

Web Client Development

The Good, The Bad and The Ugly

Michael Grundvig



Michael Bayne



Three Rings

AGC 2007

Game Architectures

- Standalone Game
- Game Portal
- Cohesive Game Portal
- MMO

Standalone Game

- A single game hosted by itself
- Either multiplayer or single-player
 - Most are single-player
- Vast majority are written in Flash
- The most common game architecture

Game Portal

- Numerous unrelated single or multiplayer games
- Ratings, message boards, high score lists



Cohesive Game Portal

- Mostly single-player with non-real-time interaction
- Persistent character or pet
- Message boards, high score lists, gifting of items
- Games generally not related to each other and vary in theme, style, gameplay, etc.



MMO

- Persistent character with graphical avatar
- Everyone in shared virtual space
- Chat, single and multiplayer gameplay



User Expectations

- Fast loading
- Small-learning curve
- Casual gameplay that is fun immediately
- Little or no installation

Dangers of Installation

- Installing a desktop application is very scary
 - Spyware has given users the fear
- Clicking "Yes" on a security dialog is also scary
- Manual plug-in install is error prone and confusing
 - Often requires browser restart
- Automatic plug-in install is sometimes confusing
 - Users miss the little bar at the top of the page
- "Just works" is ideal: game plays right in the web browser

Web-based Client Technologies



Flash



AGC 2007

Flash's Benefits

- Makes up the vast majority of online games
- Rapid development life cycle
- Extremely high plug-in penetration >98%
- Plug-in virtually eliminates platform-specific issues
- Built-in support for TCP-sockets making multiplayer games easier to develop

Flash's Limitations

- Easy to learn but difficult to master due to quirks
- Applications are a single binary file plus other text files for classes
 - Easy for multiple developers to work on classes
 - Difficult for multiple devs to work on the FLA file
- It's almost too flexible
 - Can put code everywhere and easily create a mess
 - AS3 improves but doesn't eliminate this problem

Flash Details

- How does rendering work?
 - Vectors look good but are slow
 - Bitmaps are fast
- Obscure security model
 - Any external resource requires a cross domain file of some sort
- Virtual Machines
 - Two separate virtual machines: one that handles AS1/AS2 and one that handles AS3 only

Flash Tips

- Use FlashDevelop for classes
- Save often and use multiple files or version control
- Write your own IDE extensions for common tasks
- CacheAsBitmap is great, but understand its use first

Flash Libraries

3D

- Papervision 3D <http://osflash.org/papervision3d/>

Physics

- Flade (AS2) <http://cove.org/flade/>
- APE (AS3) <http://cove.org/ape/>

General Utility

- AS3CoreLib <http://code.google.com/p/as3corelib/>
- AS3 Data Structures <http://lab.polygonal.de/ds/>

Multiplayer Game Servers

- Flash Media Server <http://www.adobe.com/>
- ElectroServer <http://www.electro-server.com/>

Flash Resources

- Flash Coders and Flex Coders mailing lists
 - <http://chattyfig.figleaf.com/>
- FlashKit.com Forums
 - <http://board.flashkit.com/board/>
- Actionscript.org
 - <http://www.actionscript.org/>
- Adobe Newsgroups
 - <http://www.adobe.com/support/forums/>

Java



AGC 2007

Java's Benefits

- Cross platform runtime
 - PC, Mac OS, Linux (and BSDs), phones, PDAs
- Modest installed base and improving: >50%
- Excellent documentation
- Can use same technology on client and server
- Mature, skinnable UI toolkit (Swing)
- Huge body of (open source) tools and libraries

Java's Limitations

- Modest installed base, plugin install not ideal
 - Plugin installation takes a long time (7+ megs)
- Plugin/JVM startup time is long
 - 5-20s: time++ between clicking and having fun
- Good 2D API, but no stock API for animation
- No low-latency sound API (better in 1.5) (see 1)
- Not supported on consoles

Types of Java Client

- Unsigned applet
- Signed applet
- Java Web Start application
- Signed applet launcher which launches application
- Standalone application

Java Tips

- Bundle code, images, other media in one jar
 - Use `ClassLoader.getResourceAsStream()` to load data
- Use Proguard to reduce shipped application size
- Combine signed and unsigned code
- Learn about managed (1, 2) and volatile images (1)
- Use `System.nanoTime()`, not `System.currentTimeMillis()`, beware of `Thread.sleep()`

Java Tools

IDEs

Eclipse, IntelliJ

Debuggers

Eclipse's, JSwat, ODB

Profilers (Memory, CPU)

YourKit, JRat, JBoss Profiler,
Profiler4j

Build Tools

Ant, CruiseControl, Maven

Useful Tools

Proguard, PMD, Checkstyle

Neat Stuff

JavaFX, Processing

Java Libraries

3D Graphics

LWJGL - OpenGL wrapper

JOGL - OpenGL wrapper

jME - scene graph engine

Xith - scene graph engine

2D Graphics

SPGL - Sprites, Particles, Misc geom
(uses LWJGL)

Slick - Sprites, Input, Tiles (uses LWJGL)

Nenya - Sprites, Isometric engine,
Character compositing, Audio/Music,
Image management (uses Java 2D)

Physics

ODEJava - Uses native ODE library

Phys2d - Pure Java

Multiplayer Game Servers

Narya, Vilya - client/server I/O, parlor
game, puzzle game, world frameworks

Darkstar - client/server I/O, migratory
code, persistence

General

Jakarta Commons - XML processing, data
structures, I/O, utilities

Java Resources

- Java.net Forums - <http://forums.java.net/>
- Java.net Games - <https://games.dev.java.net/>
- Java Bug Database -
<http://bugs.sun.com/bugdatabase/>
- Gamedev.net Forums -
<http://www.gamedev.net/community/forums/forums/>

AJAX



AGC 2007

What is AJAX?

- Building a web UI programmatically rather than via HTML
- Making asynchronous calls back to server, updating UI with results
- Written using JavaScript (or Java) and CSS

AJAX Benefits

- Application-like experience in the web browser
- Substantially reduced client/server traffic
- Can do some fancy graphical effects
- Can maintain state on the client
- CSS is a (mostly) great way to skin a UI
- Single threaded runtime reduces foot shooting

AJAX Limitations

- Browser was not designed to be an application development platform (rather it evolved)
 - Grievous lack of developer tools
- Firefox, IE, Safari and Opera are all incompatible in sneaky and annoying ways
- No asynchronous I/O, just request response
- Limited 2D drawing capabilities
 - Firefox, Safari, Opera have <canvas>, IE sort of

AJAX Interoperability

- Combine Java/Flash with JavaScript
 - APIs exist for calling into and out of both
- Be careful with applets/Flash and layers
 - Use wmode attribute (only works on Windows)
 - No way to layer Java applets
- Use JSON to pass data around
 - Flash and Java libraries exist for en/decoding

Libraries and Frameworks

- YUI - Yahoo! User Interface Library
 - Used by Yahoo! for their websites
 - UI Framework (programmatic)
 - Animations
- Dojo
 - UI Framework (declarative and programmatic)
 - Dojox extensions: animations, layout, crypto, etc.
- GWT - Google Web Toolkit
 - Translates Java into JavaScript
 - UI Framework (programmatic)
 - Built-in custom RPC mechanism

Development Tools

- Firebug (Firefox plugin)
 - DOM inspection
 - CSS inspection and runtime modification
 - JavaScript console, runtime execution of code
- MS Script Editor (IE plugin)
 - JavaScript debugger
- IE WebDeveloper
 - DOM inspection
 - JavaScript console

Questions?

Contact

Michael Grundvig - mike@electrotank.com

Michael Bayne - mdb@threerings.net

Slides

http://samskivert.com/work/2007/agc/web_client_dev.pdf

AGC 2007