About Instructor

Ali Sher Kashif
Lecturer
Department of Computer Science
COMSATS University Islamabad,
Sahiwal Campus, Pakistan
Email: ali.sher@cuisahiwal.edu.pk

Object-Oriented Programming in JAVA

Lecture 01

Agenda

- Instructor Information
- Introduction to OOP in JAVA
- Object-Oriented Languages
- Features of OOP
- Objects in OOP
- Examples of Objects
- Car Object Example

Object-Oriented Programming

- **Object-Oriented programming** is a programming technique in which programs are written on the basis of objects.

- An **object** is a collection of data and functions.

- **Objec**t may represent a person, thing or place in real world

- **Objec**t oriented programs are easier to learn and modify

- **Object-Oriented programming** is a powerful technique to develop software. It is used to analyze and design the applications in terms of object.

- Some of the object-oriented languages that have been developed are:
- C++
- Java
- C#
- Python

Features of Object-Oriented Programming

Following are some features of object-oriented programming

- **Objects**
  - **OOP** provides the facility of programming based on objects. Object is an entity that consists of data and functions.
- **Classes**
  - **Classes** are designs for creating objects. OOP provides the facility to design classes for creating different objects. All properties and functions of an object are specified in classes.

Features of Object-Oriented Programming

- **Real-world Modeling**
  - ❖ **OOP** is based on real-world modeling. As in real world, things have properties and working capabilities. Similarly objects have data and functions. Data represents properties and functions represent working of objects.
- **Reusability**
  - ❖ **OOP** provides ways of reusing the data and code. **Inheritance** is a technique that allows a programmer to use the code of existing program to create new programs.
- **Polymorphism**
  - ❖ Polymorphism is an ability of an object to behave in multiple ways

Objects

- An object represents an entity in real world such as person, thing etc.
- An object is identified by its name. An object consists of the following two things:

- **State:** States are the characteristics of an object

- **Behavior:** It is like a function that can be performed by an object
  - Example: Your desktop lamp may have only two possible states (on and off) and two possible behaviors (turn on, turn off).
  - Behavior or function is used to change the state of an object

Objects

- **Examples of objects**
  - **Physical Objects**
    - Vehicle such as car, bus, truck etc.
  - **Elements of the computer-user environment**
    - The mouse and keyboard
  - **Data-storage constructs**
    - Stack, Linked lists and Binary trees etc.
  - **Human entities**
    - Employees, Students and Customers etc.
  - **User-defined data types**
    - Time and Angles etc

A car object Example

Attributes of object car

- The characteristics of an objects are known as its **properties or attributes**
- Each object has its own properties. These properties can be used to describe the object
- The attributes of an object **Car** can be as follows:
  - Color
  - Price
  - Model
  - Engine power
  - Current gear
- The set of values of the attributes of a particular object is called its state

A car object Example

- **Functions of object car**
  - ❖ An object can perform different tasks and actions. The actions that can be performed by an object are known as **functions or methods**
  - ❖ The functions of a car object as follows
    - Start
    - Change gear
    - Stop
    - Accelerate
    - Reverse

Simple Class Program

Our first program contains a class and two objects of that class. Although it’s simple, the program demonstrates the syntax and general features of classes in **C++.**

```
class smallobj {
private:
    int somedata;
public:
    void setdata(int d) {
        somedata = d;
    }
    void showdata() {
        cout << "Data is " << somedata << endl;
    }
};

int main() {
    smallobj s1, s2;
    s1.setdata(1066);
    s2.setdata(1776);
    s1.showdata();
    s2.showdata();
    return 0;
}
```

Output

```
Data is 1066
Data is 1776
```

Simple Class Program

Our first program contains a class and two objects of that class. Although it’s simple, the program demonstrates the syntax and general features of classes in **JAVA**

```
class SmallObj {
    private int someData;

    public void setData(int d) {
        someData = d;
    }
    public void showData() {
        System.out.println("Data is " + someData);
    }
    public static void main(String[] args) {
        SmallObj s1 = new SmallObj();
        SmallObj s2 = new SmallObj();

        s1.setData(1066);
        s2.setData(1776);

        s1.showData();
        s2.showData();
    }
}
```

Output

```
Data is 1066
Data is 1776
```