Testing of Highly Distributed Service-Oriented System using Virtual Environments

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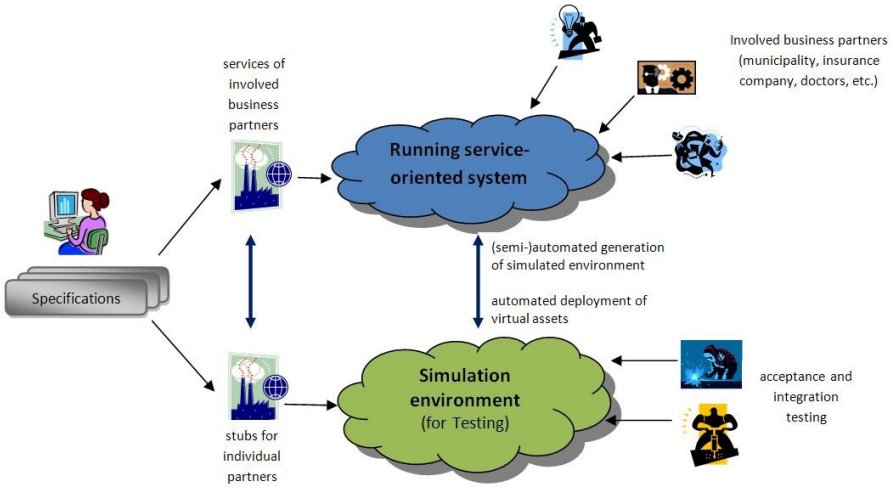
Modern application landscapes are becoming more and more interconnected. The introduction of SOA and ESB technology has increased the dependency on other systems, both internal and external. This has severe consequences for testing SOA applications, their availability, and the constraints on different environments.

Performing testing while the system is running may potentially cause a pollution of the system with test-data, sending out the test data to the end-users or even result in additional costs by invoking services that cost money per invocation. Testing costs get even higher if we consider that deploying a new version of software to different environments requires high expertise of system engineers that usually handle this kind of work. Often, the problem is that some external service is simply not available or it is available for just limited time for testing. All of these issues could be avoided if a simulation environment, behaving in the very same way as the real system, is used. Nowadays, generation of this kind of simulation environments is very feasible and it is something that needs to be explored further.

In this work we concentrate on how testing of web services is performed in highly distributed service-oriented systems using a simulation environment so that we can avoid some of the mentioned issues, or reduce their effects. To tackle this kind of problems, we propose to completely virtualize the real service-oriented system behavior by building the simulation environments (semi-)automatically. The goal is to perform the integration and acceptance testing without influencing the real system or making additional costs. In our research we especially emphasize how to make, manage and control simulation environment. In that sense, additionally to an automatic generation of virtual assets, we focus on automation of deployment process of the virtual assets and simplifying the switching between different environments (Production, Testing, etc.). On this level, we want to ensure that test-data is consistent across all virtual assets.



In order to demonstrate how this could work in practice, we present a simulation environment of real business process for the implementation of Wet Maatschappelijke Ondersteuning Law (WMO). The WMO is a Dutch law for supporting people that have a chronic disease or disability, so that these people can independently live in their homes and actively take part in everyday life despite their physical limitations. The support that is provided by the WMO typically includes transportation, a wheelchair, or a home modification (e.g. removing door posts for people using wheelchairs). The responsibility for a WMO request lies with the Dutch municipalities; they handle the complete business process. The process accesses external parties, e.g., insurance companies and doctors for medical advice.

In our previous work, we have demonstrated how simulation of service-oriented architectures using WS-BPEL can contribute to the decrease of integration testing costs on running service-oriented architectures. Now, also as a continuation of earlier work presented at the Dutch testing day in 2008 ("*Tool supported collection of test data from multiple backend systems in a SOA architecture*"), we plan to go even further and ease the testing by complete virtualization of the application behavior and deployment process automation.

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Short profile of the authors

Faris Nizamic is PhD student at the University of Groningen (RuG). His research interests cover the areas of testing of highly distributed service-oriented systems. He holds a MSc in Computing Science from the University of Sarajevo, Bosnia and Herzegovina. Last two years he has worked as a Senior Quality Assurance Engineer in NAVTEQ with the main focus on testing of web services and automation of testing processes.

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Rix Groenboom is consultant for Parasoft in the area of testing and virtualization of modern SOA, SaaS and cloud-based architectures. He has written a large number of technical articles and presented on many IT industry conferences in Europe and the USA. His core area of expertise is specification, design and validation of software applications. He holds a MSc and PhD in Computing Science from the University of Groningen and published a thesis focusing on the formalization of domain knowledge.

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Dr. Alexander Lazovik is an assistant professor at Distributed Systems group at University of Groningen (NL), after being ERCIM fellow at CWI (NL) and INRIA (F), intern at IBM TJ Watson. He obtained the PhD in computer science from the University of Trento (I) in 2006. His research interests are in the areas of service-oriented and distributed computing, including service composition, business process validation and execution, diagnosis and automated repair using techniques such as automated planning and constraint-solving. Since last few years, he is also actively interested in pervasive and ubiquitous computing, with an emphasis on dynamic coordination of context-aware embedded devices.

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