D. S. COLLEGE

ALIGARH

Final Variable and Methods , Final Classes and Abstract Methods and Classes.

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Final Variable ,Classes and method

Final Keyword In Java

The final keyword in java is used to restrict the user. The java final keyword can be used in many context. Final can be:

variable

method

class

The final keyword can be applied with the variables, a final variable that have no value it is called blank final variable or uninitialized final variable. It can be initialized in the constructor only. The blank final variable can be static also which will be initialized in the static block only. We will have detailed learning of these. Let's first learn the basics of final keyword.

1) Java final variable

If you make any variable as final, you cannot change the value of final variable(It will be constant).

Example :-

There is a final variable speedlimit, we are going to change the value of this variable, but It can't be changed because final variable once assigned a value can never be changed.

```
class Bike9{
 final int speedlimit=90;//final variable   void run(){
  speedlimit=400;
 }
```

```
 public static void main(String args[]){
 Bike9 obj=new  Bike9();
 obj.run();
 }
}//end of class
```

Output:Compile Time Error

2) Java final method

If you make any method as final, you cannot override it.

Example

```
class Bike{
  final void run(){System.out.println("running");}
}
     class Honda extends Bike{
   void run(){System.out.println("running safely with 100kmph");}
      public static void main(String args[]){
   Honda honda= new Honda();
   honda.run();
   }
}
```

Output:- Compile Time Error

3) Java final class

If you make any class as final, you cannot extend it.

Example of final class

```
final class Bike{}
 class Honda1 extends Bike{
 void run(){System.out.println("running safely with 100kmph");}
    public static void main(String args[]){
 Honda1 honda= new Honda1();
 honda.run();
 }
}
```

Output:Compile Time Error

Q) Is final method inherited?

Ans) Yes, final method is inherited but you cannot override it. For Example:

```
class Bike{
 final void run(){System.out.println("running...");}
}
class Honda2 extends Bike{
   public static void main(String args[]){
    new Honda2().run();
   }
```

}

Output:running...

Q) What is blank or uninitialized final variable?

A final variable that is not initialized at the time of declaration is known as blank final variable.

If you want to create a variable that is initialized at the time of creating object and once initialized may not be changed, it is useful. For example PAN CARD number of an employee.

It can be initialized only in constructor.

Example

```
class Student{

int id;

String name;

final String PAN_CARD_NUMBER;

...

}
```

Que) Can we initialize blank final variable?

Yes, but only in constructor. For example:

```
class Bike10{
  final int speedlimit;//blank final variable
```

```
    Bike10(){
  speedlimit=70;
  System.out.println(speedlimit);
  }
    public static void main(String args[]){
    new Bike10();
 }
}
```

Output: 70

static blank final variable

A static final variable that is not initialized at the time of declaration is known as static blank final variable. It can be initialized only in static block.

Example :

```
class A{
  static final int data;//static blank final variable
  static{ data=50;}
  public static void main(String args[]){
    System.out.println(A.data);
 }
}
```

Q) What is final parameter?

If you declare any parameter as final, you cannot change the value of it.

```
class Bike11{
  int cube(final int n){
   n=n+2;//can't be changed as n is final
   n*n*n;
  }
  public static void main(String args[]){
    Bike11 b=new Bike11();
    b.cube(5);
 }
}
```

Output: Compile Time Error

Short Answer

1. What is final in Java?

Ans: Final is a keyword that is used to restrict the user in Java programming. It can be applied with variables, methods, or classes. It is a non-access modifier.

2. Why do we need final keyword in Java? Or, what is the use of final keyword in Java?

Ans: Final keyword is used in Java ,To declare a constant or to stop the value change, To prevent inheritance, To prevent a method from being overridden.

3. Why a constructor cannot be final in Java?

Ans: If a method is marked as final it means we do not want any class to override it. As per Java Language Specification, a constructor cannot be overridden. So, there is no use in declaring a constructor as final.

4. What is final variable in Java?

Ans: A variable declared as final is known as a final variable in Java. Once the final variable is initialized, the value of the final variable can never be changed. In other words, we cannot be assigned a new value.

5. When to use final variable in java?

Ans: A final variable can be used when we want to make the value of variable constant throughout the execution of a program.

6. What is the difference between normal variable and final variable?

Ans: The only difference between a normal variable and a final variable is that we can re-assign the value to a normal variable but we cannot re-assign the value of a final variable once assigned it.

7. What is a blank final variable in Java?

Ans: A variable that is declared as final and not initialized at a time of declaration is called blank final variable.

8. What is the difference between an abstract method and final method in Java?

Ans: The key difference between abstract method and final method is that abstract method must be overridden in the subclass but final method cannot be overridden in the subclass.

9. What is final class in Java?

Ans: A class declared with a final keyword is called final class. It does not allow itself to be inherited by another class.

10. Which is the most common predefined final class object in Java?

Ans: String

11. What are the two ways to make a class final?

Ans: a final class is to declare a class with final keyword. Another way is to declare all of its constructors as private. If a class has only private constructors, it cannot be subclassed.

12. Can we create an instance of final class in another class?

Ans: Yes, we can create an instance of final class in another class but cannot be inherited.

13. Is it possible to change the value of a final variable in Java?

Ans: No, Java does not allow changing the value of a final variable. Once the value is set, it cannot be modified.

14. How can we restrict inheritance in Java?

Ans: If we declare a class final, it cannot be extended. This will restrict the inheritance of that class in Java.

15. Why Integer class has been defined final in Java?

Ans: Integer class is a wrapper for int. If it is not declared final, any other class can extend it and modify the behavior of Integer operations. To avoid it, Integer wrapper class is declared as final.

16. The finalize() method is called just prior to

Ans: Before garbage collection.

17. Can we declare main method as final?

Ans: Yes, we can declare the main method as final.

18. Can we mark a block final in Java?

Ans: No, a block cannot be marked final in java.

19. Can we declare a constructor final?

No, because constructor is never inherited.

20.What is a blank final variable?

A blank final variable is a final variable, which is not initialized during declaration.

Abstract method and classes

Abstract methods

Abstract methods in java mean those methods that stand declared with the usage of abstract keywords inside an abstract class. These do not have any definition per se and thus, are called abstract methods in Java.

Abstract Classes and Methods

Abstract class: is a restricted class that cannot be used to create objects (to access it, it must be inherited from another class). Abstract method: can only be used in an abstract class, and it does not have a body. The body is provided by the subclass (inherited from).

There are two types of abstraction in Java including control abstraction and data abstraction. Control abstraction is used for building new functionalities and it also combines control statements in a single unit

Short Answer

1. A class which is declared with the _____ keyword is known as an abstract class in Java.

Ans : A class which is declared with the abstract keyword is known as an abstract class in Java.

2. Abstract class can have constructors and static methods?

Ans : It can have constructors and static methods also.

3. What is the syntax of abstract class in java?

Ans : The syntax of abstract class in java is abstract class A{}.

4.Thread is abstract?

Ans : Thread is not an abstract class.

5. A method which is declared as abstract and does not have implementation is known as an _____?

Ans : A method which is declared as abstract and does not have implementation is known as an abstract method.

6. Which of these packages contains abstract keyword?

Ans : java.lang packages contains abstract keyword.

7. An abstract class can have a data member, abstract method, method body (non-abstract method), constructor, and even main() method.

Yes, An abstract class can have a data member, abstract method, method body (non-abstract method), constructor, and even main() method.

8. Which of these is not a correct statement?

Ans : Abstract class cannot be directly initiated with new operator, Since abstract class does not contain any definition of implementation it is not possible to create an abstract object.

9. Consider the below given code.

```
public abstract class A {
```

```
abstract void m1();

void m2(){

 System.out.println("One”);

 }

}
```

10.How to call m2() method in the above code?

Ans: Make it static and call as A.m2();

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11. What is Abstraction in Java?

Ans: Abstraction in Java is a technique by which we can hide the data that is not required to users. It hides all unwanted data so that users can work only with the required data.

12. How to achieve or implement Abstraction in Java?

Ans: There are two ways to implement abstraction in java. They are as follows:

a) Abstract class (0 to 100%)

b) Interface (100%)

13. What is the difference between abstract class and concrete class?

Ans: a) We cannot create an object of abstract class. Only objects of its non-abstract (or concrete) sub classes can be created.

b) It can have zero or more abstract methods that are not allowed in a non-abstract class (concrete class).

14. What is Abstract in Java?

Ans: Abstract is a non-access modifier in java that is applicable for classes, interfaces, methods, and inner classes.

15. Can abstract modifier applicable for variables?

Ans: No.

16. What is Abstract method in Java?

Ans: A method which is declared with abstract modifier and has no implementation (means no body) is called abstract method in java.

17. Can an abstract method be declared as static?

Ans: No.

18. Can an abstract method be declared with private modifier?

Ans: No, it cannot be private because the abstract method must be implemented in the child class. If we declare it as private, we cannot implement it from outside the class.

19. What is Concrete method in Java?

Ans: A concrete method in Java is a method which has always the body. It is also called a complete method in java.

20. When to use Abstract class in Java?

Ans: An abstract class can be used when we need to share the same method to all non-abstract sub classes with their own specific implementations.

21. When to use Abstract method in Java?

Ans: a) When the same method has to perform different tasks depending on the object calling it.

b) When you need to be overridden in its non-abstract subclasses.

22. Is abstract class a pure abstraction in Java?

Ans: No, It provides 0 to 100% abstraction.

23. Is it possible to create an object of abstract class in Java?

Ans: No. It is not possible but we can create an object of its subclass.

24. Is it possible that an abstract class can have without any abstract method?

Ans: Yes.

25. Can an abstract class have constructor?

Ans: Yes.

27. Is abstract class allow to define private, final, static, and concrete methods?

Ans: Yes.

28. Is it possible to achieve multiple inheritance through abstract class?

Ans: No.

29. Can we make an abstract class without abstract keyword?

Ans: No, a class must be declared with abstract keyword to make an abstract class.

30. Can we define an abstract method inside non-abstract class (concrete class)?

Ans: No, we cannot define an abstract method in non-abstract class.

31. What will happen if we do not override all abstract methods in subclass?

Ans: Java compiler will generate compile time error. We will have to override all abstract methods in subclass

32. What is the difference between Abstraction and Encapsulation?

Ans: Abstraction hides the implementation details from users whereas, encapsulation wraps (binds) data and code into a single unit.

33. Why abstract class has constructor even though you cannot create object?

Ans: We cannot create an object of abstract class but we can create an object of subclass of abstract class. When we create an object of subclass of an abstract class, it calls the constructor of subclass.

34. Why should we create reference to superclass (abstract class reference)?

Ans: We should create a reference of the superclass to access subclass features because superclass reference allows only to access those features of subclass which have already declared in superclass.

35. What is the advantage of Abstract class in Java?

Ans: Abstract class makes programming better and more flexible by giving the scope of implementing abstract methods.