PYTHON FOR COMPUTATIONAL PROBLEM SOLVING
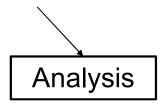
Process of CPS

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- This does not simply involve the act of computer programming.

- It is a process, with programming being only one of the steps.

- Before a program is written, a design for the program must be developed.

- And before a design can be developed, the problem to be solved must be well understood.

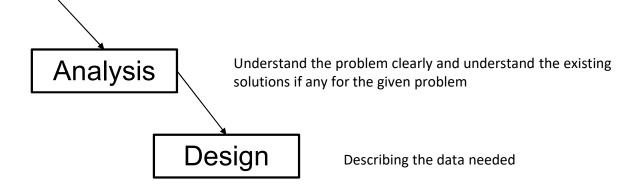- Once written, the program must be thoroughly tested.

Analysis

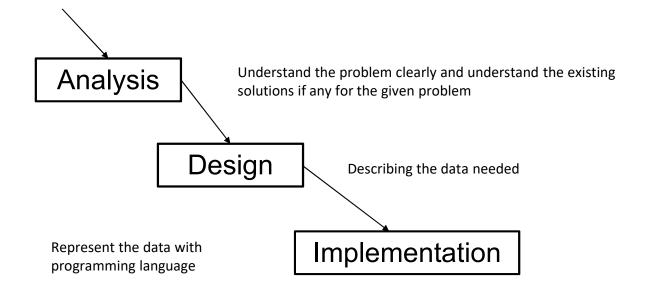Understand the problem clearly and understand the existing solutions if any for the given problem

Analysis

Understand the problem clearly and understand the existing solutions if any for the given problem

Design

Describing the data needed

Analysis

Understand the problem clearly and understand the existing solutions if any for the given problem

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Describing the data needed

Implementation

Represent the data with programming language

Analysis

Understand the problem clearly and understand the existing solutions if any for the given problem

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Errors are pervasive, persistent and inevitable
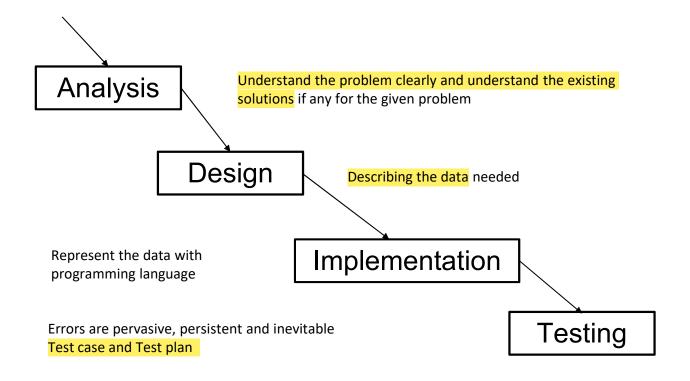Test case and Test plan

Testing

Process of Computation Problem Solving

Problem Analysis:

- Must understand the fundamental computational issues involved.

- Example:
    For MCGW problem, can use brute-force approach of trying all of the possible rowing actions that may be taken.

Knowing what constitutes a solution.

For some problems, there is only one solution. For others, there may be a number (or infinite number) of solutions. Thus, a problem may be stated as finding,

- **A solution**

- **An approximate solution**

- **A best solution**

- **All solutions**

Describe Data and Algorithms

- For the **MCGW problem**, need to store the current state of the problem.

- When solving a computational problem, either suitable existing algorithms may be found, or new algorithms must be developed.

Program Implementation

- Design decisions provide general details of the data representation and the algorithmic approaches for solving a problem.

- The details, however, do not specify which programming language to use, or how to implement the program.

- Since we are programming in Python, the implementation needs to be expressed in a syntactically correct and appropriate way, using the instructions and features available in Python.

Program Testing

Writing computer programs is difficult and challenging. As a result, **programming errors are pervasive, persistent and inevitable**.

Given this fact, **software testing is a crucial part of software development**. Testing is done incrementally as a program is being developed, when the program is complete, and when the program needs to be updated.

THANK YOU

Introduction to Computer Science Using Python – Dierbach
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