National University of Computer and Emerging Sciences

Object Oriented Programming Lab (CL1004)

Date: March 19th 2024

Course Instructor(s):

Ms. Shaharbano, Ms. Fatima

Sessional Exam

Total Time: 2 Hours
Total Marks: 50
Total Questions: 03
Paper: A
Semester: SP-2024
Campus: Karachi
Dept: Computer Science

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CLO # 1: Discuss knowledge of underlying concepts of object-oriented paradigm like abstraction, encapsulation, polymorphism, inheritance etc. (C-2)

[15 marks]

Q1: You are developing a C++ program to manage employee information. Create a class named **Employee** that incorporates static variables, constant variables, and functions to ensure proper organization and data integrity.

a) Implement a static variable named **nextEmployeeID** within the **Employee** class to assign unique IDs to each employee. This ID should be incremented for every new employee added.
b) Create a static function called **generateEmployeeID** that returns the next available employee ID. Demonstrate its usage in the **main** function by creating two instances of the **Employee** class and printing their generated IDs.
c) Introduce a constant float variable named **MAX_SALARY** to represent the maximum allowed salary for an employee.
d) Modify the member function **setSalary** to check whether the provided salary exceeds **MAX_SALARY**. If it does, set the salary to **MAX_SALARY**. Otherwise, set it to the provided value.
e) Implement a non-static member function named **displayEmployeeInfo** that prints the employee's ID, name, and salary.
f) Demonstrate the functionality by creating an instance of the **Employee** class, setting its information, and then displaying the information using the **displayEmployeeInfo** function.

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CLO # 2: Identify real world problems in terms of objects rather than procedure (C-4)

[15 marks]

Q2: You are tasked with designing a simple social media platform that handles users, posts, and comments. Users can create posts, comment on posts, and view their feed.

1. **User class**:
   - Attributes:
     - **userId** (int): Unique identifier for the user.
     - **userName** (string): Name of the user.
     - **posts** (array of **Post** objects): List of posts created by the user.
2. **Post class**:
   - Attributes:
     - **postId** (int): Unique identifier for the post.
     - **content** (string): Content of the post.
     - **comments** (array of **Comment** objects): List of comments on the post.
3. **Comment class**:
   - Attributes:
     - **commentId** (int): Unique identifier for the comment.
     - **content** (string): Content of the comment.
     - **author** (pointer to **User** object): User who wrote the comment.
4. **SocialMediaPlatform class**:
   - Attributes:
     - **users** (array of **User** objects): List of registered users.

Tasks:

a) Implement the **User, Post, Comment and SocialMediaPlatform** classes with appropriate constructors.

b) Create a simple program to test the implemented classes. Write functions in the appropriate class to perform these operations:
   i. Register a new user.
   ii. Create a new post.
   iii. Add a new comment to posts.
   iv. Display the user feed (all the posts created by a given user).

CLO #3: Illustrate design artifacts and their mapping to Object- Oriented Programming using C++. (C-3)

[20 marks]

Q3: A software house has employees who are passionate about the role they have been given. Some are developers and some are debuggers. All the affiliated employees are collectively known as employees. A team lead is both a developer and a debugger. All the employees have a name, age and joining date. Moreover, A developer has attribute; role (frontend developer or backend developer), A debugger has attribute; role (Manual debugger or auto debugger). A team lead can display all the data with respect to roles. Identify the type of inheritance that is present in the above scenario. Also, implement the scenario and create object of team lead (only) in main by adding appropriate constructors, accessor functions.

- Good luck -