

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. "Worldwide" and "Conference" are in a gold, serif font, while "Developers" is in a white, serif font enclosed in a white rectangular box. The overall aesthetic is futuristic and tech-oriented.

Worldwide

Developers

Conference



Designing Objects for Reuse and Extensibility

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Designing Objects for Reuse and Extensibility

- Audience
- Why design?
- Design patterns
- A simple design technique



Typical Design Stages

Beginning a new project

- **Design the t-shirt**
- **Start coding**



Why Design?

Compare a small business with a large one

- **Design manages complexity**
- **Design helps factor large tasks**
- **Design provides standards**



Design versus Implementation

Compare soldiers and generals

- Object oriented code is easy to generate
- Object oriented architectures are hard to create



Building Object Equity

Code can be created multiple times or invested in once

- **Objects can store an enterprise's information and its procedures**
- **Reuse of these objects increases the fidelity of that enterprise to its principles and goals**



Design Patterns

Your problem may have already been solved

- Object oriented design is maturing
- Design patterns represent architectural-level reuse



Designing for Use

It's important to solve the problem first

- Initial goal must be use, not reuse
- User driven design helps meet that goal



First Order Reuse

Reuse the best objects first

- Use the power of the system
- Get the benefits of rapid prototyping



Second Order Reuse

Have you considered a career in modeling?

- **Create a model of your world**
- **Abstract the details, focusing on the representative**
- **Take advantage of domain experts**



Component Reuse

Not just windows but whole rooms

- **Create larger units**
- **Not just a model, but control and presentation as well**



Designing with a Framework

Consider the composer and the orchestra

- **Portable object design**
- **Understand the backdrop**
- **Move from abstract representation to concrete implementation**



Model View Controller

Separating presentation and control from the thing presented

- **Communication between the layers**
- **Who knows what about whom**



Target Action

Giving the user a richer vocabulary

- **User interface gestures translated into messages to objects**
- **Provides the connection between views and controllers**



Delegation

Know what the user knows

- Custom behavior without subclassing
- Use your controller to manage framework objects



Notification

Notify anonymous observers

- **Broadcast changes to any interested observer**
- **Provides the connection between models and controllers**



Multi-Document Architecture

A standard for standard applications

- **Applications controller, the application's delegate**
- **Document controller, the window's delegate**



Rhapsody Views

The center of an object oriented GUI

- **The special connection between GUIs and views**
- **An inventory of Rhapsody views**
- **Custom views and controls**



Rhapsody Controllers

Connective tissue

- “Throwaway” objects
- Built-in controllers
- Custom controllers



Rhapsody Models

Do it right, do it once, reuse it

- Custom models



Special Techniques in Rhapsody

*Language support for reusability
and extensibility*

- **Categories**
- **Protocols**
- **Class clusters**
- **Loadable bundles**



Extensibility in a Dynamic Environment

Looked at from the right point of view, everything is a plug-in

- Well defined protocols allow any interface to be used dynamically
- Any object that conforms to the protocol can be used instead of original object



Design Techniques

Design is still an art, and as such cannot be taught, but must be experienced

- **Analysis**
- **Decomposition**
- **Modeling**



Design Stages

A process of iterative refinement

- Identify classes and objects
- Identify class and object semantics
- Identify class and object relationships
- Implement classes and objects
- Repeat



Some Simple Techniques

Responsibility Driven Design

- Linguistic analysis
- CRC cards



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