UNIT I
Basic of Programming using Ubuntu OS

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Problem Definition

The art of compiling logic in the form of general flow charts and logic diagrams
which clearly explain and present the problem to the programmer in such a way
 that all requirements involved in the run are presented.

Problem Analysis

Problem Analysis in Computer programming is the process where we break down problems into its components so that the problems can easily be understood. The way to do this is to write an ALGORITHM of the problem. Problem Analysis in Computer programming is a way where problems are discussed for giving the solution.

Algorithm

The algorithm is nothing but a well-defined, finite sequence of instructions that allows us to solve a particular class of problems in a suitable manner. Algorithms are always unambiguous and are used as specifications for performing different types of computations and tasks.

In simple terms, we can say that algorithms are formulas or procedures for solving a particular problem based on a sequence of specified actions.
Let's take a simple example – Suppose we want to make a tea, so what all steps we have to follow for making a tea:

Step 1: Take a container.
Step 2: Pour some milk.
Step 3: Add Tea leaves.
Step 4: Add sugar.
Step 5: Put it in the gas stove for around 5-10 minutes.
So, these are the basic steps which we will follow to make tea. I can also say that this is the algorithm for making tea.

Now, we can conclude that Algorithms are the basic step to accomplish a specific task. In computer language, we can define an algorithm as:

Give Data as an Input

Do Complex Calculations

Stop When you get results
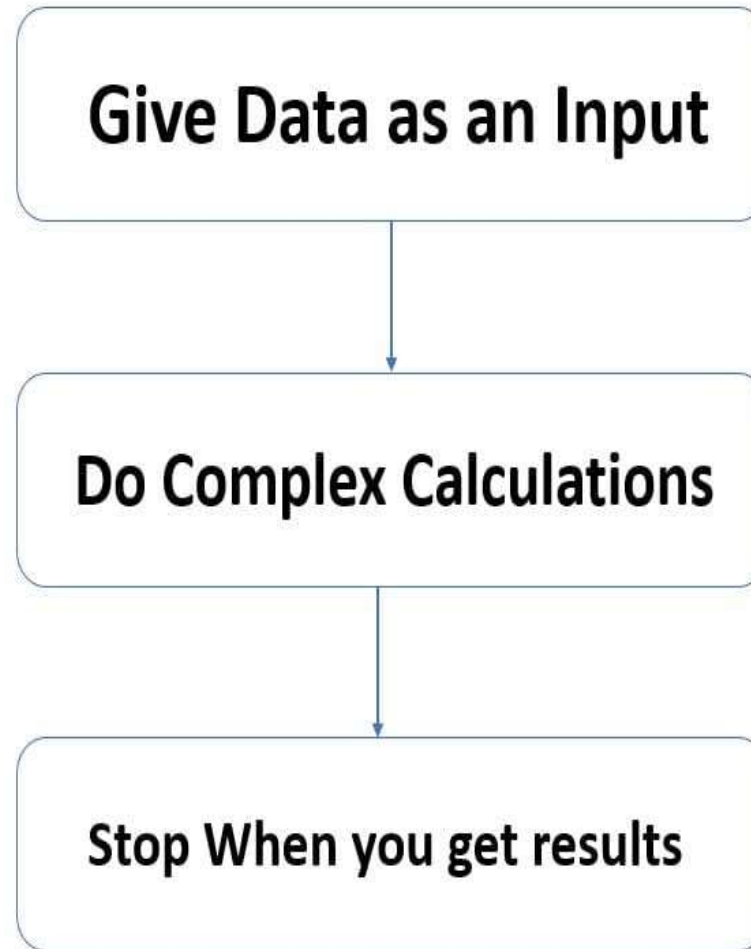
What are the Advantages of Using Algorithms

Since we have talked a lot about the algorithm, now let's see some of the advantages of the same:
It gives a step-wise solution for a particular problem, which makes it easier to understand.
It is not dependent on any programming language, so it can be easily understood by anyone.
It is easy to debug.
It uses a definite procedure.
It is easier to implement.

What are the Disadvantages of Algorithms

There are some drawbacks also, let see some of them;
It is time-consuming.
The big task is difficult to put in algorithms.

What are the Characteristics of Algorithms

Not all the steps and procedures can be called algorithms, they have some characteristics also:

Input: An algorithm must have well-defined inputs or 0 input

Output: An algorithm should have well-defined output or should match the desired output as per the result.

Feasibility: It should be efficient and feasible with the available resources.

Unambiguous: An algorithm should be unambiguous and clear, each and every single step should have a well-defined meaning.

Independent: It should have a step-by-step process that should be independent for a particular program regardless of programming language.

Flowchart

Definition: A flow chart is a graphical representation of algorithms, workflow or process.

The purpose of a flow chart is to provide people with a common language for understanding a project or process. Each flowchart represents a solution to a given problem definition. Flowchart is prepared using following common symbols:
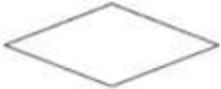
Symbol	Symbol Name
⬭	Terminal
▭	Process
◇	Decision
▱	Input / Output
○	Connector
→	Flow line

Figure: Flowchart Symbol

Terminal Symbol: In the flowchart, it is represented with the help of a circle for denoting the start and stop symbol. The symbol given below is used to represent the terminal

Input/output Symbol: The input symbol is used to represent the input data, and the output symbol is used to display the output operation. The symbol given below is used for representing the Input/output symbol.

Processing Symbol: It is represented in a flowchart with the help of a rectangle box used to represent the arithmetic and data movement instructions. The symbol given below is used to represent the processing symbol.

Decision Symbol: Diamond symbol is used for represents decision-making statements. The symbol given below is used to represent the decision symbol.

YES   NO

A > B
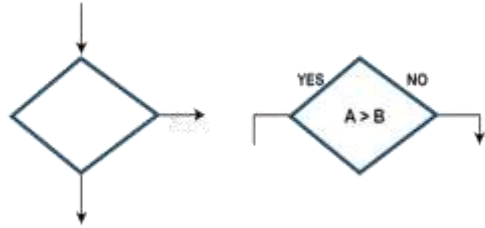
Connector Symbol: The connector symbol is used if flows discontinued at some point and continued again at another place. The following symbol is the representation of the connector symbol.

Flow lines: It represents the exact sequence in which instructions are executed. Arrows are used to represent the flow lines in a flowchart. The symbol given below is used for representing the flow lines:

Advantages of Flowchart in C:

Following are the various advantages of flowchart:
Communication: A flowchart is a better way of communicating the logic of a program.
Synthesis: Flowchart is used as working models in designing new programs and software systems.
Efficient Coding: Flowcharts act as a guide for a programmer in writing the actual code in a high-level language.
Proper Debugging: Flowcharts help in the debugging process.
Effective Analysis: Effective analysis of logical programs can be easily done with the help of a related flowchart.
Proper Documentation: Flowchart provides better and proper documentation. It consists of various activities such as collecting, organizing, storing, and maintaining all related program records.
Testing: A flowchart helps in the testing process.
Efficient program maintenance: The maintenance of the program becomes easy with the help of a flowchart.

Disadvantages of Flowchart in C:

Following are the various disadvantages of flowchart:
Time-consuming: Designing **a** flowchart is a very time-consuming process.
Complex: It isn't easy to draw a flowchart for large and complex programs.
There is no standard in the flowchart; there is no standard to determine the quantity of detail.
Difficult to modify: It is very difficult to modify the existing flowchart.

Rules or guidelines of Flow chart:

The various Rules or Guidelines for drawing the flowchart
are given below.
Only conventional flowchart symbols should be used.
Proper use of names and variables in the flowchart.
If the flowchart becomes large and complex, use connector symbols.
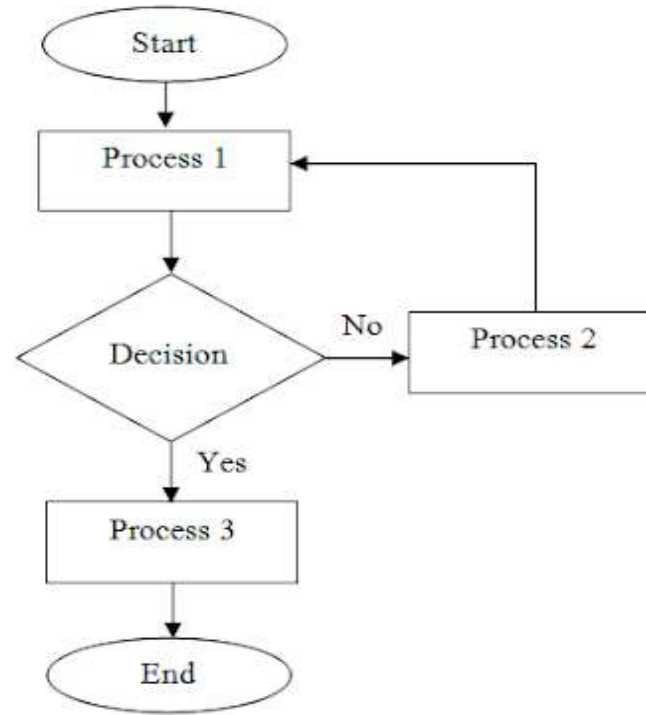Flowcharts should have start and stop points.

Figure: Basic Flowchart

Explanation of Basic Flowchart

Step-1: Start

Step-2: Begin your process 1

Step-3: Take decision (Check some condition)

Step-4: Based on answer from Step-3, execute Process 2 or Process 3.

If answer of step 3 is No, execute Process 2 and repeat Step-2, 3 and 4;

otherwise execute Process 3

Step-5: End

EXAMPLE OF FLOWCHART
•**Flowchart to check Odd or Even number**