

Applets as front-ends to server-side programming

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- ▶ Introduce applets
 - ▶ Examples of Java graphical programming
 - ▶ How-to put an applet in a HTML page
 - ▶ The HTML Applet tag and alternatives

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 - ▶ Applet-Applet
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- ▶ Media in Applets and in Java

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 - ▶ Now the Java plugin has more sophisticated caching features

Example - java code

```
import java.applet.*;
import java.awt.*; // needed for Graphics
public class FirstApplet extends Applet {
    // we draw a Hello. No interaction
    public void paint(Graphics g) {
        g.drawString("Hello!", 25, 50);
    }
}
```

Example - HTML code

```
<html>
  <head>
    <title>
      My first applet
    </title>
  </head>
  <body>
    <applet code="FirstApplet.class"
            width="150"
            height="50" />
  </body>
</html>
```

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 - ▶ To reload the applet class after a change, reloading the page may not be enough!
 - ▶ Shift-reload may work. `Ctrl-Shift-R`, or `Ctrl-Shift-F5`
 - ▶ In the Java Plugin console, press `x` to clean class cache (press `h` for other commands)

A simple graphical applet

```
import java.applet.*;
import java.awt.event.*;
import java.awt.*;
public class SimpleGraphicalApplet extends Applet
implements java.awt.event.ActionListener {
    TextField input= new TextField();
    TextArea output= new TextArea(3, 20);
    /* constructor: arrange the two buttons nicely */
    public SimpleGraphicalApplet(){
        output.setEditable(false); //no input!
        setLayout(new java.awt.BorderLayout());
        add(input, "North");
        add(output, "Center");
        input.addActionListener(this);
    }
    public void actionPerformed(ActionEvent ae){
        output.setText(input.getText());
        input.setText("");
    }
}
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    public void actionPerformed(ActionEvent ae){
        output.setText(input.getText());
        input.setText("");
    }
}

<applet code="SimpleGraphicalApplet" width="200" height="300">
</applet>
```

Applet lifecycle

- ▶ As in the previous example, the applet constructor is a good place to define the graphical layout and interaction
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 - ▶ `stop()`
 - ▶ Called when the user leaves the applet page
 - ▶ `destroy()`
 - ▶ Called when the browser exits, or the applet terminates, etc.
 - ▶ It is entirely up to the browser when to call `destroy()`
 - ▶ `stop()` is always called before `destroy`

```
import java.awt.*;
import java.applet.*;
public class TheLifeOfAnApplet extends Applet {
    public void init()      { trace("init"); }

    public void start()     { trace("start"); }

    public void stop()      { trace("stop"); }

    public void destroy() { trace("destroy"); }

    public void paint(Graphics g){ trace(g, "paint"); }

    private void trace(String s) {
        System.out.println(s);
        trace(getGraphics(), s); //retrieve the graphical context
    }
    private void trace(Graphics g, String s) {trace(g, s, 50, 20);}

    private void trace(Graphics g, String s, int x, int y) {
        g.drawString("***", x, y);
        g.drawString(s, x, y + 30);
        g.drawString("***", x, y + 60);
    }
}
```

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Comma-separated JAR files with applet code, resources, libraries needed, etc
- ▶ **OBJECT**
Refers to an already-instantiated applet saved in a file on the server

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It ensures that if Java is not installed in Explorer, the Java Plugin will be downloaded and installed at the first applet use

`OBJECT` is also understood by Mozilla in XHTML, but attributes are different

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The situation does not appear to be very “standard” at the moment

<http://java.sun.com/j2se/1.5.0/docs/guide/> ↩

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- ▶ In JSP you can look at the User-agent header to decide what kind of browser you serve to

JSP has a special action, `<jsp:plugin>`, which will generate correct code

<http://java.sun.com/products/jsp/> ↩

[syntax/2.0/syntaxref2023.html#1004158](http://java.sun.com/products/jsp/syntax/2.0/syntaxref2023.html#1004158)

Applet parameters

HTML:

```
<applet code="SomeApplet.class" width="500" height="320">  
  <param name="CourseName" value="Internet Programming" />  
  <param name="CourseID" value="2D1335" />  
  <param name="LectureNumber" value="7" />  
</applet>
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Java:

```
String course = getParameter("CourseName");  
if (course == null) course = "A KTH course";  
  
String lectno = getParameter("LectureNumber ");  
int no = Integer.parseInt(lectno);
```

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`showDocument(URL, String frame)`

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 - ▶ `InputStream getStream(String key)`

Applet-Applet and JavaScript communication

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- ▶ Adding the info of all applets in the page to a `java.awt.TextArea` called 'text'

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Enumeration e = getAppletContext().getApplets();  
while(e.hasMoreElements()) {  
    text.append("\n" + ((Applet) e.nextElement()).getAppletInfo());  
}
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<applet codebase="." code="examples.Applet3.class"  
    name="Paint" width="400" height="300" />
```

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```

```
Applet other = getAppletContext().getApplet("Paint");
if(other != null) {
    ((Applet3) other).setInfo(new Date().toString());
}
```


Applet-Applet and JavaScript communication

- ▶ Adding the info of all applets in the page to a `java.awt.TextArea` called 'text'

```
Enumeration e = getAppletContext().getApplets();
while(e.hasMoreElements()) {
    text.append("\n" + ((Applet) e.nextElement()).getAppletInfo());
}
```

- ▶ Calling a method of another applet defined as

```
<applet codebase="." code="examples.Applet3.class"
        name="Paint" width="400" height="300" />

Applet other = getAppletContext().getApplet("Paint");
if(other != null) {
    ((Applet3) other).setInfo(new Date().toString());
}
```

- ▶ The same from Javascript

```
var paintapplet = document.applet.Paint;
paintapplet.setInfo("Hello");
```

Accessing the HTML document through DOM

- ▶ Since Java 1.4 an applet can examine and modify the HTML document just like JavaScript can
- ▶ DOM = Document Object Model, `http://www.w3.org/DOM/`
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com.sun.browser.dom.DOMService  
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java\_js.html#common\_dom
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- ▶ Manipulating the object

```
org.w3c.dom.html.HTMLDocument
```

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- ▶ If the applet is signed, the browser (or java plug-in) should prompt the user that the applet requires permission for one of the above operations. How to sign applets:

http://java.sun.com/j2se/1.5.0/docs/guide/plugin/developer_guide/rsa_signing.html ↔

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 - ▶ We can connect to any server on that host
- ▶ There we can e.g. invoke a servlet (or even a CGI for that matter), that can do something useful for our applet

```
URL page = getCodeBase();  
String protocol = page.getProtocol();  
String host = page.getHost();  
int port = page.getPort();  
String servlet = "/servlet/SomeServlet";  
URL dataUrl = new URL(protocol, host, port, servlet);
```

POST using URLConnection

```
URL dataURL = new URL(protocol, host, port, servlet);
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```
URL dataURL = new URL(protocol, host, port, servlet);  
URLConnection conn = dataURL.openConnection();
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URL dataURL = new URL(protocol, host, port, servlet);
URLConnection conn = dataURL.openConnection();
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URL dataURL = new URL(protocol, host, port, servlet);
URLConnection conn = dataURL.openConnection();
conn.setUseCaches(false);
conn.setDoOutput(true);
```

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```
URL dataURL = new URL(protocol, host, port, servlet);
URLConnection conn = dataURL.openConnection();
conn.setUseCaches(false);
conn.setDoOutput(true);
String query = "firstName=" + URLEncoder.encode(firstName) +
               "&lastName=" + URLEncoder.encode(lastName) +
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conn.setRequestProperty("Content-Length",
                        String.valueOf(query.length()));
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// finished headers, now write the POST content
conn.getOutputStream().write(query.getBytes());
// start reading
BufferedReader in =
    new BufferedReader(new InputStreamReader(conn.getInputStream()));
```

Audio/Media in Java

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- ▶ Applets have direct support to play sound

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- ▶ The latest in sound and video is the Java Media Framework

<http://java.sun.com/javase/technologies/desktop/media/jmf/>