SWE 1301: Introduction to Problem Solving and Software Development

Lecture 01: Introduction
At:
Venue : CIT Theatre
Presented by: M .I. Mukhtar

Lectures

- 3 Credit Hour Course
  - Thursday – 2hrs
  - Friday – 1 hr.

Course Objectives

- To enhance students critical thinking.
- To teach students standard problem solving techniques that aid in software development.

Course Description

- This course introduces students to a broad range of approaches for solving problems.
- Emphasis is on problem solving techniques that aid programmers in developing quality software systems.
- To aid learning of the course, concepts will be illustrated using Python Programming Language.

Course Outline

- Introduction to Problem solving.
- Problem solving concepts for computers.
- Solution Planning.
- Problem Solving with Sequential, Decision and Loop Structure.
- Introduction to Software Development.

Course Reference Text

1. Problem solving and programming concept by Maureen Sprankle and Jim Hubbard
2. Problem solving and program design in c by Jeri R. Hanly and elliot B. Koffman

Course Assessment

- CA – 30%
- Exams – 70%
  - ✓ 7 questions to answer 5

Class Code

Instructions for students

- Visit www.edmodo.com from your phone or computer or download the Edmodo App.
- Click on the "Join a group" button and enter the code, .
- Follow the instructions to create an account and get started on Edmodo!

Lecture Outline

- Problem solving & Its Importance
- Problem solving in computers

What is a Problem?

- A problem is any unpleasant situation which prevent people from achieving what they want to achieve.
- Some problems are more detailed, complex and critical than others.
  - regardless of their size problems need to be solved in a satisfactory way.

Problem Solving

- People make decisions every day to solve problems that affect their lives, homes or work place.
- Bad decisions to solve a problem usually leads to wastage of time as well as resources.
- The better the decisions an individual can make, the more valuable that person will be.

Problem Solving..

- Problem solving refers to our ability to solve problem in an **effective** and **timely** manner.
  - an activity to eliminate problem.
  - Involves been able to identify and generate solution to problems.
- Problem solving is important because if you learn problem solving you can approach many academic disciplines as well as work anywhere.

Problem Solving in Computing..

- Problem solving is one of the central activities performed by professional and learners in computer related disciplines.
- Solving problems is the core of Computer science and its related disciplines .

General problem Solving Steps

- There are generally **six steps** that are followed to ensure best decision when solving a problem:
  - **Step 1**: Identify the problem.
  - **Step 2**: Understand the problem.
  - **Step 3**: Identify alternative ways to solve the problem.
  - **Step 4**: Select the best way to solve the problem from the list of alternative solutions.
  - **Step 5**: List instructions that enable you to solve the problem using the selected solution.
  - **Step 6**: Evaluate the solution.

Step 1 : Identify the problem

- The first step toward solving a problem is to identify the problem.
  - you need to make sure you identify the problem before you start solving it.
  - If you do not know what the problem is, you cannot solve it.

Step 2 : Understand the problem

- Understanding a problem is the **most important** and most **challenging** part of solving a problem.
  - You need to gather complete and accurate information.
  - If this step is not carried out properly, you will solve the wrong problem.

Step 3 : Identify alternative ways

- The list of alternative ways to solve the problem should be as complete as possible.
- Sometimes a problem solver may talk to other people to find other solutions than those he/she have identified.
- Alternative solutions must be acceptable ones.

Step 4 : Select the best way

- In this step, you need to identify and evaluate the advantage and disadvantage of each possible solution before selecting the best one.
- In order to do this, you need to select criteria for the evaluation.
- These criteria will serve as the guidelines for evaluating each solution.

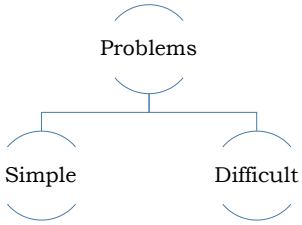
Step 5 : List the Instruction.

- This stage involve writing the step-by-step instructions to solve the problem.
- No instruction can be used unless the individual or the machine can understand it.
- This can be very limiting, especially when working with computers.

Step 6 : Evaluate the solution.

- This step involves testing a solution to check if it is correct as well as to see if it satisfies the needs of the person(s) with the problem.
- If the result is either incorrect or unsatisfactory, then the problem solver must:
  - review the list of instructions to see that they are correct or
  - start the process all over again.

Types of Problem



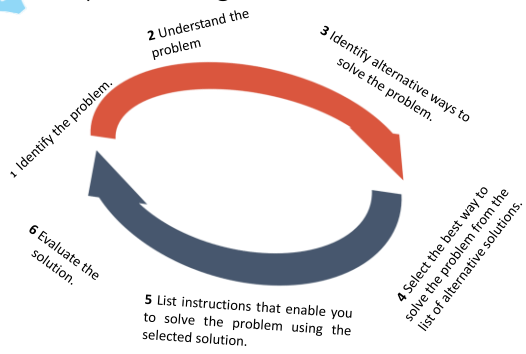
Simple Problems

- Simple problems have straightforward solutions.
  - They require the problem solving steps to be followed **consecutively**.
  - Their solutions are called **algorithmic solutions**.
    - Algorithmic solutions are reached in a series of steps.
  - Example such as area a rectangle, product of two (2) numbers.

Difficult Problems

- Difficult problems do not always have straightforward solutions
  - They are hence solved by going through the steps in a **cyclic manner** rather than **consecutively**
  - These solutions are called **heuristic solutions**.
  - Example how to expand company profits.

Steps in Solving Difficult Problems



Problem Solving Using Computers..

- Computers are built to deal with **algorithmic solutions**, which are often difficult or very time consuming for humans.
  - Example: Sorting a list of 10,000 names in alphabetical order is an easy task for the computer
- People are better than computers at **developing heuristic solutions**.
  - Example: how to recognize a face or a voice.
- This course will deal only with **algorithmic problems** and their solutions.

Difficulty with Problem Solving using Computers

- The problem-solving process is not easy. It takes practice and time to perfect, but in the long run the process proves to be of great benefit.
- One of the most difficult tasks for the problem solver when solving problems using computer is writing the instructions.
  - For example, most people cannot explain how they arrive at certain answers such as the largest of three numbers.
- The computer is a tool that will perform only tasks that the user can explain.

Difficulty with Problem Solving using Computers ...

- The computer has a specific system of communication that programmers and users must learn.
  - This system demands that **no step** in the solution to a problem is left **unstated** and that all steps be in the **proper order**.
  - You must assume the computer **knows nothing** except what you tell it and think of it as an **ignorant** but **efficient aid** to solving problems.

Successful Degree

I want to be successful in Computer Related Disciplines

Success begins in Introduction to Problem Solving and Software Development

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a bit of confidence, hard work, dedication and willingness to learn new things.

Lecture Summary

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- Problem solving refers to our ability to solve problem in an **effective** and **timely** manner.
- Problem solving is one of the central activities performed by professional and learners in computer related disciplines.

Questions??