

Algorithms and Flowcharts

In the context of programming, algorithms and flowcharts are essential tools used to plan, design, and visualize the structure and logic of a program before actually writing the code. They help in understanding the steps involved in solving a problem and how data flows through the system.

**Algorithm**  
What is an Algorithm?

An algorithm is a step-by-step procedure or formula for solving a problem. It is a finite sequence of well-defined instructions, typically used to perform a computation or solve a specific problem.

**Characteristics of an Algorithm:**

- Finite: It must terminate after a finite number of steps.
- Definite: Each step must be precisely defined and unambiguous.
- Input: It takes zero or more inputs.
- Output: It produces one or more outputs.
- Effective: All operations must be basic enough to be performed within a finite amount of time and with the available resources.

**Example of an Algorithm:**

**Problem 1:** Find the maximum number in a list of numbers.

**Algorithm:**

- Start
- Initialize max to the first element of the list.
- For each element num in the list:
  - If num is greater than max, set max to num.
- After all elements have been checked, max holds the largest number in the list.
- Print max.
- End

**Problem 2:** Algorithm to Check if a Number is Positive, Negative, or Zero

**Algorithm:**

- Start
- Input the number.
- If the number is greater than 0, print "Positive".
- If the number is less than 0, print "Negative".
- If the number is equal to 0, print "Zero".
- End

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Problem 3: Algorithm to Calculate the Sum of Two Numbers

Algorithm:

- Start
- Input the first number.
- Input the second number.
- Calculate the sum of the two numbers.
- Print the sum.
- End

Problem 4: Algorithm to Find the Largest of Three Numbers

Algorithm:

- Start
- Input the first number.
- Input the second number.
- Input the third number.
- If the first number is greater than or equal to the second number and the first number is greater than or equal to the third number:
  - Print the first number.
- Else if the second number is greater than or equal to the third number:
  - Print the second number.
- Else:
  - Print the third number.
- End

Flowchart

What is a Flowchart?

A flowchart is a graphical representation of an algorithm. It uses various symbols to denote different types of actions or steps and arrows to show the flow of control from one step to another.

Flowchart Symbols:

- Oval: Represents the start and end of a process.
- Rectangle: Represents a process or instruction.
- Diamond: Represents a decision or branching point.
- Parallelogram: Represents input/output operations.
- Arrows: Indicate the flow of control.

Flowchart Guidelines

To create a flowchart, you must follow the following current standard guideline:

- Step 1: Start the program.
- Step 2: Begin Process 1 of the program.

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- Step 3: Check some conditions and take a Decision (“yes” or “no”).
- Step 4: If the decision is “yes”, proceed to Process 3. If the decision is “no”, proceed to Process 2 and return to Step 2.
- Step 5: End of the program.

**Symbols Used In Flowchart**

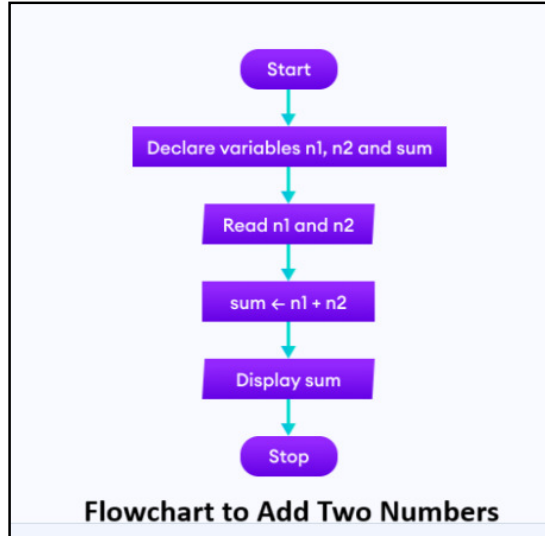
Symbol	Purpose	Description
	Flow line	Indicates the flow of logic by connecting symbols.
	Terminal(Stop/Start)	Represents the start and the end of a flowchart.
	Input/Output	Used for input and output operation.
	Processing	Used for arithmetic operations and data-manipulations.

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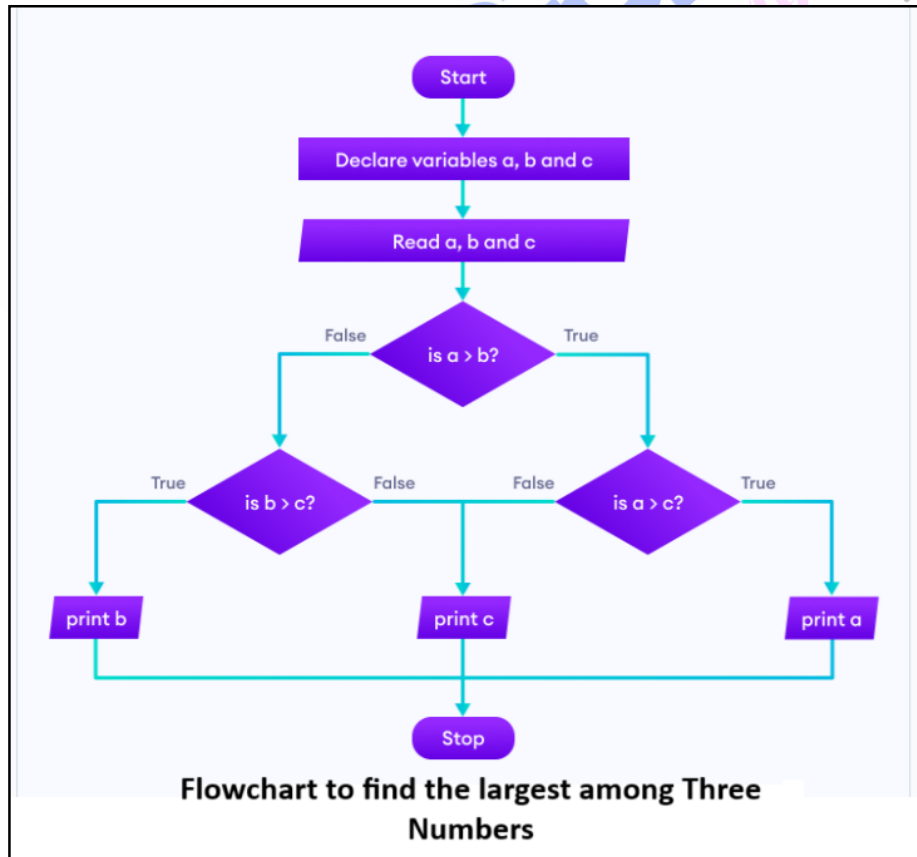
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Example of a Flowchart:

Problem: 1. Add two numbers entered by the user.



Problem 2: Find the largest among three different numbers entered by the user.



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Advantages of Using Algorithms and Flowcharts

**Algorithms:**

- Clarity: Provides a clear and concise way to describe the problem-solving process.
- Efficiency: Helps in identifying the most efficient way to solve a problem.
- Debugging: Facilitates easy identification and correction of errors in the logic.

**Flowcharts:**

- Visualization: Offers a visual representation of the steps involved, making it easier to understand the flow of the program.
- Communication: Helps in explaining the logic and flow of a program to others, especially those who may not be familiar with programming.
- Organization: Aids in organizing complex processes by breaking them down into simpler steps.

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Assignment

- Ques 1: Draw the flowchart to calculate the Average of Two Numbers.  
Ques 2: Draw the flowchart to Input Number and Check If They Are Odd or Even.  
Ques 3: Draw a Flowchart for Finding the Maximum Number among four numbers.