

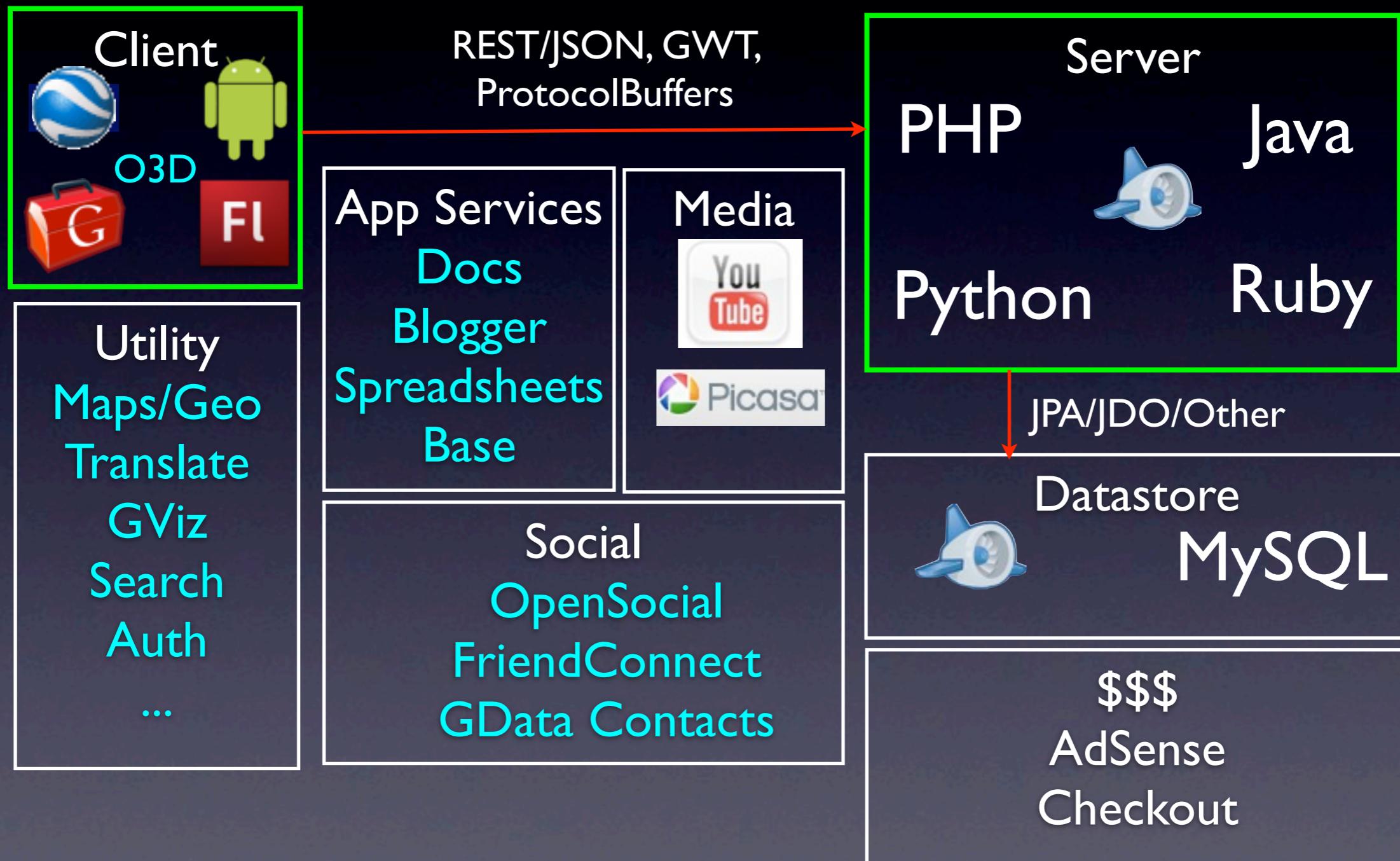
Building Applications with Google APIs

Ray Cromwell

“There’s an API for that”

- code.google.com shows 60+ APIs
- full spectrum (client, server, mobile, cloud)
- application oriented (android, opensocial)
- **Does Google have a Platform?**

Application Ecosystem



Timefire

- Store and Index large # of time series data
- Scalable Charting Engine
- Social Collaboration
- Story Telling + Video/Audio sync
- Like “Google Maps” but for “Time”

Android Version

98% Shared Code with Web version

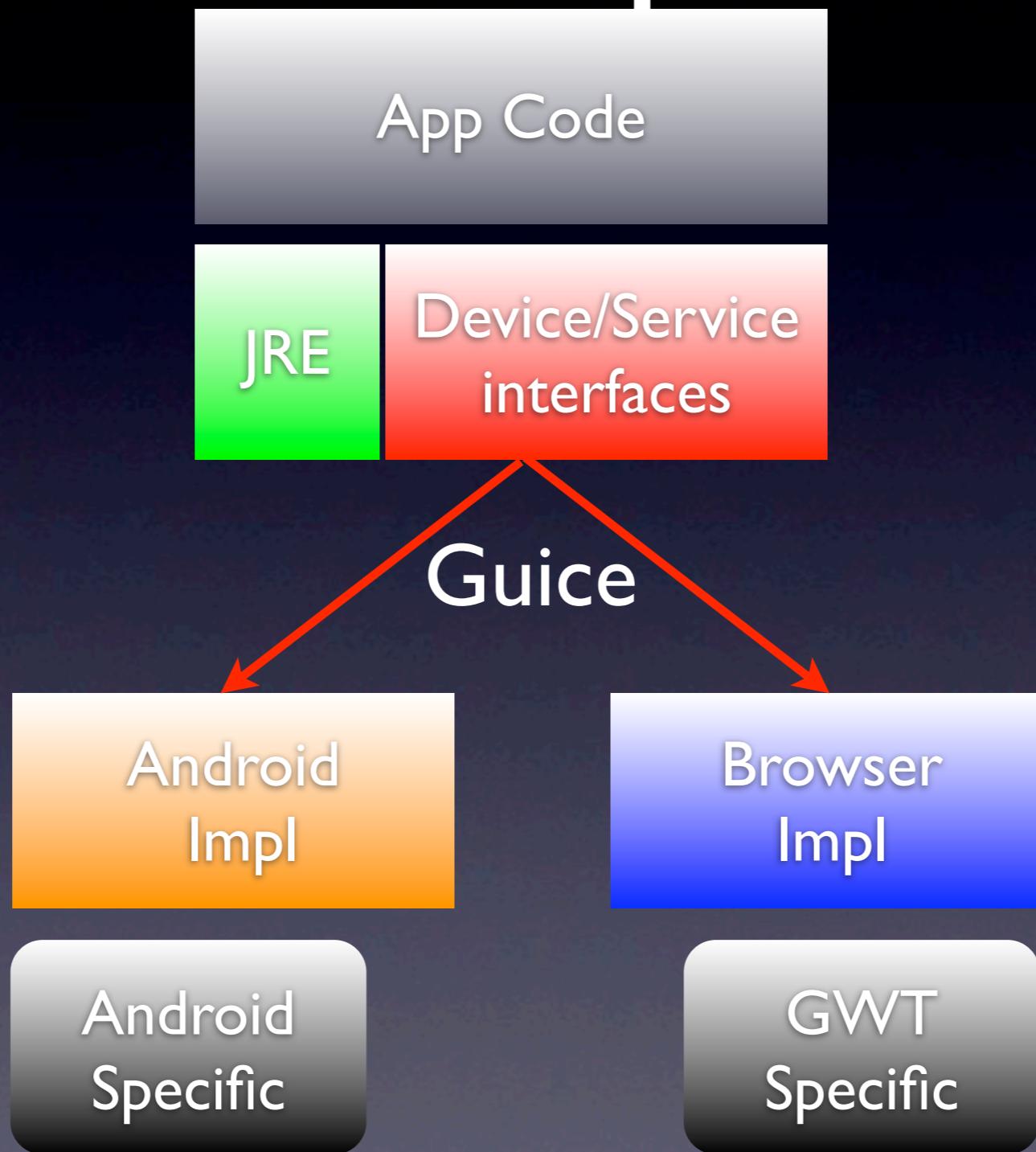
Android

- Full API stack
- Tight integration with WebKit browser
- Local database, 2D and 3D APIs
- External XML UI/Layout system
 - Makes separating presentation from logic easier, benefits code sharing

How was this done?

- Google Web Toolkit is the Foundation
- Target GWT JRE as LCD
- Use Guice Dependency Injection for platform-specific APIs
- Leverage GWT 1.6 event system

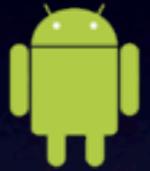
Example



Shared Widget Events



interface HasClickHandler



interface HasClickHandler



addClickHandler(`injectedHandler`)



addClickHandler(`injectedHandler`)



Gin binds `GwtHandlerImpl` to
`injectedHandler`



Guice binds `AndroidHandlerImpl` to
`injectedHandler`

Guice

- Dependency Injection API like Spring
 - Without the XML cruft!
 - Very terse, method chaining syntax
 - Compact, yet Powerful
 - Works on Android, AppEngine, GWT

Gin (Guice for GWT)

- Supports most of Guice API
- Leverages GWT compile-time Generators
- Lightweight and efficient

Dependency Injection

```
public class Checkout {  
    @Inject  
    public Checkout(OrderProcessor proc) {  
        this.processor=proc;  
    }  
}
```

vs

```
this.processor = OrderProcessorFactory.create();
```

List of APIs Used

OpenSocial	GWT	Android
Friend Connect	Contacts	Analytics
Gadgets	GViz	Maps
Spreadsheet	YouTube	Checkout
Guice	AppEngine	Blogger

Social

- I want to:
 - Get Friends
 - Send messages
 - Post Activities
 - OpenSocial/Google Friend Connect
 - Google Data Contacts API

Social Implementation

Option 1 - Android REST, GWT JS wrapper



JSNI calls to container APIs



Fetch REST urls from client

Option 2 - Android REST, GWT RPC REST



Fetch REST on Server via RPC



Fetch REST urls from client

Option 3 - Android, GWT -> Server REST



Fetch REST on Server via RPC



Fetch REST on Server via RPC

Implementation Cont

- Introduce ShareProvider interface
 - getContacts/sendMessage/logActivity
- Use Guice to inject one of the impls
- Option 3 requires only 1 impl.

Portability Pattern

- Stick to GWT JRE classes if possible
- Hide platform details behind interfaces
- Use Guice to inject on Android and GWT

Client Server Communication

- REST with JSON or XML
- ProtocolBuffers
- GWT RPC

REST

- Serialize/Deserialize to JSON or XML
- Pros: Portable to any client
 - Efficient for Browser
- Cons: Hard to tell if someone changes something
 - May be less efficient for mobile, android

ProtocolBuffers

- Used internally by all Google Services
- Compact and Fast
- Composeable
- Forward-compatible messaging
- No polymorphism

GWT RPC

- Easy to use with GWT
- Reasonable performance
- Works with Java type system
- But what of other clients, like Android

GWT RPC on Android with Guice/Gin

- Inject implementation of RPC interface
- Use `java.lang.reflect.Proxy` to dynamically implement methods
- Use `SerializationStreamWriter` to encode method invocation with parameters
- Use `HttpClient` to perform network I/O

User Management

- Needs:
 - Manage profile
 - Authenticate
 - Authorize
- “Google Accounts” API on AppEngine
- OpenID Relying Party/oAuth

Data Management

- Traditional: RDBMS
- AppEngine (BigTable)
- Document-Oriented (Spreadsheet)
 - GData APIs
- JDO/DataNucleus can address all three.
- What of client storage on Android/HTML5?

Gadgets

- Deployable bite sized applications
- Runs on
 - portals like iGoogle
 - OpenSocial containers (MySpace, etc)
 - Google Friend Connect sites
 - In Maps, Calendar, and Spreadsheets

Visualization

- High level API to number of Google charts
- Javascript and GWT APIs available
- Third parties can submit new extensions/visualizations.
- Third parties can also add new data sources.

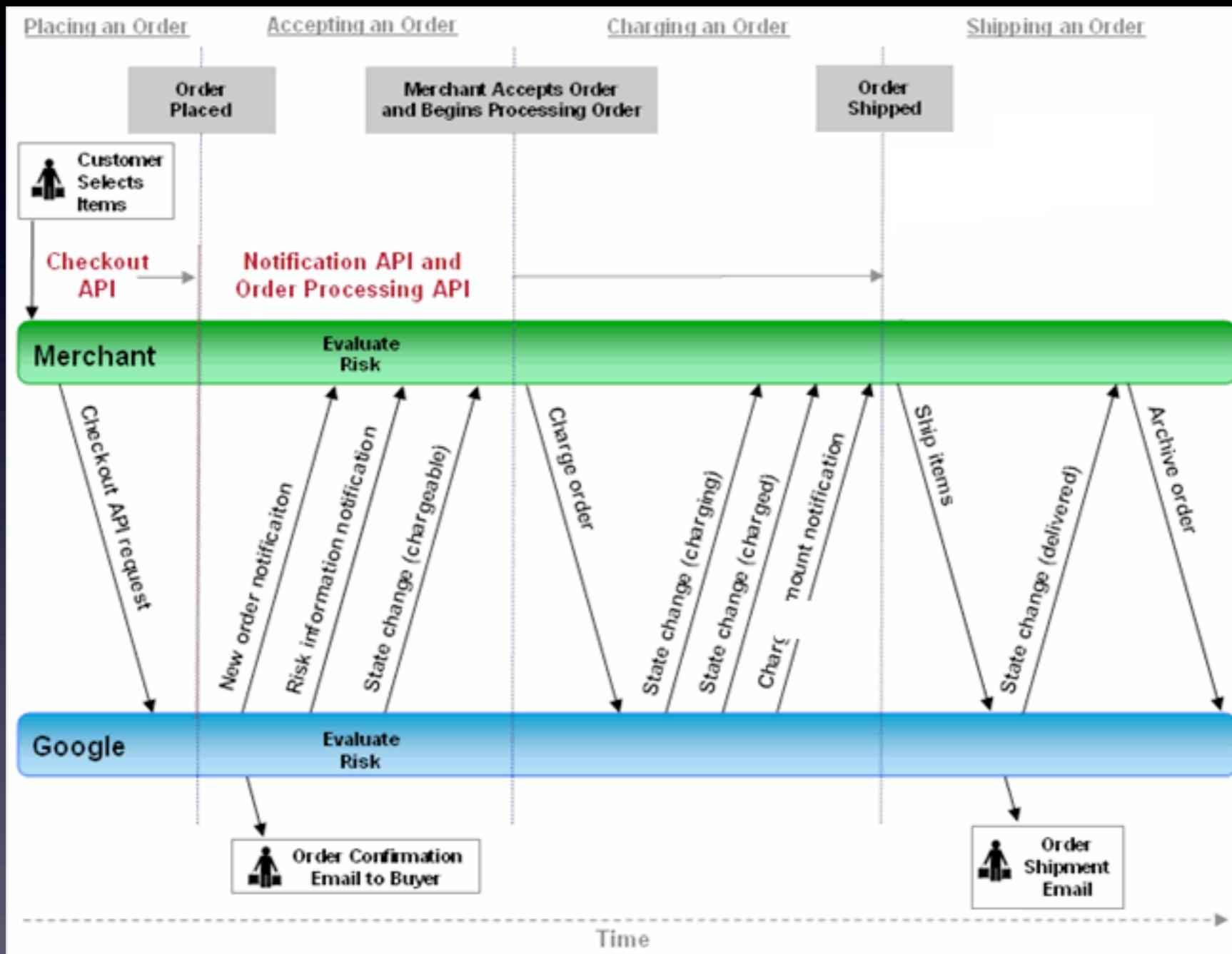
Multimedia

- Picasa GData API
- Youtube GData API
- Youtube Chromeless Player

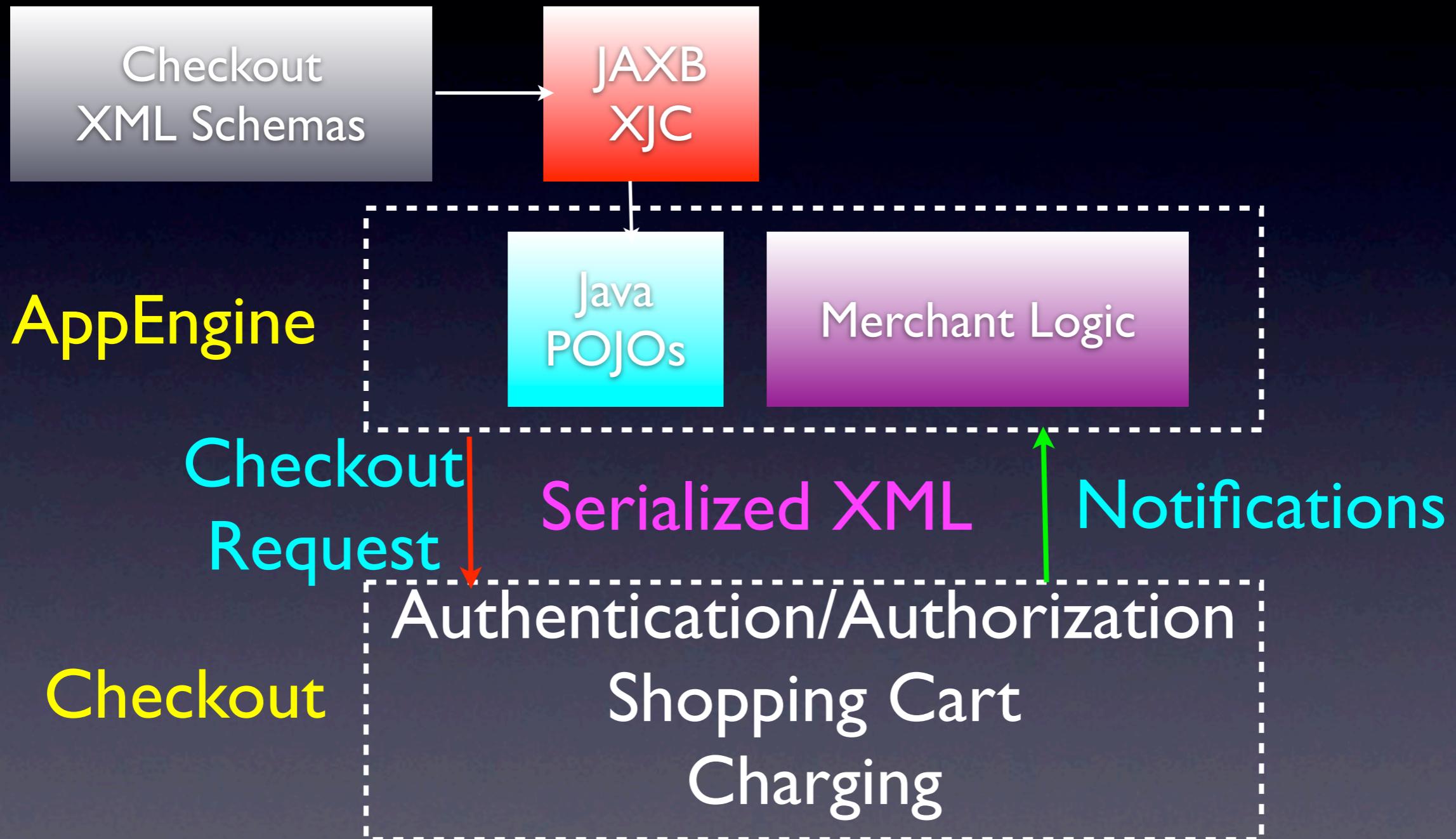
Google Checkout

- Checkout API
- Merchant Calc API
- Notification API
- Order Processing API
- Subscription API

Checkout Flow



Checkout Integration



Small Caveat

- JAXB isn't whitelisted in AppEngine
- Move it to a private package (com.foo)
 - Use JARJAR or IDE refactoring
 - One other 1-line patch needed
- Contact me later if you want a working version

There's more

- 60+ APIs documented on code.google.com
- Many more semi-official APIs in code.google.com/p
- Soft-launched APIs in Labs
- Related APIs provided by projects like Apache Shindig, Chromium, OpenSocial Foundation, Open Web groups.

There's an API for that

- Google provides services for almost all parts of the application stack
- Often based on open specs, libraries released as open source
- Vendor-Lockin can be avoided in some cases (AppEngine JDO)
- One Stop Shopping

Q&A

