SE 450  Object-Oriented Software Development

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Requirements

- Prerequisite: CSC 416
- Knowledge of object-oriented programming and C++
- Knowledge of HTML and web-browsers.

Topics

- Applets, WWW, HTML
- Classes and interfaces
- Data types and control flows
- AWT, Swing, and animation
- Input and output, collections
- Multi-threaded programming
- Networking
- Object-oriented design
- Introduction to design patterns and frameworks

Textbooks

- Primary Text
  - Object-Oriented Software Development in Java -- Principles, Patterns, and Frameworks, Xiaoping Jia, 1/ed. Addison-Wesley, 2000
- References
Textbooks (cont'd)

- References (cont'd)

On-Line Reference

Available at http://java.sun.com/
- Java API Documentation
- Java Tutorials
- Demo and Code Examples

Software Required

- Operating System
  - Unix (Linux, Solaris, ...)
  - Windows 95/NT/2000
  - MacOS
- Development environment:
  - Java 2 Platform SE (JDK 1.2 or higher)
  - Java-enabled web browser (optional)
  - Netscape 4.7 or higher

A Brief History

- January 1996: first official release JDK 1.0
- Web: applets, security, URL, networking
- GUI: Abstract Windows Toolkit (AWT)
- February 1997: JDK 1.1
- Authentication: digital signatures, certificates
- Distributed computing: RMI, object serialization, Java IDL/CORBA
- Database connectivity: JDBC
- Component architecture: JavaBean
**A Brief History (cont'd)**
- December 1998: Java 2 Platform (JDK 1.2):
  - Standard, Enterprise, and Micro Editions
  - JFC: Swing, Java2D, Java3D
  - Java Cryptography Extension (JCE)
  - Enterprise computing: enterprise JavaBean (EJB), servlets, Java server page (JSP), Jini, XML
  - Java Multimedia Framework (JMF)
  - Embedded systems: KVM, JavaCard
  - Performance enhancement: JIT, HotSpot VM
- May 2000: J2SE v1.3, (JDK 1.3)

**What's Cool About Java**
- Simple
- Object-Oriented
- Statically Typed
- Compiled
- Architecture Neutral
- Garbage Collected
- Multi-Threaded
- Robust
- Secure
- Extensible

**First Java Application**
Java source in Hello.java

```java
// Filename: Hello.java

public class Hello {
    /** A Java app prints "Hello from Venus!" */
    public static void main (String args[]) {
        System.out.println("Hello from Venus!");
        /* System.out refers to the standard output */
    }
}
```

**Elements of Java Programs**
- Class: Hello
- Method: main(...)
- Statement: System.out.println(...)
- Comments:
  - // a comment
  - /* another comment */
  - /** document commend */
- Source file: Hello.java
Compile and Run an App

To compile:

```
javac Hello.java
```
Generates Hello.class

To run:

```
java Hello
```

---

First Java Applet

Java source in HelloFromVenus.java

```java
import java.awt.*;
import java.applet.Applet;
public class HelloFromVenus extends Applet {
    public void paint(Graphics g) {
        Dimension d = getSize();
        g.setColor(Color.black);
        g.fillRect(0, 0, d.width, d.height);
        g.setFont(new Font("Sans-serif",Font.BOLD,24));
        g.setColor(new Color(255, 215, 0));
        g.drawString("Hello From Venus!", 40, 25);
        g.drawImage(getImage(getCodeBase(), "Venus.gif"), 20, 60, this);
    }
}
```

---

HTML Source

```html
<!--HelloFromVenusDemo.html-->
<html><head>
<title> Hello From Venus Applet </title>
</head>
<body bgcolor=black text=white>
<h2>Here is the <em>Hello From Venus</em> Applet</h2>
<center>
<applet code="HelloFromVenus.class"
        width=300 height=350>
</applet>
</center>
Venus photo courtesy of NASA.
<hr>
<a href="HelloFromVenus.java">The source.</a>
</body></html>
```

---

Elements of Java Applets

- **Superclass**: `java.applet.Applet`
- **No** `main()` method
- **paint()** method paints the picture
- **Applet tag**:

```html
    code width height
```

---

HTML Source

```html
<!--HelloFromVenusDemo.html-->
<html><head>
<title> Hello From Venus Applet </title>
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<body bgcolor=black text=white>
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Venus photo courtesy of NASA.
<hr>
<a href="HelloFromVenus.java">The source.</a>
</body></html>
```
Compile and Run an Applet

- To compile:
  
  \[
  \text{javac HelloFromVenus.java}
  \]

  Generates \text{HelloFromVenus.class}

- To run:
  
  a) Use the \text{appletviewer} from JDK.

  \[
  \text{appletviewer HelloFromVenusDemo.html}
  \]

  b) Open page from browser:

  \[
  \text{HelloFromVenusDemo.html}
  \]