

CSE2037 Lab - 2, Section A

```

1 unsigned int a;
2 unsigned char b1,b2,b3,b4;
3
4 int *mem_loc;//pointer to the memory location
5
6 int main(void)
7 {
8     mem_loc= (int *) 0x20000040; //memory location to be reached
9
10    *mem_loc=0x87654321; //modify the content of memory location
11
12    a=*mem_loc;//acquire the content of memory location
13
14    //a>>n operation right shifts the content of variable a by n bits.
15
16    b1=a;
17    b2=a>>8;
18    b3=a>>16;
19    b4=a>>24;
20
21    mem_loc+=1;//point to the next location
22
23    for(;;);
24 }

```

| Expression | Type | Value |
|----------------------|---------------|------------------|
| a | unsigned int | 0x87654321 (Hex) |
| mem_loc | int * | 0x20000044 |
| b1 | unsigned char | 0x21 (Hex) |
| b2 | unsigned char | 0x43 (Hex) |
| b3 | unsigned char | 0x65 (Hex) |
| b4 | unsigned char | 0x87 (Hex) |
| + Add new expression | | |

The above code is an example on how to reach a specific memory location in C language using pointers. The only constraint here is that we can reach a memory location having content of 32 bits. To reach 8-bit values within this 32-bit content, we should apply the right shift operation.

Task:

- Sixteen characters are saved in memory starting from 0x20000040.
- The content will be as follows.
0xF0, 0xF1, 0xF2, 0xF3, 0xF4, 0xF5, 0xF6, 0xF7, 0xF8, 0xF9, 0xFA, 0xFB, 0xFC, 0xFD, 0xFE, 0xFF
- Form a C code to find their average by reaching the memory content.

Hint:

- $a = a \ll 8$; left shifts the bits in variable a by 8.
- $b1 \& 0x01$ operation is done to apply bitwise AND operation between unsigned char variable b1 and hexadecimal number 0x01
- $a |= b1$ operation is done to apply bitwise OR operation between unsigned char variable a and b1. The result is saved in variable a.

Note: We provide the document early. Hence, the students can solve the problem before the lab. This does not mean that they can cheat. Therefore, the student understands that “honor system is observed” while preparing the lab solutions. He or she will sign the returned lab sheet by writing the below phrase.

“Honor system is observed while preparing this solution. I did not get help from anybody beside my lab partner. I did not help anybody beside my lab partner. I did not allow anybody to violate the honor system.”

Date / Signature of the Student