

Exercises

Paging and Logical to Physical Address Translation

E-1: Consider a simple byte addressable paging system with the following values:
Physical memory of 2^{24} bytes and page/frame size of 2^{11} bytes and a logical address space of 2^9 pages.

- How many bits are in a logical address?
- How many bytes in a frame?
- How many bits in the physical address specify the frame #?
- What is the size of the logical address space?
- How many bits in each page table entry?
- What is the size of a page table?

E-2: In a physical memory of 2^{32} bytes, and page/frame size of 2^{16} bytes.

- How many bytes in a frame?
- How many bits in the physical address specify the frame?
- What is the size of a page table (number of entries) ?
- Range of physical address space?

E-3: What could be the situation when a paged memory management system is working like fixed partitions system.

E-4: Assuming a 2KB page size, what are the page numbers and offsets for the following address references (in hexadecimal):

1234 5678 9ABC DEFA

E-5: Assuming a 4KB page size, compute page numbers and offsets for LA's of E-4.

E-5: Consider a logical address space of 16 pages of 2,048 bytes each, mapped onto a physical memory of 32 frames.

- How many bits are there in the logical address?
- How many bits are there in the physical address?
- How many bits for page/frame displacement?

E-6: In a paged memory system of 256 bytes user memory, which uses page/frame size of 16 bytes, following processes are allocated and de-allocated memory in bytes.

P1(20), P2(40), P3(60), P4(30), P5(62). P2, and P4 terminate, P6(90).

Create Page Map Table (PMT) for P6 and compute physical addresses ((hexadecimal) for P6's following logical addresses (hexadecimal).

P6's logical addresses: 59, 2A, 4B 12

E-7: In a paged memory system of 128K user memory, which uses page/frame size of 4K, following processes are allocated and de-allocated.

P1(26K), P2(12K), P3(34K), P4(10K), P5(22K). P2, and P4 terminate, P6(38K).

Compute physical addresses for P6's following logical addresses (in Hexadecimal).

P6's logical addresses: ABCD, 9876, DCBA, 1234