Service Identification in Interorganizational Process Design

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Abstract—Service identification is one of the main phases in the design of a service-oriented application. The way in which services are identified may influence the effectiveness of the SOA architecture. More specifically, the granularity of the services is very important in reaching flexibility and reusing them. Such properties are crucial in interorganizational interactions based on collaborative business processes. In fact, collaboration is facilitated by ensuring a homogeneous description of services at the right level of granularity. In this paper, we provide a detailed description of P2S (Process-to-Services), a computer-aided methodology to enable the identification of services that compose a collaborative business process. The methodology is based on metrics defined to setup service granularity, cohesion, coupling, and reuse. A prototype tool based on the methodology is also described with reference to a real case scenario.

Index Terms—Service-based process design, service identification

1 Introduction

Internet and service-oriented technologies provide a strategic platform to support the collaboration among enterprises. Organizations are exploiting the network for sharing applications and integrating processes, services and knowledge. In particular, Service Oriented Architecture (SOA) enables such interorganizational interactions by facilitating and managing service integration [25]. In fact, service technologies should be the basis of the creation of a world where application components are easily assembled to create dynamic business processes [22]. In this scenario, services can encapsulate old or new components deriving from external and internal applications.

For the design of service-based applications, several lifecycles have been proposed. We refer to the one described in [23], that is composed of the following activities:

1. business process analysis (further composed of goal analysis, SOA project planning, service identification),
2. service analysis and specification,
3. service provisioning,
4. deployment,
5. execution & monitoring.

Service identification is defined as ''*the process of identifying candidate services and creating a service portfolio of business-aligned IT services that collectively support the business processes and goals of the organization*'' [7], [11], [14]. Such activity can be performed by using three different strategies, i.e., top-down, bottom-up, meet-in-the-middle. In the top-down strategy, the SOA lifecycle starts from a workflow-based representation of a business process and decomposes it into component services that can be used to implement one or more process tasks [16], [23]. In this approach, a repository of ready-to-use services is not available and the service identification works within the business process analysis activity only. Approaches that deal with bottom-up or meet-in-the-middle strategies mostly focus on the alignment between the ideal set of services identified in the business processes and the services available at the IT level [8]. In all the strategies, the *service identification* phase has been recognized as a fundamental step of the SOA lifecycle [28]. Service identification must guarantee a homogeneous description of candidate services at the same level of granularity. The definition of the most suitable level of granularity is not a trivial task. The higher the granularity, the higher the resulting flexibility and reuse of component services. Nevertheless, high granularity implies more data exchanges and calls between services. High granularity also means many services involved in the process execution, that is, higher complexity in their governance.

Service identification is a debated topic in the literature. Some approaches focus on a methodological perspective by providing guidelines to support the designer in the identification of functionalities as in candidate services [16], [23]. Other approaches focus on metrics to evaluate the quality of service identification [20], [31]. Such metrics enable a quantitative comparison between (given) different sets of identified services, allowing the designer to select the best one, but providig him/her a scarce feedback on the rationale behind their construction.

In this paper, we illustrate the P2S (Process-to-Services) methodology for service identification, to be applied in a top-down context or in any case in which a portfolio of

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