Application and System Architecture

Experience and Lessons Learned
**Coupling & Cohesion**

- **Coupling** is measure of how much the internals of one component depend on the internals of other components
  - Low Coupling means more reuse
  - Plug-N-Play
- **Cohesion** is measure of how much the functions/services of a component belong together
  - High Cohesion means more robust
Responsibility Driven Design

- System Decomposition
  - Divide system into component parts
  - Each with a core focus
  - Well defined interfaces

- Who is Responsible for What?

- Low Coupling, High Cohesion
Abstraction Layers

- Focus on the High Level *What*
  - Don’t worry about the details.
    - That is someone else’s problem

- Recursive System Decomposition
Communications Stack (sort of)
Physical Architecture
Logical Architecture
Communication Patterns

- Tightly Bound Business Process
  - Response to User
  - Process Execution
    - Synchronous Communication (RPC)
      - Wait for answer

- Loosely Bound Business Process
  - Asynchronous Communication
    - Message-Oriented Middleware
    - Database as Middleman
Batch Versus Real-time

- Amazon.com
  - Placing order is real-time
    - Customer needs response
  - Order fulfillment can be batch
    - Physical (offline) processes involved

- The Modern Dilemma
  - Legacy Systems often Batch
  - The World is Moving to Real-Time
Batch Versus Real-Time

Web Application Servers

Scheduled Services Layer

Real-time Service Layer

Mainframe

Database

Modern Glue (WebSphere)
Service-Oriented Architecture

- Good as Abstraction
  - Component Architecture
  - Responsibility Driven Design

- Good as Implementation Mechanism
  - Separation of UI from Business Logic
  - Separation of What from How
SOAP

- One Technology for Service Layer Implementation
- XML as Communication Mechanism
  - Character-Based Neutral Format
    - Business-to-Business
    - Servers with Different Technologies
- Self-Describing Data Structures
  - VOLUMOUS!
  - Can really suck down bandwidth
Enterprise Concerns

- Stability
- Robustness
- Redundancy
- Fail-over
- Recovery

- Organizational Capabilities
- Organizational Biases
Enterprise Concerns

Client-Side Presentation

- Browser
  - HTML
  - Applet
- Wireless
  - WML
- Desktop
  - Java App

Traffic Cop

- Load Balancer
- Client-Side Presentation
  - Web Server
  - Web Server
  - Web Server

J2EE Cluster

- J2EE Container
- J2EE Container

Enterprise Data Store