4th International Workshop on Principles for Engineering Service-Oriented Systems

Organizers
Patricia Lago (VU University Amsterdam, Netherlands)
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ICSE 2012
Zurich, Switzerland
June 4, 2012
## Agenda 1

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<td>09:15 – 10:30</td>
<td>Session 1 — Keynote: An Internet of Services - Visions</td>
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<td><em>Carl Worms (Credit Suisse AG, Switzerland)</em></td>
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<td>11:00 – 12:30</td>
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<td>• Simulating Awareness in Global Software Engineering: A Comparative Analysis of Scrum and Agile Service Networks</td>
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<td>• Non-Functional Analysis of Service Choreographies</td>
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<td>• Local Model Learning for Asynchronous Services</td>
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<td>- Spicy Stonehenge: Proposing a SOA Case Study</td>
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<td>- Open SOALab: Case Study Artifacts for SOA Research and Education</td>
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<td>- Constraint-Based Invocation of Stateful Web Services: The Beep Store</td>
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<td>- Providing Lightweight and Adaptable Service Technology for Information and Communication (PLASTIC) in the Mobile eHealth Case Study</td>
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### Agenda 3

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<td>• SALMonADA: A Platform for Monitoring and Explaining Violations of WS-Agreement-Compliant Documents</td>
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<td>• PRadapt: A Framework for Dynamic Monitoring of Adaptable Service-Based Systems</td>
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<td>• Exploring the Impact of Inaccuracy and Imprecision of QoS Assumptions on Proactive Constraint-Based QoS Prediction for Service Orchestrations</td>
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<td>• Managing Multiple Applications in a Service Platform</td>
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<td>17:15 – 17:30</td>
<td>Closing Remarks</td>
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Keynote: An Internet of Services – Visions 2012
Carl Worms (Credit Suisse AG, Switzerland)

- **Main SOA Ingredients @ Credit Suisse**
  - Decomposition into coarse-grained components — services expose a business view — not coupled to database design
  - Credit Suisse eXchange Bus (CSXB)
    - Mandatory to use enterprise information bus for integration
  - Central Service Repository (Interface Management System — IFMS)
    - 1,100 services available
    - Service catalog, design tool, governance enforcer, lifecycle management, code generator
  - SOA Governance
    - Quality assurance process enforces policies — IFMS policies are just a subset
Keynote: An Internet of Services – Visions 2

Future of IT at Credit Suisse

5 years
- Mastering of technical debt — complete analysis of the cost of rework — understand the cost of immature development processes
- Industrialization of solution delivery: flexibility of development procedures; tools for development, test efficiency and quality assurance
- New types of business requirements: security and risk tolerance in global distributed environments, business intelligence for big data and analytics

10 years — The Cloud
- Fully-automated data centers with completely standardized HW components
- Strict quality criteria for software: limited size and complexity; well-defined runtime features; 100% tested and error-free; standardized interfaces; decoupled architecture on all classical layers (UI, business logic, data)
- Software will be generated from sophisticated models to be independent from cloud providers
Keynote: An Internet of Services – Visions 3

- Next steps for Internet of Services
  - Globalization of SOA
  - Migration of 2’600 CORBA service operations to web services
  - Consolidation of data flows between front and back offices
  - Adoption (and improvement) of financial industry standards, e.g., SWIFT
  - Global management of the ever-growing software portfolio
Context is home automation for the elderly — high adaptability and dependability requirements

Research problem: how to maintain service dependability in an evolving and non-trustable world

Dependability means that every service meeting its QoS

Work presents an autonomic approach based on dependability objectives — rule-based system determines triggers for system reconfiguration based on dependability values produced by a system monitoring component

Service dependability is determined using a voting-based approach — aggregation algorithm for consumer evaluations/votes (between 0 and 1) for each QoS parameter
Agile service networks are networks of service-oriented applications (nodes) that collaborate on a common task (edges)

Research question: Can ASNs help maintain awareness in GSE (lack of awareness is a problem in Scrum)

Research compared awareness “propagation” for Scrum and ASN — built two prototypes
- For ASN, awareness was implemented using a coordination model in which coordination information is associated with each node (valuable data exchanges)
- For Scrum it was done via scrum masters in a hierarchical structure
- Measured time it took to propagate bug information

Results show that ASNs are much more effective
Q4BPNM is used to express non-functional properties in choreographies in BPMN specifications — performance, security and dependability
- Properties are extracted from SLAs
- Model transformation from KlaperSuite to models that can be analyzed using Markov chains, queuing theory, etc.

Questions can be asked against these BPMN specifications

Future work
- Derive implicit constraints from explicit ones
- Visual improvements — single view of specification and properties
- Integrate KlaperSuite into a BPMN-compliant tool
- Map choreography annotations to individual tasks
- Identify liability for contractual breaches
- Adaptive analysis
How to compose systems if we don’t have behavioral models for all services?

Most active learning techniques use the L* algorithm — works well for synchronous but not asynchronous communication because of non-determinism
- If ended prematurely, L* might not return safe approximate models

Goal is to build a property-enforcing adapter — property expressed as a FSM

BASYL: Black-box asynchronous learning
- Runtime behavior exploration is done against properties

Studies show that BASYL can obtain models precise enough for controller synthesis, although some execution scenarios might be missing
Case Study: Spicy Stonehenge: Proposing a SOA
Case Study
Tiago Espinha (TU Delft, Netherlands)

 SOA research lacks standard tools to compare and validate research results
 Spicy Stonehenge is based on Apache Stonehenge and implements a simulation of a stock market
 Built on top of Turmeric SOA (open-source, used by eBay) — leverages its monitoring features
 Source and instructions: http://git.io/stonehenge
Case Study: Open SOALab: Case Study Artifacts for SOA Research and Education

Thomas Reichherzer (University of West Florida, USA)

- Interested in providing a tested for SOA research as well as teaching resources for SOA-related courses
- Students and faculty build and add new SOA components to the Open SOALab repository. They can then be used in class projects and/or research activities
- Systems: currency exchange (PHP and SOAP), hotel reservation (invokes currency exchange), web auto parts (BPEL, Java, Amazon cloud services)
Case Study: Constraint-Based Invocation of Stateful Web Services: The Beep Store
Sylvain Hallé (Université du Québec à Chicoutimi, Canada)

- Tutorial application for CD store (shopping cart + payment)
- Built to analyze correctness properties of client-service interactions (e.g., data type constraints, message sequence constraints (temporal and data), data-aware sequential constraints)
- Applications: runtime monitoring, model checking, trace validation
- Service is a single stand-alone PHP file where each contract violation is clearly marked
Case Study: Cloud in a Cloud for Cloud Education
Nobukazu Yoshioka (National Institute of Informatics, Japan)

- edubase Cloud — cloud infrastructure built by GRACE (Center for Global Research in Advanced Software Science and Engineering) for academia
- Includes a client monitoring console (similar to the one provided by Amazon EC2)
- Used in a cloud course since this year in which students build their own cloud on top of edubase
Case Study: A Car Logistics Scenario for Context-Aware Adaptive Service-Based Systems
Annapaola Marconi (FBK-IRST, Italy)

- Context is management and operation of a car delivery process from the port to the dealer
- Created a modeling framework for context-aware business processes and services
- Tested for runtime context-aware composition of services and automatic adaptation of context-aware business processes
A Monitoring Data Set for Evaluating QoS-Aware Service-Based Systems
Philipp Leitner (Vienna University of Technology, Austria)

- Case study from the manufacturing domain
- Instrumented end-to-end business processes with steps implemented as services: QoS data, process-specific data and low-level instance data
- Microsoft .NET on top of VRESCo
- Repository artifacts include a data set with monitoring results (~10000 executions) that can be used for comparing algorithms for predicting SLOs, find factors that influence SLOs, mine the impact of different adaptations are applied to the process
Case Study: Providing Lightweight and Adaptable Service Technology for Information and Communication (PLASTIC) in the Mobile eHealth
Luca Berardinelli (University of L'Aquila, Italy)

- PLASTIC: www.ist-plastic.org
- Define context as PDA device context (e.g., high/low power) and network context (e.g., bandwidth)
- Use of combination of tools for MDE — challenge is that tools do not integrate well
- Models and transformations are in the repository
Paper: SALMonADA: A Platform for Monitoring and Explaining Violations of WS-Agreement-Compliant Documents
Carlos Müller (Universidad de Sevilla, Spain)

- QoS specification using WS-Agreement
  - Had to develop a WS-Agreement-compliant specification language because WS-Agreement provide a standard structure but not a standard language (e.g. no single standard for expressing SLOs) — Monitoring management document

- Monitoring
  - Passive monitoring (obtain QoS of service composition) using SALMon

- Detecting and explaining violations
  - CSPs (constraint satisfaction problems) to express SLAs
  - Extended SALMon to include an analyzer — determines if CSPs can be satisfied
  - Violations are explained in natural text if a solution cannot be found

- SALmonADA as a Service: www.isa.us.es/ada.source/SLAnalyzer/
Ricardo Contreras (City University, UK)

- Existing monitoring approaches assume monitoring rules are pre-defined and known in advance (at design time) — not viable in dynamic and adaptive environments
- The main components of the Pradapt framework are a rule adaptor and an execution engine
- Adaptation is based on adaptable pervasive flows (AFPs) — automatically derived at runtime, taking into consideration the current system composition and environment
Paper: Exploring the Impact of Inaccuracy and Imprecision of QoS Assumptions on Proactive Constraint-Based QoS Prediction for Service Orchestrations
Dragan Ivanovic (Technical University of Madrid (UPM), Spain)

- Constrained-based QoS prediction (based on CSPs) can be used at runtime at any point during system execution
  - Formulate a CSP that models QoS for an orchestration instance at the point of prediction
  - Solve the CSP against the given SLO
  - Problem is that it is not always accurate because it is done at design time
- Paper studies the effect of inaccuracy in SLO predictions
- Study shows that introducing inaccuracy does not significantly worsen indicators in most cases
Paper: Managing Multiple Applications in a Service Platform

Jacky Estublier (Universit Joseph Fourier, France)

- In OGSi, composite services are not a platform concept — against information hiding
- Provider visibility should be controlled
- Built a layer on top of OSGi to promote information hiding and service composition
Key Takeaways: Service Requirements for the Internet of Services

- Documentation — Metadata to enable discovery, selection, monitoring and behavior prediction
- Quality — requires more modeling, simulation and testing — translate into more governance
- Adaptability — integration with runtime monitoring and management infrastructures