A Case Study: Developing an Architectural Design Description for the Application Viewpoint

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• Project Context
• Project Charter
• Architecture Approach
• 4+1 RUP views
• Conclusion
• Q&A
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Introduction

- Case study of experience in developing the models of the application viewpoint to produce the Architecture Design Description (ADD)

- Experience on a team project based on a real-world initiative in a global automotive manufacturer

- Team project was part of the requirements of a course in IT System Architecture

- The Application Architecture Viewpoint (AAV) Team followed the S-K Approach to develop the ADD
• Introduction
• **Project Context**
• Project Charter
• Architecture Approach
• 4+1 RUP views
• Conclusion
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Project Context

• Focus is on existing Global Purchasing System (GPS) of the Heavy Vehicle Division of an automotive manufacturer
  – Has a legacy client/server architecture
  – Has dependencies on thick-client software layers

• The Heavy Vehicle Division seeks to
  – Upgrade the Global Purchasing System
  – Deploy a new Global Contract Module.
Project Context cont.

• Who will need access to the new system?
  – 170 existing users
  – 246 future users at distributed locations (assembly plants and office locations)

• The purpose of initiative is to provide all Global Purchasing System users with
  – Required minimum hardware and software prior to implementing the new release of the system
  – Ensure that current users have successful access to the new Global Contract feature and related information
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Project Charter

• The project scope includes analyzing
  – Automotive manufacturing environment
  – Global Purchasing applications
  – User base
  – Infrastructure supporting the legacy purchasing system
  – All other constraints imposed by corporate IT strategies and policies

• AAV Team is tasked to develop the Architecture Design Description (ADD) which includes
  – Baseline application architecture, supporting views, and new architectural models that will achieve the desired outcomes and concerns specified in the project requirements.
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S-K Architecture Approach
## S-K Architectural Framework

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Purpose</th>
<th>Concern/ Principle</th>
<th>Content</th>
<th>Layer</th>
<th>Aspect</th>
<th>Viewpoint Language</th>
<th>Model Portfolio</th>
<th>Standard</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategist (CFO)</td>
<td>Deciding</td>
<td>Business Principles</td>
<td>Overview</td>
<td>Business</td>
<td>Structure</td>
<td>Enterprise Strategic Plan</td>
<td>System Block Diagram</td>
<td>COBIT</td>
<td>MS Visio</td>
</tr>
<tr>
<td>Global CIO</td>
<td>Informing</td>
<td>Business/ Strategy</td>
<td>Coherence-Scope</td>
<td>Business, Technology</td>
<td>Structure</td>
<td>IT Strategic Plan</td>
<td>System Block Diagram</td>
<td>COBIT</td>
<td>MS Visio</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Deciding</td>
<td>Timeliness Efficiency</td>
<td>Details</td>
<td>Application, Technology</td>
<td>Structure, Information</td>
<td>Figure 3: S-K Arch. Process Model, Figure 4: 4+1 RUP</td>
<td>IEEE 12207, IEEE 1058, Pmbok, IBM RUP</td>
<td>MS Visio &amp; MS Project</td>
<td></td>
</tr>
<tr>
<td>Analysts/Tester</td>
<td>Designing</td>
<td>Accessibility to contract data</td>
<td>Details</td>
<td>Application, Technology</td>
<td>Information</td>
<td>Figure 5: Business use case model for GPS, Function table</td>
<td>OMG UML 2.0</td>
<td>MagicDraw &amp; MS Word</td>
<td></td>
</tr>
<tr>
<td>Programmers</td>
<td>Designing</td>
<td>Desired functionality Reduced complexity</td>
<td>Details</td>
<td>Application</td>
<td>Information</td>
<td>Unified Modeling Language</td>
<td>Figure 7: Implementation model (architecture layers) Figure 8: Package diagram, Figure 9: Class diagram</td>
<td>OMG UML 2.0</td>
<td>MS Visio &amp; MagicDraw</td>
</tr>
<tr>
<td>System Integrator</td>
<td>Designing</td>
<td>Dependency on other projects</td>
<td>Details</td>
<td>Application</td>
<td>Structure Information</td>
<td>Unified Modeling Language</td>
<td>Figure 6: Business Process for GPS Figure 7: Implementation model</td>
<td>OMG UML 2.0</td>
<td>MS Visio &amp; MagicDraw</td>
</tr>
<tr>
<td>System Engineering</td>
<td>Designing</td>
<td>Enhanced functionality Maintainability</td>
<td>Details</td>
<td>Application, Technology</td>
<td>Structure Information</td>
<td>Unified Modeling Language</td>
<td>Figure 10: Deployment diagram</td>
<td>OMG UML 2.0</td>
<td>MS Visio &amp; MagicDraw</td>
</tr>
<tr>
<td>End User</td>
<td>Informing</td>
<td>Ease of use</td>
<td>Details</td>
<td>Application</td>
<td>Information</td>
<td>User Training guide</td>
<td>Figure 5: Use case model</td>
<td>COBIT</td>
<td>MS Visio</td>
</tr>
<tr>
<td>Procurement</td>
<td>Deciding</td>
<td>Strategy</td>
<td>Details</td>
<td>Business</td>
<td>Structure Information</td>
<td>System Block Diagram</td>
<td></td>
<td>COBIT</td>
<td>MS Visio</td>
</tr>
</tbody>
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4+1 RUP views

- Logical: the functionality as seen by the end user
- Implementation: the system as seen by the programmers
- Process: view seen by system integrators
- Deployment: view seen by system engineering to be used for installation and delivery
- Use-Case: the high level use-cases that drive the architecture
RUP 4+1 Views

End Use
Functionality

Logical
View

Implementation
View

Programmers
Software Management

Analysts/Testers
Behavior

Use Case
View

Process
View

Deployment
View

System Integrators
Performance
Scalability Throughput

System Engineering
System Topology
Delivery, Installation
Communication

ISECON 2006
Lawrence Technological
University
## Logical View

<table>
<thead>
<tr>
<th>Function #</th>
<th>Function</th>
<th>Function Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F01.01000</td>
<td>Login</td>
<td>All users need to sign on to use the GPS system.</td>
</tr>
<tr>
<td>F01.02000</td>
<td>Logout</td>
<td>When finished with the purchasing business process, user clicks “logout” to sign out.</td>
</tr>
<tr>
<td>F01.03000</td>
<td>Requirement Cycle</td>
<td>Follow corporate statement of work and cost estimates processes and maintain relevant data.</td>
</tr>
<tr>
<td>F01.04000</td>
<td>Requisition Cycle</td>
<td>Access module to perform following functions:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Evaluate specifications</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Confirm sources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Review past performance of sources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Produce solicitation package (bid documents, qualified vendor, proposal evaluation)</td>
</tr>
<tr>
<td>F01.05000</td>
<td>Solicitation Cycle</td>
<td>Access module to support solicitation process and create:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Request for Quote</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Request for Information</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Request for Proposal</td>
</tr>
<tr>
<td>F01.06000</td>
<td>Award Cycle</td>
<td>• Support processes to award contract and store digital contract information</td>
</tr>
<tr>
<td>F01.07000</td>
<td>Global Contract Administration</td>
<td>Access global contract function module</td>
</tr>
</tbody>
</table>
Use-case View

- Captures business requirements of the system at a high level.
- Depicts the collaboration between the external actors (the purchasing manager and vendor) and the individual use cases that comprise the system.
Process View

A process view for the application is captured externally and internally.

- The external part is the workflow configuration for purchase requisitions process of the purchasing process.
- The internal part is the application object process and messaging represented by a sequence diagram.
Process View - Sequence diagram
Implementation View

Describes the organization of static software modules in the development environment in terms of:

- Layering
- Packaging
- Structural building blocks of the system objects
Architecture Layers

- Separating the application into layers to capture business logic in the application layer.

- Each of these layers is meant to be an independent entity that does not include any repetitions; all system functionality is encapsulated in layers.
Package Diagram

- Packages help in organizing applications as well as model elements into groups, making the implementation
  - Simpler
  - Easier
  - More organized
Deployment View

LDAP: Lightweight Directory Access Protocol
Websphere: IBM Application Server
BPM: Workflow capabilities, receiving, routing and reporting
Interwoven: Enterprise Content Management solution
Purchasing Portal Conceptual Infrastructure Architecture

External

Internet

HTTPs/VPN

At Home Workers

Extranet

Network Based IDS

Content Switches

Host Based IDS

EZ Sign-on Agent

Private

Portal Database

Content Management Application

Portal Application

Workflow Application

Interwoven Portal Builder on WebSphere

BPM

Windows 2003 Advanced Server

Windows 2003 Advanced Server

Windows 2000 Advanced Server

Windows 2000 Advanced Server

Windows 2000 Advanced Server

User & Entitlement Stores

User & Entitlement Stores

EZ Sign-on

EZ Sign-on Authorization

EZ Sign-on Authorization

EZ Sign-on Authorization

Windows 2003 Advanced Servers

Windows 2003 Advanced Servers

Windows 2003 Advanced Servers

Windows 2003 Advanced Servers

Master LDAP

Portal LDAP

Division LDAP Sync

WAN

TCP/IP, HTTP(s)

Desktop PC

Desktop PC

Desktop PC

Desktop PC

Division Systems

Mainframe, Windows 2003, UNIX (various versions) Oracle DBs

IE 5.x & Up

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Conclusion

- Case study describes the AAV Team project experience to develop the ADD from the application viewpoint for a real-world initiative in the Heavy Vehicle Division of a global automotive manufacturer.
- Shown the models of the application views of the technical architecture; used the GPS as the application.
- Instantiation of the S-K Architectural Framework for the application viewpoint.
- Architectural models for the application viewpoint were developed using the 4+1 Rational Unified Process (RUP) architectural views.
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Thank you!

Questions???