



2012 IEEE 6th International Workshop on the Maintenance and Evolution of Service-Oriented and Cloud-Based Systems (MESOCA 2012)



SUMMARY

**28TH IEEE INTERNATIONAL CONFERENCE ON SOFTWARE
MAINTENANCE (ICSM 2012)**

**RIVA DEL GARDA, TRENTO, ITALY
SEPTEMBER 24, 2012**

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

Opening Keynote: SOA and Cloud — Experiences from a Large Enterprise

Carl Worms, Credit Suisse AG



- **One central IT division with people in 64 different legal entities globally — 50,000 employees where 1/3 company employees are either internal or external IT — not surprised, banks nowadays about data processing — 6,000 applications — 4 releases per year, which is why they call themselves a “maintenance shop”**
- **IT architecture disciplines: three horizontal layers: business, application and technical/platform; four cross-cutting layers: data, integration, security and systems management — all surrounded by IT architecture governance and processes**
- **5 years of Cloud @ Credit Suisse (private cloud)**
 - IaaS: Compute Hosting Platform (CHP)
 - PaaS: DB Hosting Platform, Application Platform (AP)
 - SaaS: Applications — Just started looking at public cloud for applications that do not manage sensitive and/or customer information, such as order management — banking is delicate because trading algorithms and pricing are current differentiators
- **Main Cloud Use Cases is application development and operations — ordering capacity, deployment, testing (several stages), infrastructure change management — main challenge is packaging applications to work on the pre-provisioned platforms**
- **Cloud design**
 - Top-down design approach — standardized features
 - Think-out-of-the-box for new environment — avoid legacy lock-in
 - Use unchanged vendor products for design exploration and proofs of concept
 - Strive for radical simplicity — avoid early optimization of last 5-10%
 - Make everything automatable
 - Hide actual implementations/products behind abstracted service APIs
 - Design for use in all environments (test/secure server/DMZ, branches)
- **Cloud design principles — clouds will force you to layer applications**
 - Location independence
 - Placement independence
 - Cloning
 - Dynamic in-place configuration
 - Horizontal scalability
 - Capacity is allocated in fixed-sized chunks
 - Eco-system automation with service APIs
 - High degree of automation
 - No client login
 - Infrastructure service APIs
 - Avoid vendor dependencies
- **Expect migration to cloud to take 10-15 years, similar to what it took them to migrate from mainframes to client/server**

Opening Keynote: SOA and Cloud — Experiences from a Large Enterprise

Continuation ...



- **15 years of SOA @ Credit Suisse**
 - Part of the integration architecture
 - Started in 1997 with CORBA and the Credit Suisse Information Bus — moved to Global SOA in 2005 along with DiMA (Disentangling the Mainframes) — Enterprise SOA in 2008
 - Main components
 - ✦ Decomposition into components — expose a business view — not coupled to database design or existing data structures
 - ✦ Credit Suisse eXchange Bus (CSXB) — includes an Interface Management System (IFMS), service integration mechanism (sync, async and bulk), portal integration for service composition across business domains, and a OneBank BPM Platform (OBPM)
 - ✦ Central service repository — IFMS is key to manage 1,100 services — developed in-house — serves as a service catalog, design tool, governance enforcer, lifecycle manager and code generator
 - ✦ SOA-related roles — the IFMS user community — service designer, service reviewer, service developer, and service portfolio manager
 - ✦ SOA governance — quality assurance process — three step process: integration architecture team (do we need it?), cross-functional review team (well designed?), tool and process support (implemented as specified?)
- **Experiences**
 - Availability drives use — 80% of transactions implemented via services
 - Reuse is very uneven — average is 4 (4 different applications use a service)
- **Challenges and next steps**
 - Establish PaaS for standard application platforms on top of their IaaS
 - Globalization of SOA within Credit Suisse — standardization of data structures, global support organizations, technical migration of 2600 CORBA services to Web services
- **Research topics (see presentation)**

Paper Presentations

Chair: Marin Litoiu, York University, Canada



- A recent survey of cloud adopters shows the advantage of cloud applications over on-premise applications and the trend for migrating to the cloud
- But, there are challenges, mainly related to application-to-application integration and mobility access
- Discussion points
 - What is the role of processes?
 - Is SOA the answer for integration?
 - What is the role of policies?

Cloudstep: A Step-by-Step Decision Process to Support Legacy Application Migration to the Cloud

Nabor Mendonça (University of Fortaleza (UNIFOR), Brazil)



- Joint work between software process and reengineering groups at the university
- Driven by lack of a systematic process to guide project managers and application developers in making informed cloud selection and migration decisions
- Cloudstep helps with the identification and analysis of relevant cloud migration factors
- Feasibility/matching based on profile-based characterization of organizations, applications, and cloud providers (more applicable to IaaS, but can be used for PaaS or SaaS)
- Constraints include financial, organizational, security, communication, performance, availability and suitability
- Non-successful outcomes include stop migration, change the application, change the migration scope or change the cloud provider
- Successful outcome is a migration strategy that includes migration costs as well as operational and management costs — actual migration is outside of the scope of this process
- Case study at a Brazilian company called Naja RIS compared two scenarios in 4 settings (on premise, Amazon EC2 Virginia, Amazon EC2 Sao Paulo, Rackspace)
- Future work will integrate results of case study, migration to multi-cloud environments and tool support

Linking Legacy Services to the Business Process Model

Stephan Sneed (Metasonic AG, Germany)



- Reverse engineering project for converting legacy COBOL code to a business process model in S-BPM, via XML and WSDL
- Additional step is translating the S-BPM model to natural language
- S-BPM is a Eclipse-based tool suite — uses EMF (Eclipse Modeling Framework) — takes in a WSDL file and produces corresponding natural language

Policy Modeling and Compliance Verification in Enterprise Software Systems: A Survey

Georgios Chatzikonstantinou (National Technical University of Athens, Greece)



- **Survey and classification of policy modeling and policy compliance verification techniques, along with pros and cons of each**
- **Focus on four policy types: security, business process, regulatory, design**
- **Policy classification**
 - Graphical: UML profiles, sequence charts, directed graphs, agent-based
 - Formal languages: logic-based, high level
- **Policy compliance verification technique classification**
 - Model checkers
 - Probabilistic model checkers
 - Theorem provers
- **Future research**
 - Combine reverse engineering with monitoring techniques to verify that the system complies with a set of policies
 - Tracing events against compliance constraints to identify deviations from SLAs
 - Tracing actual resource usage patterns for automatic system reconfiguration at runtime

Paper Presentations

Chair: Anca Ionita (University Politehnica of Bucharest, Romania)



- **Challenges of Cloud Environments**

- Selecting a cloud provider
- Virtual machines — configuration and deployment
- Runtime adaptation strategies
- Selecting a database management system
- Solutions for massive data repositories
- Performance and security with Cloud architectures
- Transforming existing applications

CDOSim: Simulating Cloud Deployment Options for Software Migration Support

Florian Fittkau (University of Kiel - Software Engineering Group, Germany)



- Simulation tool to help find the best trade-off between high performance and low cost
- Built on top of CloudSim, a cloud provider simulation and part of a larger approach called CloudMIG (CDOSim is the evaluation step) — available at <http://www.cloudmig.org/>
- Context is enterprise software
- A cloud deployment option (CDO) is the combination of decisions regarding cloud provider selection, component-to-VM deployments, VM instance configuration and specific adaptation strategies (per layer)
- Uses the MIPIPS Benchmark — million integer instructions per second — to measure computing performance of a VM instance
- Simulation is based on a combination of static and dynamic analysis
- Output is cost, response time, SLA violations and rating
- Evaluated the MIPIPS benchmark against two other benchmarks — calculated the relative error between simulated and actual values

A Three-Dimensional Data Model in HBase for Large Time-Series Dataset Analysis

Eleni Stroulia (University of Alberta, Canada)



- General problem is how to organize data in HBase as an example of a novel application stack — expected outcome of this work is a set of design patterns for HBase
- HBase is the open source version of BigTable — it is a distributed, 3D table data structure — time stamp is the third dimension
- Each table has one or more “column families” that are stored as one file in the Hadoop file system (HDFS)
- Work is relevant for data migration to the cloud, mainly for applications that have time-based data, such as geographic applications
- Experimented using two large data sets: Cosmology (astrophysics particle data) and Bixi (bike rentals in Canada)
- Early results show that there are differences between static and dynamic data, the amount of historical data, and localization (to take advantage of parallelism)
- Challenge is to design the right key — should account for what the natural period is for querying data (e.g. what is the most recent data for X? Day? Month? Year?)

Invited Presentation: Smart Applications on Cloud Infrastructures

Marin Litoiu (York University, Canada)



- Focus is partitioning applications for two-tier clouds — rationale is that centralized clouds cannot support all types of applications
- Tier 1 (edge) clouds deployed on routers are connected to the Tier 2 cloud (core)
- Project goals
 - Two tier clouds: edge and core
 - Integrated end-to-end elasticity
 - Smart apps that can sense their environment and adapt at runtime based on current and future load
- Applications are partitioned into what to execute locally (private cloud/edge) and what can be “bursted” to the public cloud (core), using a small set of annotations that are then expanded using dependency graph analysis to exactly determine what code units can be moved
- The moment at which bursting occurs is determined by a monitoring service that monitors system load and anticipates future load
- Currently implemented for Java code
- Lots of questions about where the data resides — the code you mark as public should not depend on data in the database because that remains local if the driver is performance (their driver is privacy) — next step could be to find ways to annotate the database as well so that the bursted code can move along with its data — of course the next challenge would be data synchronization

Closing Keynote: From Software as a Good to Software as a Service: Preparing the Evolution of Software Products into the Cloud

Leire Orue-Echevarria Arrieta TECNALIA, Spain



- **Problem statement: going from software-as-a-product based company to a software-as-a-service based company**
 - The business model changes greatly!
- **General challenges**
 - Is the cloud suitable for me?
 - How to adapt my applications to the cloud?
 - Which functionality/modules should I add to my application to offer it as a service over the cloud?
 - And what if I want to change IaaS providers?
 - How do I know my IaaS providers is meeting established SLAs
- **Organizational challenges**
 - ROI and payback
 - Not every day's work — new roles, responsibilities, tasks, competencies, processes
 - No expertise within the organization — everything is new
 - Provider lock-in
- **Requirements challenges**
 - Maintaining requirements from the original legacy system
 - Meeting new non-functional requirements
- **Technological challenges**
 - Lack of SOA support
 - Lack of SoS validation support
 - Lack of support for SaaS-compliant requirements
 - Lack of MD(r)E support
 - Multiple GUIs

Closing Keynote: From Software as a Good to Software as a Service: Preparing the Evolution of Software Products into the Cloud

Continuation ...



- **Architectural challenges**
 - System needs to be adjusted to be SaaS-compliant
 - No “one size fits all” when it comes to reuse
 - Unpredictable performance
- **Procedure challenges**
 - Different maintenance, deployment and support procedures
 - Demand provisioning procedures
 - Dependency management
 - New withdrawal procedures — e.g. how to break the contract and get your data back
- **M2S — Migration to SaaS**
 - Pre-migration: Tool support for migration and provider decision — maturity assessment (questionnaire) and feasibility analysis (technical and business, source code analysis and cost-benefit analysis)
 - Migration: Tool support for the migration — recovery (model extraction), implementation (model transformation, code generation, new code) and V&V (test case identification and execution, compare results with test data for legacy system)
 - Provisioning: Tool support for provisioning and maintenance — might require creation of a certification model to create consumer trust

MESOCA 2012 – Next Steps



- Introduction and summary slides will be on the web site:
<http://www.sei.cmu.edu/community/mesoca2012/>
- Presenters, please send me your presentations in PDF format so I can put them on the web site
- Get ready for MESOCA 2013!

MESOCA 2013



- Co-located with ICSM 2013 in Eindhoven, The Netherlands
- Tentative date: September 23, 2013
- General Chair: Anca Ionita
- We want to open it to the community
 - Increase size and diversity of program committee
 - Increase size of the event
 - Open the chair roles to members from different organizations
 - Please send us your ideas

SEE YOU NEXT YEAR! TELL YOUR FRIENDS!