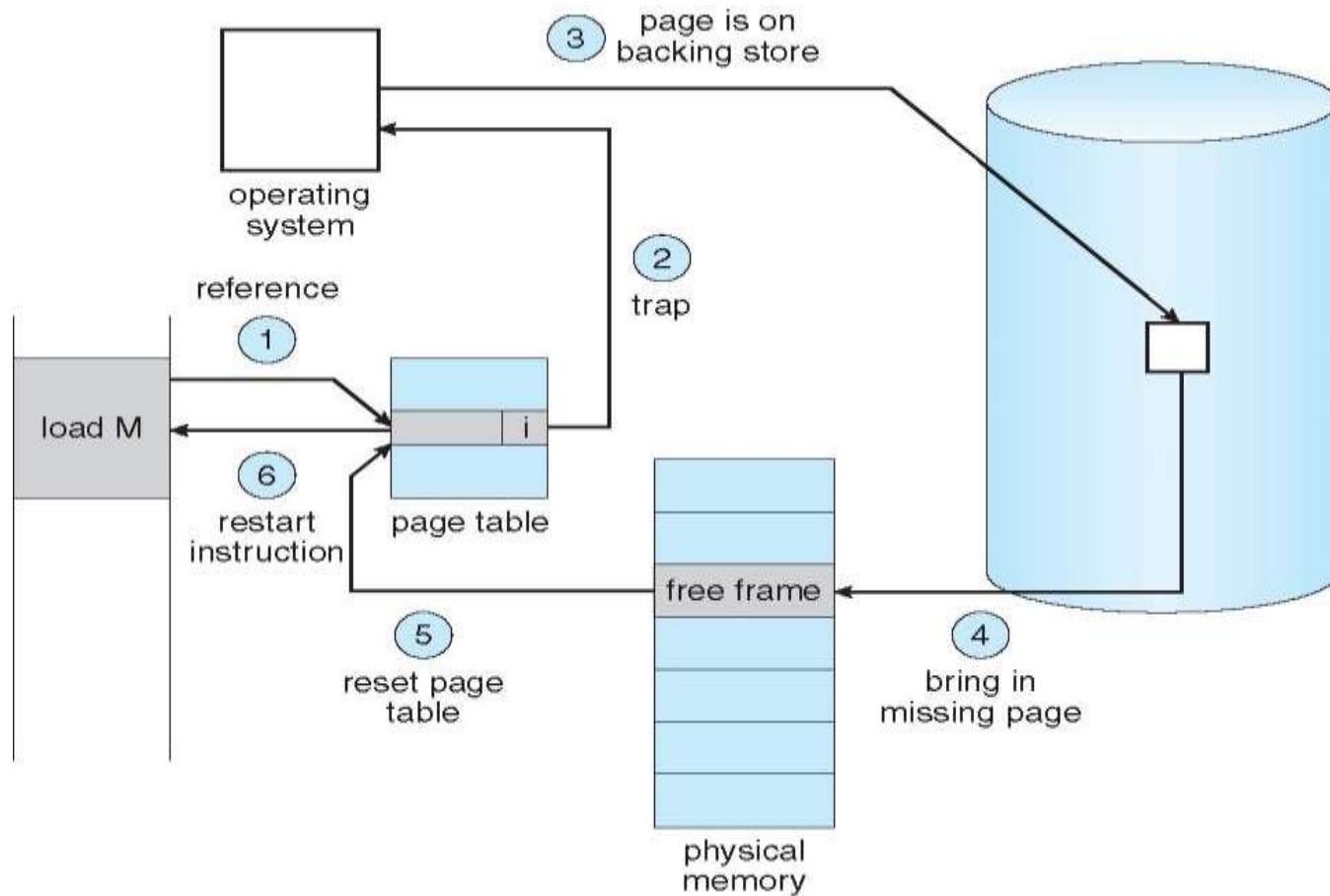
# Page Table When Some Pages Are Not in Main Memory



# Page fault

Page fault occurs when the operating system tries to access page marked invalid.

# Steps in Handling a Page Fault





# Hardware support

- Page table with protection bit
- Secondary memory – swap device
- Software required to restart the instruction after a page fault

ADD the contents of A and B Store in C

Fetch and decode instruction ADD

Fetch A

Fetch B

Add A and B

Store sum in C

# Performance of demand paging

- Effective access time =  $(1-p) * m_a + p * \text{page fault time}$
- $m_a$ - 10 to 200 nano sec
- P-probability of page fault
- Page fault time
  - Time taken to service the page fault interrupt
  - Time taken to read the page
  - Time taken to restart the process

### 3. What do you mean by Page replacement?

- Find the location of required page in secondary memory
- Find a free frame ,use it
- If no frame is free , use page replacement algorithm is used.

- FIFO algorithm
- Optimal page replacement algorithm
- Least recently used algorithm
- Least frequently used algorithm

## 4. What do you mean by Thrashing?

- Thrashing is a condition in which excessive paging operations are taking place. This **causes** the performance of the computer to degrade or collapse.
- **Thrashing** is a state in which our CPU perform 'productive' work less and 'swapping' more. CPU is busy in swapping pages, so much that it can not respond to user program as much as required.

# 5.Explain the Frame allocation algorithm

- Equal allocation
- Proportional allocation

# Proportional allocation

- Total no of frames are proportionally split among the process depending on their requirement.

$$10/137 * 62 = 4 \text{ frames} - p1$$

$$127/137 * 62 = 57 \text{ frames}$$

# Equal allocation

- Divide  $m$  frames among  $n$  processes giving an equal share of  $m/n$  frames.

Free frames – 62 (size – 1kb)

P1 = 10 kb

P2 = 127 kb