

Tutorial 3

Memory Management

1. Describe how internal fragmentation and external fragmentation can happen in fixed contiguous memory allocation systems.
2. A program requests pages in the following order:

d c b a d c e d c b a e

Construct a **page trace analysis** indicating page faults with an asterisk (*) using **First In First Out (FIFO)** where:

- (i) Memory is divided into 3 page frames;
 - (ii) Memory is divided into 4 page frames.
3. Modern computers use **virtual memory**.
 - (i) Briefly explain what is meant by virtual memory.
 - (ii) Give **two** advantages of virtual memory.
 4. Explain the following terms:
 - (i) Thrashing;
 - (ii) Least recently used page.
 - (iii) The working set of pages in demand paging
 - (iv) Memory compaction.
 - (v) Page modified bit.

5. What is “Belady’s anomaly” in page allocation algorithms? Why does it occur?

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