Software Service Engineering

Lecture 3:
Service Engineering Methodology
Doc. Guangyu Gao
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✓ Overview of SSE Methodology

✓ Typical SSE Methodology
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✓ Typical SSE Methodology
1. Overview of SSE Methodology

What is methodology?

- a set of particular methods applied in a discipline area.
  - each method solve some particular problems in the discipline area, and consisted with a series processes, activities and tasks.
  - besides “methods”, also including fundamentals, standards, rules, postulates as well as supporting tools obeyed in these methods.

- adopt particular methods and rules in methodology when facing realistic problems.

- the reusable template for problem-solving in a specific domain, and the summary of the best practice.
1. Overview of SSE Methodology

Software Service Engineering Methodology (SSEM)

Software Service Engineering Methodology:
- Be consisted by a whole set of Methods, Rules and Procedures,
- Be Used for Functional Planning, Description/Modeling, Construction for service systems
- To satisfy rapidly changed user requirement with Performance Optimization.
1. Overview of SSE Methodology

- Several Ideas of SSEM
  - 1. focused around the construction phase, but not the running.
  - 2. composed with methods and guiding principles covered in different phases.
  - 3. following uniform engineering principles.
  - 4. aiming to increase efficiency, decrease cost, improve qualities of target system, and reduce the difficult in management and coordination.
  - 5. criteria: easy learning and use? Standard? considering all aspects in service design? Adapting various changes?
1. Overview of SSE Methodology

Methodological Framework

- Service Requirement
- Service Model Specification and Modeling
- Service Framework Design
- Service System Development
- Service System Implementation
- Supporting Environment

Service Domain Knowledge
Service Component Library
1. Overview of SSE Methodology

- **Methodological Framework**
  - Doing survey customer’s requirement, using on-demand ideas to do service design, and to construct a set of **Service Models** with the consensus known between customers and enterprises.
  - Using **Service Development Methods** to transfer service model into available service systems.
  - Evaluate service system for optimization with related **Evaluation Method** for service models/systems to be built or have been built.
  - With corresponding **Development Platform and Software Tools**, to support and realize service modeling, system development as well as evaluation.
1. Overview of SSE Methodology

➤ Methodological Framework

• Including:
  - Service Model Specification
  - Service Modeling Method
  - Service System Development Method
  - Service Performance Evaluation
  - Supporting Tools and Platforms
  - Service System Implementation Guidelines
1. Overview of SSE Methodology

(1) Service Model Specification

- Model-driven

- Communication and Collaboration

Main Contents:
- Graphical model specification, relationship between multiple view model.
- Formal semantic model description.
- Mathematically optimized models.
1. Overview of SSE Methodology

(2) Service Modeling Method

- **Service Modeling**
  - Using appropriate service modeling language, according to specific methods and steps to construct models of target service and service system.

- **Practical business and requirement into service models**

- **Guide** system development and implementation.

- **Main Contents:**
  - Service modeling ≠ drawing.
  - Model refinement
  - Semantics enrichment
  - Model transformation and interoperability
  - Model analysis and verification
1. Overview of SSE Methodology

➢ (3) Service System Development Method

● Service System Development:
  - Developing and Constructing service system according to service models to support service business running and value creation.

● Typical service system development methods:
  - Top-down methods.
  - Bottom-up methods.
  - Domain-based methods.
1. Overview of SSE Methodology

(4) Service Performance Evaluation
1. Overview of SSE Methodology

(5) Supporting Tools and Platforms

- Service system design, development, deployment as well as implementation need be supported by related software tools and platforms.
- Including:
  - Service model specification tools;
  - Service system development tools;
  - Supporting tools for service system development;
  - Service performance evaluation tools;
  - …
- All these tools form the supporting platform.
1. Overview of SSE Methodology

➢ (5) Service System Implementation Guidelines

- Transfer service system from the design and development environment to real customer running environment.
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✓ Overview of SSE Methodology

✓ Typical SSE Methodology
2. Typical SSE Methodology

(1) SOA Service Methodology

- *Service Methodology developed based on traditional software engineering method:*
  - Methodology in service computing, focused on service system with software as the main form.
  - Representative examples:
    - IBM: Service Oriented Modeling and Architecture (SOMA);
    - Sybase: Service Oriented Development of Application (SODA);
    - Service-Oriented Unified Process (SOUP).

2. Typical SSE Methodology

(1) SOA Service Methodology Case: *SOMA*

- Core of SOMA: recognize, design and realize services, components as well as service choreography.

Whatever portion we need, we design and build with parts of SOMA.
2. Typical SSE Methodology

➢ (1) SOA Service Methodology Case: SOMA

Current Business and Technical Architecture

Decompose Business Domain

Create Business Goal/Service Model

Analyze Existing Assets
Componentize Legacy Systems

Top-down

Identify Subsystems, Components, use cases

Specify Enterprise Components

Structure Enterprise Components using Patterns

Allocate Services to Coarse-grained Components

Leverage Component
Service repository

Future Enterprise and Application Architecture

Technology Realization Mapping:
Map Components, Services to Implementation

Service Repository
(2) Model-driven Methodology

- **Highly complex service**: single layer model can’t handle, thus, model-driven based ideas are introduced.
  - Laying the service model, and each layer focus on one phase of the whole development.
  - Building grammar and semantic mapping between models in different layers to transfer models to service system.

- Similar to MDA in software area, corresponding models: CIM, PIM, PSM etc.

- Generally, standard modeling specification of UML, EDOC Profile, BPMN etc. in top layer, realized models with Web service, SCA, BPEL etc. in bottom layer.
2. Typical SSE Methodology

➢ (2) Model-driven Methodology Case

![Diagram of Service Engineering Process, Model Family, and Services System]
2. Typical SSE Methodology

(3) Domain Engineering-based Methodology

- Similar to traditional software reuse process, including three phases:
  - Service domain engineering: to build domain model and domain service system with customers’ requirements in a domain; recognize reusable service components.
  - Service component engineering: to design, develop and management service components.
  - Service application engineering: to configure and adjust domain service system with specific customer’s personality demand to form the corresponding target service system.
2. Typical SSE Methodology

(3) Domain Engineering-based Methodology Case:

- Framework-based service engineering methodology:

- Using service template as service description model, including product model, process model, resource and technology model with form of use case diagram, workflow diagram, service blueprint.

- Two phases: domain modeling and application modeling.
2. Typical SSE Methodology

(4) Semantic-driven Methodology

- For rigor, consistency and accuracy, using formal methods to define semantic (knowledge and specification) of business demand, and then mapping service requirement to specific service design with semantic transformation for corresponding service system.
- i.e. Agent-based service system design method.