Agenda Key: 31CD
Session Number: 480063

Java™ 101: Basic Syntax and Structure

Jeff Lee

Java related sessions

Basic Java

- Mon 9:30 - 22MD A Java Introduction to Object-Oriented Programming (OOP)
- Mon 3:30 - 26MJ Debugging the New Java ***New Session***
- **Tues 8:00 - 31CD** Java 101: Basic Syntax and Structure
- Tues 11:00 - 33LA LAB: Introduction to Java ***LAB***
- Web 9:30 - 42CD The Future of Java on IBM i

Java Toolbox

- Tues 2:00 - 35CB Introducing the IBM Toolbox for Java
- Wed 8:00 - 41LA LAB: IBM Toolbox for Java ***LAB***
- Thur 9:30 - 52CC IBM Toolbox for Java: Advanced

Advanced Java related topics

- Mon 11:00 - 23MH Introduction to XML Processing with Java
- Tues 3:30 - 36MG Java Application Performance Analysis and Tuning on IBM i
- Wed 2:00 - 45CD Using the JVM Tools Interface (JVMTI)
- Thur 12:30 - 54CB Multi-Threaded Programming Using Java
- Thur 2:00 - 55MH Java Stored Procedures and Java User-Defined Functions

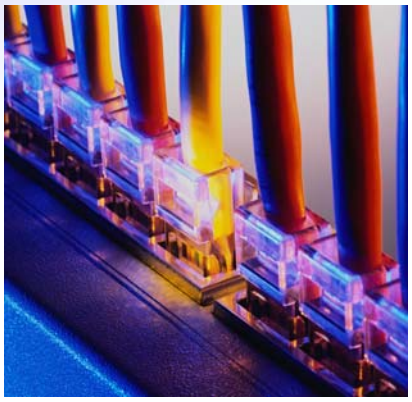
Outline

- Introduction
- Why Java?
- Object-Oriented Overview
- Java Definitions
- Elementary Java Structure
- Java Syntax and Control Flow
- Tips for Approaching Java Code
- Tools for Java Development

Introduction

- Goals
  - Introduce basic Java syntax elements, compared with RPG
  - Develop skills for reading and understanding Java source code
- Expand skills in writing Java code
  - Get you understanding Java code syntax
  - Help you find different ways of looking at code
- How to get there
  - Look at Java code
  - Help you understand it

Why Java? It's simple.



- Most popular programming language
- Distributed
- Robust
- Multithreaded
- Write once, run anywhere
- Internationalization

The New Power Equation

OO in 5 Minutes or Less

- Class
  - A pattern, template, or model for an object
- Object
  - An **instance** of a class
  - A combination of **data** and **functions (behavior)**
- Fields
  - The **data** in an object (attributes, characteristics)
- Methods
  - The **functions** in an object (procedures, subroutines)

The New Power Equation

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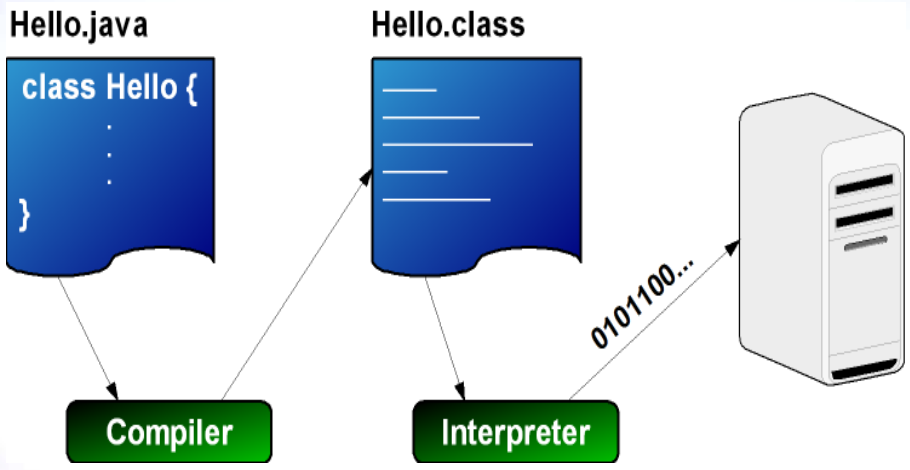
Java Definitions

- Class file
  - Result of compiling Java **source code** into **byte codes**
- Jar File
  - Java archive; a **collection** of class files and other resources
- Java Virtual Machine (JVM)
  - Runtime environment that converts **byte codes** to **machine code**
- Classpath
  - Path that the JVM searches for classes and other resources
- Package
  - Collection of related classes providing access **protection** and namespace management

Life of a Java program



Example Java program

```
import javax.swing.*;

class Hello
{
  public static void main( String [] args )
  {
    JOptionPane.showMessageDialog( new JFrame(),
        "Hello, world!",
        "Example Java Program",
        JOptionPane.PLAIN_MESSAGE);
    System.exit(0);
  }
}
```

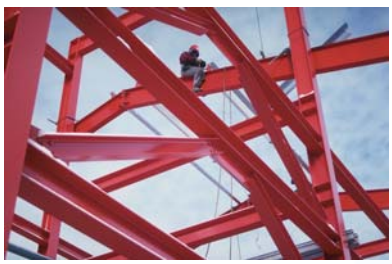
- To compile Java source: javac Hello.java
- To run Java program: java Hello

Elementary Java Structure

- Dot-delimited class name implies underlying **subdirectory structure**

```
java.awt.Button => java/awt/Button.class
com.ibm.as400.system.Hello => com/ibm/as400/system/Hello.class
```

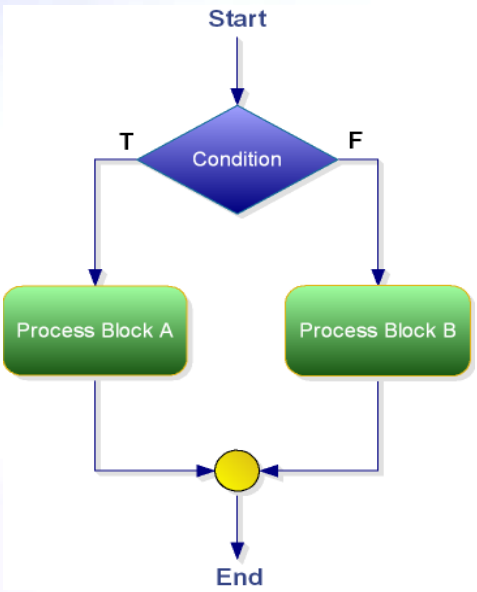
- Several common styles of writing Java code
- Compiler does NOT CARE how you indent, but YOU should!
  - Whitespace is ignored
  - Make code readable



Control Flow Constructs

- Conditional
  - Branches and loops
- Exceptional
  - try, catch, throw
- Unconditional
  - Method calls

Conditional Control Flow: if/else



- `if/else`
  - executes block if expression evaluates to “true”

Conditional Control Flow: if/else

Java Syntax

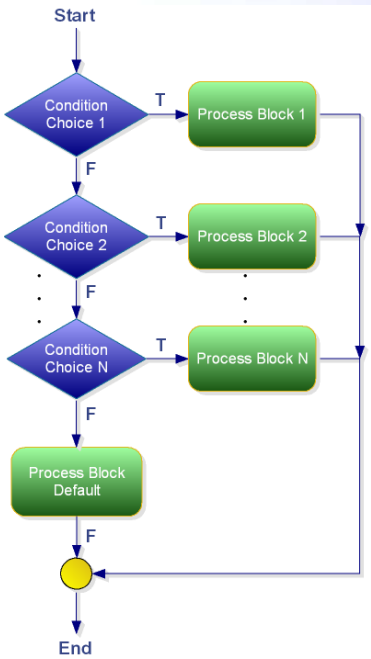
```
if (nameLength > 8) {
  truncate = true;
}
else {
  truncate = false;
}
```

RPG Syntax

```
if nameLength > 8;
   truncate = *ON;
else;
   truncate = *OFF;
endif;
```


Conditional Control Flow: switch

- **`switch`**
  - An easy-to-read collection of if statements
  - Must use the **`break`** keyword to transfer control to just after the switch statement
  - Argument to **`switch()`** must be scalar value (i.e. integer or character)



Conditional Control Flow: switch

Java Syntax

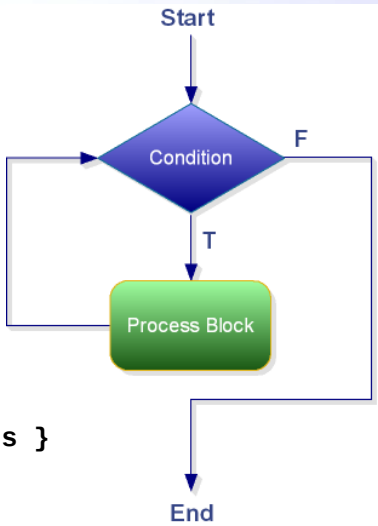
```
switch (status) {
  case 1:
    System.out.println ("Error.");
    break;
  case 2:
    System.out.println ("End of File.");
    break;
  default:
    System.out.println ("Success!");
    break;
}
```

RPG Syntax

```
select;
 when status = 1;
   dsply 'Error.';
 when status = 2;
   dsply 'End of File.';
 other;
   dsply 'Success!';
endsl;
```


Conditional Control Flow: Loops

- **while**
  - while (condition) { statements }
- **do … while**
  - do { statements } while (condition) ;
- **for**
  - for (init; condition; incr) { statements }



Conditional Control Flow: Loops

Java Syntax

```
while (!eof(file)) {
  processRecord();
}

do {
  processRecord();
} while(x > array.length);

for (i = start; i < end;
    i += inc) {
  processRecord();
}
```

RPG Syntax

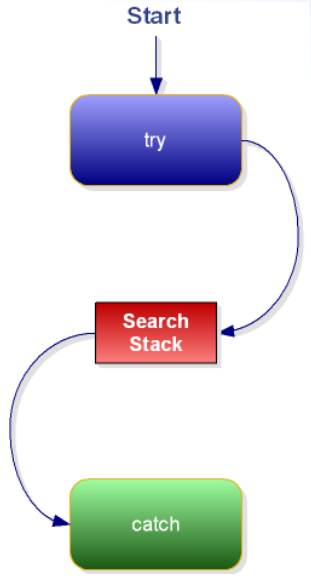
```
dow not %eof(file);
  processRecord();
enddo;

dou x > %elem(Array);
  processRecord();
enddo;

for i = start by inc
    to %elem(array);
  processRecord();
endfor;
```


Exceptional Control Flow

- **`try/catch`**
  - Errors are propagated up the stack
  - Hint: Always list catch blocks from most specific to most general
  - The **finally** statement is always executed, even if errors
  - Must re-throw exception using the **throw** keyword if not handled



Exceptional Control Flow

Java Syntax

```
try {
   // code that might 'throw'
} catch(FileException e1) {
   // handle file error
} catch(Exception e2) {
   // handle all other errors
} finally {
   // ALWAYS do…
}
```

RPG Syntax

```
MONITOR
   // code that might 'throw'
ON-ERROR *FILE
   // handle file error
ON-ERROR
   // handle all other errors
ENDMOD
```


Unconditional Control Flow: Method Calls

```
import javax.swing.*;

class MyApplication {
  public static void main( String [] args ) {
     String question = "why \"i\"?";
     String answer = showDialog("Question!", question);
     System.out.println( question + " " + answer );
     System.exit(0);
  }

  static String showDialog(String title, String message) {
    String out = JOptionPane.showInputDialog(
         new JFrame(),
         message,
         title,
         JOptionPane.PLAIN_MESSAGE);
    return out;
  }
}
```

Tips for Approaching Java Code

- Check packaging
  - Jar or class
  - Does it include the source?
- API or Application
  - If it is an API, evaluate the interface
  - If it is an Application, look for main and run it
- Look at documentation
  - Is there a javadoc?

Comment Styles: Javadoc

```
package java.lang;

/**
 * Class <code>Object</code> is the root of the class hierarchy.
 * Every class has <code>Object</code> as a superclass. All objects,
 * including arrays, implement the methods of this class.
 *
 * @author  unascribed
 * @version 1.68, 04/08/04
 * @see     java.lang.Class
 * @since   JDK1.0
 **/

public class Object {
    . . .
```

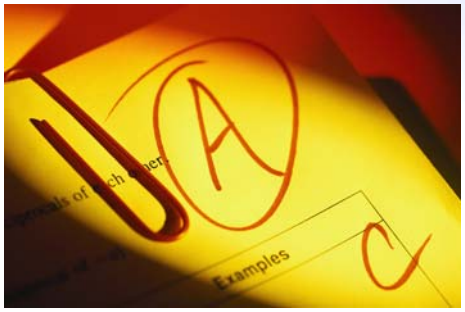
Javadoc

Tools for Java Development

- Development Environments and Editors
  - Eclipse
  - WebSphere Studio Application Developer
  - Rational Application Developer (RAD)
  - jEdit
  - Notepad++
- Modeling
  - Unified Modeling Language (UML)
  - Rational Rose XDE
- Decompilers
  - DJ Java Decompiler
  - jShrink

Summary

- Scratching the surface…
  - Why Java?
  - Terminology
  - Java Structure and Syntax
  - Development Tools and Tips
- Java Resources
  - Sun's Java Website (java.sun.com)
  - IBM developerWorks
  - IBM Toolbox for Java



References

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- developerWorks: www.ibm.com/developerworks
- IBM Toolbox for Java: www.ibm.com/systems/i/software/toolbox
- Eclipse: www.eclipse.org
- WebSphere: www.ibm.com/software/websphere
- jEdit: www.jedit.org
- Notepad++: sourceforge.net/projects/notepad-plus
- FindBugs: findbugs.sourceforge.net
- UML: www.uml.org
- Rational software: www.ibm.com/software/rational
- DJ Java Decompiler: members.fortunecity.com/neshkov/dj.html
- Jshrink: www.e-t.com/jshrink.html

Questions

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Backup Slides

Programming Languages Popularity

Position	Programming Language	Ratings
1	Java	19.797%
2	C	15.862%
3	C++	10.357%
4	PHP	9.485%
5	(Visual) Basic	8.285%
6	Python	5.185%
7	C#	4.321%
8	JavaScript	3.607%
9	Perl	3.419%
10	Delphi	2.710%

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