SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME : 20CS101 PROGRAMMING FOR PROBLEM SOLVING

I YEAR /I SEMESTER

Unit 1- INTRODUCTION TO PROBLEM SOLVING TECHNIQUES

Topic 3: Building Blocks of Algorithms (Statements, State, Control Flow, Functions)

UNIT I	INTRODUCTION TO PROBLEM SOLVING TECHNIQUES	

Fundamentals - Computer Hardware – Computer Software - Algorithms - Building blocks of algorithms (statements, state, control flow, functions) - Notation (pseudo code, flow chart, and programming language) -Problem formulation - Algorithmic problem solving - Simple strategies for developing algorithms (iteration, recursion). Illustrative problems.

What is Algorithm?

Definition: An algorithm is procedure consisting of a finite set of unambiguous rules (instructions) which specify a finite sequence of operations that provides the solution to a problem. In other word, an algorithm is a step-by-step procedure to solve a given problem

Definition: An algorithm is a finite number of clearly described, unambiguous steps that can be systematically followed to produce a desired result for given input in a finite amount of time.

Building blocks of algorithm

- It has been proven that any algorithm can be constructed from just three basic building blocks. These three building blocks are Sequence, Selection, and Iteration.

Building Block	Common name
Sequence	Action
Selection	Decision
Iteration	Repetition or Loop

Sequence

- A sequence is one of the basic logic structures in computer programming.
- In a sequence structure, an action, or event, leads to the next ordered action in a predetermined order.
- The sequence can contain any number of actions, but no actions can be skipped in the sequence.
- Once running, the program must perform each action in order without skipping any.

Selection and Iteration

- A selection (also called a decision) is also one of the basic logic structures in computer programming. In a selection structure, a question is asked, and depending on the answer, the program takes one of two courses of action, after which the program moves on to the next event .
- An iteration is a single pass through a group/set of instructions. Most programs often contain loops of instructions that are executed over and over again. The computer repeatedly executes the loop, iterating through the loop

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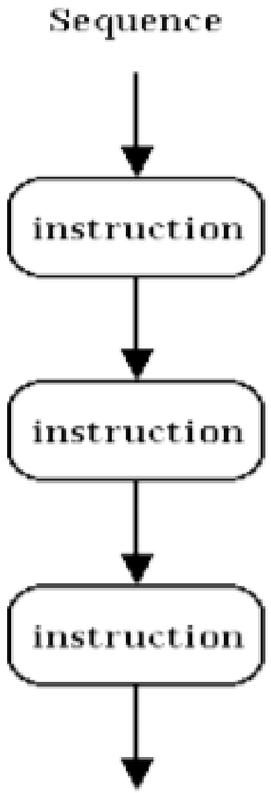
Sequence
instruction
instruction
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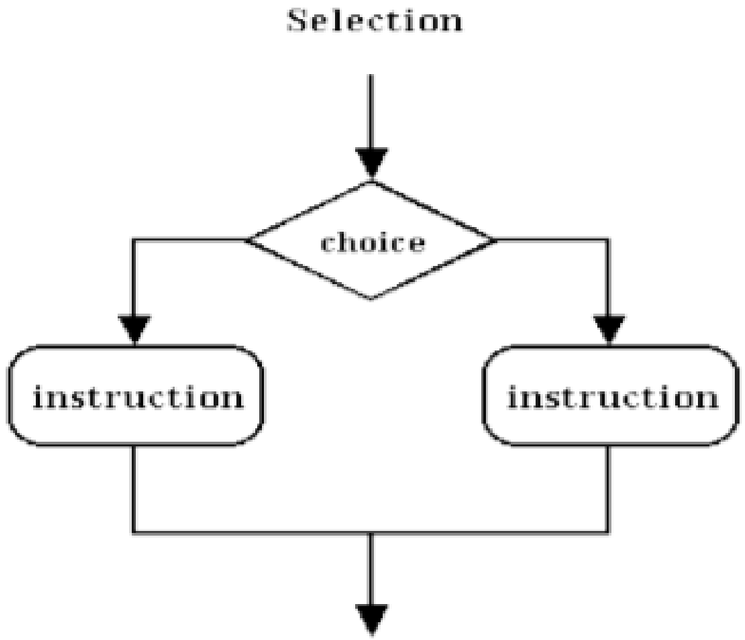
Selection
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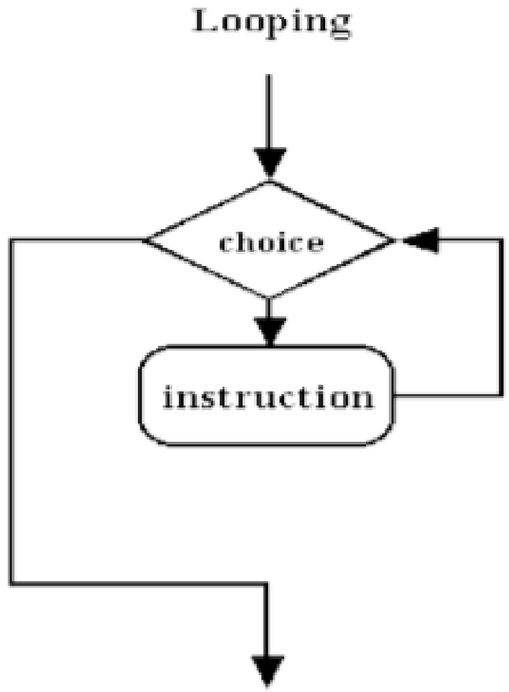
Looping
choice
instruction

Example

Write an algorithm to add two numbers entered by user.

Step 1: Start
Step 2: Declare variables num1, num2 and sum.
Step 3: Read values num1 and num2.
Step 4: Add num1 and num2 and assign the result to sum.
sum←num1+num2
Step 5: Display sum
Step 6: Stop

Example

Write an algorithm to find the largest among three different numbers entered by user.

```
Step 1: Start
Step 2: Declare variables a,b and c.
Step 3: Read variables a,b and c.
Step 4: If a>b
          If a>c
            Display a is the largest number.
          Else
            Display c is the largest number.
        Else
          If b>c
            Display b is the largest number.
          Else
            Display c is the greatest number.
Step 5: Stop
```

Iteration

- Iteration is the act of repeating a process, either to generate an unbounded sequence of outcomes, or with the aim of approaching a desired goal, target or result.
- Each repetition of the process is also called an "iteration", and the results of one iteration are used as the starting point for the next iteration.

Example

```
a = 0
for i from 1 to 3          // loop three times
{
  a = a + i                // add the current value of i to a
}
print a                    // the number 6 is printed (0 + 1; 1 + 2; 3 + 3)
```

Recursion

- The process in which a function calls itself directly or indirectly is called recursion and the corresponding function is called as recursive function.
- Using recursive algorithm, certain problems can be solved quite easily. Examples of such problems are Towers of Hanoi (TOH), In order/Preorder/Post order Tree Traversals, DFS of Graph, etc.

Example

```
int fact(int n)
{
if (n < = 1) // base case
 return 1;
 else
 return n*fact(n-1);
}
```

Assessment 1

1. What is Algorithm?

Ans : _____

2. Write algorithm for finding greatest of 3 numbers.

Ans : _____

References

TEXT BOOKS

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Thank You