

1. Abstract classes and abstract methods:

Abstract class is an incomplete class. It cannot be instantiated. An abstract class must consist of at least one abstract method. An abstract method is a method that is just declared and have no implementation.

Add another abstract method `specifyPlace(String name)` and complete the code.

```

1  abstract class Maps{
2
3      ... abstract void show();
4  }
5      // The class which inherits this base class "Maps" must provide
6      // the body of show() method, otherwise that sub class will also be abstract.
7
8  class WebMaps extends Maps {
9      ...
10     ... void show()
11     ... {
12         ... System.out.println("Web Maps: Bing Map, Google Map");
13     }
14 }
15
16
17 public class AbstractClassDemo{
18     ...
19     public static void main (String[] args) {
20         ...
21         ... // Maps m = new Maps();
22         ... // Uncommenting the above statement will induce
23         ... // compiler error as it to create an
24         ... // instance of abstract class ( which is illegal).
25
26         ... WebMaps w = new WebMaps();
27         ...
28         ... w.show();
29     }
30 }

```

2. Interface

- The interface declares a set of public method (no implementation) and fields
- A class that implements the interface provides an implementation for each of the methods the interface defines.
- **Add another interface PlantInterface and use it.**

```

1  // Write two interfaces "AnimalInterface" and "HumanInterface".
2  // Create a class "PersonClass" to implement the interface.
3
4  /* File name : HumanInterface.java */
5  interface HumanInterface {
6      ... String type ="Human"; // constant
7      ... public void study(String qualification);
8  }
9
10 /* File name : AnimalInterface.java */
11 interface AnimalInterface {
12
13     ... public void eat();
14     ... public void travel();
15 }
16
17 /* File name : PersonClass.java */
18 class PersonClass implements AnimalInterface, HumanInterface{
19
20     ... public void eat(){
21         ... System.out.println("Person eats");
22     }
23
24     ... public void travel(){
25         ... System.out.println("Person travels");
26     }
27
28     ... public void study(String qualification){
29         ... System.out.println(type +" studying " + qualification);
30     }
31
32     ... public int noOfLegs(){
33         ... return 0;
34     }
35 }
36
37 /* File name : InterfaceDemo.java */
38 public class InterfaceDemo{
39     ...
40     ... public static void main(String args[]){
41         ... PersonClass m = new PersonClass();
42         ... m.eat();
43         ... m.travel();
44         ... m.study("BESE");
45     }
46 }
47

```

3. Package:

- used to encapsulate a group of classes, interfaces, and sub-packages
- It is a container of a group of related classes where some classes are made public and others are not exposed.
- Refer Example:
 1. Package name: mypackage
 2. Class inside package: Food.java, Animal.java
 3. Classes which use the package: Vegetables.java , PackageDemo.java , Fruits.java

Add another class Place.java in the package and use it.

```

1  /* File name : myPackage/Animal.java */
2  package myPackage;
3
4  public class Animal {
5      →
6      → public String eat(String food){
7      →      → return("Animal is eating "+ food);
8      →      → }
9      →
10     → public void makeSound(String sound){
11     →      → System.out.println("Animal is saying "+ sound);
12     →      → }
13     → }
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```

3  /* File name : myPackage/Foods.java */
4  package myPackage;
5
6  import java.util.Scanner;
7
8  public class Foods {
9
10     protected String foodName;
11     protected int foodID;
12
13     public void show()
14     {
15         System.out.println("Show method in Food Class");
16     }
17
18     public int getFoodID()
19     {
20         int id;
21         Scanner b = new Scanner(System.in);
22         System.out.print("Enter id: ");
23         id = Integer.parseInt(b.nextLine());
24         return(id);
25     }
26
27     public String getFoodName()
28     {
29         String name;
30         Scanner b = new Scanner(System.in);
31         System.out.print("Enter Food Name: ");
32         name = b.nextLine();
33         return(name);
34     }
35
36     public void setFoodID(int fID, String fName){
37         this.foodName = fName;
38         this.foodID = fID;
39         System.out.println("this.foodID : " + " + this.foodName );
40     }
41 }
42
43

```

9. Reflection:

- Reflection is the ability of a program to analyze itself.
- The **java.lang.reflect** package provides the ability to obtain the information about the fields, constructors, methods, and modifiers of a class.
- **Demerits:**
 - Performance Overhead
 - Security Restrictions
 - Exposure of Internals

```

1  import java.lang.reflect.*;
2  public class ReflectionDemo {
3      public static void main(String args[])
4      {
5          try {
6              Class c = Class.forName("java.util.Stack");
7              Method methods[] = c.getDeclaredMethods();
8
9              // dump all methods in the Stack class
10             for (int i = 0; i < methods.length; i++)
11                 System.out.println(methods[i].toString());
12         }
13         catch (Exception e) {
14             System.err.println(e);
15         }
16     }
17 }

```