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1. With relevant examples, explain the following concepts as used in Java programming.

a. **Mutable classes.**

Explain what is meant by mutable class

A mutable class is one that can change its internal state after it is created.

Write a program that implements the concept of mutable class

public class Example {

private String str;

Example(String str) {

this.str = str;

}

public String getName() {

return str;

}

public void setName(String coursename) {

this.str = coursename;

}

public static void main(String[] args) {

Example obj = new Example("Diploma in IT");

System.out.println(obj.getName());

// Here, we can update the name using the setName method.

obj.setName("Java Programming");

System.out.println(obj.getName());

}

}

b. **Immutable classes.**

Explain what is meant by immutable class

An immutable class is one that can not change its internal state after it is created.

Write a program that implements the concept of immutable class

public class Example {

private final String str;

Example(final String str) {

this.str = str;

}

public final String getName() {

return str;

}

//main method

public static void main(String[] args) {

Example obj = new Example("Core Java Programming.");

System.out.println(obj.getName());

}

}

c. Explain the situations where mutable classes are more preferable than immutable classes when writing a Java program.

* Immutable classes are thread-safe so you will not have any synchronization issues.
* Immutable classes are good Map keys and Set elements, since these typically do not change once created.
* Immutable classes it easier to write, use and reason about the code (class invariant is established once and then unchanged)
* Immutable classes make it easier to parallelize your program as there are no conflicts among objects.

2.

1. Explain what a String buffer class is as used in Java, the syntax of creating an object of StringBuffer class and Explain the methods in the StringBuffer class.

String buffer is a thread-safe, a sequence of characters that can change.

The syntax of creating a StringBuffer object is:

Methods in the StringBuffer class:

* length() - used to return the length of the string i.e. total number of characters.
* reverse() - used to return the string in reversed order.
* capacity() - used to return the current capacity.

1. Write the output of the following program.

class Myoutput

1. {

2. public static void main(String args[])

3. {

4. String ast = "hello i love java";

5. System.out.println(ast.indexOf('e')+" "+ast.indexOf('ast')+" "+ast.lastIndexOf('l')+" "+ast .lastIndexOf('v'));

6. }

7. }

Output:

**The program has no output**

1. Explain your answer in (2b) above.

**In the above code we have ast.indexOf('ast'). indexOf() does not take a String argument hence resulting to an error.**

1. With explanation, write the output of the following program.

class Myoutput

1. {

2. public static void main(String args[])

3. {

4. StringBuffer bfobj = new StringBuffer("Jambo");

5. StringBuffer bfobj1 = new StringBuffer(" Kenya");

6. c.append(bfobj1);

7. System.out.println(bfobj);

8. }

9. }

***The program does not run because of an error in line 6. “c.append(bfobj1);”. The variable “c” was not created.***

1. With explanation, write the output of the following program.

class Myoutput

1. {

2. public static void main(String args[])

3. {

4. StringBuffer str1 = new StringBuffer("Jambo");

5. StringBuffer str2 = str1.reverse();

6. System.out.println(str2);

7. }

8. }

Output: obmaJ

***This is because the original str1 having “Jambo” has been reversed by the reverse() function and transferred to the str2 variable that is later printed.***

1. With explanation, write the output of the following program.

class Myoutput

1. {

2. class output

3. {

4. public static void main(String args[])

5. {

6. char c[]={'A', '1', 'b' ,' ' ,'a' , '0'};

7. for (int i = 0; i < 5; ++i)

8. {

9. i++;

10. if(Character.isDigit(c[i]))

11. System.out.println(c[i]+" is a digit");

12. if(Character.isWhitespace(c[i]))

13. System.out.println(c[i]+" is a Whitespace character");

14. if(Character.isUpperCase(c[i]))

15. System.out.println(c[i]+" is an Upper case Letter");

16. if(Character.isLowerCase(c[i]))

17. System.out.println(c[i]+" is a lower case Letter");

18. i++;

19. }

20. }

21. }

Output:

1 is a digit

a is a lower case Letter

At the first loop, we check if the second value is a digit, a whitespace, an uppercase or lowercase. Since it is “1”, then it is a digit, and we print to the console.

We then skip the third value, and check the forth value if it is a digit, a whitespace, an uppercase or lowercase. Since the forth value is “a”, then it is a lowercase, and we print to the console.

“I” is incremented two times in the loop.