

TUTORIAL EIGHT**Memory Organization (Part 2)**

1. Consider a computer system with a 32-bit logical address and 1-Kbyte page size. The system has 1 Gbytes of physical memory.
 - a) Give the format of both the logical and physical addresses of this system.
 - b) How many entries are there in a page table?
 - c) If an inverted page table is used, how many entries are there?
2. A paged memory system uses the page size of 1024 bytes. Size of a page table entry is 4 bytes and the logical address space is 2^{30} bytes.
 - a) What is the size of the page table if single level of paging is used?
 - b) What is the minimum number of levels of page tables needed in this system to ensure that the outmost page table will fit within a single page frame?
 - c) Draw an address translation diagram to show how logical address translation is performed.

Virtual Memory (Part 1)

3. A computer has four page frames. The time of loading, time of last access, and the R bit for each page are as shown below (the times are in clock ticks):

<u>PAGE</u>	<u>LOADED</u>	<u>LAST ACCESS.</u>	<u>R</u>
0	126	279	0
1	230	260	0
2	120	272	1
3	160	280	1

- a) Which page will FIFO replace?
 - b) Which page will second chance replace?
 - c) Which page will LRU replace?
4. For each of the page replacement policies listed below, calculate the number of page faults encountered when referencing the following pages:

0 1 6 0 3 4 0 1 0 3 4 6 3 4

Assume the availability of 4 empty page frames.

- a) FIFO
- b) CLOCK
- c) LRU