Unit 6: Inheritance

Inheritance is way to form new classes based on existing classes by taking on their attributes/behavior, grouping related classes​, and sharing code between two or more classes​. It is useful for ensuring that code isn’t duplicated, and making code easier to develop.

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​One class can extend another by absorbing its data and/or behavior:

**superclass**: The parent class that is being extended​

**subclass**: The child class that extends the superclass and inherits its behavior and gets a copy of every field and method from superclass​

Syntax:

public class name extends superclass {…}​

​**is-a relationship**: A hierarchical connection where one category can be treated as a specialized version of another, such as every marketer is an employee​ and every legal secretary is a secretary​

**inheritance hierarchy**: A set of classes connected by is-a relationships that can share common code.​

**override**: To write a new version of a method in a subclass that replaces the superclass's version.​

No special syntax required to override a superclass method, just write a new version of it in the subclass.​ If the code for overriding includes a call to the superclass method, this can be done by using the super keyword.

**Polymorphism**: is the mechanism of selecting the appropriate methos for a particular object in a class hierarchy; in java this happen during runtime

**Interface**: is a collection of related methods, either abstract (headers only) or default (implementation provided in the interface). Interfaces are implemented with the implements keyword

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Unit 6: Inheritance - Problems

1. Consider the following class definitions

public class Data{

private int x;

public void setX(int n){ x= n;}

//other methods not shown

}

public class EnhancedData extends Data{

private int y;

public void setY(int n){ y=n; }

//other methods not shown

}

Assume the following declaration appears in a client program:

EnhancedData item = new EnhancedData( );

Which of the following statements would be valid?

I item.y = 16;

II item.setY(16);

III item.setX(25);

1. I
2. II
3. I and II
4. II and III
5. I, II, and III

2. When designing classes, which of the following would be the best reason to use inheritance?

(A) Inheritance allows you to write applications that require fewer base and super classes

(B) Inheritance allows the creation of a subclass that can use the methods of its superclass without rewriting the cod for those methods.

(C) Inheritance allows for data encapsulation, while noninherited classes do not allow for this

(D) Inheritance reduces the number of polymorphic structures encapsulated in applications

(E)Inheritance guarantees that the applications will compile and execute much more quickly

3. A bear is an animal and a zoo contains many animals, including bears. Three classes Animal, Bear, and Zoo are declared to represent animal, bear, and zoo objects. Which of the following is the most appropriate set of declarations?

(A)

public class Animal extends Bear{ … }

public class Zoo{

private Animal[] myAnimals;

…

}

(B)

public class Bear extends Animal{...}

public class Zoo{

private Animal[] myAnimals;

…

}

(C)

public class Animal extends Zoo

{

private Bear myBear;

…

}

(D)

public class Bear extends Animal, Zoo

{

…

}

(E)

public class Bear extends Animal implements Zoo

{

…

}

1. Consider the following class definitions.

Public class A

{

private int a1;

public void methodA( )

{

methodB( ); // Statement I

}

}

public class B extends A

{

public void methodB( )

{

methodA( ); //Statement II

a1=0; //Statement III

}

}

}

Which of the labeled statements in the methods shown above will cause a compile-time error?

1. I only
2. III only
3. I and II
4. I and III
5. II and III
6. Which of the following is (are) true of an interface?

I An interface can contain a constructor

II An interface can be instantiated

III All methods in an interface are abstract

1. I only
2. II only
3. III only
4. I and II only
5. I, II, and III

1. Consider the following three declarations.

I Integer obj1 = new Integer(7);

II Comparable obj 2 = new Integer(7);

III Comparable obj3 = new Comparable(7);

Which of these declarations is (are legal)?

1. I only
2. I and II only
3. I and III only
4. II and III only
5. I, II, and III
6. When designing a class hierarchy, which of the following should be true of a superclass?
7. A superclass should contain the data and functionality that are common to all the subclasses that inherit from the superclass
8. A superclass should be the largest, most complex class from which all other subclasses are derived
9. A superclass should contain the data and functionality that are only required for the most complex class
10. A superclass should have public data in order to provide access for the entire class hierarchy
11. A superclass should contain the most specific details of the class hierarchy
12. Consider the following class declarations.

public class Base{

private int myVal;

public Base(){

myVal = 0;

}

public Base(int x){

myVal = x;

}

}

public class Sub extends Base{

public Sub(){

super(0);

}

}

Which of the following statements will NOT compile?

1. Base b1 = new Base();
2. Base b2 = new Base(5);
3. Base s1 = new Sub();
4. Sub s2 = new Sub();
5. Sub s3 = new Sub(5);