

Use-case SOA4All Testbed

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Abstract

In the scope of the FP7 project SOA4All, a Service Web Architecture that brings Web services and Service Oriented Architecture (SOA) to a Web scale will be built. This architecture will be based on four main cornerstones (Web principles, Web 2.0, Semantic Web and Context Management). In order to validate the research results a testbed infrastructure will be created, featuring large volumes of services as well as suitable testing tools. The testbed infrastructure should not only be available to all work packages in SOA4All, but also to interested third parties, which want to conduct experiments in such an environment.

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1 Executive summary

Service Oriented Architectures for All (SOA4All) is a Large-Scale Integrating Project funded by the European Seventh Framework Programme, under the Service and Software Architectures, Infrastructures and Engineering research area.

SOA4All will help to realize a world where billions of parties are exposing and consuming services via advanced Web technology: the main objective of the project is to provide a comprehensive framework and infrastructure that integrates complementary and evolutionary technical advances (i.e., SOA, context management, Web principles, Web 2.0 and Semantic Web) into a coherent and domain-independent service delivery platform.

The main objectives of the project are to introduce the following key enablers to realize a web of services interconnecting billions of services:

- Scalability to master the very large and meeting the challenge of dealing with billions of services. Ease of use to allow end-users not only to interact with services but also to create services.
- Discovery to find the “right” service among the billions of services offered.
- Dynamic composition of services to create the networks of services underpinning business networks and aggregating seamless solutions by orchestrating a network of services.
- Increased robustness to respond to change. Services will appear, disappear, change location, adjust their usage model from free-use to pay-per-invocation, will be blocked, out of service, be inspected and commented upon – with dependent services being able to act quickly to changes.
- Context-Awareness to support collaboration across business networks in context of business processes and the personalization of services to individual preferences.

In order to validate the achievement of these objectives, a testbed infrastructure for SOA4All will be built in the scope of this project. The testbed infrastructure should not only be available to all work packages in SOA4All, but also to interested third parties, which want to conduct experiments in an environment hosting a large set of services and tools to support test generation, automation and test case ranking and selection.

2 Targeted users

- Primary actors
SOA4All project consortium: Academic users, Industry and SMEs (including telecommunication companies, SOA solution and infrastructure providers and ISPs)
- Supporting actors
Academic users intending to use the SOA4All testbed for other experiments (e.g., within the scope of the Semantic Web Service Challenge¹)
- Stakeholders and their interests
SMEs: Content and (third party) service providers, Service brokers
End users, intending to use the SOA4All prototype available from the three concrete business scenarios within the project

¹ Further information available at <http://sws-challenge.org>

3 Description

3.1 Interfacing with the user

- **Goal** – By deploying the SOA4All testbed on the FIRE facilities, the SOA4All project partners intend to evaluate and validate the project results and prototypes developed in the scope of SOA4All. Specific goals include both short-term experiments and continuously running applications, which demonstrate the uses of a service world in business scenarios.

The main use of the testbeds will be to set up a testing infrastructure, available to all work packages in SOA4All. The testbed infrastructure should also provide tools to support test generation, automation and test case ranking and selection. This infrastructure will enable the validation of the SOA4All developments, demonstrating the achievement of project objectives and the advancement beyond current state of the art.

- **Actors** – The main actors involved in this use case include the SOA4All project consortium, specifically the partners involved with the testing and evaluation of the results produced in the technical work packages. In addition, the 3 concrete Use Cases developed within the SOA4All project should be deployed on the testbed infrastructure.

Further supporting actors interacting with the testbed are other organisations interested in applying their prototypes to an environment featuring realistic, high volume of services and automated testing support.

3.2 Platform set up

- **Pre-conditions or assumptions** –

Running test cases for SOA4All project results means that the two major outcomes of the project – the SOA4All runtime, as well as the components making up the SOA4All studio – should be deployed, and available to potential users, respectively.

Pre-condition #1: The SOA4All runtime, consisting of a distributed and scalable Service Bus as infrastructural backbone supported by Semantic Spaces for communication and coordination, should be deployed.

Pre-condition #2: Depending on the parts of the project to be tested, evaluated or validated, the different SOA4All components which cover the lifecycle of services, from design-time to run-time and post-mortem analysis, need to be available. In addition, potential (end-) users will test SOA4All through an easy-to-use and holistic graphical user interface, called the “SOA4All Studio”, which connects the underlying components and will enable the desired lightweight interaction.

Pre-condition #3: A suitably large collection of services (both WS-* and REST services) has been deployed and is available for discovery and consumption. Services can come from the use cases developed within the project itself or from related projects, but will also be generated automatically using suitable testbed management tools. The service testbed should be parameterized to simulate realistic behaviour, specifically regarding QoS parameters, e.g. communication failures.

- **Trigger** – Test cases provided by the users, or automatically generated by the testing tools are executed.
- **Steps** – Users utilize the functionalities provided by the SOA4All components or studio to build their own applications based on (arbitrary) services, found via discovery services or service brokers. User- built applications are tested by executing a series of (automatically generated) test cases, which include functional (unit) tests, as well as integration tests for the composed services.

- **Non-functional requirements** – The testbed should also simulate a variety of quality of service parameters, which would typically be of importance in a web of (billions of) services, including messaging failures, delay, workload and reliability.

3.3 Results acquisition

- **Post-conditions** – Results from the tests which are run by interested parties, such as component owners, will be collected and analysed statistically. This will not only be used to provide valuable feedback for the testing of the components, but also regarding the achievement the major project objectives, such as scalability on a large set of services.

Furthermore, as testing on a large scale service environment will be costly in terms of efforts, different methods for the analysis and ranking of test cases should be employed, in order to reduce effort for future test case runs, while maintaining efficiency.

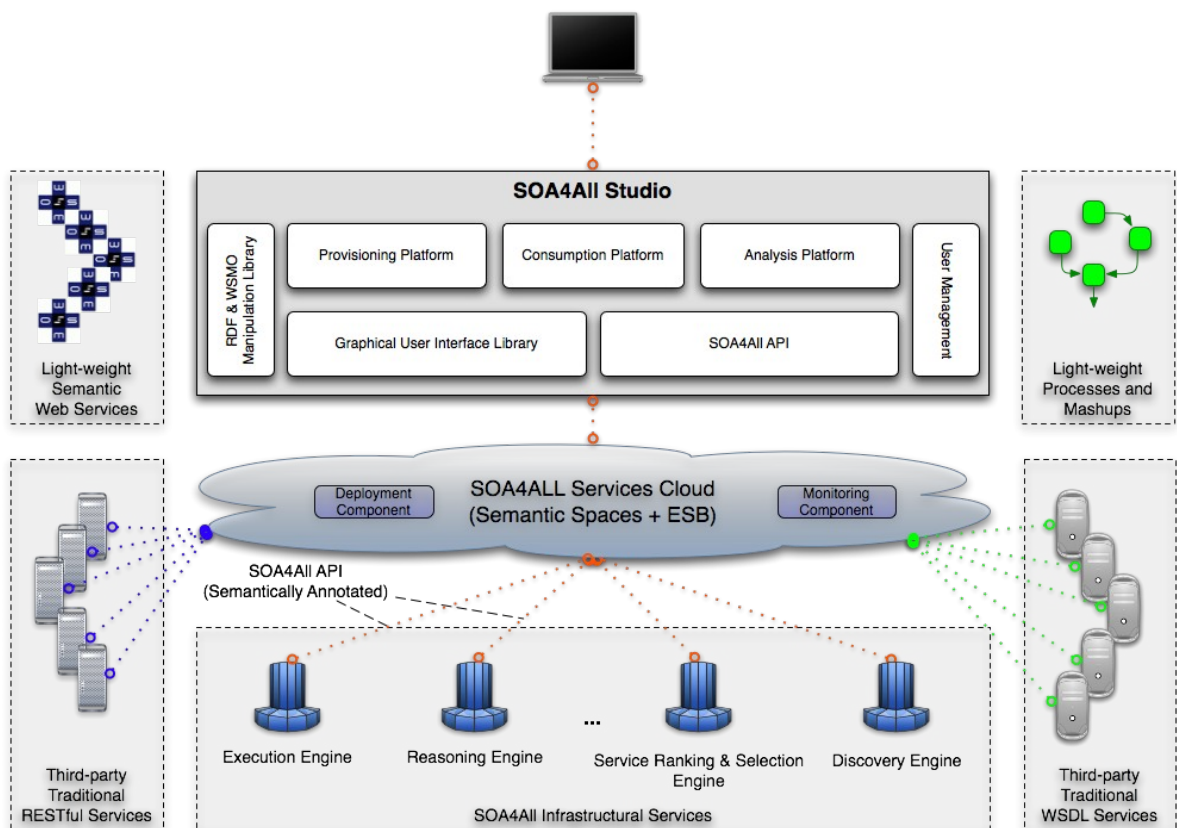


Figure 1: SOA4All Architecture

4 Expected impact

The results gathered by testing the SOA4All tools and architecture will be directly used to improve the project results and steer further development within the project. Besides this direct impact on the project, further expected impacts are detailed below.

4.1 Research on the Future Internet

The experiments conducted within the scope of the SOA4All project will provide valuable insights to the usage of the project results in an environment with a large volume of available services. Thus, the experiments provide feedback for any project related to the future Web of services, where billions of services will be available for users, necessitating new solutions for scalable discovery, composition and service consumption.

4.2 The market

In the SOA4All project, three different use cases are developed, concentrating on different business scenarios.

- The use case “End-user Integrated Enterprise Service Delivery Platform” investigates how enterprise services can be integrated into the open, dynamic, lightweight, and end-user driven service platform that is envisioned by SOA4All. For this, it is necessary to develop a virtualization layer (“facade”) closing the gap between the existing, heavyweight enterprise services and the user-designed composite processes. Additionally, a new user interface has to be developed in order to provide an intuitive environment for lightweight service composition and consumption.
- Web21C is a platform that allows developers to consume services exposed by BT. It abstracts the services into a simple interface accessible through a number of different programming languages that free the developer to focus on creating their application. Services so exposed include voice calls, messaging, authentication, call flow, conference calls, inbound SMS, and more. Utilising the technology developed in the various core research areas of the project it will allow BT to provide third parties access to Virtualised IT and Network resource by exposing its common capabilities to third parties, making them easy to consume, combine and share.
- The ISP C2C eCommerce infrastructure, which allows end customers to build their own eCommerce applications from a set of services provided either by the ISP or by third party suppliers. Using a collection of Web 2.0 applications, such as a dedicated Web site builder, end customer can create eCommerce applications offering their own products (using a combination of services, such as payment providers, fraud detection, delivery and notification services etc.). The major achievement is to offer new possibilities to end customers to become providers themselves, while opening up new market opportunities for ISPs and service providers as well.

4.3 Evolution as a testbed for third parties

As already stated, the SOA4All testbed is also meant to be available as a testing environment for third parties, which want to conduct experiments on a large scale of services. As a concrete first goal, the testbed will be used to provide a test environments for participants for participants of the Semantic Web Service challenge (SWS challenge). The SWS challenge seeks participants from industry and academic researchers developing software components and/or intelligent agents to prove the capabilities of their solutions regarding the automation of mediation, choreography and discovery of processes between Web services.