



Algorithm and flowchart

Lect.

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Algorithm and flowchart

- Algorithm and flowchart are two types of tools to explain the process of a program. This page extends the differences between an algorithm and a flowchart, and how to create a flowchart to explain an algorithm in a visual way.
- Algorithms and flowcharts are two different tools used for creating new programs, especially in computer programming. An algorithm is a step-by-step analysis of the process, while a flowchart explains the steps of a program in a graphical way.



Definition of Algorithm

- To write a logical step-by-step method to solve the problem is called algorithm, in other words, an algorithm is a procedure for solving problems. In order to solve a mathematical or computer problem, this is the first step of the procedure. An algorithm includes calculations, reasoning and data processing. Algorithms can be presented by natural languages, pseudo code and flowcharts,



Advantages and Disadvantages of Algorithms

o Advantages

- o 1- One of these advantages is in the development of the procedure itself, which involves the identification of the processes, major decision points, and variables necessary to solve the problem.
- o 2- Developing an algorithm allows and even forces examination of the solution process in a rational manner.
- o 3- Identification of the processes and decision points reduces the task into a series of smaller steps of more manageable size
- o 4- The required specification aids in the identification and reduction of subconscious biases. By using an algorithm, decision-making becomes a more rational process.
- o 5- Solution process allows the identification of weaknesses and errors in the process.



Disadvantages



- o 1- One disadvantage of algorithms is that they always terminate, which means there are some computational procedures—occasionally even useful ones—which are not algorithms
- o 2- All computational procedures, whether they terminate or not, can only give computable results.

Example1: Convert Temperature from Fahrenheit (°F) to Celsius (°C)

Sol:

Step 1: Read temperature in Fahrenheit,

Step 2: Calculate temperature with formula $C = 5/9 * (F - 32)$,

Example2: Find the sum two numbers N and M

Sol:

Step 1: start

Step 2: input N, M

Step 3: $sum = N + M$

Step 4: output sum

Step 5: End



Definition of Flowchart

- A flowchart is the graphical or pictorial representation of an algorithm with the help of different symbols, shapes and arrows in order to demonstrate a process or a program. With algorithms, we can easily understand a program. The main purpose of a flowchart is to analyze different processes. Several standard graphics are applied in a flowchart:



Advantages and Disadvantages of Flow Chart

Advantages

- o 1. **Communication:** Flow Charts are better way of communicating the logic of a system to all concerned.
- o 2. **Effective Analysis:** With the help of flow chart, problem can be analyzed in more effective way.
- o 3. **Proper Documentation:** Program flow charts serve as a good program documentation, which is needed for various purposes.
- o 4. **Efficient Coding:** The flow charts act as a guide or blueprint during the systems analysis and program development phase.
- o 5. **Proper Debugging:** The flow chart helps in debugging process.
- o 6. **Efficient Program Maintenance:** The maintenance of operating program becomes easy with the help of flow chart. It helps the programmer to put efforts more efficiently on that part.



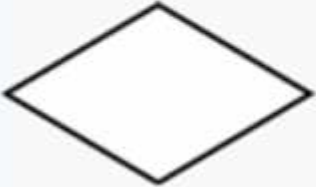
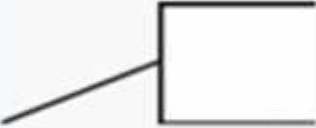
Disadvantages

- Complex logic: Sometimes, the program logic is quite complicated. In that case, flow chart becomes complex and clumsy.
- 1. Alterations and Modifications: If alterations are required the flow chart may require redrawing completely.
- 2. Reproduction: As the flow chart symbols cannot be typed, reproduction of flow chart becomes a problem.
- 3. The essentials of what is done can easily be lost in the technical details of how it is done.

Common symbols

The **American National Standards Institute** (ANSI) set standards for flowcharts and their symbols in the 1960s. The **International Organization for Standardization** (ISO) adopted the ANSI symbols in 1970. The current standard was revised in 1985. Generally, flowcharts flow from top to bottom and left to right

ANSI/ISO Shape	Name	Description
	Flow line (Arrowhead)	Shows the process's order of operation. A line coming from one symbol and pointing at another. Arrowheads are added if the flow is not the standard top-to-bottom, left-to right.
	Terminal	Indicates the beginning and ending of a program or sub-process. Represented as a stadium , oval or rounded (fillet) rectangle. They usually contain the word "Start" or "End", or another phrase signaling the start or end of a process, such as "submit inquiry" or "receive product".
	Process	Represents a set of operations that changes value, form, or location of data. Represented as a rectangle .

	Process	Represents a set of operations that changes value, form, or location of data. Represented as a rectangle .
	Decision	Shows a conditional operation that determines which one of the two paths the program will take. The operation is commonly a yes/no question or true/false test. Represented as a diamond (rhombus).
	Input/output	Indicates the process of inputting and outputting data, as in entering data or displaying results. Represented as a parallelogram .
	Annotation ¹ (Comment)	Indicating additional information about a step the program. Represented as an open rectangle with a dashed or solid line connecting it to the corresponding symbol in the flowchart.
	Predefined Process	Shows named process which is defined elsewhere. Represented as a rectangle with double-struck vertical edges.



On-page Connector

Pairs of labeled connectors replace long or confusing lines on a flowchart page. Represented by a small circle with a letter inside.

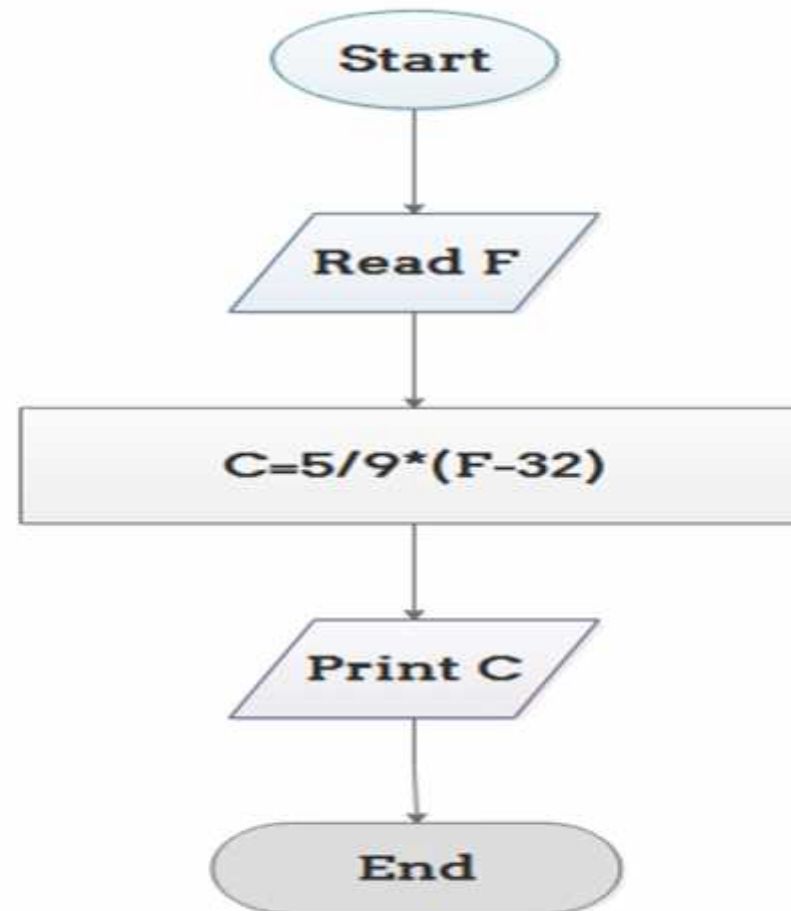


Off-page Connector

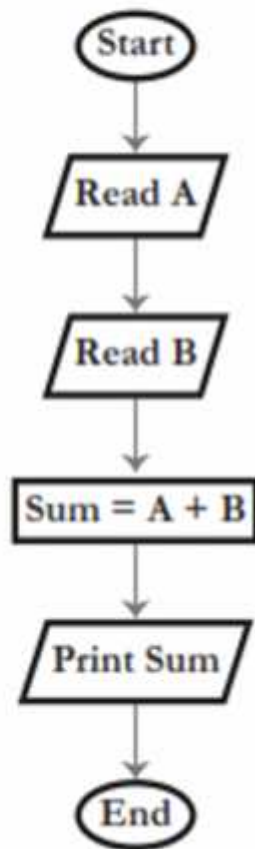
A labeled connector for use when the target is on another page. Represented as a [home plate-shaped pentagon](#).

Example1: Convert Temperature from Fahrenheit () to Celsius ()

Flowchart:



Flowchart - How to find sum of two numbers



Finding sum of 845 and 247

Start

|
A = 845

|
B = 247

|
Sum = 845 + 247

|
Sum = 1092

|
End

A, B, C are the marks scored by a student in Science, Mathematics and English.
Refer the flowchart

