Object-Oriented Programming (OOP)
Lecture No. 1

Division of science and Technology
University of Education, Lahore

Course Objectives

- Make students familiar with the concepts of object-oriented programming
- Develop solutions to the problems using object orientation techniques
- Provide hands on learning experience by implementing the object oriented concepts

Course Contents

- **Basic of Object Oriented Programming**: Evolution of object oriented Paradigm, Object oriented concepts and principles, problem solving in object oriented paradigm, Object oriented program design process.
- **Class Fundamentals**; Classes, methods, objects and encapsulation; constructors and destructors, operator and function overloading, virtual functions.
- **Inheritance**: Derived classes, Member access, Super, Types of inheritance.
- **Polymorphism:** Method overriding, Dynamic method dispatch, Abstract classes and variables, Final keywords.
- **Abstract classes**: Defining and using the abstract classes
- **Exception Handling**: Exception fundamental, Exception types, Built-in and User defined exception.
- **File Handling**: I/O and file processing, Practical, Assignments and mini project.

Books

- C++ How to Program
  By Deitel & Deitel

- The C++ Programming Language
  By Bjarne Stroustrup

- Object-Oriented Software Engineering
  By Jacobson, Christerson, Jonsson, Overgaard

Grading Policy

- Practical 15 %
- Sessional 20 %
- Mid-Term 20 %
- Final 45 %

Pre-requisite knowledge

(Programming fundamentals concepts)

- **Introduction to Programming:** Problem solving, Introduction to programming and programs, Types of languages, Compiler vs. Interpreter.
- **Overview of Programming:** Structure of Program, indentation and coding conventions, Program output, Syntax rules, Common errors, Language keywords.
- **Data Types:** Identifiers, Constants, Types of variables, Type conversion and casting, Type promotion rules.
- **Operators**: Arithmetic operators and punctuations, Precedence, Associations, Equality and relational operators.
- **Control Statements:** Selection structure (if/, if/else), Multiple selection structure (switch and break), break and continue, Loops.
- **Arrays:** Declaring arrays; Initialization, Multidimensional arrays, Two dimensional array, Example (Matrix manipulation), Assignments, Mini Project.
- **Methods/Functions**: Library functions, Modular Approach, Functions, Function definitions. Function prototypes.
- **Class Fundamentals:** Class syntax, General form of class, Object declaration.

Object-Orientation (OO)

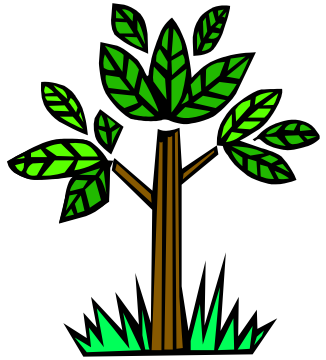
- A technique for system modeling (system is set of interacting components)

- OO model consists of several interacting objects

Examples -Models

- Highway maps
- Architectural models
- Mechanical models

Objects - Examples



Why object orientation?

- Procedural Vs OO techniques
- Close to real world (objects and interactions)
- Modularity (Examples – student management system)
- Maintenance (Requirement changes- extensions required)

What is an object?

An object is

- Something tangible (Ali, Car)
- Something that can be apprehended intellectually (Time, Date)

…what is an object?

An object has

- State (attributes)
- Well-defined behavior (operations)
- Unique identity

Example – Ali is a tangible object

- State (attributes)
  - Name
  - Age
- behaviour (operations)
  - Walks
  - Eats
- Identity
  - His name

Example- Time is an intangible object

- State (attributes)
  - Hours
  - Minutes
  - Seconds
- behaviour (operations)
  - Set Hours
  - Set Minutes
  - Set Seconds
- Identity
  - Would have a unique ID in the model

Example- Date is an intangible object

- State (attributes)
  - Year - Day
  - Month
- behaviour (operations)
  - Set Year - Set Day
  - Set Month
- Identity
  - Would have a unique ID in the model

Programming Exercise (Recall)

- Application: Write a C++ program that defines two functions: input and processing. The input function is meant to take input of 20 integers in array and the processing function displays the number of even and odd numbers in that array.

Reference

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