J.1

OVERVIEW OF JAVA

Why was Java invented?

1. To replace C/C++ with a better design.

2. To enable creation of applets for the World-Wide Web.

3. To be portable and to operate in distributed environments.

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IMPORTANT FEATURES OF JAVA

1. Portable

   a. Java programs are compiled to byte-code, which is interpreted at run time.

   b. Java uses an international character code, 16-bit Unicode, of which ASCII is a subset.

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2. Object-Oriented

- classes and objects
- methods
- class hierarchies
- inheritance

3. Pointers

- Java does not have explicit pointers.
- This makes coding easier.

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5. Datatypes

a. Primitive Types

- boolean
- char (16-bit)
- byte (8-bit signed)
- short (16-bit signed)
- int (32-bit signed)
- long (64-bit signed)
- float (32-bit signed)
- double (64-bit signed)

b. Object Versions of Primitive Types

e.g. The Integer class extends the abstract Number class to represent the int type as a class.

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5. Datatypes (cont.)

c. Other Useful Classes

- String and StringBuffer
- InputStream and OutputStream
- BitSet
- Enumeration
- Vector
- Stack
- Dictionary
- HashTable

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6. Memory Management

a. Programmers can allocate new objects.

b. Objects that are no longer referenced are removed by the Garbage Collector.

7. Interfaces

a. Java classes support only single inheritance

b. Interfaces allow the declarations of a set of abstract methods.

c. Interfaces support multiple inheritance.

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8. Packages

a. A package incorporates a set of classes and methods that can be used all together.

b. There are built-in packages for

- Java language constructs
- Utilities
- Math
- I/O
- Graphics

c. Programmers can define their own packages.

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9. Exceptions

Java has explicit language constructs for

- generating exceptions (throw)
- receiving exceptions (catch)
- cleaning up after exceptions (finally)

10. Multithreading

A. Java includes the concept of threads for parallel or concurrent execution.

B. Java provides the Runnable interface, which can be easier to use than pure threads.

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Java Program to Print out its Arguments

```
class EchoArgs {
      public static void main(String[] args) {
            for (int i = 0 ; i < args.length ; i++) {
                  System.out.println("Argument " + i + ": "
                        + args[i]);
                        }
      }
}
```

```
>javac EchoArgs.java

>java EchoArgs 10 -3 4.5 abc

Argument 0: 10
         1: -3
         2: 4.5
         3: abc
```

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Program to Compute Roots of a Quadratic

```
public class MySqrt {
public static void main (String[] args) {
      int a,b,c;
      double darg,denom,ds,dmb,root1,root2;
      String A,B,C;

      /* Get values for A, B, C */

      A = args[0];  B = args[1];  C = args[2];

      /* Convert values to double */

      a = Integer.parseInt(A);
      b = Integer.parseInt(B);
      c = Integer.parseInt(C);

      /* Print values for a, b, and c */

      System.out.println("a = " + a + "; b = "
                  + b + "; c = " + c);
```

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```
/* Calculate the roots */

      darg = (double) (b * b - 4.0 * a * c);
      ds = Math.sqrt(darg);
      denom = 2.0 * a;
      dmb = (double) (- b);

      root1 = ( dmb + ds) / denom;
      root2 = ( dmb - ds) / denom;

      System.out.println("root1 is " + root1);
      System.out.println("root2 is " + root2);
   }
 }
```

```
>Java MySqrt  1  -10  25
a = 1; b = -10; c = 25
root1 is 5.0
root2 is 5.0
```

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Explicit casting to a larger type is not required.

```
/* Calculate the roots */

      darg = b * b - 4.0 * a * c;
      ds = Math.sqrt(darg);
      denom = 2.0 * a;

      root1 = ( (- b) + ds) / denom;
      root2 = ( (- b) - ds) / denom;

      System.out.println("root1 is " + root1);
      System.out.println("root2 is " + root2);

   }
 }
```

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```
import java.awt.Graphics;
import java.awt.Font;
import java.awt.Color;

public class FirstGraphics extends java.applet.Applet {

    public void paint(Graphics g) {

      Font fbigbold = new Font("TimesRoman",Font.BOLD,36);
      Font fsmallplain = new Font("TimesRoman",Font.PLAIN,18);

      g.setFont(fbigbold);
      g.drawString("BIG, BOLD, BLACK STRING",10,50);

      g.setFont(fsmallplain);
      g.setColor(Color.red);
      g.drawString("Small, plain, red string",10,70);

      g.setColor(Color.blue);
      g.drawString("Filled and unfilled rectangles",10,100);
      g.drawString("Filled and unfilled ovals",250,100);

      g.drawRect(60,120,80,60);
      g.drawOval(310,120,80,60);
      g.setColor(Color.yellow);
      g.fillRect(65,125,70,50);
      g.fillOval(315,125,70,50);
    }
  }
```

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```
<HTML>
<HEAD>
<TITLE>My First Java Applet</TITLE>
</HEAD>
<BODY>
<H3>This is what my Java Applet did:</H3>
<P>
<APPLET CODE="FirstGraphics.class" WIDTH=500 HEIGHT=500>
Your browser doesn't support Java!
</APPLET>
</BODY>
</HTML>
```

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