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A Service Oriented Approach for Vehicle Insurance Using Ontology

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Abstract

The Web Service Definition Language (WSDL) and Universal Description Discovery Integration (UDDI) standards arose as ad hoc standards for the definition of service interfaces and service registries. However, even together these standards do not provide enough basis for a service consumer to get a full understanding of the behavior of a service. This paper proposes a service definition, a service classification, and service specification framework, all based on a founded theory, the theory. The theory originates from the scientific fields of Language Philosophy and Systemic Ontology. According to this theory, the operation of organizations is all about communication between and production by social actors. The service specification framework can be applied both for specifying human services, i.e., services executed by human beings, and IT services (i.e., services executed by IT systems).

Keywords: *WSDL,UDDI.*

1. INTRODUCTION

Call users to analyze huge quantities of data. larger databases, in turn, yield improved innovative predictions. Data mining tools forecast future trends and behaviors, which allows business trend setters to make proactive, innovative knowledge-driven decisions. In the web service standards, community researchers and practitioners state that the service contract consists of an interface definition (WSDL), a message structure definition (XML Schema), and, if required, a policy definition. These policies specify rules and constraints that must be met by the consumer before it can access the web service. . These policies do not prescribe what one should specify about a service, but they provide a generic structure for specifying several aspects. WS-Policy is the proposed XML-based standard that allows providers to specify their policies and that allows consumers to specify their policy requirements Also, two standards for specifying the Service Level Agreement (SLA) are evolving; Web Service Level Agreement (WSLA) proposed by IBM and WS-agreement proposed by the Open Grid Forum (OGF). These standards focus on specifying the agreements made by service consumers and providers and the way to evaluate and measure these agreements. In this sense, they have a broader scope than only specifying the service itself. However, they focus mainly on quality aspects like, for instance, performance. A web service is an interface that describes a collection of operation that are network-accessible through standardized XML messaging.

A web service performs a specific task or a set of task. A Web service performs a specific task or a set of tasks. A Web service is described using a standard, formal XML notation, called its service description that provides all of the details necessary to interact with the service, including message formats (that detail the operations), transport protocols, and location. Web service descriptions are expressed in WSDL. A service provider creates a Web service and its service definition and then publishes the service with a service registry based on a standard called the Universal Description, Discovery, and Integration (UDDI) specification. Once a Web service is published, a service requester may find the service via the UDDI interface. The UDDI registry provides the service requester with a WSDL service description and a URL (uniform resource locator) pointing to the service itself. The service requester may then use this information to directly bind to the service and invoke it.

2. EXISTING SYSTEM

In the web service standards, community researchers and practitioners state that the service contract consists of an interface definition (WSDL), a message structure definition (XML Schema), and, if required, a policy definition. These policies specify rules and constraints that must be met by the consumer before it can access the web service. Policies are used to specify aspects of a service that cannot be specified in WSDL or XML schema. These aspects include among others technical limitations, choice of security protocol, privacy constraints, and type of reliable messaging used.These policies do not prescribe what one should specify about a service, but they provide a generic structure for specifying several aspects. WS Policy is the proposed XML-based standard that allows providers to specify their policies and that allows consumers to specify their policy requirements Also, two standards for specifying the Service Level Agreement (SLA) are evolving; Web Service Level Agreement (WSLA) proposed by IBM and WS agreement proposed by the Open Grid Forum (OGF). These standards focus on specifying the agreements made by service consumers and providers and the way to evaluate and measure these agreements. In this sense, they have a broader scope than only specifying the service itself. However, they focus mainly on quality aspects like, for instance, performance.

2.1 The Si-Theory

The theory finds its roots in the scientific fields of Language Philosophy, in particular the Language Action Perspective (LAP), and in Systemic Ontology . It focuses on the use of language to achieve agreement and mutual understanding. By applying the si theory one can disentangle the essential knowledge of the construction and the operation of the organization of an enterprise, by which we mean a commercial or nonprofit company as well as a network of enterprises. This essential enterprise model is called the Enterprise Ontology. The theory consists of several axioms and one theorem. In this section, we give a short summary of the si theory. We only discuss the parts of the theory that we need for developing a service specification framework, viz.: the operation axiom, the transaction axiom, the distinction axiom, and the organization theorem.

2.2 The Notion of "Service"

Before thinking about how we can specify services in a service specification framework, we need to define what a service is. Economists and business scientists have been debating about this "service" notion for more than two centuries. Often, the definitions in business literature limit the service notion to the delivery of immaterial goods. The adoption of the notion of "service" by computer scientists and IT practitioners has been more recent. In both the business science field and the computer science field a service is regarded as an interaction between a requesting party (often called consumer or customer) and an offering party (often called provider or supplier). The offering party is able to produce a certain value that is requested by the other party. But even with this common notion a precise definition and mutual understanding of the term service is missing. The three aspect organizations. is a logical representation of a repeatable business activity that has a specified outcome (e.g., check customer credit; provide weather data, consolidate drilling reports), is self-contained, may be composed of other services, and is a "black-box" to consumers of the service.

3. PROPOSED SYSTEM

The main contribution of this paper is, therefore, a method for service-orientation including a service definition, a generic service specification framework, and a distinction between different types of services. The method is based on the _-theory. This theory regards organizations as social systems and sees IT systems as support for social actors in performing communication-related activities and production-related activities. Based on this theory, we see many similarities in the specification of human services and IT services. A definition of the notion of "service" is, therefore, given which can be applied to both types of services and that acts as a foundation for our framework. Our generic framework can be used by service providers for specifying both human services and IT services to enable service consumers 1) to find a certain service, 2) to determine whether the provided functionality corresponds to their needs, and 3) to know how to use a certain service. The structure of this paper is as follows: We start by discussing related work that deals with the problem of service specification in Section 2. In Section 3, we give a brief overview of the _-theory and explain the notion of "service" using this theory. We provide a service definition and present a classification in six types of services: ontological human services, infological human services, data logical human services, ontological IT services, infological IT services, and data logical IT services.

The service executor area of concern defines who is the provider of the service and contains two aspects, namely the actor role and contact information. The actor role aspect specifies the role of the actor that takes final responsibility for the service. In human service, this is the actor role of the human executing the production fact, whereas in IT service, this is the actor role of the human responsible for executing the production act, but who has delegated his responsibility to an IT system. This information can be gained from two types of diagrams provided by the Enterprise Ontology, namely the Actor Transaction Diagram or the Process Model.

It would go far beyond the scope of this paper to introduce all the Enterprise Ontology models in detail. In the example case given later in this paper, we introduce only the most relevant ones. For further details, we refer to the Enterprise Ontology book. Since the initiator could feel an urge to contact the service executor, contact information of the executor needs to be provided in the specification framework. We could consider, for instance, situations in which a protocol error arises after calling an IT service and the fault condition denotes to contact the service executor. Also, the initiator may still have some question about the service after reading its specification .The service coordination area of concern has as goal to give the consumer all information required for realizing successful communication with the provider.

We, therefore, specify the required coordination acts for communicating with the executor. Next to this, for completely specifying the service coordination area of concern, we require three aspects that are implementation-dependent. Since the Enterprise Ontology models the essence of an enterprise in a completely implementation- independent way, we cannot gain this information from the Enterprise Ontology models. Though these aspects are also not explicitly mentioned in the -theory, they logically follow when one thinks about how to access a service. First, a service consumer needs to know whether the service is an IT service or a human service, because IT systems and humans communicate in a different way. We call the related aspect coordination kind. Second, the consumer has to apply a certain protocol for successful communication. Knowing the location of a service in itself is pretty useless for a service consumer without knowing how he has to offer the service input to and receive the service output from the service provider. Successful communication between the consuming service component and the providing service component is enabled using protocols. Protocols define the rules governing the syntax, semantics and synchronization of communication.

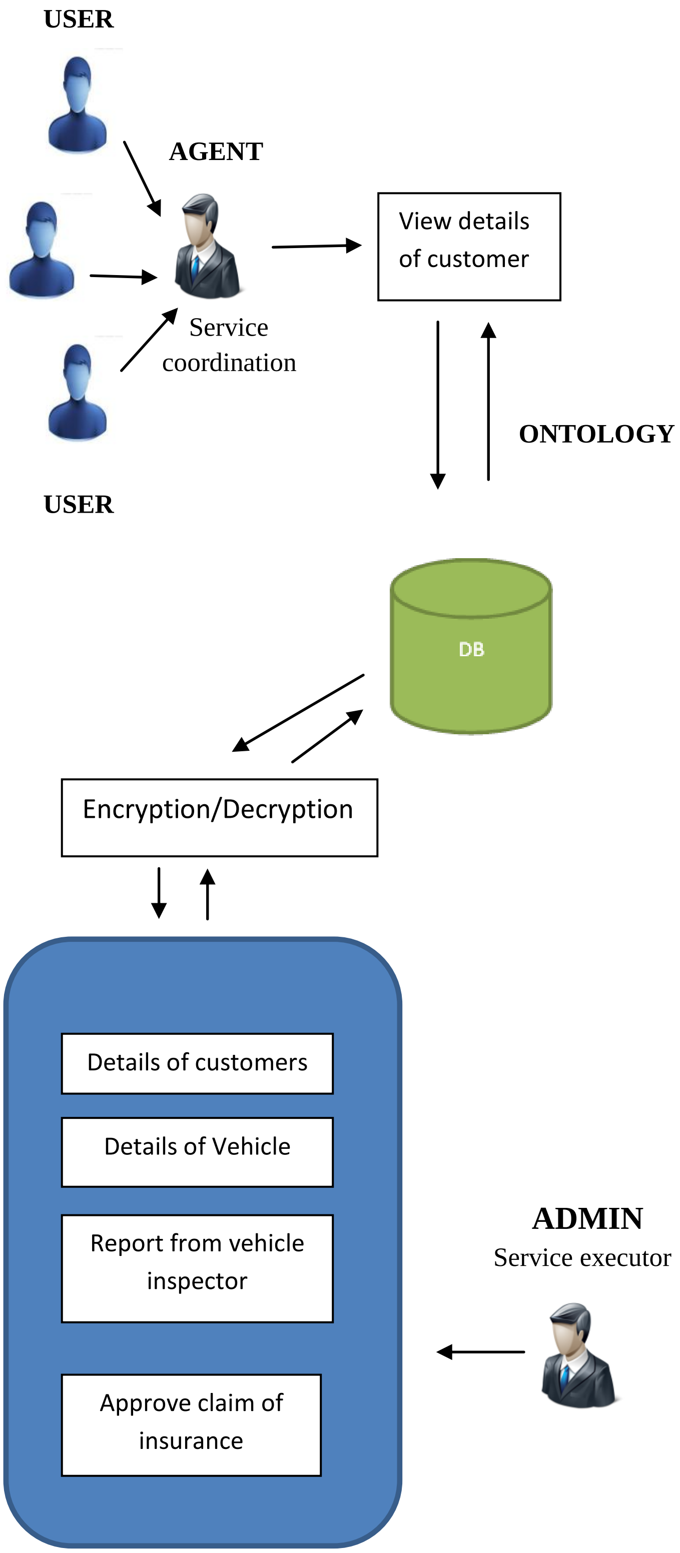


Fig 4.1 Data flow diagram

4. SERVICES PROVIDED

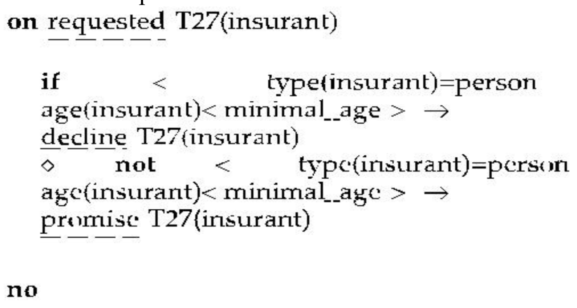
`4.1 SERVICE EXECUTOR

The service executor aspect specifies the role of the actor that takes final responsibility for the service. So whether it concerns an IT service or a human service, the same actor role remains responsible. The only difference is that in case of an IT service the actor fulfilling the actor role delegates his responsibility to an IT system. As shown in Fig. 4, the policy underwriter is the actor role executing the transaction T27 and, therefore, responsible for the "policy underwriting" service.

4.2 SERVICE PRODUCTION

In the service production area of concern, we specify the actual value that the policy underwriter actor role (in this case, the policy underwriter) offers to the service initiator (in this case the policy binder actor role). The production act in our example concerns policy underwriting, which is part of the transaction "T27 Policy underwriting." We define this act as follows: Policy underwriting is the act of evaluating the risk and exposures of potential insurants. It involves making the decision whether or not the insurant can get coverage for the insured and what additional premium the insurant has to pay if the insured poses a larger than average risk.

The information used aspect is derived from the Information Use Table (IUT). The extract of the IUT concerning the transaction "T27 Policy underwriting" is shown in Table 1. This IUT is in its turn derived from the State Model and the Action Rules, and specifies for every object class, fact type, and result type from the State Model, in which steps of the Process Model its instances are used. The notation of the process steps in the right column are as follows: Transaction/Process step. For example, T27/ex denotes the execution of the production act in the transaction "policy underwriting," and T27/ac denotes the coordination act accept of the transaction "policy underwriting." The production fact can be derived from the Transaction Result Table. As shown in Fig. 5 the result type of the transaction "policy underwriting" is "policy underwriting for policy pol has been done." The production kind of this transaction is "ontological," since it forms part of the ontological model of Protector. Examples of an infological respectively datalogical service are "calculate premium" and "store calculation results."



```
on requested T27(insurant)

    if        <          type(insurant)=person
    age(insurant)< minimal_age >  →
    decline T27(insurant)
    ◇      not      <        type(insurant)=person
    age(insurant)< minimal_age >  →
    promise T27(insurant)

no
```

Fig 4.2 Part of action model of protector

4.3 SERVICE COORDINATION

With the coordination acts aspect, the steps of a transaction that deal with communication between the initiator and the executor need to be defined. In our example, if the initiator calls the service "policy underwriting," he wants to know whether the executor processes his request or if the executor may also decline such a request. If the initiator does not receive any notification, such as a promise or a decline, after having sent his request, he would be unsure if his request is being processed or not. For the specification of the coordination aspect, we therefore use a transaction pattern, which needs to be known and agreed upon by both parties, the initiator and the executor. In Section 3.1.2, three patterns have been introduced for describing the coordination between two parties, namely the basic transaction pattern, the standard transaction pattern and the complete transaction pattern. They differ in the way they handle dissents between the two parties.

5. CONCLUSION

Service-oriented approaches are gaining more and more attention since they claim to provide new and flexible ways of supporting the activities in an organization. However, the current ways of implementing these approaches often lead to additional overhead and additional costs without delivering the expected advantages. Two major problems in the area of service-orientation can be identified. First, a complete and clear understanding of the notion of service is missing. As a consequence, it is unclear what functionality should be implemented as a service. Second, an appropriate framework for specifying services is missing. As a consequence, insufficient information is provided to the service consumer concerning various aspects, e.g., the functionality and the behavior of the respective service. In this paper, we primarily addressed the problem of service. However, as we have based our research on the rigorous _-theory, we have also improved our understanding of services by relating them to transactions. The function of the specification of a service is to give all stakeholders the information about the service they need, e.g., for service discovering, selection, and usage. Solely by specifying the input and output aspects of a service, as is the current practice, the service consumer does not get sufficient information to determine whether the service fits his needs. These specification aspects only reflect part of the total externally visible behavior of a service. Though many standards exist for specifying certain aspects of a service, a holistic approach is still missing. The main contribution of this paper is the development of such a holistic framework, which we call the Generic Service Specification Framework. In order to do so, we provided a definition of the notion of service and introduced six different types of services, based on thetheory. The first distinction is between human services, i.e., services executed by human beings, and IT services, i.e., services executed by IT systems. The second distinction corresponds to the three aspect organizations, as proposed by the organization theorem: the B-organization, the I-organization, and the D-organization. By applying the theory to an organization, one can extract the essence of the construction and the operation of (the organization of) an enterprise. This essence is contained in the so-called ontological model of the organization. This essential knowledge is needed for identifying the services that are needed in order to let the organization operate. Next, these services are specified according to the generic service specification framework. As an example for demonstrating the feasibility and the usefulness of the generic service specification framework, we analyzed the insurance case.

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