

King Fahd University of Petroleum and Minerals
Information & Computer Science Department
ICS 103 – Computer Programming in C
Summer Semester 2008 (073)

Lab # 2 (Data Types)

Objective:

To apply the Software Development Method using C-language.

Scope:

The student should know the following:

1. The Problem Solving approach
2. Different data types of C and their use.
3. How to declare variables
4. Standard input and output functions
5. How to write a complete program

Useful Concepts:

A useful list of basic data type of C , number of bytes used to store these data types in memory of computer system and format used in *printf()* and *scanf()* for handling data types is given below :

<i>Data Type</i>	<i>Bytes</i>	<i>Format (Conversion Specifier Used)</i>
signed char	1	%c
unsigned char	1	%c
short signed int	2	%d
short unsigned int	2	%u
long signed int	4	%ld
Long unsigned int	4	%lu
float	4	%f
double	8	%lf
long double	10	%Lf

And the list of Escape characters that are useful to control the appearance of the text.

<i>Escape Sequence</i>	<i>Description</i>
\n	Newline. Position the cursor at the beginning of the next line.
\t	Horizontal tab. Move the cursor to the next tab stop.
\a	Alert. Sound the system bell.
\\	Backslash. Insert a backslash character in a string.
\"	Double quote. Insert a double quote character in a string.

And the list of some fundamental arithmetic operators:

<i>Operators</i>	<i>Description</i>	<i>Example</i>
+	Addition.	$c = a + b;$
-	Subtraction.	$c = a - b;$
*	Multiplication.	$c = a * b;$
/	Division.	$c = a / b;$
()	Give highest precedence to the expression.	$c = 10 * (a + b);$

Exercise # 1:

Apply the five steps of problem solving to the following problem. Write a C program that prompts for and reads the radius of a sphere and then calculates the surface area and the volume of the sphere.

Step 1: Requirement Specification

Have a clear understanding of the problem.

Step 2: Analysis

- ***Problem Input***
- ***Problem Output***
- ***Relevant Formula***

Step 3: Design

Write the algorithm (set of steps)

- 1.
- 2.
- 3.
- 4.

Step 4: Implementation

Convert the algorithm into a C program. Edit the program using Turbo C.

Step 5: Verification & Testing

Run the program, correct the errors if any, and test your program by entering different values for the radius.

Exercise # 2:

Write a C program that displays (prints) the following output lines where X is your first name. Use three printf statements.

Sample Output:

```
*****  
* Ameen *  
*****
```

Exercise # 3:

Repeat exercise # 2 using only one printf statement.

Exercise # 4

Write a C program that prompts for and reads two integers and then prints out the sum, the difference and the product.

Sample Output:

```
Enter two integer numbers > 5 2  
5+2 = 7  
5-2 = 3  
5*2 = 10
```

LAB HW # 1

Due: next lab session

SAUDIA airline provides each passenger with free limit of luggage weight. If the passenger has extra luggage weight, he will be charged for it. Assume that he has to pay SR 30 for each extra kilo. Write a C program that reads the amount of free limit weight in kilo and then reads the weight of passenger's luggage in kilo. The program then calculates the amount of charge that the passenger has to pay for his extra luggage weight. (*For simplicity assume that the weight of passenger's luggage is ALWAYS than the free limit. Also, assume that weight values are integers*)

Sample Output:

```
Enter the free limit of luggage weight (kilo)> 25  
Enter the weight of passenger's luggage (kilo)> 30  
The passenger has to pay 150 Riyals
```

Submission Guidelines:

1. The homework **must be** submitted at the beginning of the next lab session in both soft and hard copies (floppy disk and print out).
2. Late homework **is not** accepted.
3. The homework **must be** solved individually. Any kind of copying will result in serious damage for all parties involved.

Evaluation:

Your Lab Work grade will depend **on your** active participation, individual efforts in solving lab problem and seriousness during the lab.