Lecture 14: Object Oriented Programming.

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Recap to the previous lecture!

• What is an exception in Java?
• The different types?
• How to handle exception / exceptions?
Lecture 14 : OOP

• OOP.
• Objects and classes.
What is OOP?
“Object Oriented Programming”

- Model in programming language that is organized around “Objects” rather than “actions”.

- Normal programs has been viewed as logical sequence of commands: take user input, processing it then output data.

- OOP allows creating new structures that models something!
What is an Object?

Software entity of related *state* and *behavior*, used to *model* the real-world objects that you find in everyday life.

The key to understanding object-oriented technology is through understanding objects.
Examples of real-world objects: your desk and your bicycle.

Bicycle has:
- state (current gear, current speed).
- behavior (changing gear, applying brakes).

Software objects are conceptually similar to real-world objects: both consist of state and related behavior.
• An object stores its state in fields (variables) and exposes its behavior through methods (functions).

• Methods operate on an object's internal state and serve as the primary mechanism for object-to-object communication.
What is a Class?

Blueprint or prototype from which objects are created.

Think of it as the factory of these objects, an object is an instance of a class.
Every object belongs to (is an instance of) a class

- An object may have fields, or variables, described in class.
- An object may have methods, described in class.
- A class is like a template, or cookie cutter, you use the class to make objects
• The definition of a class is *re-useable* by other object-oriented programs.

• The concept of classes allows a programmer to create any *new data type* that is not already defined in the language itself.
How to define Class in java

public class class-name{

    //your class variables or fields

    //your class functions or methods

} //end of scope
public class person {
    String name;
}

person p1 = new person();
p1.name = "adam";

person p2 = new person();
P2.name = "alice";
The dot operator?

- Object_name.class_variable: means you are accessing the copy of this variable related to this object.

- Object_name.class_method: means you are accessing the copy of this method related to this object.
Consider as an example, a person?

• We want to model a person:
  1. What can be the fields or variables?
public class person {

    String First_Name;
    String Second_Name;
    int age;

}
2. What can be the functions or methods?
public class person {

    String First_Name;
    String Second_Name;
    int age;

    void display_FullName() {

        System.out.println(First_Name + " " + Second_Name);

    }

}
person p1 = new person();
p1.First_Name = “adam”;
p1.Second_Name = “william”;

person p2 = new person();
p2.First_Name = “alice”;
p2.Second_Name = “jack”;

p1.display_FullName();
p2.display_FullName();
Try this!

• Define class that models school with a name, number of students, address and number of teachers.

• Define two objects of type schools and assign values.
Try this!

• Define class that models student with a first name, last name, age, GPA and expected graduation date.

• Define a function that prints these information in a good shape.

• Define few students, assign different values then call this function.
Try this!

• Define class that models employee with a name, salary, age and the year of employment.

• Define two objects of type employees and assign values.
Try this!

- For the previous employee class define function that prints the following based on the salary:
  - If salary between 20 and 30, print “level C”
  - If salary between 31 and 40, print “level B”
  - If salary between 41 and 50, print “level A”
Try this!

- Define a class that models cube with length, breadth and height.
- Define a method that calculates and returns the volume \((l\times w\times h)\) of the cube.
Try this!

• Define a class that models car with brand, country, current speed and direction.

• Define a methods that doubles the current speed of the car.

• Define two cars and assign initial speed value for each.

• Print the current speed after calling the function for each object.
Try this!

- Define a class that models circle in terms of radius.

- Add function that calculates and prints the area.

- Define three objects of type circle, assign values for the radiiuses and call the function.
Try this!

• Define a class that models book with title, author and publication year.

• Define the following methods:
  1- print the information.
  2- return string of the information.
  3- get the title.
  4- set the publication year.