National University of Computer and Emerging Sciences

Lab Manual # 2

Programming Fundamentals

(Section BCS-1G)

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Objectives

The objectives of this lab are to cover the following:

- What is a Flow Chart and how to make flow chart?
- What is Pseudo code and how to write pseudo code?
- Introduction Visual studio and different type of ID's?
- What is linker, compiler and debugger.

Important Notes

- Be aware that while writing pseudo code by proper start and mention steps.
- You will be writing Pseudo code for sequential statements and conditional statements.
- Try to indent your program so that statements inside a block can be distinguished from another block

What is Flow Chart:

A **flowchart** is a type of diagram, that represents an algorithm or process, showing the steps as boxes of various kinds, and their order by connecting these with arrows. This diagrammatic representation can give a step-by-step solution to a given problem. Data is represented in these boxes, and arrows connecting them represent flow / direction of flow of data. Flowcharts are used in analyzing, designing, documenting or managing a process or program in various fields

Name the four flowchart structures :

1. Sequence
2. Selection
3. Repetition
4. Case

Symbols of flowchart

A typical flowchart from older computer science textbooks may have the following kinds of symbols:

Start and end symbols

Represented as circles, ovals or rounded rectangles, usually containing the word **"Start"** or **"End",** or another phrase signaling the start or end of a process, such as "submit enquiry" or "receive product".

Arrows

Showing what's called "flow of control" in computer science. An arrow coming from one symbol and ending at another symbol represents that control passes to the symbol the arrow points to.

Processing steps

Represented as rectangles. Examples: "Add 1 to X"; "replace identified part"; "save changes" or similar.

Input/output

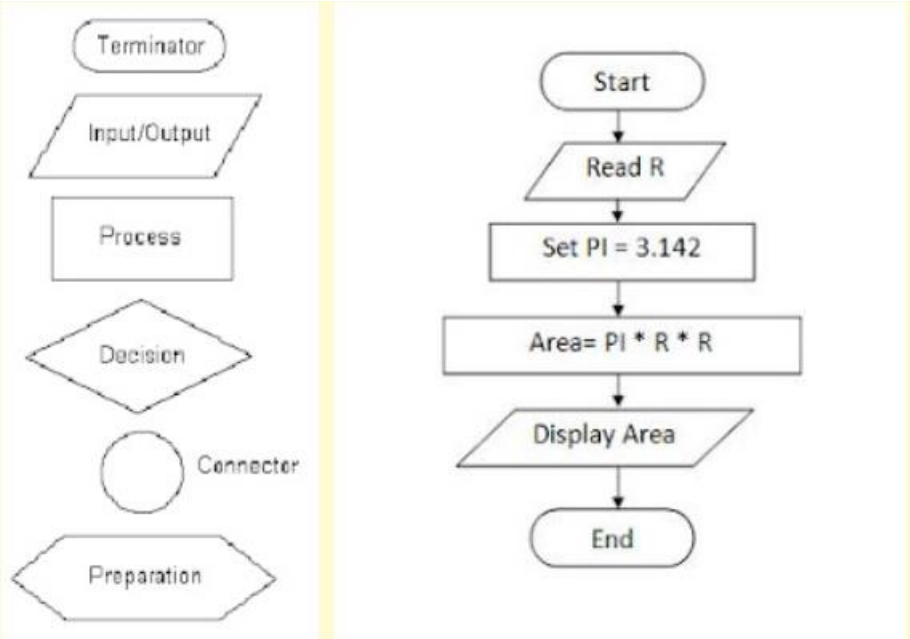
Represented as a parallelogram. Examples: Get X from the user; display X.

Conditional or decision

Represented as a diamond (rhombus). These typically contain a Yes/No question or True/False test. This symbol is unique in that it has two arrows coming out of it, usually from the bottom point and right point, one corresponding to Yes or True, and one corresponding to No or False.

With flowcharting, essential steps of an algorithm are shown using the shapes above. The flow of data between steps is indicated by arrows, or flow lines. For example, sequence type of flowchart:

Example:



What is Pseudo Code?

Pseudo code is a term which is often used in programming and algorithm based fields. It is a methodology that allows the programmer to represent the implementation of an algorithm. Simply, we can say that it's the cooked up representation of an algorithm. Often at times, algorithms are represented with the help of pseudo codes as they can be interpreted by programmers no matter what their programming background or knowledge is. Pseudo code, as the name suggests, is a false code or a representation of code which can be understood by even a layman with some school level programming knowledge.

Example:

```
1. START
2. READ R
3. SET PI=3.142
4. CALCULATE AREA OF CIRCLE
   4.1.    FORMULA:
           Area= PI * R * R
5. DISPLAY Area
6. END
```

- Write Pseudo Code and make flow chart for the problems involving sequential statements and if/else.

Problems / Assignments

Problem 1:

Read a number from the user, test whether it is even or odd and then display accordingly.

Problem 2:

Read a test score (integer value in the range 0-100), determine if the score is passing (50 or more) and then display accordingly (fail if the score is below 50; pass otherwise).

Problem 3:

Write a pseudo code to find the grade from marks. User is required to input marks obtained and then program gives him a grade according to his marks. The grading scale is shown below:

Marks	Grade
90——-100	A+
80——-89	A
70——-79	B
60——-69	C
50——-59	D
00——-49	F

Problem 4:	

Read three numbers and display the largest and the smallest integers.

Problem 5:	

Read five numbers from the user and calculate the average.

Problem 6:	

Write a Pseudo code that finds the max element in a list of numbers.

C++ "Hello World!" Program

```
/ Your First C++ Program

#include <iostream>
using namespace std;
int main() {
    cout << "Hello World!";
    return 0;
}
```

Output:

```
Hello World!
```

1. **// Your First C++ Program**

   In C++, any line starting with // is a comment. Comments are intended for the person reading the code to better understand the functionality of the program. It is completely ignored by the C++ compiler.

2. **#include <iostream>**

   The **#include** is a preprocessor directive used to include files in our program. The above code is including the contents of the iostream file.

   This allows us to use **cout** in our program to print output on the screen.

   For now, just remember that we need to use #include **<iostream>** to use **cout** that allows us to print output on the screen.

3. **int main() {...}**

   A valid C++ program must have the main() function. The curly braces indicate the start and the end of the function.

   The execution of code beings from this function.

4. **cout << "Hello World!";**

   cout prints the content inside the quotation marks. It must be followed by << followed by the format string. In our example, **"Hello World!"** is the format string.

   Note: ; is used to indicate the end of a statement.

5. **return 0;**

   The **return 0;** statement is the **"Exit status"** of the program. In simple terms, the program ends with this statement.

END