Extracting and Facilitating Architecture in Service-Oriented Software Systems

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Context

- **SOA in the banking domain**
  - SOA systems based on Java EE, Web Services, host transactions (CICS), .NET
  - Service development and operation is governed by a service lifecycle
  - Service information is managed in service registries/repositories
  - Stakeholders needing architectural information for SOA management activities

- **Problems**
  - SOA information managed in different locations and tools
  - Manual maintenance of SOA information
  - Architecture documentation out of date
  - Manual reconstruction from implementation
LISA Model

- Provides concepts similar to ADLs (e.g., xADL)
- Includes code model similar to AMTs
- Can be bound to different implementation technologies
- Support for AKM and variability management
LISA Toolkit

- Based on LISA Model, integrated in Eclipse IDE
- Views, editors, analysis, continuous synchronization of architecture and implementation
SOA Characteristics and Support

- **SOA**
  - System of Systems (SoS)
  - Different implementation and access technologies (heterogeneity)
  - Different administrative domains
  - Decoupled subsystems
  - Evolution through reconfiguration and adaptation of subsystems
  - ...

- **SOA support in LISA**
  - High-level architectural concepts, support for run-time configurations
  - Bindings to different technologies within one architecture model
  - Support for distributing and combining architecture descriptions from different subsystems and administrative domains
Aims

- Provide architectural information that is consistent and up-to-date
  - Automatically extract architecture
  - Synchronize with EA and SOA management tools
- Support architecture reviews, design and evolution
  - Provide support for architecture visualization, browsing, and review
- Extend and validate LISA approach for supporting SOA-based software systems
Architecture Extraction

- Different parsers, extract and map to LISA models
- Differ in information source, supported abstraction level, supported technology
- Incremental extraction
1. Create component (and service) definitions
   - Component types
     - Java Bean
     - CICS
     - DAO
     - HAO
   - Protocol bindings
     - Web Services
     - EJB/IIOP

2. Create configurations
   - Service and component instances

3. Create connections

Example: XML-Service Configuration
Example: Resulting Configuration
Example: Extract connections from code

```java
package at.pesen.linz.fin.tilungstraeger.services.bean;

import java

public class ...
    ...
    public ...
    ...
    }
    ...
    }

import java

public class ...
    ...
    public ...
    ...
    }
    ...
    }
```
Stakeholders

- **Software architect**
  - Establish company-wide reference architectures and standards, ensure conformance to these standards
  - Interested in system overview and standards conformance

- **Solution architect**
  - Design and evolve a specific solution within a SOA over time
  - Requires more detailed information used for future design activities

- **Application and component designer**
  - Detailed component and interface design
  - Requires information on design of internal services
  - Is responsible for managing information in service registries
Typical questions

- System overview
  - Available services
  - System configuration

- Detailed analysis
  - Service relationships
  - Host transactions
  - Conformance to reference architectures
Available Services

- External Services
- Components
  - BLOs
  - CICS
  - HAOs
  - DAOs
- Configurations
Component/Service Usage

Configurations Using Component/Service: KundensucheService

- FIN_CRM_Services.at.fin_linz.crm.services.Environment
- FIN_CRM_Services.bean
  - KundensucheService
- FIN_CRM_Services.src/java/at/fin_linz/finneu/personen/services/bean/services.xml

Connected Instances

- adresseHAO (Reference) [1..1]
  - Component Instance "AdresseHAO" (Part of Configuration FIN_CRM_Services.hao)
- KundensucheServicePort (Service)
- stammdatenHAO (Reference) [1..1]
  - Component Instance "StammdatenHAO" (Part of Configuration FIN_CRM_Services.hao)
System Configuration – Overview (2)
System Configuration – Overview (3)
System Configuration – Focus Mode (1)
Method Invocation Analysis (1)
Method Invocation Analysis (2)
Method Invocation Analysis (3)
Host Transactions
Experiences

- Continuous adaptation and refinement of approach (action research) with company stakeholders
- Applied approach to several different SOA subsystems, developed by different teams
- Decided to use approach as part of EAM effort spanning whole banking group
- Want to include client architecture and architecture of back-end software (host)
- Decided to provide architectural information in a standardized way to restrict diversity
Current and Future Work

- Provide additional views
- Synchronization with SOA registry/repository
- (Synchronization with EAM tools)
- Export to UML tools for further design activities
- Automatic analysis of conformance to reference architectures
- Enhanced review support through facilitation of AKM and context information
- …
Thank You