Lab 3
Inheritance

Learning outcome:

At the end of this lab, student should be able:

1. be able to understand the relationship among classes.
2. be able to analyze the problem and construt object-oriented program using inheritance

Dateline: End of Week 5 - depending on your lab hour. Submit to your demonstrator before the lab session ends. Upload to Putrablast.

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1. Design a class named Student and its two subclass named Undergraduate and Postgraduate. A student has an matric, name, email and gpa. Undergraduate student has a classification level (freshman, sophomore, junior or senior), and Postgraduate student has a thesis title. Define an appropriate constructor, set and get method for each class. Student class has a toString method that return student matric, name, email and gpa.

   Implement the classes. Write a test program that creates Undergraduate and Postgraduate, and invokes their toString() methods. Example of output:

   Student:
   Matric: 123444
   Name: Ali Ahmad
   E-mail: ali@gmail
   GPA: 3.75

   Undergraduate Student:
   Matric: 123446
   Name: Syahida Said
   GPA: 3.00
   Classification: Junior

   Postgraduate Student:
   Matric: 123555
   Name: Muhammad Aiman Basir
   GPA: 3.57
   Thesis: Cancer Prognosis

2. Most teachers assign various graded activities for their students to complete. A graded activity can be given a numeric score such as 70, 85, 90, and so on, and a letter grade such as A, B, C, D, or F. A letter grade is given based on the condition in following Table 1.

Table 1: Score and Letter Grade

Condition	Letter Grade
Score >= 90	A
Score >= 80	B
Score >= 70	C
Score >= 60	D
Score < 60	F

Design a class name GradeActivity to hold the numeric score of a graded activity. The SetScore method sets a numeric score, and the getScore method returns the numeric score. The getGrade method returns the letter grade that corresponds to the numeric score.

Design an Essay class that extends the GradeActivity class. The essay class should determine the grade a student receives for an essay. The student's essay score can be up to 100 and is determined in the following manner:

Grammar: 30 points
Spelling: 20 points
Correct length: 20 points
Content: 30 points

a. Draw a UML
b. Demonstrate the class in a simple program.
    1. Create an object of a class.
    2. Create a variable of type superclass that hold a reference to a subclass object.

3. Design a class named Person and its two subclasses named Employee and Dependent. A person has a name, address, phone number and email. A Dependent has a gender and date of birth. An Employee has an employee number and basic salary. Make Manager, SalesPerson and Secretary subclasses of Employee. A manager has an allowance. A SalesPerson has a commission. Define an appropriate constructor, get and set method for each class.

   Draw the UML diagram for the classes. Implement the classes. Write a test program that creates Manager and SalesPerson, and invokes their toString() methods.

   Create Manager object with the following information:
   Name: Ahmad Abu
   Employee number: A11981
   Basic salary: 6300.00
   Allowance: 1300.00

   For SalesPerson:
   Name: Nur Fatimah Ishak
   Employee number: S02063
   Basic salary: 2500
   Commission: 1200

   Your can have your output for example as follows:
   - The Manager Ahmad Abu (employee number A11981) has a salary of 6300.
   - The SalesPerson Nur Fatimah Ishak (employee number 0S2063) has a salary of 2500.
   - The manager Ahmad Abu also has an allowance of 1300.