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 Inheritence

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, v1 = [a b c] and vector 2, v2 = [d e f], then the inner product v1.v2 = 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.