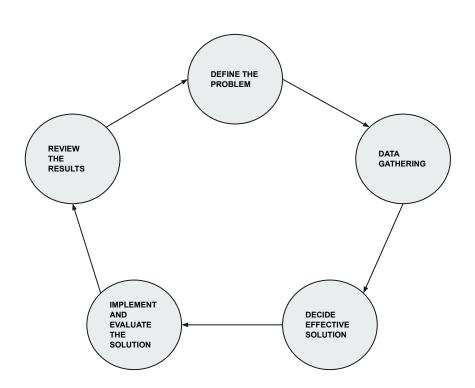
Welcome To C Programming Language

Introduction to Problem Solving

- The problem that we want to solve can come from any real-world problem or perhaps even from the abstract world. We need to have a standard systematic approach to problem solving through programming in C.
- In order to solve a problem on a computer, we must know how to represent the information describing the problem and determine the steps to transform the information from one representation into another.
- A computer is a very powerful and versatile machine capable of performing a multitude of different tasks, yet it has
 no intelligence or thinking power.



IDEAL SOLUTION

IDENTIFY

DEFINE

EXPLORE

ACT

LOOK

What is Problem Solving?

• Step 1: Understanding the Problem:

Here we try to understand the problem to be solved in totally. Before with the next stage or step, we should be absolutely sure about the objectives of the given problem.

• Step 2: Analyzing the Problem:

After understanding thoroughly the problem to be solved, we look at different ways of solving the problem and evaluate each of these methods.

The idea here is to search for an appropriate solution to the problem under consideration. The end result of this stage is a broad overview of the sequence of operations that are to be carried out to solve the given problem.

• Step 3: Developing the Solution:

Here, the overview of the sequence of operations that was the result of the analysis stage is expanded to form a detailed step by step solution to the problem under consideration.

• Step 4: Coding and Implementation:

The last stage of problem-solving is the conversion of the detailed sequence of operations into a language that the computer can understand. Here, each step is converted to its equivalent instruction or instructions in the computer language that has been chosen for the implantation.

The vehicle for the computer solution to a problem is a set of explicit and unambiguous instructions expressed in a programming language.

Problem Solving Steps

Problem-solving is a creative process which defines systematization and mechanization.

1. Problem Definition Phase:

- The success in solving any problem is possible only after the problem has been fully understood. That is, we cannot hope to solve a problem, which we do not understand. So, the problem understanding is the first step towards the solution of the problem.
- In the problem definition phase, we must emphasize what must be done rather than how is it to be done. That is, we try to extract the precisely defined set of tasks from the problem statement.

2. Getting Started on a Problem:

- There are many ways of solving a problem and there may be several solutions. So, it is difficult to recognize immediately which path could be more productive.
- Sometimes you do not have any idea where to begin solving a problem, even if the problem has been defined.
 Such block sometimes occurs because you are overly concerned with the details of the implementation even before you have completely understood or worked out a solution.

4. Similarities Among Problems:

- One way to make a start is by considering a specific example. Another approach is to bring the experience to bear on the current problems. So, it is important to see if there are any similarities between the current problem and the past problems which we have solved.
- The more experience one has the more tools and techniques one can bring to bear in tackling the given problem.

5. Working Backwards from the Solution:

- In some cases, we can assume that we already have the solution to the problem and then try to work backwards to the starting point. Even a guess at the solution to the problem may be enough to give us a foothold to start on the problem.
- We can systematize the investigations and avoid duplicate efforts by writing down the various steps taken and explorations made.
- Another practice that helps to develop the problem-solving skills, once we have solved a problem, to consciously reflect back on the way we went about discovering the solution.

General Problem Solving Strategies

1. Divide and Conquer:

The most widely known and used strategy, where the basic idea is to break down the original problem into two
or more sub-problems, which is presumably easier or more efficient to solve.

2. Binary Doubling:

• This is the reverse of the divide and conquers strategy i.e build-up the solution for a larger problem from solutions and smaller sub-problems.

3. Dynamic Programming

4. General Search, Backtracking and Branch-and-Bound