SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF INFORMATION TECHNOLOGY

19ITB201 – DESIGN AND ANALYSIS OF ALGORITHMS

II YEAR IV SEM

UNIT-I-Introduction

TOPIC: Fundamentals of Algorithmic Problem Solving

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FUNDAMENTALS OF ALGORITHMIC PROBLEM SOLVING

Subject :Design and Analysis of Algorithm

How projects can be implemented in Software Companies?

Answer: Fundamentals of Algorithmic Problem Solving

Fundamentals of Algorithmic Problem Solving

FUNDAMENTALS OF ALGORIHTMIC PROBLEM SOLVING

A sequence of steps involved in designing and analyzing an algorithm is shown in the figure

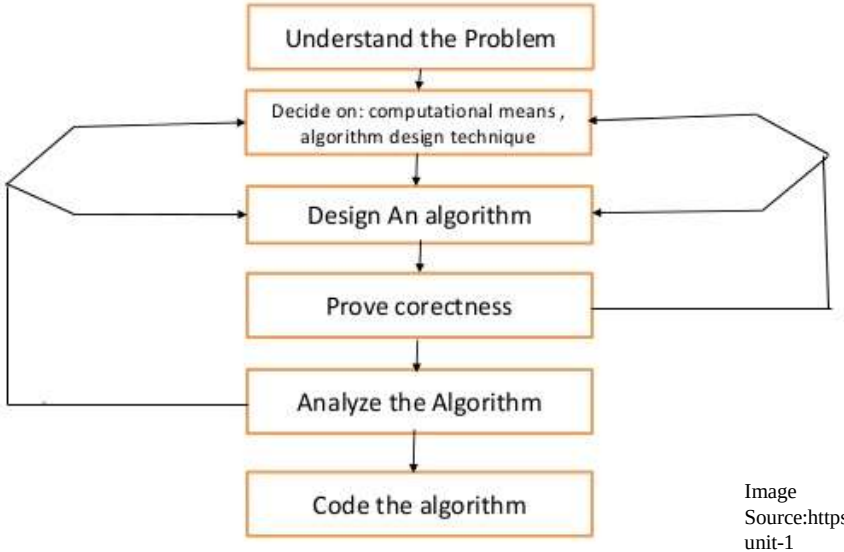


Image Source:https://www.slideshare.net/AbhimanyuMishra3/daa-unit-1

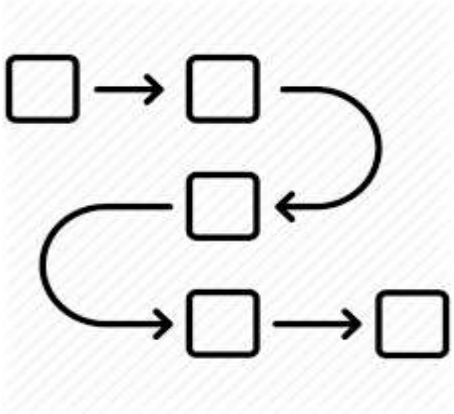
1.Understanding the Problem

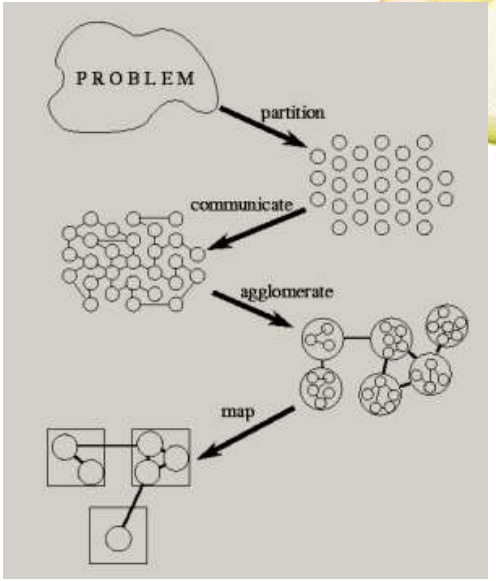
- This is the first step in **designing of algorithm**.
- Identify the problem types and **use existing algorithm** to find solution.
- Input (***instance***) to the problem and range of the input get fixed.

2.Decision making

The Decision making is done on the following:

(a) Ascertaining the Capabilities of the Computational Device





Decision making

(b) **Choosing between Exact and Approximate Problem Solving**

- Approximation algorithm.
- Exact algorithm.

(c) **Algorithm Design Techniques**

- Algorithms+ *Data Structures = Programs*

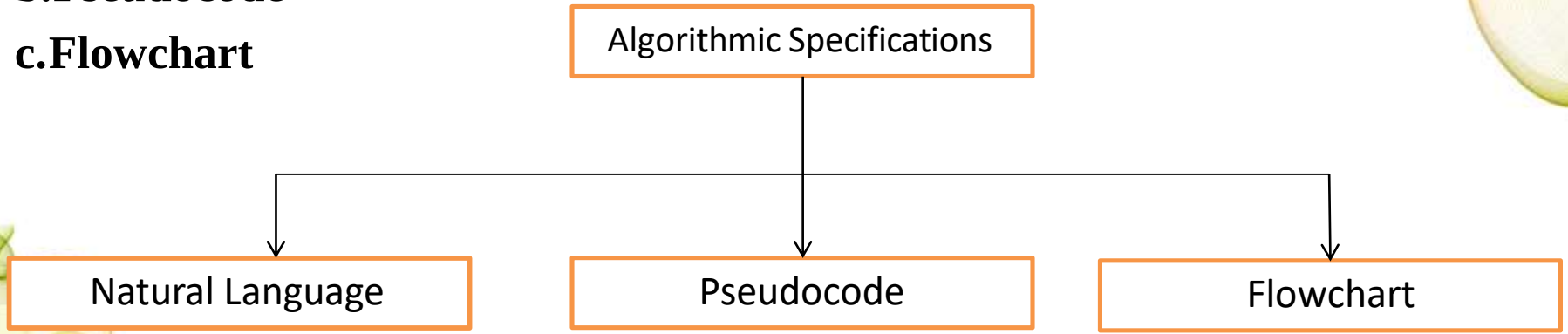
3. Methods of Specifying an Algorithm

There are three ways to specify an algorithm. They are:

a.Natural language

b.Pseudocode

c.Flowchart



Methods of Specifying an Algorithm

a.Natural Language

Example: An algorithm to perform addition of two numbers.

Step 1: Read the first number, say a.

Step 2: Read the first number, say b.

Step 3: Add the above two numbers and store the result in c.

Step 4: Display the result from c.

Methods of Specifying an Algorithm

b. Pseudocode

Pseudocode is a mixture of a natural language and programming language constructs. Pseudocode is usually more precise than natural language.

For Assignment operation left arrow “←”, for comments two slashes “//”,**if** condition**, for,while** loops are used.

ALGORITHM *Sum(a,b)*

//Problem Description: This algorithm performs addition of two numbers

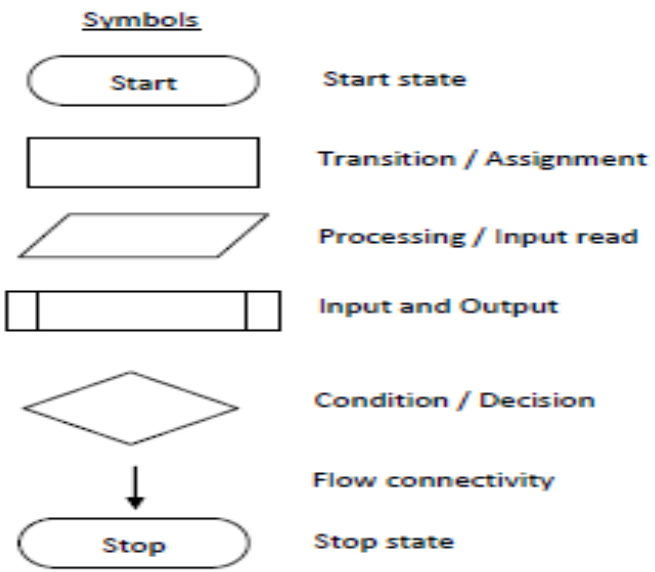
//Input: Two integers a and b

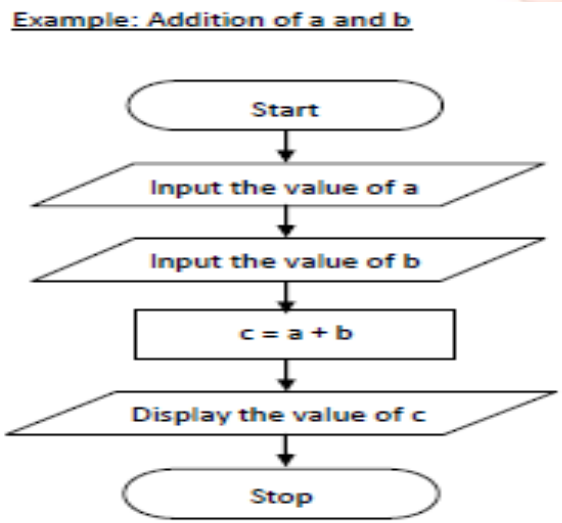
//Output: Addition of two integers c←a+b

return c

c. Flowchart

F*lowchart* is a **graphical representation** of an algorithm. It is a method of expressing an algorithm by a collection of connected geometric shapes containing descriptions of the algorithm's step





4. Proving an Algorithm's Correctness

- Once an algorithm has been specified then its ***correctness*** must be proved.
- An algorithm must yields a required **result** for every legitimate input in a finite amount of time.

5. Analyzing an Algorithm

- ***Time efficiency***, indicating how fast the algorithm runs, and
- ***Space efficiency***, indicating how much extra memory it uses.
- The efficiency of an algorithm is determined by measuring both time efficiency and space efficiency.

So factors to analyze an algorithm are:

- Time efficiency of an algorithm
- Space efficiency of an algorithm
- Simplicity of an algorithm
- Generality of an algorithm

6.Coding an Algorithm

- The coding / implementation of an algorithm is done by a suitable programming language like C, C++, JAVA.
- It is very essential to write an **optimized code (efficient code)** to reduce the burden of compiler.


Thank you!