



JavaOneSM

Sun's Worldwide Java Developer Conference



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Developing Real-World Applets

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Applets vs. Applications

- Memory Size
- Code Size
- Execution Time
- Load Time



Applet Strategy

- Smaller

- 1 Kbyte ↔ ~ 1 second

- Fewer

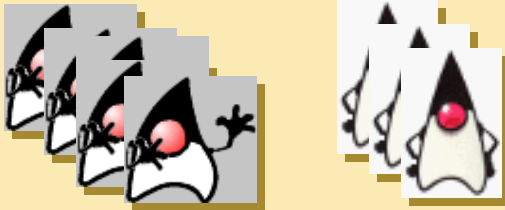
- 1 File ↔ ~ 3 seconds

- Tease



Image Strip

12



1

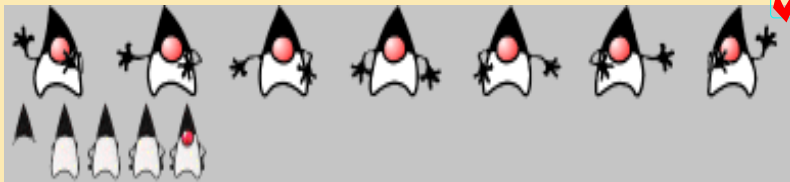




Image Strip (review)

<http://www.xeo.com>

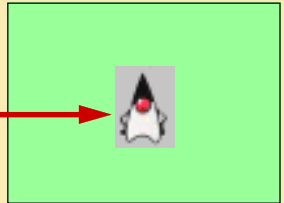


Applet

```
getImage(url, "duke.gif")
```



Image Strip (review)



Graphics

```
drawImage(image, x, y)
```



Image Strip (review)

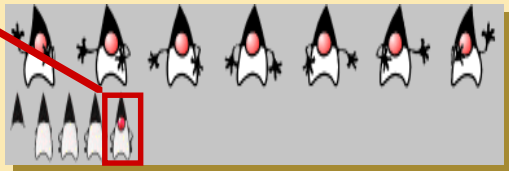
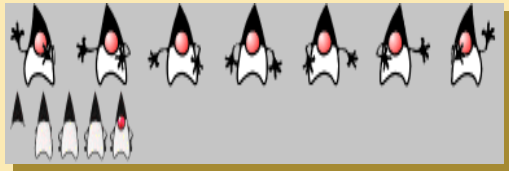
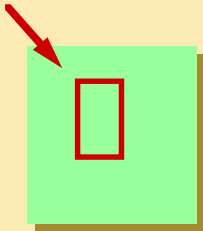




Image Strip

1) Set Clipping Rectangle

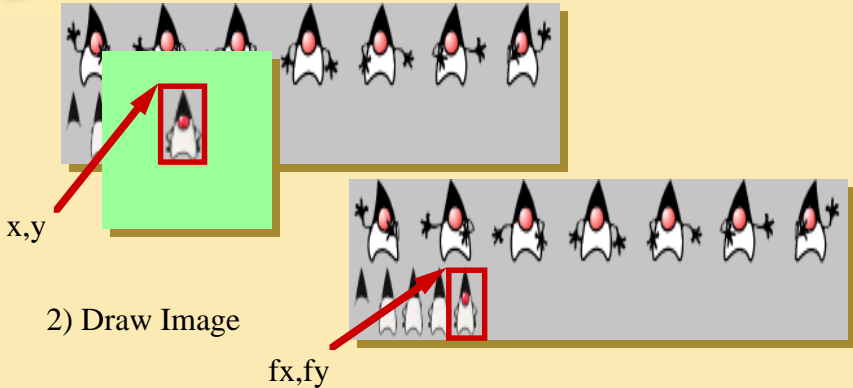


Graphics

```
clipRect(x, y, width, height)
```



Image Strip



Graphics

`drawImage(strip, x-fx, y-fy)`

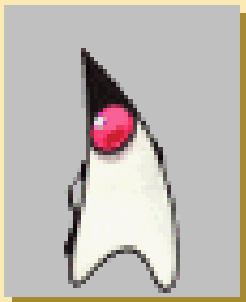


Image Strip

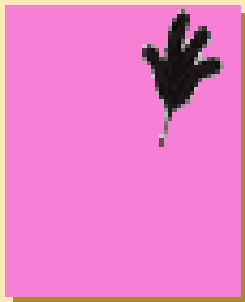
```
void drawFrame(Graphics g, Image strip,  
              int dx, int dy,  
              int sx, sy, int width, int height) {  
    g.clipRect(dx, dy, width, height);  
    g.drawImage(strip, dx-sx, dy-sy, this);  
}
```



Transparency



+

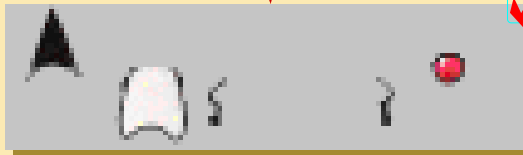


=





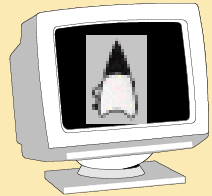
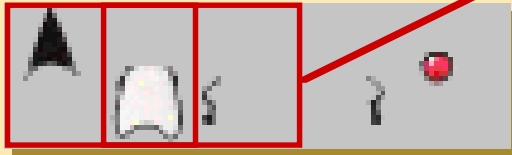
Transparency



-2 K



Transparency





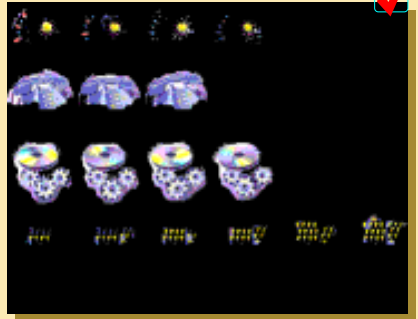
Transparency



60 KBytes



10 KBytes



Transparency

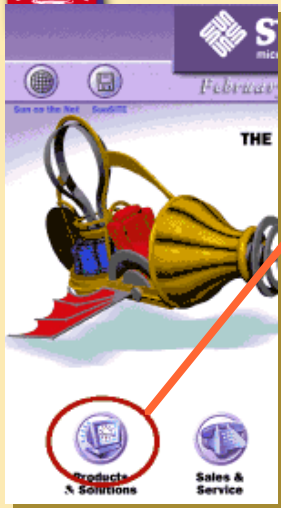




Image Compression (review)

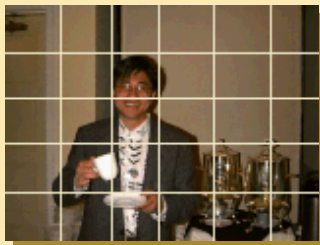
GIF



- bit patterns

- more solid colors
- less colors

JPEG

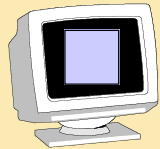
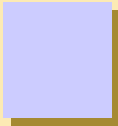


- detail

- less quality

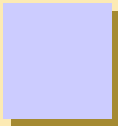


Double Buffering





Double Buffering

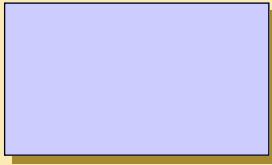




Double Buffering

Applet

`createImage(width, height)`






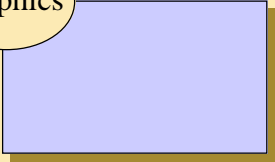
Double Buffering

Image

`getGraphics()`



Graphics





Double Buffering

Graphics

```
drawImage(image, x, y)
```



Graphics

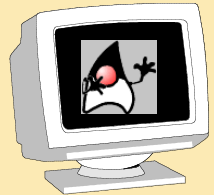




Double Buffering

Graphics

```
drawImage(image, x, y)
```





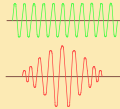
Double Buffering

```
public void init() {  
    ...  
    buf = createImage(width, height);  
    bufG = buf.getGraphics();  
    ...  
}  
  
public void paint(Graphics g) {  
    ...  
    bufG.drawImage(image, x, y, this);  
    ...  
    g.drawImage(buf, 0, 0, this);  
    ...  
}
```




Audio (review)

<http://www.xeo.com>

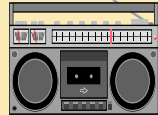
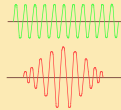


Applet

```
getAudioClip(url, "dance.au")
```



Audio (review)



```
AudioClip play()  
          loop()  
          stop()
```



Audio (review)

```
public void init() {
    ...
    clip = getAudioClip(url, "dance.au");
    ...
}

public void start() {
    ...
    clip.play();
    ...
}
```




Audio (review)

```
public void init() {  
    ...  
    clip = getAudioClip(url, STOP.au");  
    ...  
}  
  
public void start() {  
    ...  
    clip.play();  
    ...  
}
```

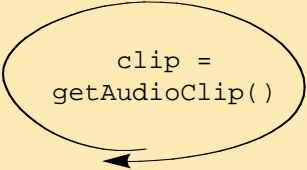




Audio

```
public void init() {  
    ...  
    start thread   
    ...  
}
```

`clip =
getAudioClip()`



```
public void start() {  
    ...  
    if (clip != null) clip.play();  
    ...  
}
```



Applet Parameters (review)

HELLO WORLD

```
<param name=message value="HELLO WORLD" >
```

Applet

`getParameter`(paramName)



Applet Parameters

HELLO WORLD

blink

TRY JAVA™

```
<param name=messages  
value="HELLO WORLD|TRY JAVA">
```

separator



Applet Parameters

HELLO WORLD

blink

TRY JAVA™

```
<param name=sep value="#">
```

```
<param name=messages  
value="HELLO WORLD#TRY JAVA">
```




Applet Parameters

HELLO WORLD

blink

TRY JAVA™

```
<param name=messages  
  value="HELLO WORLD|TRY JAVA">  
<param name=colors  
  value="green|red">
```



Applet Parameters

HELLO WORLD

blink

TRY JAVA™

```
<param name=message1  
  value="HELLO WORLD|green|yellow">  
<param name=message2  
  value="TRY JAVA|red|white">
```



Applet Parameters

```
<param name=message1 value="HELLO WORLD|green|yellow">  
<param name=message2 value="TRY JAVA|red|white">
```

```
for (int i=1; ; i++) {  
    p = getParameter("message"+i);  
    if (p == null) break;  
        ...  
}
```



Applet Parameters

```
<param name=file value="InputFile">
```

InputFile:

```
HELLO WORLD
  bgColor=green
  textColor=yellow
  font=Courier
  fontSize=14
TRY JAVA
  bgColor=red
  textColor=white
```



Applet Parameters

```
<param name=file value="InputFile">
```

URL

```
URL(url, filename)  
getContent()
```



Applet Parameters

```
String getContent(String url) {  
    URL url = new URL(null, url);  
    return (String)url.getContent();  
}
```



Parsing Parameters

`StringTokenizer`

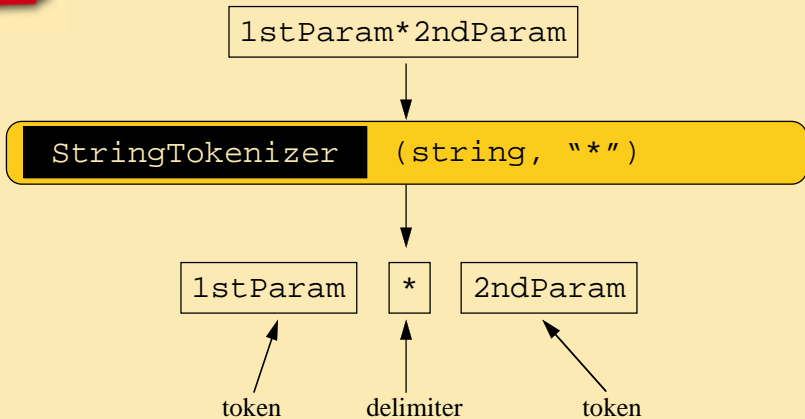
`(string, delimiters)`

`StreamTokenizer`

`(inputstream)`



StringTokenizer





StringTokenizer

```
// Get parameter
p = getParameter("p");

// Create StringTokenizer
st = new StringTokenizer(p, "*");

// Create storage
strs = new String[st.countTokens()];

// Get tokens
for (int i=0; i<strs.length; i++) {
    strings[i] = st.nextToken();
}
```



StringTokenizer

"pat chan" 3.14 + pi //comment

StreamTokenizer ()

quoted string "pat chan"

number 3.14

character +

word pi



StringTokenizer

```
// Create URL
url = new URL(null, "http://www.xeo.com/InFile");

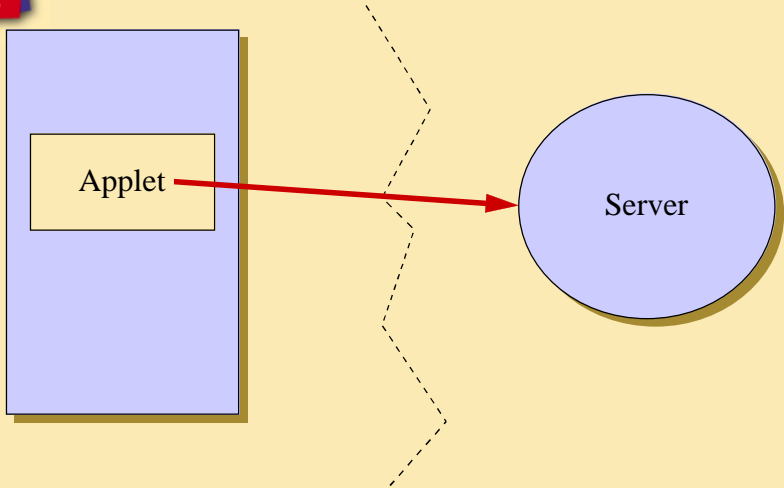
// Create InputStream
is = url.openStream();

// Create StringTokenizer
st = new StringTokenizer(is);

// Get tokens
st.nextToken();
```

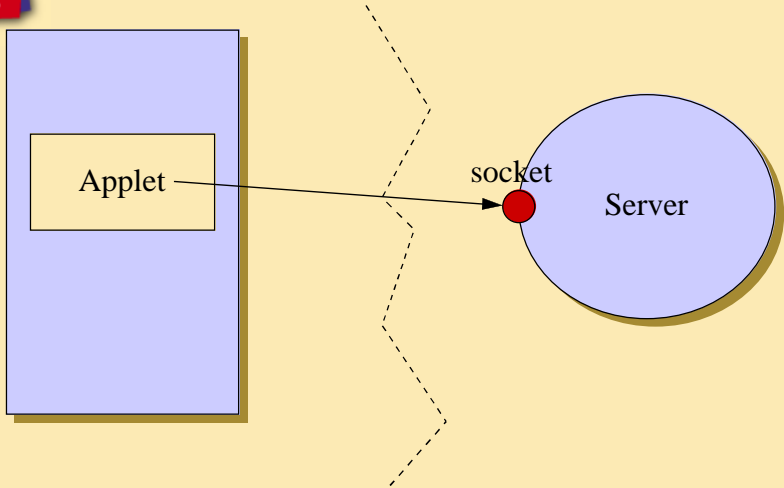


Client / Server



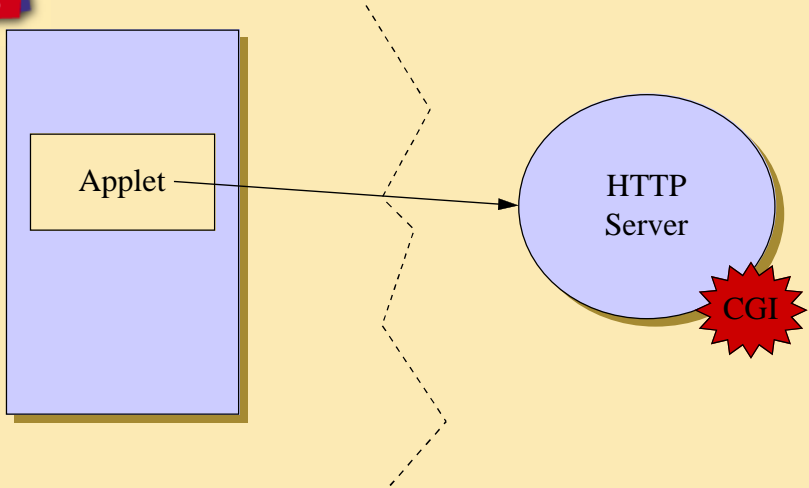


Client / Server





Client / Server





Client / Server (review)

Name:

Email:

URLEncoder

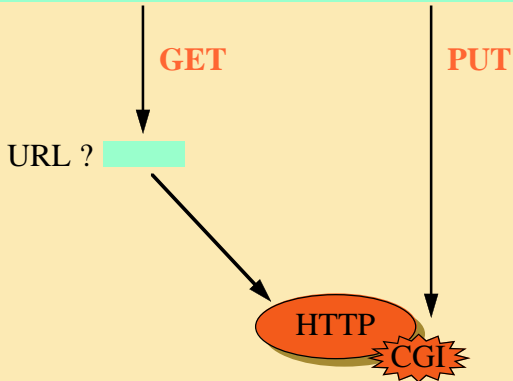
`encode(string)`

Name=Patrick+Chan&Email=chan%40xeo%2e.com



Client / Server (review)

Name=Patrick+Chan&Email=chan%40xeo%2e.com





Client / Server - GET

```
String getData(String params) {  
    URL url = new URL(  
        "http://www.xeo.com/cgi-bin?" + params);  
  
    return (String)url.getContent()  
}
```

URL

URL(url, filename)
getContent()



Client / Server - PUT

Socket

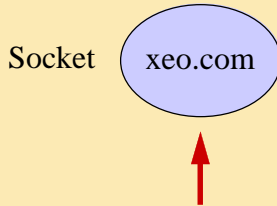
xeo.com

Socket

(hostname, 80)



Client / Server - PUT

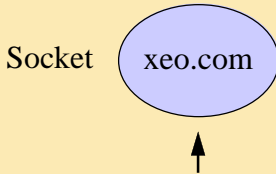


Socket

getOutputStream()



Client / Server - PUT



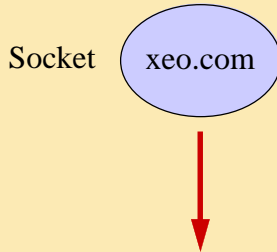
```
POST /cgi-bin/script.pl HTTP/1.0
Content-type: application/x-www-form-urlencoded
Content-length: 100

<parameters>
```

```
DataStream writeBytes(string)
```



Client / Server - PUT

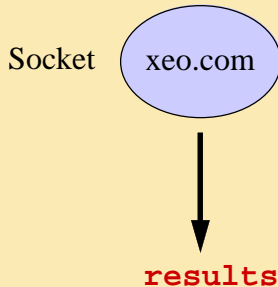


Socket

`getInputStream()`



Client / Server - PUT



```
DataInputStream readLine()
```



Client / Server - PUT

```
String getData(String params) {
    String line, result;

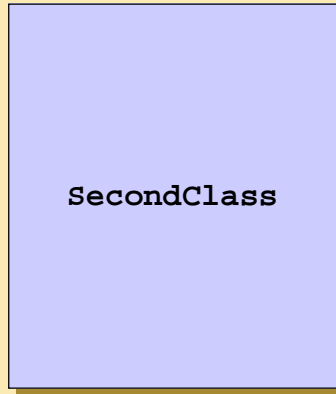
    // Create sockets and streams
    Socket s = new Socket("techweb.cnet.com", 80);
    DataOutputStream os = new DataOutputStream(s.getOutputStream());
    DataInputStream is = new DataInputStream(s.getInputStream());

    // Deliver parameters
    os.writeBytes("POST /cgi-bin/script.pl HTTP/1.0\r\n");
    os.writeBytes("Content-type: application/x-www-form-urlencoded\r\n");
    os.writeBytes("Content-length: "+params.length()+"\r\n");
    os.writeBytes("\r\n");
    os.writeBytes(params);

    // Read results
    while ((line = is.readLine()) != null)
        result += line + "\n";
    return result;
}
```



Delay Code Loading





Delay Code Loading (review)

```
public class A extends Applet {
    SecondClass sc;
    ...
    void m() {
        if (sc == null) { ... }
    }
}

class SecondClass {
    ...
}
```



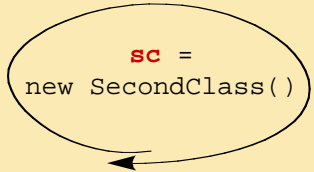
Delay Code Loading (review)

- `new SecondClass()`
- `SecondClass.staticMethod()`
- `if (object instanceof SecondClass)`



Delay Code Loading

```
public void init() {  
    ...  
    start thread ...  
}
```



```
public void update(Graphics g) {  
    if (sc == null) {  
        // tease  
        ...  
    } else {  
        // use sc  
        ...  
    }  
}
```



Delay Code Loading

```
java™ -verbose sun.applet.AppletViewer index.html
```



Font Sizes

Windows95



MacOS





Font Sizes (review)

Font

```
new Font(name, style, size)
```

Font *Font* **Font** *Font* Font Font

Component

```
getFontMetrics(font)
```

FontMetrics

```
getHeight(image, x, y)
```

X | — height
|
— width



Font Sizes

26 pixels high



TimesRoman 26

TimesRoman 25

TimesRoman 24

TimesRoman 23

TimesRoman 22

TimesRoman 21

TimesRoman 20

TimesRoman 19

TimesRoman 18

TimesRoman 17

TimesRoman 16

TimesRoman 15

TimesRoman 14

TimesRoman 13



Font Sizes

```
Font getFont(int height) {  
    Font f;  
    FontMetrics fm;  
    int i = height;  
  
    do {  
        f = new Font("Helvetica", PLAIN, i--);  
        fm = getFontMetrics(f);  
    } while (fm.getHeight() > height);  
    return f;  
}
```




Time (review)



Thread

`sleep(milliseconds)`

Applet

`repaint()`





Time

Thread

sleep(milliseconds)

- AppletViewer - 30 ms
- Netscape - 55 ms



Time

```
adjDelay = delay
```

```
System
```

```
currentTimeMillis()
```



```
sleep(adjDelay)
```

```
repaint()
```

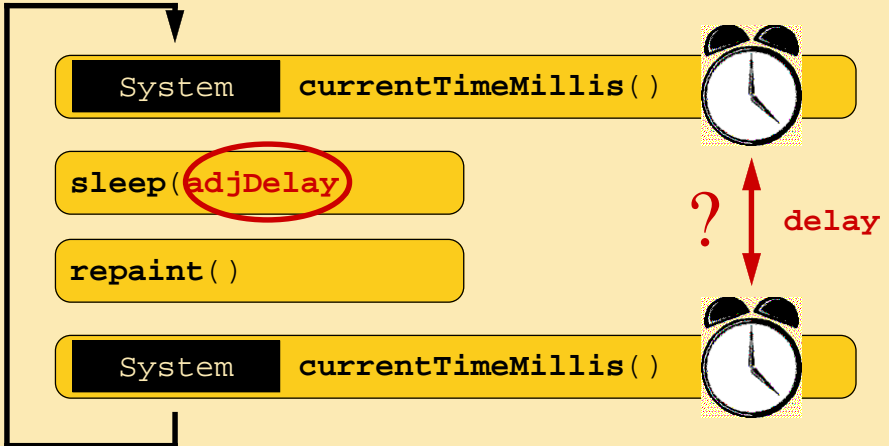
```
System
```

```
currentTimeMillis()
```



?

delay





Time (simplified)

```
int delay;
public void run() {
    int adjDelay = delay;
    long t1 = System.currentTimeMillis();

    while ( <condition> ) {
        Thread.sleep(adjDelay);
        long t2 = System.currentTimeMillis();
        if (t2-t1 > delay)
            adjDelay = Math.max(33, adjDelay-1);
        else
            ++adjDelay;
        t1 = t2;
    }
}
```



Applet Protection

```
<param name=copyright  
value="SuperApp, Patrick Chan © 1996 All  
Rights Reserved. www.xeo.com">
```

```
if (!getParameter("copyright").equals("...")) {  
    throw (new Exception("copyright violation"));  
}
```



Applet Protection

```
<param name=copyright  
value="SuperApp, Patrick Chan © 1996 All  
Rights Reserved. www.xeo.com">
```

```
copyright = getParameter("copyright");  
  
//System.out.println(copyright.hashCode());  
  
if (copyright != -4323493993) {  
    throw (new Exception("copyright violation"));  
}
```




AltaVista

Query:

applet:Hangman

What's New! | What's Cool! | Handbook | Net Search



Tip: Do not use AND or OR

Search

Documents 1-10 (1 duplicate removed) of 33

Hang Duke Demo	[26Jan96]
Hang Duke Demo	[14Dec95]
Hang Duke	[18Mar96]
Hotjava	[19Apr96]
Hangman	[19Apr96]
Hang Duke	[23Dec95]
EduServ Technologies, Inc	[07Apr96]
Hang Duke	[02Feb96]
No Title	[23Mar96]



Miscellaneous

- No MediaTracker
- Use Optimizer (~20% smaller)
- Use CODEBASE