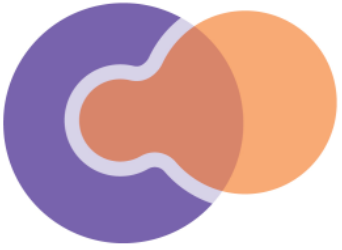

2013 IEEE 7th International Symposium on the Maintenance and Evolution of Service-Oriented and Cloud-Based Systems (MESOCA 2013)

CO-LOCATED WITH THE 29TH IEEE INTERNATIONAL CONFERENCE ON SOFTWARE MAINTENANCE (ICSM 2013)

EINDHOVEN, THE NETHERLANDS
SEPTEMBER 23, 2013

SUMMARY AND NEXT STEPS

GENERAL CHAIR: ANCA DANIELA IONITA
PROGRAM CO-CHAIRS: GRACE A. LEWIS AND MARIN LITOIU

Keynote: Search-Based Optimization Techniques in the Context of SOA and Cloud Computing

Massimiliano Di Penta, University of Sannio, Italy

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Maintenance and Evolution of Service-Oriented and Cloud-Based Systems

- Dynamic composition and binding in SOA
- Service Level Agreement and negotiation
- Automatic reconfiguration of applications
- Optimizing the deployment of load in cloud infrastructure

- Search-Based Software Engineering (SBSE)
  - Many possibilities – in testing, refactoring, prioritizing requirements
  - Choose the best solution based on a fitness function (quantitative evaluation)
- Techniques
  - hill climbing, simulated annealing, genetic algorithms (roulette wheel solution, crossover and mutate operators)
- SBSE in software maintenance
  - Software clustering, software refactoring, automatic bug fixing, concept location (related to reverse engineering), regression testing

- SBSE in SOA
  - Automatic discovery, self-negotiation, composition, dynamic binding, self-healing / autonomic computing
  - Example: SLA negotiation (automatic or partially automatic approaches)
    - Heuristics to generate SLA proposals
    - Fitness for getting feedback about them
    - Negotiation types: bargaining, tendering, auction, combined
    - Aggregating QoS attributes
    - Multi-objective negotiation
    - Automatic vs. human-centric
      - Ask humans; learn the fitness function from the humans

Keynote: Search-Based Optimization Techniques in the Context of SOA and Cloud Computing

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- SBSE in SOA Advantages
  - easy to use, flexibility, good performance
- Challenges for applying SBSE for SOA and CLOUD
  - Determine automatic behavior at run-time
  - Load balancing
  - Run-time replacement of failing behavior
  - Run-time repairing and patching
- Open problems
  - Humans are not in the loop
  - Convergence of some algorithms is not guaranteed
  - Time needed to find a solution (for run-time applications)

Session 1: Migration to SOA Environments

Chair: Mike Smit, Dalhousie University, Canada

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- Structuring SOA migration
  - Pre-planning using concept-refining methodology to choose approach, tools, etc.
  - A defined process that reflects a decade of best practices in the literature
- The next step in migration: workflow automation
  - Moving workflow outside of application boundaries to do end-to-end workflow management on systems-of-systems
- The value of case studies
  - Used by all three papers to illustrate their contributions

A Structured Legacy to SOA Migration Process and its Evaluation in Practice

Ravi Khadka, Amir Saeidi, Slinger Jansen and Jurriaan Hage (Utrecht University, The Netherlands)

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- Background
  - > 100 academic papers on legacy to SOA migration
  - 2 categories: migration feasibility; supporting technology
- A complete migration process
  - Technological, organizational and business perspectives
    - Migration planning
    - Implementation and management
  - Six-phases that cover both planning and execution

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- Challenges
  - Business-IT alignment
  - Componentization
  - Infrastructure engineering
  - Automated toolsets
  - Determine optimal granularity
  - Service versioning
- Evaluation
  - a migration process in a bank
- Discussion
  - Legacy system understanding: technical, or business and process perspectives?
  - Bottom-up and top-bottom approaches

Platform-Based Approach for Automation of Workflows in a System of Systems

Tarmo Ploom (Credit Suisse AG, Switzerland), Axel Glaser (PostFinance AG, Switzerland) and Stefan Scheit (Telstra Corporation, Australia)

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- Problems
  - Processes evolve continuously: structuring and automation
  - The size of systems – business processes at large scale – workflows in systems of systems are hidden
  - Processes going through many applications – up to 200
- Automated processes in a very large scale context
  - Towards a centralized workflow platform
  - Combine SOA and BPM for a system of systems
- Global platform
  - New York, London, Zurich, Singapore

Tarmo Ploom (Credit Suisse AG, Switzerland), Axel Glaser (PostFinance AG, Switzerland) and Stefan Scheit (Telstra Corporation, Australia)

- Plans for the future:
  - increase scalability
  - leverage Credit Suisse SOA
  - transform to software product line approach
- Discussion topics
  - Problems with databases
  - Micro-flows and macro-flows
  - Activities become smaller in time while the automation increases
  - Emergence of SOA platforms

Overhauling Legacy Enterprise Software Applications with a Concept Refinement Process Model

Daniel Knight, Gregory Knight and Nasseh Tabrizi (East Carolina University, Greenville, USA)

- Concerns:
  - Concept refinement - PRIOR to the development process for transforming legacy applications
  - High level understanding
  - Analyze research trends and technologies
  - Identify, conceptualize and analyze remedies and solutions
  - Rapid prototyping for a selected solution
- Discussion
  - Rewrite or reengineering the existing system? – in the prototype phase – reusing existing functionality
  - Does it pertain to the development process (very early aspects of it) ?
  - Case study – migrate a 10 years old system – 6 people involved - a prototype of a mobile application - timeline: 2 months

Session 2: Web Services

Chair: Anca Daniela Ionita, University Politehnica of Bucharest, Romania

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- Reuse
  - Reuse existing classes and methods in an existing object-oriented system as web services in a service-oriented architecture
  - Build the reused services into new business processes
- Web services maintainability
  - RESTful vs. SOAP-WSDL
- Maintenance of Web services tests
  - Automatic Web Service Change Management
  - Efficient regression testing of web services by selecting the relevant test cases to construct a reduced test suite from the existing one, built for a previous version of Web services

Reusing Existing Object-Oriented Code as Web Services in a SOA

Harry M. Sneed (ANECON GmbH, Austria), Chris Verhoef (Free University, The Netherlands) and Stephan H. Sneed (MetaSonic AG, Germany)

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- Bottom-up approach to collecting Web services
- Code mining: C++, C#, Java
- Generate WSDL interfaces, SOA diagram, documentation and test scripts
- Reuse services into new S-BPM business processes
  - Generated BPEL process
- Conclusions and discussion
  - Using existing code – quick, cheap, not extensively used
  - Legacy classes – potential services
  - Identify methods that include a business rule
  - A GUI software is not a candidate for a Web service

Ricardo Ramos de Oliveira, Robson Vinícius Vieira Sanchez, Júlio Cezar Estrella, and Renata Pontin de Mattos Fortes (Universidade de São Paulo, São Carlos - SP, Brazil), and Valério Brusamolin (Centro de Telemática, Curitiba - PR, Brazil)

Experiment with students

- University of Sao Paulo, Brazil
- Variables, e.g. programming language

- Analysis results for adaptive maintenance:
  - Modifiability sub-characteristics
  - Time spent on web services maintenance
  - RESTful web services are better on the server side –
  - SOAP-WSDL web services better on the client-side
- Discussion
  - What is the cause for this difference at the server side? WSDL is more rigid than REST.
  - Metric: Cyclomatic complexity

A Tool-Supported Approach to Perform Efficient Regression Testing of Web Services

Animesh Chaturvedi and Atul Gupta (Indian Institute of Information Technology, Jabalpur, India)

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- Problems with regression testing
  - detect changes in WSDL (XSD) or at code level
- Construct a reduced test suite based on the old one
  - Delete, insert and modify operations
  - New reduced test suite
- Cost metrics proposed
  - Number of operation in WSDL / changes / code lines
  - Effort required
- Case studies
  - Eucalyptus, Amazon WS, Bible WS, currency converting WS etc.

Session 3: Migration to Cloud Environments

Chair: Grace A. Lewis, Carnegie Mellon Software Engineering Institute, USA

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- Why migrate to cloud environments?
  - Business agility — deployment and configuration
  - Focus on higher-value activities
  - Cost — from capital expenditures to operating expenditures
- Remains challenging
  - Not all applications and all data are meant for the cloud
  - Not all applications and all data are ready for the cloud

Top 10 Enterprise Applications for Public Cloud

1.Development and testing
2.Development platform services
3.Training servers
4.One-time big data projects
5.Websites
6.Customer relationship management
7.Project management, expense reporting and time management
8.Email
9.Human resources
10.Cloud-based anti-spam and anti-virus services

Source: http://www.infoworld.com/d/cloud-computing/top-10-enterprise-applications-public-clouds-196147

- Availability, reliability, data integrity
  - Another potential benefit: energy efficiency
- Delegating data management to the Cloud
  - Determine energy waist due to data management
  - Value of energy metrics
  - Industrial case study: Dutch telecommunications provider
- Data classification criteria:
  - Retention
  - Frequency of usage
  - Modification
- Discussion: adding privacy to the criteria

Cloud Modernization Assessment Framework: Analyzing the Impact of a Potential Migration to Cloud

Juncal Alonso, Leire Orue-Echevarria, Marisa Escalante (Tecnalia, Spain), Jesús Gorroñogoitia (Atos, Spain) and Domenico Presenza (Engineering, Italy)

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- ARTIST project
  - transforming legacy code to SaaS
  - Model-driven reverse engineering
- Pre-migration phase
  - Maturity assessment, technical & business feasibility analysis
  - Assess the risks of migration to Cloud
    - Cost, ROI, effort estimations
- Case study: Java PetStore

Invited Presentation: Tales of Empirically Understanding and Providing Process Support for Migrating to Clouds

M. Ali Babar (Lancaster University, United Kingdom)

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- Case studies in industrial and academic environments
  - Topics: decision support, processes, architecture
  - IT University of Copenhagen – the first migration to Cloud in the Danish Public Sector – e-mail system
  - Tools as a Service (TaaS) –large scale distributed teams of software developers
- Challenges
  - Location specific – domain and legal experts
  - Strategy for moving back
  - Migration education – lack of knowledge and skills

Session 4: Architecture

Chair: Marin Litoiu, York University, Canada

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- Autonomic support for Cloud systems
- Architectural issues
- Towards multi-clouds

Design and Runtime Architectures to Support Autonomic Management

Etienne Gandrille, Catherine Hamon (Orange Labs, France) and Philippe Lalanda (Grenoble University, France)

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- Architectural elements for autonomic computing
  - Dynamic composition at run-time
  - Resource availability is unpredictable
  - Administration difficulty: missing the documentation
  - The run-time architecture - conforming to the design one
  - IBM approach: MAPE-K
- Validation:
  - digital home services
  - Use case: pervasive health domain / Orange Labs – determine abnormal tracks indicating behavioral changes, which are signs of serious problems
- Cilia Framework

- Types of migration
  - From in-house to cloud resources
  - From one provider to another / or to multiple others
- X-Cloud Application Management Platform
  - Platform that enables developers to deploy and manage applications on cloud systems
  - Application-driven interfaces and language instead of specific provider terminology
  - Pattern-based deployment service
  - Built on stream processing

- Case studies:
  - 3 Tiers Web application
    - Load average and response time
    - Management logic throughput
  - Smart Applications on Virtual Infrastructure (SAVI)
    - Pan-Canadian network of researchers and systems

Session 5: Cloud Monitoring and Processes

Chair: Muhammad Ali Babar, Lancaster University, United Kingdom

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- PaaS Migration: Architectural Concerns and Patterns
  - Statelessness and data externalization are solutions for elasticity and performance
  - Relational to NoSQL – data migration and verification
  - Skill shortage can pose significant problems
- Monitoring Adaptive Service-Level Agreements
  - Monitoring infrastructure must adapt according to the changes in underlying environment
  - Multi-source monitoring for adaptive SLA following the evolution of the Cloud infrastructure

PaaS Cloud Migration — Migration Process, Architecture Problems and Solutions

Claus Pahl and Huanhuan Xiong (Dublin City University, Ireland)

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- Layers
  - Consultation
  - Infrastructure assessment and requirements
  - Software development
  - Provisioning
- A basic solution, then a scalable one
- Techniques
  - Stateless programming
  - Databases for state management
  - Data externalization for resiliency
- Test case: 10 servers, 1000 users

Adaptive SLA Monitoring of Service Choreographies Enacted on the Cloud

Antonia Bertolino, Antonello Calabrò and Guglielmo De Angelis (Istituto di Scienza e Tecnologie della Informazione "A. Faedo", Italy)

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- Orchestration and choreography
- Adaptation of the monitoring infrastructure to keep track of the environment evolution
- Functional and non-functional service monitoring (check the SLA)
- Multi-source monitoring

MESOCA 2013 – NEXT STEPS

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- Proceedings available at: icsm2013.tue.nl/MESOCA2013.pdf
- Introduction and summary slides will be on the web site:

http://www.sei.cmu.edu/community/mesoca2013/

- Presenters, please send us your presentations in PDF format so I can put them on the web site.
- Extended versions of selected accepted papers will be considered for publication in the Journal of Systems and Software by Elsevier!
- Get ready for MESOCA 2014!

MESOCA 2014

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Maintenance and Evolution of Service-Oriented and Cloud-Based Systems

- Co-located with ICSM 2014 in Victoria, British Columbia, Canada, September 20 - 26, 2014
- Tentative date: September 21, 2014
- General Chair: Anca Daniela Ionita
- Program Chairs: Muhammad Ali Babar, Mike Smit
- Steering Committee: Grace A. Lewis, Marin Litoiu
- Name: 2014 IEEE 8th International Symposium on the Maintenance and Evolution of Service-Oriented Systems and Cloud-Based Environments
- Increase size of the event

SEE YOU NEXT YEAR! TELL YOUR FRIENDS!