IcedTea and LiveConnect

Thomas Fitzsimmons
Senior Software Engineer
Overview

- gcjwebplugin
- IcedTeaPlugin
  - Motivation
  - Design
  - Future
  - Demos
gcjwebplugin History

- Project Start: July 2003
- First Release: March 2004
- Becomes GNU Project: January 2005
- Merged into GNU Classpath: May 2006
- Disabled in Fedora Core 6: October 2006
- OpenJDK Release: May 2007
- Merged into IcedTea: August 2007
- Released in Fedora 8: November 2007

Maintenance:
- Standalone Releases
- GNU Classpath
- IcedTea
"Thanks for all you[r] work, nice to have a java plugin for x64 browsers now!"

-- Justin Conover

"For me, it is working beautifully!"

-- Antonio Olivares

"check out the iced-tea java plugin for x86_64, works like a champ!"

-- Ben Little

"This is great!"

-- David L
gcjwebplugin Successes

- No browser crashes
- Out-of-process-VM design
- x86-64 port
- ppc and ppc64 ports in Fedora Rawhide
gcjwebplugin Shortcoming

- Most common IcedTea bug report:
  - missing `LiveConnect` support:
    - 10 reports
  - \(~6\%\) of total bug reports in IcedTea, Red Hat Bugzillas
Motivation

Provide LiveConnect support in Fedora.
Plan

Rewrite gcjwebplugin as an XPCOM component. Call the result IcedTeaPlugin.
What is LiveConnect?

- Browser feature
- Allows Java/JavaScript intercommunication
- OJI, XPCOM, LiveConnect

Plugin components:

- JNI implementation, object translator, configuration UI

Browser components:

- applet tag info, JavaScript caller
Progress

First commit: September 2007

Then on-and-off work for 4 months

Then...
This is lifted from a Nick Heinle tutorial.

The applet is embedded in this page, and connected it to JavaScript using a simple function:

```javascript
hello
```

As the other three examples. The point is, however, that this can be made very dynamicText, or any Java app to your site, is to embed it with the APPLET tag.

```html
<APPLET code="dynamicText.class" CODEBASE="file:///home/fitzsim/sources/ICEDPlugin/testpage/example.html" width=300 height=200>
  <PARAM NAME="dynamicTextApp" VALUE="?"
</APPLET>
```
February 16, 2008
JavaScript-to-Java

MatchColor
Status

- ~5600 lines of code
- ~8000 line patch to IcedTea
- Prototype-quality
- Committed to IcedTea repository today
Design Overview

Diagram:

- Plugin
  - Plugin Thread
- TCP connection
  - Main Thread
- Appletviewer
Implementation Details

- Out-of-process-JVM design
- LiveConnect is harder to implement in this way
- Plugin functions that make Java calls:
  - gcjwebplugin: ~5 simple
  - IcedTeaPlugin: ~50 complex
Implementation Details

Argument encoding and decoding

Call: boolean lessThanThirty(int candidate)

- plugin side:
  calling: “(I)Z”, jvalue* → “22”
  returning: jni_type, nsCString → true

- appletviewer side:
  calling: “22”, Integer.class -> new Integer(22)
  returning: true, Boolean.class -> “true”

- Types: Primitives, Object, String, Array
Implementation Details

- Unicode character handling
  - Mozilla uses UCS-2, Java encodes UTF-16
    - still need to handle supplementary characters
  - Mozilla expects UCS-2 string length in characters, not bytes
  - Mozilla built with -fshort-wchar
Implementation Details

- jobject handling
Future Work

- Port to public XPCOM APIs
- Security
- Multithreading
- Exception handling
- Test suite
- Signed applet verification
- Multiple applets on one page
Future Work

- FIXMEs
- Refactoring
- Binary IPC protocol
- Memory auditing
- Fix Mozilla LiveConnect memory leaks
- Win32 testing?
- Package OpenOffice SVG Importer for Fedora
Demo
Thank Yous

- Joshua Sumali
- FOSDEM 2008 organizers
Questions?

Thomas Fitzsimmons
fitzsim@redhat.com
fitzsim.org/blog