**FAST School of Computing**

**Object Oriented Programming – Spring 2025**

**Software Engineering Department**

**LAB 09**

**Classes in C++**

**Learning Outcomes**

In this lab you are expected to learn the following:

* Classes
* Constructors (Default, Parameterized)
* Initializer lists with constructors.
* Accessing objects using global functions
* Member Functions and Non-Member Functions
* Static and Constant Data Members and Member Functions
* Friend Functions

**Note:** Plagiarism(from some else or internet) in any 1 question will lead to zero marks in the whole lab task.

**Problem 1 (Medium Level):**

Design a class **Holiday** that represents a holiday during the year. This class has three **private** data members:

* **name**: A string that represents the name of holiday.
* **day**: An integer that holds the day of the month of holiday.
* **month**: A string that holds the month the holiday is in.
* Count\_Holidays: Add a static data member to count the total number of Holidays objects created.

The class has the following **member functions:**

1. Write a default constructor that initializes each data member of class such that: **name** with **NULL**, **day** with **0** and **month** with **NULL**
2. Write a constructor that accepts the arguments for each data member such that:

**string n** assigned to **name**, **int d** to **day** and **string m** to **month**.

1. Generate getter setter of each member variable: such that **name** should never be greater than 50 characters, **day** should never be negative and **month** should not be greater than 10 characters.
2. Write a static member function to access this count
3. Write a function **inSameMonth** (outside class) which takes two Holiday objects as arguments, compares two objects of the class Holiday, and returns true if they have the same month otherwise false.
4. Write a function **avgDate** (outside class) which takes an **array** of type Holiday and its **size** as its argument and returns a **double** value that is the average of the entire day data member in the Holiday array **arr**. You may assume that the array is full (i.e. does not have any NULL entries).

**Problem 2 (Medium Level):**

Create a class HugeInteger that uses a 40-element array of digits to store integers as large as 40 digits each. Provide member functions input, output, add and substract. For comparing HugeInteger objects, provide functions isEqualTo, isNotEqualTo, isGreaterThan, isLessThan, isGreaterThanOrEqualTo and isLessThanOrEqualToeach of these is a "predicate" function that simply returns TRue if the relationship holds between the two HugeIntegers and returns false if the relationship does not hold. Also, provide a predicate function isZero. If you feel ambitious, provide member functions multiply, divide and modulus.

**Submission Details:**

1. Save single .cpp file with your roll no and lab number e.g. i22-XXXX\_Lab9.cpp
2. Take screen shot of running test cases of tasks.
3. Zip the .cpp file and screen shots (Do not create .rar file) with roll no and lab no. e.g. i22-XXXX\_Lab9.zip.
4. Submitw the zip file on google class room.