National University of Computer and Emerging Sciences

Laboratory Manual # 07
Object Oriented Programming

Course Instructor	Mr. Uzair Naqvi
Lab Instructors	Seemab Ayub , Aqib Zeeshan
Section	BCS-2E
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Instructions for lab submission:

You have to submit source code (.cpp) files along with a word document. In the word document you have to give the heading of each exercise/question, then paste your source code and output snippet. Save your word document in the following format: roll number-lab no-section i.e. 22l-0008-lab6-BCS2B.

Objectives:

- Operator overloading

1) Exercise- Complex Numbers:

Create a Complex class to represent complex numbers with real and imaginary parts. Overload the following operators:

- +: Adds two complex numbers (real and imaginary components added separately).
- -: Subtracts two complex numbers (real and imaginary components subtracted separately).
- *: Multiplies two complex numbers (follow the formula for complex number multiplication).
- <<: Overloaded for output stream insertion (cout << complexObject). Print the complex number in the format "(real, imag)".
- >>: Overloaded for input stream extraction (cin >> complexObject). Read the real and imaginary parts of the complex number from the user.

2) Exercise- Time:

Create a Time class to represent time with hours, minutes, and seconds. Overload the following operators:

- +: Adds two time objects (handle overflow for hours, minutes, and seconds).
- -: Subtracts two time objects (handle underflow for hours, minutes, and seconds).
- ++: Pre-increment operator that increments the time by 1 second (handle overflow for minutes and hours).
- --: Pre-decrement operator that decrements the time by 1 second (handle underflow for minutes and hours).
- ==: Compares two time objects for equality.
- !=: Compares two time objects for inequality.

3) Exercise- Distance:

Create a Distance class to represent distance in meters. Overload the following operators:

- <: Less than operator to compare distances.
- >: Greater than operator to compare distances.
- <=: Less than or equal to operator to compare distances.
- >=: Greater than or equal to operator to compare distances.
- +=: Adds a certain number of meters to the distance object.
- -=: Subtracts a certain number of meters from the distance object.

Bonus Challenge: Overload the logical operators (&& and ||) for the Time class. You can define them based on whether both times are within a certain time range (e.g., morning hours).

4) Exercise- Matrix Multiplication:

Create a Matrix class to represent a 2D matrix with rows and columns. Overload the following operators:

- Overload the * operator to perform matrix multiplication between two Matrix objects.
- Ensure proper dimension checks to prevent invalid multiplication.

5) Exercise- Bitwise Operators:

Design a class FlagRegister to represent a set of flags (represented as bits). Overload the following operators:

- Overload bitwise operators like & (AND), | (OR), and ^ (XOR) to perform bitwise operations on the flags within the register.