CS3600

Worksheet 08- Solution

1. The size of page offset(w) determines __b___ and p determines __a____.
   a. Number of pages in logical address
   b. Number of words in a page.
   c. Number of frames in the physical memory.

	p	w
0	0	0
	0	1
1	1	0
	1	1

2. An address consists of a 6-bit page number and a 2-bit offset.
   a. Number of pages= _____ 2^6
   b. Page size =_____ 2^2
   c. The address (2, 1) denotes the binary address _____. 00001001

3. Consider a logical address space of 64 pages of 1,024 words each, mapped onto a physical memory of 32 frames.
   a. How many bits are there in the logical address?
      1024= 2^{10} and 64 = 2^6, therefore 10+6 = 16 bits

   b. How many bits are there in the physical address?
      1024= 2^{10} (offset is same for page and frame) and 32 = 2^5, therefore 10+5 = 15 bits

4. With a page size of 512 words and a program size of 1550 words, _____ words are lost to internal fragmentation.

   512 * 4 =2048; 2048 -1550 =498 words in the 4th page

5. A page table (PT) has the following contents.

Page Number	Frame number
0	**5**
1	**6**
2	
3	**9**
4	**12**

Page size = 512 words. Given the logical address (LA) = 1780, determine the following:

Page number p , Offset w and Frame number f.

Page number is obtained by dividing the LA by the page size: 1780 / 512 = 3
.
The offset is the remainder of the division: w = 1780 % 512 = 244. (the % sign represents the modulo operation, which computes the remainder of the division)

The frame number is the content of the page table at index p: PT [3] = 9.

p = 3, w = 244, f = 9

6. A page table (PT) has the following contents.

Page Number	Frame number
0	**6**
1	
2	**10**
3	**13**
4	**7**
	….

Page size = 512 words. Given the logical address LA = 350, determine the following:

Page number p , Offset w , Frame number f and physical address.

Page number is obtained by dividing the LA by the page size: 350 / 512 = 0.

The offset is the remainder of the division: w = 350 % 512 = 350.

The frame number is the content of the page table at index p: PT[0] = 6.

PA is obtained by multiplying the frame number f by the page size and adding the offset w:
PA = 6 * 512 + 350 = 3422

p = 0, w = 350, f = 6, PA = 3422