

**Aiko Pras
Marten van Sinderen (Eds.)**

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Dependable and Adaptable Networks and Services

**13th Open European Summer School
and IFIP TC6.6 Workshop, EUNICE 2007
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Aiko Pras Marten van Sinderen (Eds.)

Dependable and Adaptable Networks and Services

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Preface

The main goal of the EUNICE Summer School is to give young researchers, and particularly PhD students, the opportunity to present their work at an international level. The EUNICE Summer School also seeks to offer comprehensive and inspiring invited talks from experienced experts in the field, providing a context for discussions on ongoing research and new challenges.

The EUNICE Summer School is an initiative of the European University Network of Information and Communication Engineering, or EUNICE Network for short. Although the summer school events are organized by the member institutions taking turns, submission to and participation in the events are open to researchers outside the EUNICE Network.

The 13th EUNICE Summer School returned to Enschede, The Netherlands, where it was hosted earlier in 2000. Back in 2000, the theme of the summer school was ‘Innovative Internet Applications.’ Much has changed since then: wireless network technologies have become a constantly growing part of the Internet infrastructure, and increasingly smaller and more powerful computing devices with flexible connectivity open the possibility of new services and applications.

The EUNICE 2007 theme, ‘Dependable and Adaptable Networks and Services,’ linked to this change and how it affects and is affected by research in the field of information and communication technology. One of the main challenges in the next decade will be to make the Internet and the services that are provided on top of it more dependable and adaptable. Research on this theme is needed for fixed, wireless and ad-hoc networking, ubiquitous communication and computing, sensor networks, and context-awareness. While individual mobile applications with context-aware and personalized features emerged, at the same time many challenges for network and service architectures were imposed concerning integration, interoperability, management, provisioning, reliability and security. On the one hand research has to make available a sound understanding of these applications and their supporting service and network architectures. On the other hand, research should produce service and network infrastructure solutions to be able to provide the necessary quality of service for the envisioned applications.

We received many submissions on these topics, but unfortunately could only accept 17 papers for presentation at the summer school. A fair evaluation and selection of papers was only possible thanks to the first-class reviews, at least three per submitted paper, from our Program Committee members. The accepted papers were grouped as follows in sessions for the single-track technical program: (1) Middleware and Supportive Services, (2) Context-Awareness, (3) Voice over IP, (4) User Behavior, Security and Legal Aspects, (5) Performance Aspects, and (6) Novel Architectures. This technical program was complemented with four invited keynotes.

We would like to take this opportunity to express our thanks and gratitude to the sponsors and supporters of the 13th EUNICE Summer School: IFIP TC6 Working Group 6.6, IEEE Communications Society, Euro-NGI, EMANICS, Springer, NWO, and CTIT.

Many people worked very hard to make this summer school a success. Special thanks go to the Program Committee members for their efforts necessary to maintain the high-quality standard of the EUNICE Summer School, to Annelies Klos for her essential support in to the local organization, and to Remco van de Meent for his contribution during the preparation of the conference proceedings.

May 2007

Aiko Pras
Marten van Sinderen

EUNICE — Member Charter

European Network of Universities and Companies in Information and Communication Engineering.

1 Mission

The European universities and companies signing this charter are anxious to improve in a permanent manner the quality and relevance of their teaching and research in the field of information and communication technologies. They declare their desire to co-operate in the following ways:

- By jointly developing and promoting the best and compatible standard of European higher education and professionals in information and communication technologies
- By increasing scientific and technical knowledge in the field of telecommunications and developing their applications in the economy

2 Membership

The network is made up of European universities within the European Union and outside it, whether from Western, Central or Eastern Europe. These universities are involved at their own appropriate organization level, taking into account the mission of the network. The parties signing the present charter will be the “founding partners.” Other universities, very limited in number, might be invited to join the network as “members.”

Transnational companies, working together with the universities on information and communication technologies, and representatives from the relevant commission of the European Union will be offered the opportunity to be associate members. No institution can apply for membership.

3 Education

The partners will seek the development of high-level compatibility of the existing or commonly developed courses and programs, in order to facilitate their recognition by employers independently of their geographical location in Europe. To achieve this goal, the partners will, inside the network, work on mutual recognition of these courses and programs.

To develop interculturality, these courses and programs will be accessible in such a way as to encourage, as far as possible, long-duration mobility for students

and faculty members from one country to another (i.e., several months). To set compatible standards, shorter-duration operations will be conducted such as:

- Summer schools for young faculty members and PhD students
- Intensive seminars, in limited numbers, for students
- Short-duration mobility for faculty members for teaching assignments
- Use of new technologies in education

Finally, the partners will take advantage of the network of relations set up as described above to develop common modules for onsite training, for the world industry.

4 Research

The partners will also take advantage of this network to collaborate on research and development projects which could be carried out in common by several of them and which could lead to marketable applications in particular.

5 Organization and Structure

To achieve the above-mentioned aims, the institutions concerned will form a flexible structure whose role will be to think about and decide on joint actions. It will be called the steering group and will meet twice a year. The network would have no legal status. However, the network may authorize a member or set of members to act on its behalf.

Concrete proposition in education and research will be worked out in small working groups of at least two partners, chosen by the steering group as opportunities arise. Finally, a permanent secretariat, located at France Telecom University, will be established to co-ordinate all the information relevant to the network's activities.

6 Means and Finance

The institutions concerned will provide the specific financial and/or inkind support necessary for the smooth running of the network, notably human resources (research lecturers, engineers, administrators, etc.).

The partners in the network will share information about funding opportunities and seek, as often as necessary, financial aid from public authorities for its actions:

- Within each country
- From bilateral programs at a country level, whenever such financial aids exist
- And finally at the European level by means of community schemes (ERASMUS, COMETT, TEMPUS, RACE, ESPRIT,..., scientific and technological co-operation with Central and Eastern Europe, ..., human resources and mobility, etc.)

All things being equal regarding a specific action within the scope of the network, a member will prefer co-operation with other members of the network.

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Organization

EUNICE 2007 was organised by the Centre for Telematics and Information Technology of the University of Twente, The Netherlands.

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Identity as a Service – Towards a Service-Oriented Identity Management Architecture

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Abstract. Service-oriented architecture (SOA) will form the basis of future information systems. Web services are a promising way to implement SOA enabling the loose coupling of functionality at service interfaces. The focus in SOA changes from traditional software systems to reusable, business-relevant services. Considering the cross-cutting concern of identity management (IdM), it is still an open issue how to construct an SOA-aware IdM architecture enabling “identity as a service” and how to loosely couple the IdM services with SOA’s core concern part. In this paper we present a blueprint for a service-oriented identity management architecture featuring interoperability by applying existing standards. Our solution has been tested and evaluated in an implementation case study.

1 Introduction

1.1 Background on Web Service-Oriented Architecture

Currently most enterprises try to align their business processes with the supporting IT by migrating to service-oriented architecture (SOA). Web service technologies are commonly recognized as a promising way for the implementation of SOA; in the following, we focus on web service-oriented architectures (WSOA). With the mutual consent to use WSDL (Web Services Description Language, [1]) for the definition of service interfaces and SOAP (Simple Object Access Protocol, [2]) as the communication protocol, the cornerstone for interoperability is set. Bottom-up approaches start with existing applications and wrap their business functionality to web services. Integration can then be done by composing web services of heterogeneous software systems using process execution languages like BPEL (Business Process Execution Language). Top-down approaches focus business processes and their mapping to composite and basic web services. This allows business analysts to perform “programming-in-the-large”, the system-independent orchestration of business-related (web) services along business processes [3].

1.2 Motivation for Identity Management in Web Service-Oriented Architecture

Besides the development of WSOA’s core concern part there are several cross-cutting concerns that have to be addressed: a central one is to enable security, especially

access control. Access control consists of authentication and authorization verification. Looking at the mass and complexity of the existing and upcoming standards in the web service security area like WS-Security, SAML, XACML or the Liberty Alliance's stack proposal it is comprehensible to see software developers often neglect the web service security part. Additionally, state-of-the-art IdM suites are just being prepared for WSOA [4]. As well, current application servers often do not yet support a necessary combination of relevant IdM standards to enable sophisticated access control. This is why as of today existing web services in most cases have little or no security features. Complications even increase when composing several web services which provide functionality from different underlying applications – workarounds like using the applications' built-in IdM are not applicable any more; an overall IdM architecture for WSOA is needed – enabling “identity as a service”.

1.3 Contributions and Structuring of This Paper

The contributions of this paper are:

1. **The design of a service-oriented identity management architecture**, specified at service interfaces, the implementing components as well as the employed data repositories. The prerequisite is to respect WSOA-specifics like the loose coupling and the existence of basic and composite web services.
2. The alignment of the proposed architecture to existing and promising standards with the goal to **enable interoperability**.

The paper is organized as follows: section 2 introduces the architecture of WSOA and derives the requirements for appropriate IdM services building the bridging point between WSOA's core concerns and the IdM architecture. In section 3 we propose the design of a service-oriented identity management architecture and motivate how to gain interoperability. In section 4 we present our implementation experience. Section 5 treats the related work. A conclusion and an outlook on future work in this area close the body of the paper.

2 Web Service-Oriented Architecture and Requirements for Identity Management

The basic WSOA “layering” consists of existing applications at the bottom layer that are wrapped to web services, typically using application servers. Web services can be composed at an integration layer using BPEL. Web portals are used to integrate the (human) users using existing web technology like web browsers. The aforementioned further layers are put on top of the existing applications. Among others, this allows flexible service reuse in different business processes. This common core of WSOA can be found in many publications [5, 6, 7, 8]. It is important to notice that the web service architecture does not imply strict layering. Web services can be accessed either directly or via one or many intermediaries like BPEL engines. From WSOA's