PROJECT RESULTS

Managing embedded web services

Exploiting service-oriented architecture for seamless system integration

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The SODA project has developed the overall ecosystem to manage interworking and high-level communications between devices in service-oriented architecture (SOA) systems. This simplifies the development of systems using embedded web services in low-cost devices. The result is a world-leading implementation technology for the so-called 'web of objects'. The SODA approach was demonstrated in a range of domains from industrial and home automation to medical care. And SODA provided major contributions to global standardisation activities in this field through OASIS Devices Profile for Web Services (DPWS).

Availability of affordable, high-performance, low-power electronic components allows embedding of an unprecedented amount of intelligence into very small components. The preceding ITEA SIRENA project played a pioneering role in this area by applying the SOA paradigm to communications and interworking between such components at the device level.

Providing complete applications
This basic technology enables communication between any device, sensor or actuator. These devices can then communicate with information technology (IT) systems, personal computers (PCs) or even personal digital assistants (PDAs) to provide complete applications over Internet and intranets. And it can be used in nearly any domain to build advanced functionality into all types of embedded devices – resulting in new distributed applications based on interconnected, self-reliant smart devices in the web of objects.

While much of this was possible before, it is now very simple and easy to do. All devices, from a temperature sensor in the home to the PC or IT system will speak exactly the same language – the web-services language. Before, each intermediary would involve protocol conversions with data conversion and many different operations at each stage – really very complex. With web services, it is possible to interconnect devices with no intermediaries, protocol conversions or data manipulation.

Developing easy-to-deploy tool suite
SIRENA defined the service infrastructure for real-time embedded devices in a platform-, language- and network-neutral way, applicable to a wide variety of networked devices for diverse applications. SODA has developed the implementation of a comprehensive, scalable, easy-to-deploy SOA ecosystem – a complete tool suite – on top of this communications infrastructure, on industry-preferred platforms, supported by wired and wireless communications.

This involved the development of tools and methodologies to manage the complete life cycle of an application starting from an initial specification, implementation, deployment and maintenance – with different solutions and users at each stage, and different tools to enable these things. It included extensions and improvements of DPWS, such as increased

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performance and serviceability as well as integrated security support.

An important element was the preparation of seamless integration of device-provided services with higher-level business processes. Applications were demonstrated in several domains – such as industrial automation, telecommunications, home networking and automotive electronics – to validate use of SOA on a broad scale and to promote standardisation in vertical application domains.

Member of the SODA consortium were heavily involved with OASIS in the development of the DPWS standard. This enables secure web service messaging, discovery, description and eventing in a similar manner to Universal Plug and Play (UPnP). However, it is fully aligned with web services technology and allows for seamless integration of device-provided services in enterprise-wide applications.

Real applications already
Real applications have already been developed making use of the SODA approach. Schneider Electric has made a strong move to SOA as an interoperability concept, simplifying integration of the different businesses it has acquired over the past ten years. Many different systems which could have been difficult to interconnect now all work together to achieve a common objective.

EADS is using the SOA approach in professional mobile radio (PMR) integration for emergency service communication systems for fire brigades, police, etc. This involves the deployment of the DPWS solution between base stations and remote devices.

Consortium members are also working in the SOCRADES EU Framework Programme project on next-generation industrial automation systems with other major competitors that all have internal projects for deployment of SOA using SODA results.

Major project outcomes

Dissemination
- 50 papers, presented at several major conferences, including major contributions to the IEEE International Conference on Industrial Informatics (INDIN) yearly events, where project members organised a track on SOA.
- Several presentation awards including a special session entitled "Web of objects", at the ITEA2 2008 annual event in Rotterdam.
- 10 presentations/demos at events, including 2 industrial demonstrators (one of which was presented in several events), 1 combined home / telecommunication demonstrator, 1 automotive demonstrator and 2 telecommunication demonstrators.

Exploitation
- Major exploitation in Schneider Electric through the "EcoStruxure" integration program
- Integration of SODA results in EADS PMR devices
- Integration of SODA results in transportation projects with Geensys
- Major system use and integration through Sogeti and through several Spanish partners

Patents
- At least 6 new patents from Schneider Electric

Standardisation
- Major contributions to OASIS DPWS, which was standardized on June 30, 2009

Spin-offs
- The SODA project was for a large part funding one small start-up company, ODONATA, which developed the DPWS stack implementations used by the SODA project.

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