

Outline

- Data Types in C
- Functions
- Arrays

**Data Types in C**

C contains the following basic data types:

C Data Type	Description	Range	Memory size
<b>char</b>	Character	Alphanumeric	8 bits
<b>int</b>	Integer	-32768 to 32767	16 bits
<b>float</b>	Real	$3.4 \times 10^{-38}$ to $3.4 \times 10^{38}$	32 bits
<b>double</b>	Double precision real	$1.7 \times 10^{-308}$ to $1.7 \times 10^{308}$	64 bits
<b>long</b>	Long integer	-2147483648 to 2147483647	32 bits
<b>short</b>	Short integer	-32768 to 32767	16 bits
<b>unsigned</b>	Unsigned integer	0 to 65535	16 bits

**Variable Declarations**

**Every variable occurring in a program must be declared before it is used.**

The syntax for declaring a variable in C is :

**var\_type** *list variables*;

ex.                    **int** i,j,k;   **float** x,y,z;   **char** letter;

**Constants**

C allows you to declare *constants*. Value defined as a constant **can not be changed** afterwards. The **const** keyword is to declare a constant, as shown below:

**const int** a =2;

Another way to define constants in a program is by using **#define** , as shown below.

**#define** a 2

**Global Variables**

Global variables are defined above **main()** in the following way:

```

short number,sum;
int bignumber,bigsum;
char letter;
main() {
    }

```

It is also possible to **pre-initialise** global variables using the = operator for assignment.

**Example**            **float** sum=0.0;  
                      **int** bigsum=0;  
                      **char** letter=`A';  
                      main () { }

## Functions

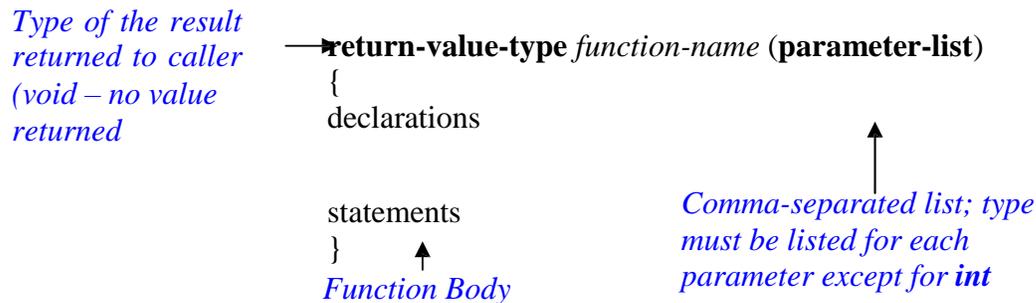
Modules in C are called functions. There are two types of functions:

- 1.) *Programmer-defined* functions – one that programmer writes
- 2.) *Pre-packaged* functions available in the C standard library (**printf**, **scanf** etc.)

Functions are invoked by a *function call*. The function call specifies the function name and provides information (as arguments) that the called function needs in order to perform its designated task.

All variables declared in function definitions are *local variables* and they are **known only in the function in which they are defined**.

The format of a function definition is:



**A function can not be defined inside another function under any circumstances.**

## Arrays

An array is a contiguous collection of objects of the same type. Arrays are declared by stating the following:

- The type of the values to be stored
- A variable identifier (The name of the array)
- The number of elements in the array

**Example:** The following statement declares an array to store 100 **int** values  
**int** b[100];

**Note that** the size of the array has to be specified when declaring an array; otherwise, an error will be generated.

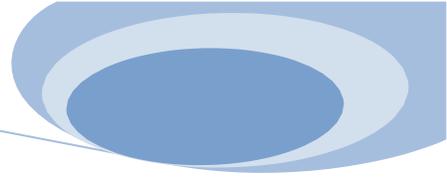
### Assigning values to Arrays

The following program shows how to read the elements of an array from the keyboard, using a **scanf** statement and a **for** loop to cycle through each element in turn.

```

#include <stdio.h>
main()
{
    int count;
    float b[4];
    for( count = 0; count <=3; count++ )
        scanf("%d", &b[count]);
}

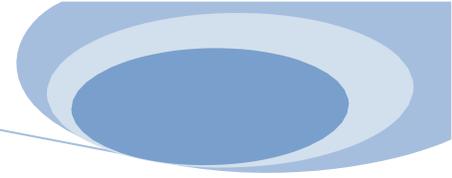
```



## Lab Work

The program below prompts the user to enter his / her name and displays it on the screen.

```
#include<stdio.h>
void main( void )
{
    int i = 0;
    char array_1[ ] = { 'H', 'E', 'L', 'L', 'O', '\0' };
    char array_2[ ] = "Write your name";
    char array_3[ 30 ];
    printf( "%s\n", array_1 );
    while( array_2[ i ] != '\0' )
    {
        printf( "%c", array_2[ i ] );
        i++;
    }
    printf( "\n" );
    scanf( "%s", array_3 );
    printf( "Your name is : %s", array_3 );
}
```



## **Homework**

### **1.a (Due after one week)**

Write a program that inputs 5 real numbers from the keyboard, and prints the **sum**, **mean**, **median**, **product**, **smallest**, and **largest** of these numbers.

### **1.b (Due after one week)**

Write a program that inputs three real numbers. Then write a **function** called **Total** to find the output of the following operation. If any of the input numbers are negative the programme should print an error message and exit, otherwise the program calculates and prints the output according to the formula.

$$Q = \left( \frac{1}{2} a^2 + 3b^3 - \frac{5c}{4} \right)$$

a , b and c are entered by the user.

NOTES:

*1) Please Send your Homework in the following Emails, but remember **who is your lab instructor***

***emu.clab2@gmail.com** for **Pouya's Student**  
**eenglab212@gmail.com** for **Mohamad's Student***

*2) Subject of email Should include student Number + Homework Number  
For Example: "St. 15000012 Homework #1"*

*3) Your homework should be saved with your student number and attached as notepad.  
For Example 15000012.txt*