

CL101
INTRODUCTION
TO COMPUTING

LAB 05
Introduction to C Programming

NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES

Objectives:

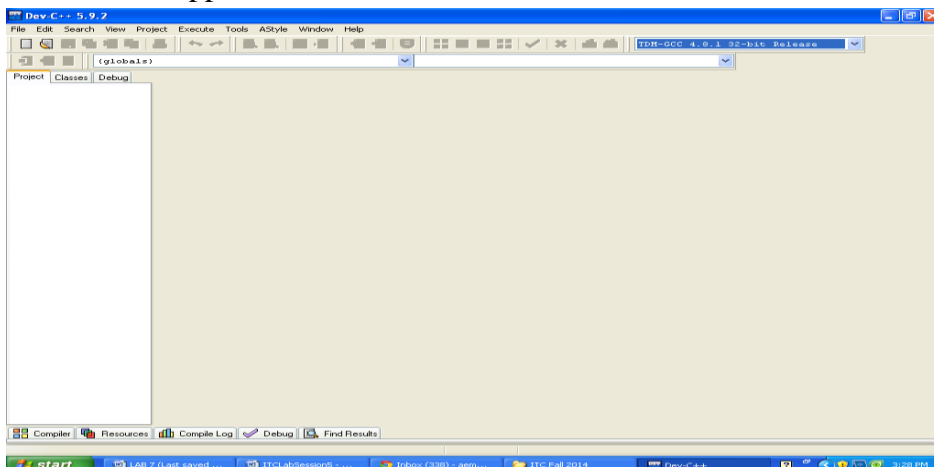
- Introduction to Dev C++ tool
- Introduction to C program structure
- Escape sequences
- Variables
- Format specifiers.
- Data types in C
- Operators.

Introduction to Dev C++ tool:

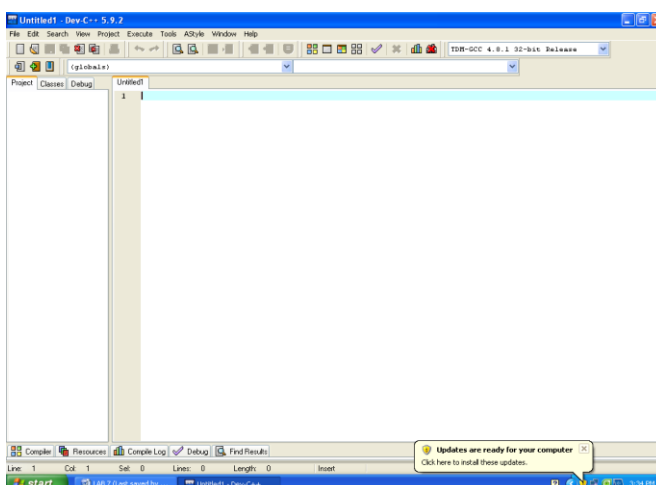
Dev-C++ is a full-featured integrated development environment (IDE), which is able to create Windows or DOS-based C/C++ programs using the Mingw compiler system (included with the package), or the Cygwin compiler. These are the recommended requirements of Dev-C++: Microsoft Windows 98, NT or 2000 32 MB RAM 233 Mhz Intel compatible CPU 45 MB free disk space Dev-C++ allows you to write, compile and run a C or C++ program.

Steps to use compiler:

- 1- Once you install compiler, then an icon of dev C++ appears on your desktop, on clicking a window will appear



- 2- Click File → New → Source File



- 3- Write code on this window and save it
- 4- For Compile go to Execute → Compile or press F9

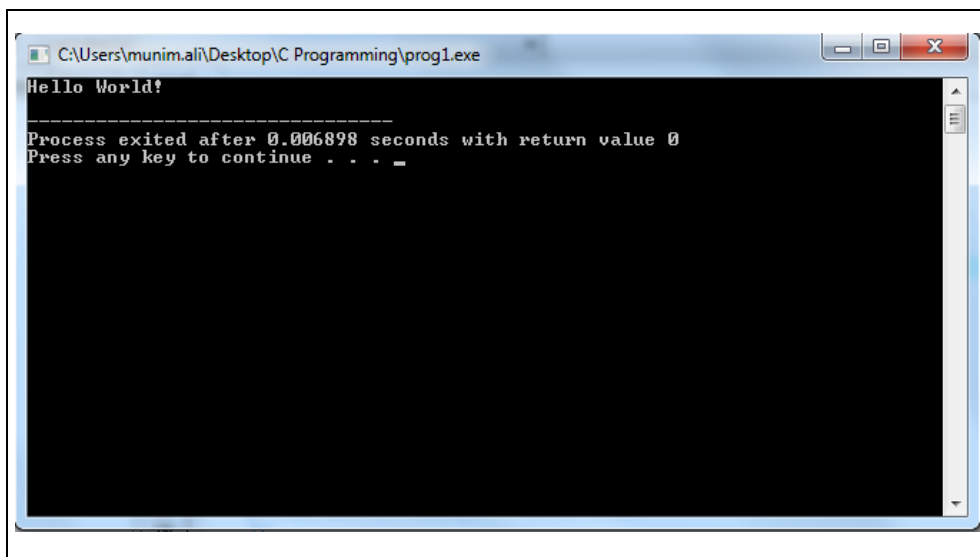
- 5- For run or execute file go to Execute → run or press F10
- 6- For compile and run go to Execute → compile and run or press F11

Introduction to C Program Structure:

Sample program:

```
#include <stdio.h>
void main ( void )
{
    printf ( "Hello World!\n" );
    getch ( ) ;
}
```

Output:



- The #include command occurs before the program starts.
- All your code will be within the brackets of main.
- printf() is used to print data on the output screen.
- getch() is used to hold the output screen.

Escape Sequences:

These are non-printing characters. They are special character set, each with specific meaning. An escape sequence always begins with a back slash and is followed by one or more special characters.

Esc. Seq.	Purpose	Esc. Seq.	Purpose
\n	New line	\t	Tab
\b	Backspace	\r	Carriage return
\f	Form feed	\a	Alert
\'	Single quote	\"	Double quote
\\	Backslash		

Variables:

A variable name is a location in memory where a value can be stored for use by a program. All variables must be defined with a name and a data type in the code before they can be used in a program. A variable name in C should be a valid identifier. An identifier is a series of characters consisting of letters, digits and underscore and does not begin with a digit. C is case sensitive i.e. area and Area can't be treated as same. There are certain reserved words called Keywords that have standard, predefined meanings in C. These keywords can be used only for their intended purpose; they can't be used as programmer defined identifier.

Create a variable:

```
int age;
```

Data Types:

C supports several different types of data, each of which may be represented differently within the computer's memory.

Type	Storage size	Value range
char	1 byte	-128 to 127 or 0 to 255
unsigned char	1 byte	0 to 255
signed char	1 byte	-128 to 127
int	2 or 4 bytes	-32,768 to 32,767 or -2,147,483,648 to 2,147,483,647
unsigned int	2 or 4 bytes	0 to 65,535 or 0 to 4,294,967,295
short	2 bytes	-32,768 to 32,767
unsigned short	2 bytes	0 to 65,535
long	4 bytes	-2,147,483,648 to 2,147,483,647
unsigned long	4 bytes	0 to 4,294,967,295
float	4 bytes	1.2E-38 to 3.4E+38
double	8 bytes	2.3E-308 to 1.7E+308
Long double	10 bytes	3.4E-4932 to 1.1E+4932

Format Specifiers:

Format specifier specifies that which type of data has to be print or read into.

Specifiers	Meaning
%c	Character
%d	Integer
%f	Float value
%e	Float value in exponential form
%u	Unsigned Integer
%x	Hexadecimal integer (unsigned)
%o	Octal value
%s	String

Operators:

In C, there are various operators, used to form expressions. The data items on which the operators act upon are called operands. Some operators require two operands while other act upon only one operand. They are classified as: 1. Arithmetic Operators (binary type) 2. Unary Operators 3. Relational and Logical Operators 4. Assignment Operator

Arithmetic Operators:

In C, most programs perform arithmetic calculations. Arithmetic calculations can be performed by using the following arithmetic operators. Table 3.1 summarizes the C arithmetic operators. Note the use of various special symbols not used in algebra. The asterisk (*) indicates multiplication and the percent sign (%) is the modulus or remainder operator. The arithmetic operators in the Table are all binary operators, i.e., operators that take two operands.

C++ operation	C++ arithmetic operator	C++ expression
Addition	+	$x + y$
Subtraction	-	$x - y$
Multiplication	*	$x * y$
Division	/	x / y
Modulus	%	$x \% y$

Unary Operators:

Arithmetic operators in addition to the arithmetic assignment operators, C also provides two unary operators that act upon on a single operand to produce a new value, for adding 1 to or subtracting 1 from the value of a numeric variable. These are the unary increment operator, ++, and the unary decrement operator, --

Assignment Operators:

C provides several assignment operators for abbreviating assignment expressions. For example, the statement: $c = c + 3$; can be abbreviated with the addition assignment operator += as $c += 3$; The += operator adds the value of the expression on the right of the operator to the value of the variable on the left of the operator and stores the result in the variable on the left of the operator. Thus the assignment $c += 3$ adds 3 to c.

Operators	Operation	Explanation
$++a$	Pre Increment	Increment a by 1, then use the new value of a in the expression in which a resides.
$a++$	Post Increment	Use the current value of a in the expression in which a resides, then increment a by 1.
$--a$	Pre Decrement	Decrement a by 1, then use the new value of a in the expression in which b resides.
$a--$	Post Decrement	Use the current value of a in the expression in which a resides, then decrement b by 1.

Summary of Operator Precedence and Associativity:

The operators are shown from top to bottom, in decreasing order of precedence

Operators	Associativity	Type
()	left to right	parentheses
++ --	left to right	unary (postfix)
++ -- + - !	right to left	unary (prefix)
* / %	left to right	multiplicative
+ -	left to right	additive
<< >>	left to right	insertion/extraction
< <= > >=	left to right	relational
== !=	left to right	equality
&&	left to right	logical AND
	left to right	logical OR
?:	right to left	conditional
= += -= *= /= %=	right to left	assignment

Output:

Printf():

Printf is a predefined function in "stdio.h" header file, by using this function, we can print the data or user defined message on console or monitor. While working with printf(), it can take any number of arguments but first argument must be within the double quotes (" ") and every argument should be separated with comma (,) Within the double quotes, whatever we pass, it prints same, if any format specifies are there, then that copy the type of value. The scientific name of the monitor is called console.

Syntax:

```
printf("user defined message");
```

```
. printf("Format specifiers",value1,value2,..);
```

EXAMPLE:

```
int a=10;  
double d=13.4;  
printf("%f%d",d,a);
```

Input:

Scanf():

scanf() is a predefined function in "stdio.h" header file. It can be used to read the input value from the keyword.

Syntax:

```
scanf("format specifiers",&value1,&value2,.....);
```

Example:

```
int a;  
float b;  
scanf("%d%f",&a,&b);
```

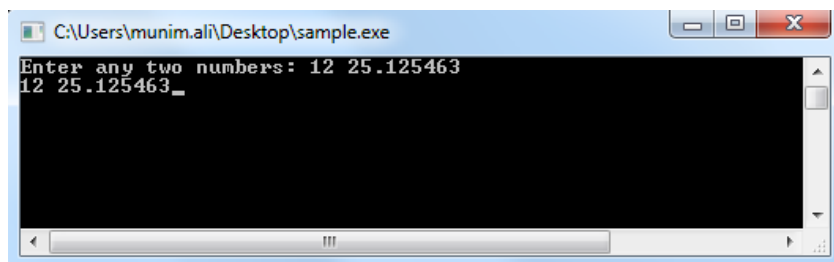
In the above example scanf() is able to read two input values (both int and float value) and those are stored in a and b variable respectively.

Sample program:

```
#include <stdio.h>
#include <conio.h>

void main()
{
    int a;
    float b;
    printf("Enter any two numbers: ");
    scanf("%d %f",&a,&b);
    printf("%d %f",a,b);
    getch();
}
```

Output:

A screenshot of a Windows command prompt window. The title bar shows the file path "C:\Users\munim.ali\Desktop\sample.exe". The command prompt displays the text "Enter any two numbers: 12 25.125463" on the first line and "12 25.125463_" on the second line, indicating that the program has successfully read and printed the input values. The window has a standard Windows interface with minimize, maximize, and close buttons in the top right corner and a scrollbar on the right side.

```
C:\Users\munim.ali\Desktop\sample.exe
Enter any two numbers: 12 25.125463
12 25.125463_
```