Serviam Literature Survey

Part I

Introduction

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1   Introduction

One of the first tasks for each of the Serviam project working groups was to investigate current state-of art, and to document this in a literature survey. Since the project's working groups focuses on different problem domains within Web services, the literature survey is divided into five parts. This part, the introduction, ties the parts together by introducing a common definition of software services, and by describing the contents and purpose of the other four parts of the literature survey.

The purpose of the literature survey was to provide input to further work in the project's working groups by investigate the state-of art in selected areas.

2   Overview of the Literature Survey

The Serviam project is divided into four workings groups, Business value, Architecture, Support functions and Maintenance. Each of these workgroups represents an area of interest of the project members. Given the limited resources, each working group has selected a sub-domain to study in the literature survey. A list of the parts of the survey is presented in table 1, below.

Working Group	Contribution to the Survey
Literature Survey	Part I, "Introduction" (this document)
Business Value	Part II, "Business Value" (Söderström, 2004)
Architecture	Part III, "Web Service Design" (Henkel, 2004)
	Part IV, "Service-based Processes" (Zdravkovic, 2004)
Support functions	Part V, "Web Service Security" (Toms, 2004)
Maintenance	Survey performed as an expert panel hearing (Kajko-Mattson, 2004)

Table 1, Overview of the literature survey parts

Each part of the literature contains a selection of references to relevant work describing each topic. The following sections give an overview of each working group's selection of sub-domains to study.

2.1   Business Value

One of the issues that hinders swift change to new technology is initial lack of evident business value. Without a clear understanding of the business benefits that Web services can give an organisation, managers cannot take the decision to introduce the technology. The task of the business value group is thus to make it clear what benefits an organisation can harvest when moving towards the use of Web services.

Based on existing literature, Part II of the literature survey "Business Value" gives and overview of the business as well as technical benefits that web services can give. This part of the survey also gives an overview of common ways to introduce Web service technologies.

2.2   Architecture

As soon as a new technology is introduced there are always questions on how to architect solutions based on the new technology. Of special interest is how the "new" architecture differs and extends existing, well-proven, architectures.

The architecture working group contribution to the literature survey is divided into two parts. Firstly, Part III "Web Service Design" examines a set of design principles that, according to literature, should be applied to build service-based systems. These principles range from principles for granularity of services, to principles that should be applied to design the interface of Web services. Thus, Part II provides a broad overview of design principles. Secondly, part IV "Service-based Processes", gives and overview of a new architecture area – the construction of processes that coordinate the actions of services. Part IV provides a more focused overview of a selected topic, service-based processes, which will be further analysed during the project.

2.3 Support Functions

Support Functions are generally defined as the infrastructure that needs to be in place in order to use Web services. In the project, support functions include Security and service repositories. Among the project members there are a high interest in security issues, this prompted the working group to focus on the security domain for the literature survey.

Literature survey Part V, "Web Services Security", gives an overview of current problems in web services security, as well as giving an overview of existing security standards in the Web service field.

2.4 Maintenance

Maintenance and management of Web services are complex tasks, since service-based systems are inherently distributed, even across organisations. Surprisingly thought, current literature does not describe ways to handle management and maintenance of Web services.

Due to lack of literature, the state-of-art survey of the Maintenance work group was performed as an expert panel debate at a research conference.

3 What is a Web Service?

Although the technologies SOAP, WSDL and UDDI are well-known, there still exists some confusion about what a Web service is. Part of the confusion stems from the word "Web service". A very common misconception is that w Web service is anything provided over the Internet. Using this definition, even the simplest web-page could be a Web service. For the Serviam project a stricter definition based on the more general term "Software services" is more applicable. The term "Software service" is defined in the following section, this definition the text is modified from (Henkel, 2004).

3.1 Software Services

Disregarding the software domain, a service can be defined as an "act or performance offered by one party to another" (Lovelock et al., 1996). From a business perspective, a service can be viewed as a process that produces value for the consumer of the service. The parties involved in this definition are not limited to software, i.e. a party can be either human or software. Regardless of whether a service is used and provided by humans or software, a service does not result in any ownership (Bennett et al., 2001b; Dumas et al., 2001). This means that a service is an offering that can be used, compared to a commodity that can be owned and bought.

An application service provider (ASP) is an example of a service where the provider is a software system, and the consumer is a human.

The term *software* service is used to denote a service that can be used by software systems, or speaking in software terms, a service can be called upon from other software systems. In this definition both parties are software programs that communicate, potentially over a network. Just as for non-software services the consumer and provider of a software service can belong to separate enterprises. The remainder of this paper will focus on software services.

Services and Components

Services share many properties with components. Firstly, both services and components offer a well-defined interface that hides the details of implementation. Secondly, both services and components are modular so that they can be combined to form new components and services, respectively. The important difference is that a service is a run-time entity offering a service interface while a component is a physical/binary entity that needs to be installed before use. Users of components need to buy them, install them and then use them, while a service user simply finds the service and uses it (Herzum, 2001). This difference implies that the provider of a service is responsible for it, even in run-time, while the provider of a component not necessarily has any responsibility and control of the run-time environment.

Component technologies like COM+ and EJB are useful for building software services. An EJB component for example, installed and running on a server can be offered as a service. It can be said that components are developed, but they should be provided as services (Allen and Frost 1998). This means that components are primarily used as building blocks in the development phase, whereas services exist in run-time.

Not all components of a system should be exposed/provided as services since the user of an application (software or human) is seldom interested in the inner workings of the system. A black-box view is preferred. By selecting the components to be provided as services, an uncluttered interface to the system can be obtained. Thus, the exposed services are commonly (but not necessarily) more coarsely grained than the components that together implement the service.

Due to the run-time properties of services, it is natural to focus on the service interface and on run-time communication when discussing services. When one on the other hand is discussing components, the development, deployment and run-time environments come into focus.

There are then four properties of components and services that can be compared. The comparison based on these properties is summarized in Table 2, below.

Property	Components	Services
Use	Buy-install-use	Use-pay
Responsibility of provider	Construction and delivery	Run-time service availability
Granularity	Application building block	Application interface
Focus of interest	Implementation	Communication

Table 2, Components and services compared.

3.2 Web Services

A Web service is a software service that communicates using the SOAP protocol.

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