Subject: PRF192- PFC
Workshop 1

Objectives:

(1) Reviewing for number systems

(2) Computing and exploring memory of a C program

Recommendations

Part 1: Students do exercises using notebooks

Part 2: Students develop programs, run them, write down their memory structure to notebooks.

Part 1: Number systems

Exercise 1 (2 marks): Convert decimal numbers to binary ones

Decimal	4-bit Binary	Decimal	8-bit Binary	Decimal	16-bit Binary
9	1001	7	0000 0111	255	0000 0000 1111 1111
7		31		193	
4		105		182	
13		155		334	
12		161		519	

Exercise 2 (2 marks): Convert decimal numbers to binary and hexadecimal ones

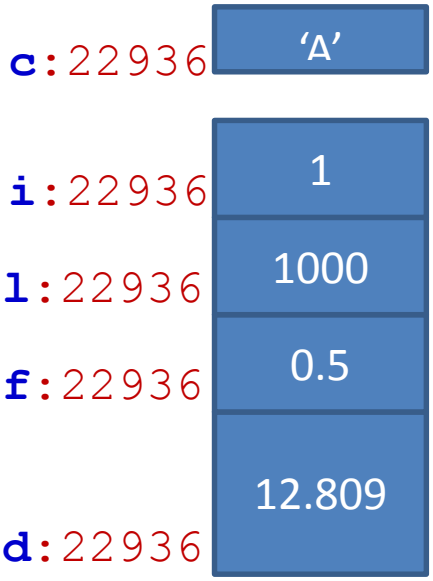
Decimal	Binary	Hexa.	Decimal	16-bit Binary	Hexadecimal
9	1001	9	255	0000 0000 1111 1111	00FF
127	0111 1111	7F	192		
123			184		
155			312		
164			513		
39			268		

Exercise 3 (2 marks)

1- Show binary formats of 1-byte unsigned numbers: 247, 123, 174
2- Show binary formats of 2-byte unsigned numbers: 557, 168, 453
3- Show binary formats of 1-byte signed numbers: -53, -161, -145
4- Show the decimal values of 1-byte unsigned representations:
01101011 b , 10101101 b , 10001010 b , 01001110 b

Part 2: Explore memory structure of programs

Sample



Vars_demo.c

```
/* Variables Demo - Operator &: address of */
#include <stdio.h>
#include <conio.h>
int main() {
   char c='A'; int i=1; long l=1000;
   float f=0.5f; double d=12.809 ;
   printf("Variable c: at addr: %u, value: %c, size: %d\n", &c, c, sizeof(c));
   printf("Variable i: at addr: %u, value: %d, size: %d\n", &i, i, sizeof(i));
   printf("Variable l: at addr: %u, value: %ld, size: %d\n", &l, l, sizeof(l));
   printf("Variable f: at addr: %u, value: %f, size: %d\n", &f, f, sizeof(f));
   printf("Variable d: at addr: %u, value: %lf, size: %d\n", &d, d, sizeof(d));
   getch();
}
```

```
G:\GiangDay\FU\PFC\PFC_Lab\Vars_demo.exe
Variable c: at addr: 2293623, value: A, size: 1
Variable i: at addr: 2293616, value: 1, size: 4
Variable l: at addr: 2293612, value: 1000, size: 4
Variable f: at addr: 2293608, value: 0.500000, size: 4
Variable d: at addr: 2293600, value: 12.809000, size: 8
```

Writing a program to complete following requirements, and then draw the memory structure of all variables in program:

As a cashier in a supermarket, you need to make a bill for customer. Please write a program to meet the request as below:

a) *Functions* **(3 marks):**

- Input the price of product chosen by customer
- Calculate the value added tax (VAT) as 10 percent of price of the product
- Input the quantity of product collected by customer
- Display the total amount of the bill that need to be paid.

b) *Explore memory* **(1 marks):**

Draw the memory structure of all variables in program as the same as sample above.

---------- *The end* ----------