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A Dynamic Model for Evaluating Web Services Regarding Run-time Parameters

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Abstract

Trust is one of the most important factors for making decision. By using trust, making decision and transactions go easy. Every day internet becomes big, and many web services are published. Therefore Service Oriented Architecture is proposed to improve publishing and discovering services process. In this architecture, clients prefer to trust to service providers and then select desire services. Reason of needing trust in this architecture is, in some situations maybe exists many services for specific functionality. So client should consider non-functional properties. Therefore in this project we propose architecture for assessing web services trust. Because trust is based on information, first trust parameters are considered in this thesis. Then we proposed architecture for assessing web service trust. Based on this architecture, parameters, services and service providers trust algorithms are proposed.

Key Words

Security, Evaluating Web Services, SOA, Run-Time Parameters

I. INTRODUCTION

In an actual environment there is always a degree of uncertainty about strangers. So when people do not trust toward others, refuse to interact with them. So we can say, trust plays an

important role in facilitating cooperation in such circumstances. Trust is more of a communicational characteristic to feature of people .Therefore, trust is defined as the relationship between trust and the trustee [1]. Trustor is an entity that trusts to another entity called trustee [2]. Entity can include a person, shop, bank, service or a product. Entities can be recognized by its attributes, such as name, ID, photo, signature, physical location of store and expressed policies [3]. Many experiments have taken place in the field of trust in e-commerce and peer-to-peer environments. However in terms of web services and service-oriented environment, many researches have not been done. In other words it is immature and needs further researches and investigations. So it is required to provide a solution for identifying parameters of trust and evaluating them for web services. The issue of trust in web services and service-oriented environment with the issue of trust in other fields is different and more aspects need to be considered. There are also challenges in this area that need to be monitored. The issues that need further investigation are as follows:

1. Definition of trust: trust has certain distinctions in the quality of service and reputation.

2. Expression of trust principles: Trust has different aspects and requirements that could affect the concept of trust.

3. Trust parameters: trust is evaluated based on information hence determining parameters and information that should be used to evaluate the trust of services and providers is critical.

4. Trust evaluation architecture: the proposed architecture must be the least expensive to implement and could evaluate trust with only minor changes in the structure of service-oriented architecture.

According to the statement, the central issue in this project is that by introducing different parameters of trust for web services a mechanism to calculate the amount of trust that a user can have to the service and server should also be provided.

II. RELATED WORKS

Most of the researchers' job in the context of trust have been done on trust criteria and trust a in distributed systems such as grid computing, pervasive computing and peer-to-peer networks. Some of presented works in the context of Trust have surveyed trust from security perspective. Standards such as WS-Trust and WS-Policy are created to display the credentials and security policies which they are used for trust-based security.[4]

In [5] a model of trust in mesh networks is provided in which evaluate trust based on security. Most of the models have been proposed to evaluate and calculate the trust use static information and scenarios and few works has been done in dynamic calculation and trust run-time context. Authors in some accomplished works have been satisfied only by describing and oral explanations about the Trust and its parameters. In [6], [7], [8] and [9], to evaluate the trust of

web services some frameworks have been provided. Frameworks presented in [7], [8], [9] are general and components and their functions are not specifically detailed. The framework presented in [6], compared to three other frameworks, is more slightly detailed. In other words, the authors express architectural components and functions of each one of them. But run-time parameter of the service has not been determined in this job. The authors also used SLA to evaluate Trust the parameters must be entered in SLA is not given. Server's Trust is one of the important parameters of Trust evaluation systems in Trust management systems. In [10] server's Trust is regarded as one of the most important parameters. In some works, trust only calculated based on their feedbacks from users. Feedback is one of the most important parameter in trust but there are other parameters that should be considered. Wang and Zhang have developed a model to evaluate the trust based on user feedback [11]. In this paper a model to evaluate the trust is provided that only feedback is noted as a trust parameter. Elshaafi et al. [12] have developed a model to evaluate trust where the monitoring has been used to evaluate trust. In this article provided a good framework for monitoring of web services, but the parameters that should be considered for evaluation are not defined.

III. SERVICE-ORIENTED ARCHITECTURE BASED ON TRUST

In proposed architecture service oriented architecture has been developed to create lowest cost for restructuring. In this architecture a unit has been considered to evaluate trust. With this change it is not needed to fundamentally change the structure of services. Therefore by using the same service-oriented architecture, you can choose services based on trust.

In Figure 1 service-oriented architecture has been developed in a way that can support trust to choose the services. Servers in this architecture are responsible for evaluating trust to services and servers. The developed architecture a unit is intended to measure trust and some additional interface.

Evaluation unit which has added to the server has a database for storing values of parameters and values of trust. In this architecture, an interface for servers and an interface for clients is intended. Server interface allow servers to publish their services and enter values considered for trust parameters. Through this interface, servers are also able to view their trust value to improve the quality of their services.

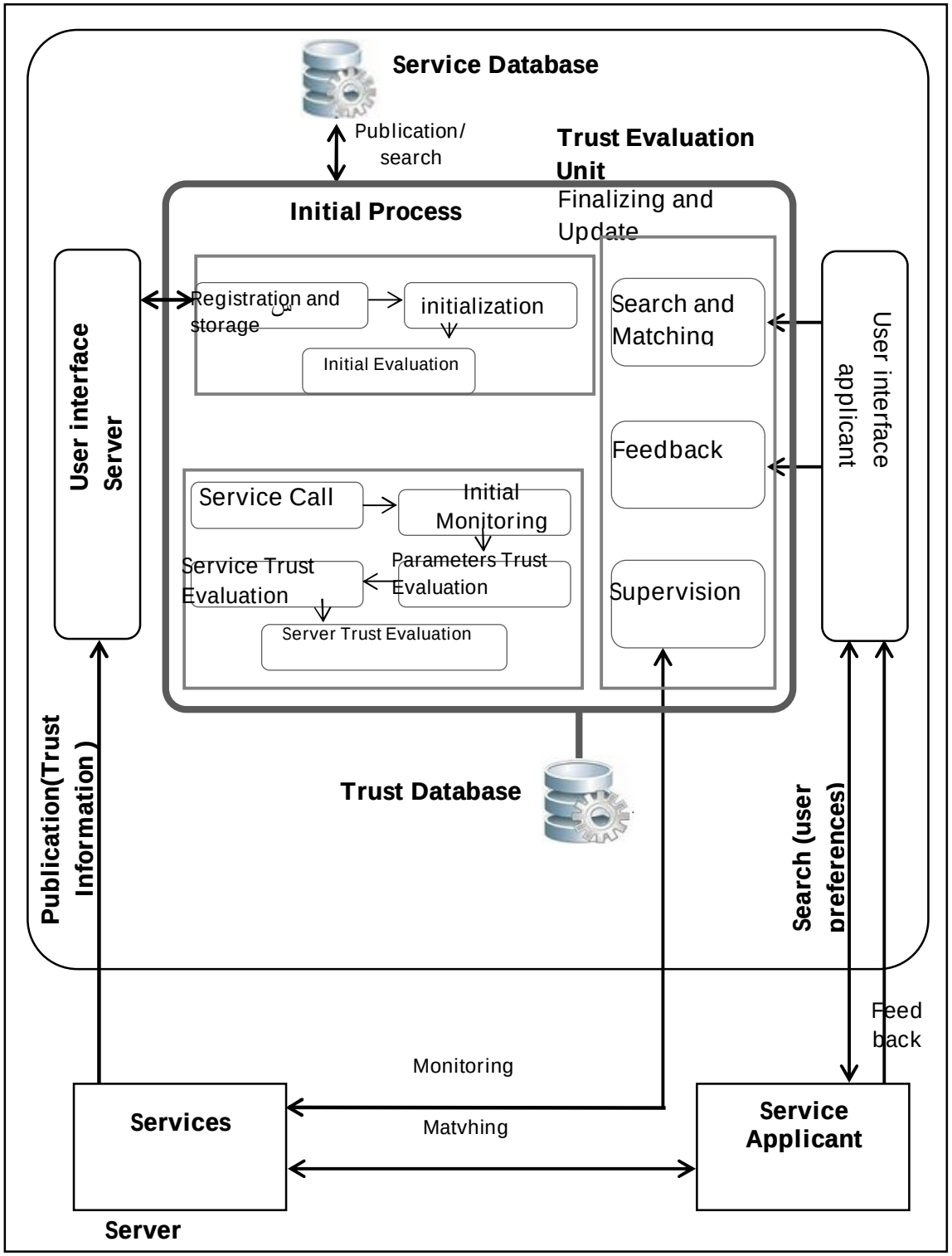

FIGURE 1. TRUST-BASED SERVICE-ORIENTED ARCHITECTURE

Applicant interface allows them to choose their server considering their required parameters. Clients can also provide their feedback through this interface. In the proposed architecture when a server wants to publish a service, enters the requested information and gives it to server interface. Then reliability evaluation unit stores the parameter values to calculate reliability in its database and then spread service in service database.

When an applicant request a service for a specific function, choose considered parameters of trust and pass request to user interface. Then trust evaluation unit receive the request and choose the services that have been published due to applicant request among available services in database service. Then trust values for these services have been chosen with regard to the chosen parameters by applicant have been calculated and offer the most trustworthy services to the applicant.

IV. IMPLEMENTATION AND EVALUATION

The layer model shown in Figure has been used in project implementation.

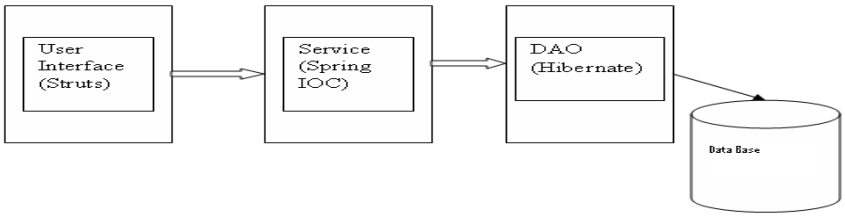

FIGURE 2. PROJECT STRUCTURE

1. Data layer: This layer is used to store and retrieve data.

2. Service layer: This layer has the main codes and policies and rules that are implemented in this field.

3. User interface layer: How to get input from user and how to view the contents in this section.

Project implementation is performed based on the model developed for the described service oriented architecture shown in Figure 1. In the developed model, the two parts have been added to the service-oriented architecture, which these sections include evaluation unit, interface.

According to Figure 1, the evaluation unit in the service layer and its database in data layer and interfaces implemented on user interface layer.

Project implementation is done in Java and using InjelliJIDE 11.01

[1] http://www.jetbrains.com/idea/

V. ANALYSIS OF CHANGING USER BEHAVIOR IMPACT ON THE USER'S CREDENTIALS

According to the values in Table 1, user as the first user in the system provides a feedback. Because it is the first feedback, so the user's credentials do not change. Then user feedback is lower than the first feedback so the result should be a reduced reputation value. This reduction is shown in Figure 3.

TABLE 1. USER FEEDBACK

SERVER PARAMETERS						SERVICE PARAMETERS				
E-MAIL	PHONE NO.	PHYSICAL LOCATION	WEB SITE	ONLINE SUPPORT	ORDER PROGRESS	PENALTY RATE	COMPENSATION RATE	SATISFACTION FROM OUTPUT	SATISFACTION FROM PAYMENT	ROW
1	1	1	1	10	9	80	80	8	7	.1
-1	-1	-1	-1	4	2	65	50	3	0.5	.2
-1	-1	1	1	8	7.5	60	60	7	6	.3
1	1	1	1	6	6.5	40	55	6	6	.4
1	1	1	1	7	6.25	61.25	61.25	6	4.87	.5
1	1	1	1	7	6	62	64	6.2	4.5	.6
1	1	1	1	7	6	62	65	6	4.5	.7
1	1	1	1	7	6	62	65	6	4.5	.8
1	1	1	1	7	6	62	65	6	4.5	.9
1	1	1	1	7	6	62	65	6	4.5	.10

User's third feedback is different from previous feedbacks so user credit has been reduced. Because there was not much different from feedback with previous feedback, reducing the amount of user credit is much less than previous. In the fourth feedback, user entered his feedback values close to the average of previous feedback. Because of change in user behavior toward consistent with previous feedbacks, the amount of user credit has enhanced. In the fifth feedback, the user literally entered previous values which have led to rise again the user credit.

Sixth feedback is also close to previous values, so that the user has done so much uniformly thus trust should be increased. This increase is evident in Figure 3. User have entered feedback

from the seventh to the tenth as the same and close to the previous values that this has resulted in a gradual increase in user credentials.

Therefore it can say that when user behavior is varied amount of user credentials would be decreased. Variability of user behavior may be due to malicious user behavior or user to be anonymous with the service. Thus, presented model according to the result covers' both subjects and have shown the correct response to it.

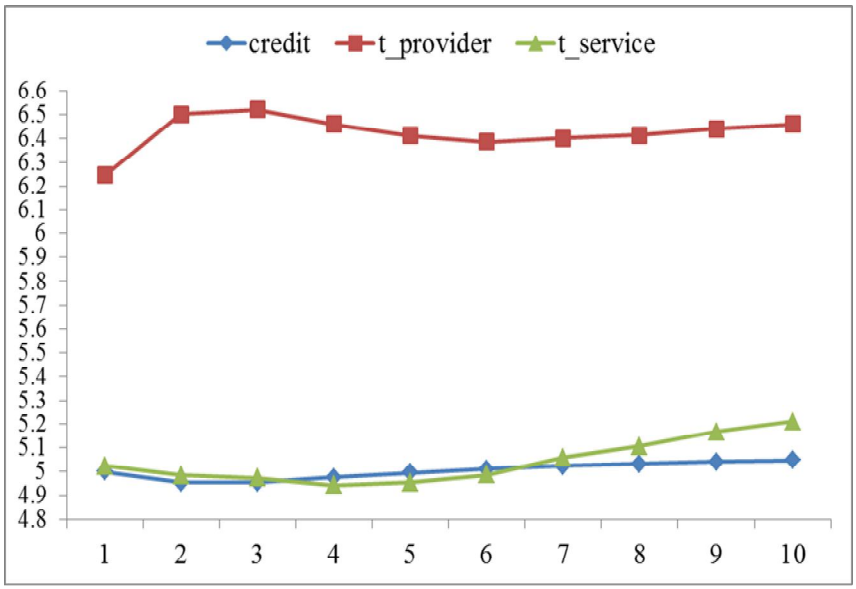

FIGURE 3. CHANGES IN THE REPUTATION AMOUNT, SERVICE AND SERVER RELIABILITY

VI. CONCLUSION AND DISCUSSIONS

Due to the expansion of services, service oriented architecture, both in research and in industry has been paid attention. In this architecture, many services may be issued for a specific function. Thus, the user is required in addition to the service function also consider non-functional features. The main objective of this study is to provide a comprehensive model for evaluating the reliability of web services. To achieve this, the parameters that should be considered for the evaluation of trust, were identified and categorized. Then for these parameters, appropriate definitions and how they were set have been provided. To evaluate the reliability of service, it is necessary first calculate the reliability for each of the parameters. According to the definitions provided for parameters, models for evaluating the reliability, each parameter separately expressed. After evaluating parameters service reliability were calculated. Then, according to the reliable service value and reliable server parameters as well, the server reliability is calculated.

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