

**Department of Computer Science**

**Spring 2018**

# **CS1421 – Object Oriented Programming Lab**

# **Lab 6**

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**Lab 4 & 6**

**Classes, Objects, Methods and Constructors**

**Objective**

After completing this lab, the students should be able to

* Understand the usage and implementation of inheritance
* Understand usage and implementation of multi-level inheritance
* Understand super keyword

**Practice Tasks**

**Note: Draw UML class hierarchy diagram for all tasks.**

**Task 1**

Suppose you have designed a class Person that has a name, address, phoneNumber and emailAddress. Now you have to design a class Student that has a name, address, phoneNumber, emailAddress, an enrollmentId and a gpa. You have to design another class Faculty that has a name, address, phoneNumber, emailAddress, empId, salary, office hours and designation.

Which object oriented principle would you use to design these classes to avoid redundancy and provide reusability and how?

Create all classes, then create constructors, accessors and mutators for all fields and Override the **toString()** methods to display the class name and person’s name. Also override the **displayData()** methods.

Draw the UML diagram for classes and implement them. Write a test program that creates a Person, Student and Faculty and invokes their displayData() and toString() methods.

**Task 2**

IAL Saatchi & Saatchi (Pakistani large advertising firm) have approached the students of MAJU (especially the OOP students) to design and create the future episodes of Commander Safeguard animated series. They have given you general information about some characters. Now you have a very little time to understand the characters properly and design a system which clearly represents the nature of many characters.

The information from IAL Saatchi & Saatchi is as below:

*We have many characters in our series.*

*Each character has a name.*

*Every character can move and can speak.*

*Germs are one kind of character in our series.*

*The difference is that every germ has a disease.*

*The germ can fire a disease and/or can spread the disease.*

*There are some special germs that can fly.*

*The characters other than Germs are human.*

*Every human can wash hands.*

*There are basically two types of Humans; Protectors*

*Protector includes Commander Safeguard along with his team that may contain some special kids and doctors.*

Using information given above design some classes using the concept of inheritance to get the contract of being the animator of world known animated series.

**Task 3**

Hyperstar is Pakistan’s most dynamic, fast-moving and exciting hypermarket chain. The company has global expertise which helps them offer the shoppers here in the Pakistan the same quality, variety and value-for-money that is provided all over the world. Hyperstar Pakistan has hired you to represent following products available in their store through classes. The classification required is as follows:

1. All the products have a productId and a name.
2. Utility products have name, productId and discount. Also calculate the discount for each product.
3. Food products having attributes name, productId and dateOfExpiry.

Also define a method to show data in each class. Your code should avoid redundancy and be reusable wherever possible.