

PROGRAM DESIGN AND DEVELOPMENT

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INTRODUCTION

- The program development life cycle was introduced in 70s, and is still in widespread use. The life cycle provides an organized plan for breaking the task of program development into manageable chunks, each of which must be successfully completed before moving on to the next phase.

PROGRAM DEVELOPMENT LIFE CYCLE

- Program development life cycle is a systematic way of developing quality software. The program development process is divided into following phases:-

PROGRAM DEVELOPMENT LIFE CYCLE

- **Designing the program:-** Program design starts by focusing on the main goal that the program is trying to achieve and then break the program into manageable chunks, each of which contribute to this goal. This approach of program design is called *top-down program design* or *modular programming*.

PROGRAM DEVELOPMENT LIFE CYCLE

- **Coding the program:-** Coding the program involves translating the algorithm into specific program language instructions. While writing the code, prefer to use only well defined control structures. This technique of programming using only well defined control structure is known as *structured programming*.

PROGRAM DEVELOPMENT LIFE CYCLE

- **Testing and debugging the program:-** after removal of syntax errors, the program will execute. However, the output of the program may not be correct. This is due to logical error in the program. A logical error is a mistake that the programmer made while designing the solution to the problem.
- Syntax errors and logical error are collectively known as bugs. The process of identifying and eliminating these errors is known as debugging.

PROGRAM DEVELOPMENT LIFE CYCLE

- **Documenting the program:-** After testing, the software project is almost complete. The structure charts, pseudocodes, flowcharts and decision tables developed during the design phase become documentation for others who are associated with the software project.

PROGRAM DEVELOPMENT LIFE CYCLE

- **Deploying and maintaining the program:-**In the final phase, the program is deployed (installed) at the user's site. Also the program is kept under watch till the user gives green signal to it.
- Even after the software project is complete, it needs to be maintained and evaluated regularly. In program maintenance, the programming team fixes program errors that users discover during its day-to-day use.

INTRODUCTION TO ALGORITHMS

- An *algorithm* is a finite set of steps defining the solution of a particular problem. An algorithm can be expressed in English like language, called *pseudocode*, in a programming language, or in the form of a flowchart.

INTRODUCTION TO ALGORITHMS

- Each algorithm must satisfy the following criteria :-
- **Input:-** there are zero or more values which are externally supplied.
- **Output:-**At least one value is produced.
- **Definiteness:-**Each step must be clear and unambiguous.
- **Finiteness:-** The algorithm must terminate after a finite number of steps.
- **Effectiveness:-** Each step must be sufficiently basic, in addition not only each step be definite, it must also be feasible.

ALGORITHM COMPLEXITY

- There are basically two aspects of computer programming. One is the data organization i.e. the data structure to represent the data of the problem in hand. The other one involves choosing the appropriate algorithm to solve the problem in hand.
- As an algorithm is a sequence of steps to solve a problem, there may be more than one algorithm to solve a problem.

ALGORITHM COMPLEXITY

- The choice of particular algorithm depends on the following considerations:-
- Performance requirements, i.e., time complexity
- Memory requirements, i.e., space complexity
- Programming requirements.

RECURSION

- Recursion is a technique in development of program, is ***the ability for a function to refer to itself to solve a problem.*** This concept is used to solve a variety of problems that would be difficult to solve using iterative constructs such as for, while and do—while loops. Recursive functions can be directly implemented in C language.