

The background features a dark, textured surface with a glowing blue and purple sphere in the center. A white Apple logo is positioned at the top of the sphere. The text "Worldwide Developers Conference" is overlaid on the image. The word "Worldwide" is in a gold, serif font. The word "Developers" is in a white, serif font and is enclosed in a white rectangular border. The word "Conference" is in a gold, serif font. The overall aesthetic is futuristic and tech-oriented.

Worldwide

Developers

Conference



Uncommon Object Model: The Rhapsody Runtime

Object Runtimes Group

Blaine Garst

Toby Paterson

Uncommon Object Model

Reasonable features

- **Dynamic dispatch**
- **Single inheritance of implementation**
- **Multiple inheritance of abstraction**
- **Introspection**
- **Exceptions**
- **Garbage collection**



Uncommon Object Model

Mature frameworks

- **Foundation classes**
 - Collection classes
 - Unicode strings
 - OS abstractions
- **Distribution Model**
- **Persistence Model**



Where Do I Get One?

- Java



Where Do I Get One?

- Java
- Objective-C !!



Java in Developer Release

Mid-1997

- Sun JDK 1.1
- JIT
- Debugging



Java in Premier Release

Early 1998

- Better GC
- Better Performance
- Current JDK (1.2)



Java in Unified Release

Mid-1998

- **Java 2.0, HotSpot**
- **Scalability**
 - Reduced VM memory usage
 - Precompile commonly used classes
 - Scatter-load code and data to reduce memory footprint
 - Share classes between processes



Objective-C

Ten years of refinement

- **Highly tuned, scalable runtime**
- **Mature (dynamic shared) libraries**
- **Development tools**
- **Performance tools**
- **Java style syntax!**



Objective-C: Runtime

- **Meta-data kept in executable**
- **Hash table based dispatching**
- **Freeze-dried selector caches**
- **Dynamic code loading (NSBundle)**
- **Dynamic class creation (!!)**



Objective-C

- **Ten years of refinement**
- **Highly tuned, scalable runtime**
- **Mature (dynamic shared) libraries**
- **Development tools**
- **Performance tools**
- **Java style syntax!**



Objective-C: Modern syntax!

```
NSString description() {  
    NSString here = @"Here: ";  
    NSString tmp = list.description();  
    return  
    here.stringByAppendingString(tmp);  
}
```



Objective-C

What's different

- **Forwarding**
- **Categories (anybody can extend any class)**
- **Class objects**
- **C structs, unions, varargs, pointers...**
- **Swizzling**



The Bridge

Packages map to Objective-C frameworks

- **Java classes map to Objective-C classes**
 - Subclass in Java
- **Bridge handles messaging (this/self, super)**
 - scalars -> scalars
 - exceptions -> exceptions
 - objects -> objects
 - protocols -> interfaces



What Should I Remember About This Talk?

- **Closely working with Sun**
- **JDK, Beans, RMI, AWT, JFC, AFC...**
- **“Yellow Box” in Java on Mac OS, Rhapsody, Windows**





Demo



Q&A

The background of the image is a collage of various items: a magnifying glass with an Apple logo on its handle, a green pen holder with several pens, a globe, and some papers. The text is overlaid on this background.

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