Architecture Summary

Prepared by Architecture Working Group

Goals and summary: April 4, 2012
Updated recommendation: Nov 7, 2013
Original Goals

- Document Current IT Infrastructure
- High-level Architecture Design
- Review Enterprise Middleware Options
- Devise Interim Plan
- Strategy for transitioning existing applications and web services
- Long-term Enterprise Middleware Plan
- High-level Project Plan / Recommendation
General Requirements

- SOA
- Technology Neutral
- Open Standards
- Sustainable infrastructure
- Integration of new technology over time
- Support current functionality
- Total Cost of Ownership
- Support multiple H/W and OS
- Catalog current architecture
- Plan for existing systems
- Support custom middleware components that adopt open standards
- Support open source and vendor-based components
- Review and amendment over time
- Support key Structural Components (*next slide)
Key Structural Components

- User Interface Stack
- Enterprise Information Systems (Mainframe)
- Enterprise Workflow
- Identity Management
- Security
- Connectivity (DB, O/R mapping, and persistence)
- Data Services (use of data across diverse systems)
- Service Bus
- Web Service Registry
- System Monitoring
- System Logging
- Build & Test Framework
- Development Tools
- Business Intelligence
Architecture Inventory

- Overall System Diagram
  - Posted in SFEE
- Key Component Documentation
  - Posted in SFEE
- jLink Component Documentation
  - Posted in SFEE
Transition to Standards-Based Design
Enterprise Middleware Options

These met our requirements & design:

1. Red Hat JBoss Enterprise Middleware
2. Oracle Fusion Middleware
3. IBM WebSphere
4. Kuali Rice
5. jLink
6. Microsoft Application Platform
7. Hybrid (Tomcat + Java EE 6 Web Profile + Configuration and Monitoring tools + Workflow Engine, SOA registry, etc.)
Enterprise Middleware Options

- Considered 3 additional factors:
  - Total Cost
  - Avoid Home-Grown
  - One ACT Solution

- Resulting list of products:
  1. Oracle Fusion Middleware (possible UC License)
  2. Red Hat JBoss Enterprise Middleware
  3. Hybrid (Tomcat + Java EE 6 Web Profile + Configuration and Monitoring tools + Workflow Engine + SOA registry, etc.)
High-Level Review

Review Criteria (input via online form)

1. Ease of Implementation / Adoption
2. Upfront Cost
3. Adaptable / Maintainable / Extensible
4. Total Cost of Ownership
5. Standards-based Compliance
6. Security
7. Performance / Scalable
8. Reliability
9. Integration
10. Resource Needs
High-Level Review

No Clear Winner

- Total Costs Were left out (items 2 and 4)
- All have similar Standards-Based Compliance (item 5)
- Hybrid option has overall higher ratings due to its flexibility, however components such as ESB, Workflow, Configuration + Monitoring Tools would need to be managed individually
Cost Estimates

Annual Product License and Support Fee

- Oracle Fusion: $240k – $15M
- RedHat JBOSS: $104k
- Tomcat Hybrid: $29k
Interim Plan – up to 1 year

1. Establish Applications Tech Lead Group
   ▶ Serve as new technology vetting committee
   ▶ Discuss best practices, documentation, how to use, how it fits into ACT’s blueprint
   ▶ Details and charter posted in SFEE

2. Adopt the J2EE stack
   ▶ Alleviate limitations of current technologies
   ▶ Identify approved vs. deprecated components
   ▶ Details, chart of libraries, deprecation strategy posted in SFEE
Transition Plan for Existing Apps

1. Port all legacy apps to new product
   - **Pro**: Eliminates all legacy code
   - **Pro**: Brings all technology up-to-date
   - **Pro**: One middleware to support
   - **Con**: A multitude of effort/risk to port everything

2. Gradually deprecate pieces of the legacy middleware
   - **Pro**: Low risk
   - **Pro**: Low upfront cost/effort
   - **Pro**: Less impact on clients
   - **Con**: Continued support for legacy middleware/systems
Deprecate Pieces of Middleware

- Identify alternative approach
- Clearly document alternative approach
- Train developers
- Set date for using alternative approach for new development
- Certain technologies will continue to use jLink until an alternative approach is identified, i.e.:
  - Web Services layer
  - Security layer
- Re-evaluate progress, and set date for transition of additional apps
# References

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Recommendation – Step 1

Key project goals:

- Implement Interim Plan
- Establish Tech Lead Group
- Document Best Practices, Guidelines, Blueprint
- Adopt Relevant J2EE Components
- Implement Deprecation Process

Compile all System Documentation

- Easy-to-access location
- Easy to keep updated
- Available to all of ACT
Recommendation – Step 1

Key project goals:
- Implement Interim Plan
- Establish Tech Lead Group
- Document Best Practices, Guidelines, Blueprint
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- Implement Deprecation Process
- Compile all System Documentation
  - Easy-to-access location
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  - Available to all of ACT
Recommendation – Step 2

Enterprise Architect (work group) to:

- Finalize Comparison of Products
  - Pricing, Installation, Configuration, Integration
- Calculate TCO
- Select Product
- Install New Product
- Transition to New Product
- Hire Consultants to help with above aspects
Jboss Middleware Stack
Start With Key Components
JBoss EAP POC Findings

- Stable and robust
- Clustering and software load balancing
- Enterprise-grade product based on open standards
- Reasonable license cost
  - Note: Already budgeted based on last years assessments
- Easy to adopt
- Large community
Fuse ESB POC Findings

- Red Hat still consolidating 3 ESB solutions
  - Old: JBoss SOA Platform
  - Current: Fuse ESB
  - Future: Fuse Service Works
- License cost is changing
  - Fuse: Fixed price per instance
  - RedHat Fuse: Price by core count
  - RedHat Fuse Service Works: Increased price
Fuse POC Findings (cont.)

- Complicated to use
  - Fuse: Hand code
  - WSO2: Visual creation and transformation tool
Restart of ESB Assessment

- Based on Fuse POC findings, the ESB assessment process was restarted.
- Products reviewed
  - Fuse + JBoss
  - Mule
  - Layer7
  - WSO2
  - Talend
ESB Evaluation Approach

1. Review Reports – Gartner, Forester, Oasis
2. Create Requirements Matrix
3. Watch Youtube Demonstrations
4. Search Community – Blogs, Stackoverflow, Whitepapers, Monster
5. Interview Other Users
6. Vendor Presentations, Architecture, Vendor Websites
7. Proof of Concept Implementation
ESB Selection Criteria

- Functionality
  - Technical Specs
  - Flexibility
  - Modular Architecture
- Quality of Service
  - Performance
  - Security
  - Governance
- Usability
  - Documentation
  - Samples
  - Ease of Use
- Maturity
- Company Size and Vision
- Maintainability
- Support
- Cost
- Community
- Industry Ratings
## Comparison Results

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<tr>
<th>Products</th>
<th>WSO2</th>
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WSO2 POC Findings

- Easy to set up
- Easy to use
  - One-click quality of service attributes, i.e. security
- Flexible license model
  - Fee per instance – can cancel subscription any time.
- Fastest rated ESB
- Smallest overall footprint
ESB Risks

- Fuse ESB
  - RedHat ESB product is evolving and will require migration effort
  - Licensing model is evolving and will require larger investment
  - Steep learning curve will hinder adoption and use

- WSO2
  - Smaller community
  - Potential for buy-out by larger organization
WSO2 Community

- Using and considering WSO2
  - University of Wisconsin Madison
  - UCLA Med Center
  - Boeing, Trimble, Expedia, Stubhub, eBay
  - University of Michigan and NYU (investigating)

- WSO2 Con annual convention held in S.F.
  - November 2013
  - 150 participants (50% using, 50% investigating)

- Online community support
  - www.stackoverflow.com
Recommendation: App Server

- JBoss Enterprise Application Platform
  - Platform for Web Applications
  - Replaces JLink middleware functionality with standard J2EE and industry-standards.
  - Annual support subscription
  - Initial consultant setup & training
Recommendation: ESB

WSO2 ESB

- Platform for creating and managing reusable web services
- Platform for system to system communication
- Replaces JLink middleware functionality
- Visual development tool
- Independent from Web App Server environment
- Annual support subscription
- Quickstart implementation & training
Immediate Use Cases

- eCOI
- Marketplace
- UCPath
- APOL
- Student
- Mobile

- Web Service (6)
- ESB (3)
- Message Queue (3)
- BPM/BPEL (1)
- API Management (2)
Prioritized ESB/Middleware Needs

1. App Server (J2EE stack)
2. Enterprise Service Bus (ESB)
3. Message Queue
4. Web Services (SOAP and RESTful)
5. API Management
6. BPEL/BPM
7. Cloud Connectivity

**Overarching needs: Security & Governance**
Proposed Middleware Services
## ESB References

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JBoss EAP Architecture Design
WSO2 ESB Architecture Design