CSE 333 – SECTION 5

C++ Review
Overview

- Classes, Constructors, etc.
- Introduction to operator overloading
- Example program – An Integer Array class
- Section exercise
C++ classes

• Encapsulation and Abstraction

• Access specifiers:
  • Public: anything outside the class can access it
  • Protected: only this class and derived classes can access it
  • Private: only this class can access it

• Polymorphism

• Multiple Inheritance
Constructors

• Function called when an object of a class is created
• Initializes the data members of a class
• Has the same name as the class

Types -
  • Default – also called the empty constructor
  • Parameterized – Has arguments.
  • Copy – Pass another already constructed object of the same class.
Operator Overloading

• A form of polymorphism.
• Give special meanings to operators in user-defined classes.
• Special member functions in classes with a particular naming convention.
• For E.g., for overloading the ‘+’ operator, define a member function named `operator+`.
Common operators

• The most commonly overloaded operators are
  • = (assignment operator)
  • + - * (binary arithmetic operators)
  • += -= *= (compound assignment operators)
  • == != (comparison operators)
Demo

IntArray class
Section Exercise

• Define a class Vector that represents a vector in 3-D space with the following:
  • The representation of a vector should be three doubles giving the magnitudes in the x, y, and z directions.
  • Write a default constructor, a constructor with 3 doubles as arguments a copy constructor and a destructor.

• Use operator overloading to implement:
  • Addition and subtraction of vectors
    • Add or subtract the corresponding elements of the array.
  • Assignment operation
    • Assign values of a vector object to another vector object.
  • Inner product of two vectors
    • If vector 1, \( v_1 = [a \ b \ c] \) and vector 2, \( v_2 = [d \ e \ f] \), then the inner product \( v_1.v_2 = a*d + b*c + c*d \).
  • Scalar-vector multiplication
    • If \( k \) is a scalar and \( v = [a \ b \ c] \) is a vector, then \( k*v = [k*a \ k*b \ k*c] \).
  • Printing a vector to stdout.