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EVALUATION OF SERVICE TRANSACTIONS AND SELECTION OF QUALITY OFFERED SERVICES IN A BUSINESS ENVIRONMENT

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ABSTRACT

The application of service oriented architecture in business is to meet the best quality requirements to the customers and providers. Where, service evaluations are carried out based on the quality attributes of scalability, usability, security, performance. In past many evaluation systems have been proposed for business applications with different criteria. However, security metric to be considered this study proposes a new Analysis Estimator Service (AES) system to analyze and estimate the transaction data from the multiple scalable factors. For this purpose two types of estimations namely, Transaction Service (TS) and Quality Service (QS) Estimators are proposed to evaluate the transactions concerning Security and Quality. From this estimation analysis, it is observed that the transaction data achieves two beneficial advantages of secured data transmission and offered quality services to the customers. So in this proposed approach customers have the clear view to analyze and estimate the service data to-From the providers.

Keywords: Analyzer Estimator Service (AES) System, Transaction Security (TS) Estimator, Quality Service (QS) Estimator, Collector and Informer, Order and Agreement Approval

1. INTRODUCTION

Industries and companies provide a best service offers to their customers in the fields of grocery, healthcare, hospitality, insurance, education, technology and entertainment. In this process, multi options are listed to the customers so that they can select the best optional services, according to the user needs where the quality offers may vary with services. During the transaction of services, the data may get anonymous i.e., Customer may get the incorrect transaction reports, sudden substantial damages and the unavailability of services. To avoid such terms of inconvenience in accessing services, it is necessary to evaluate them both in the terms of security and service availability.

The major security issues in SOA:

- Authentication and authorization of services
- Stateless and distributed services

While considering the Security issues in Service Oriented Architecture, different kinds of vulnerabilities that affect the system are Denial of Service attacks (DoS), Repudiation, Disclosing the confidential information, man-in-middle attacks, session reply, spoofing, SQL injection and Data tampering. These attacks can be prevented using various methodologies. In most of these methods, some of the recent research challenges are discussed including security to prevent the hacking of services. The threats are prevented by generating service policies, providing confidentiality, Integrity, Authorization and Authentication since they guard the service transactions. Normally, in Service Oriented Architecture the communication between the service providers and consumers and the services are shown to the several consumers based on the

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agreements. During the agreement generation, service policies get an active role since it provides security, governance and help to monitor the business processes.

1.1. Authentication and Authorization of Services

In transmission of data-services, multi collections of transaction data are transferred which originate from the source and sent to the destination. In such cases the data received from the unknown resources are blocked to avoid insecure transmission when the service data are split and transmitted to multiple sources. The multisource has the pieces of data and is stored in the destination. In such case, the data should be secured using integrity and confidentiality. Moreover confidential information like passwords, PIN numbers, transactions ID which are used during the transactions need to be authenticated. The authorization and authentication are carried out securely with the XML security technologies like X.509 certificates, Security Assertion Markup Language (SAML) and REST services which allow only the authorized access for numerous services.

The researchers Zhao *et al*. (2012), proposed a data access framework for Service Oriented Rich Clients (SORC) for the retrieval of services from the client side. The major advantage of their work is that it has thin clients usage with web server and hence the data storage and data manipulation are low. The disadvantages of the existing systems are overcome with this framework which makes heterogeneous data access and provides the unified local data source and cache mechanism. The cache strategies are evaluated by the authors with the adaptive approach to attain a good performance based on the user historical actions. Thus the researchers proved that data access are simpler and efficient than the traditional approaches.

Chunxiao *et al*. (2012) introduced a secure virtual platform in an untrusted environment. The authors proposed secure virtualization architecture for an untrusted OS environment which introduces the Domain Runtime (Dom0) protocol mechanism from the untrusted Operating Systems. They also proposed techniques for the secondary storage and network interface get securely maintain from the unauthorized accessing.

1.2. Stateless and Distributed Services

In service oriented architecture services are loosely coupled, distributed and stateless. So, if any of the services fails, it is not roll back because of the stateless service. Moreover, the web service transactions needed long time for recovery due to any cause of failures. In SOA architecture, all set of services are composed together in which one service output is given as an input to other set of services. If any one of the services fails it affects other services with respect to functionality. To avoid such stoppage of transactions in services XML database system locking and unlocking methods for concurrency control has been utilized by recent services. In recent times, new techniques including Business Transaction Protocol (BTP) and Web Services Transactions (WS-T) are used to reduce the failure rate of service transactions.

Chan *et al*. (2012) designed a recommender system which helps to solve the problems related to user perspective. In client point of view claiming of any services can be done in the form of query language. They Compare their work with the text based recommendation approach propose a collaborative filtering technique to evaluate the user interactions. To validate these interactions, four types of algorithms namely Operation-operation filtering algorithm, User-user filtering algorithm, Combination-filtering algorithm, Priorities-assignment strategy are proposed by them to make effective validation. For easily discovering the web services, this recommender system helps to retrieve the services with the key of User-Id and WS-Operations. So, the quality recommendations are generated based on the user behavior.

Furtado (2009) proposes a Quality of Service (QoS) Broker used to produce a quality service between the applications and server. This Broker introduces a priority based weighted fair queuing approach to avoid the congestion. Thus quality service broker can be either included or deployed in the web application or server. The broker can be adaptable if the applications have the elements of Target (T), Service Future (SF) and contract. Important problem of admission control can be solved with the tempQueue concept and the approach of Maximum throughput and Feedback.

Over considering the existing survey and different approaches the proposed AES approach can manipulate vast amount of transactions and produces the offer-able service to the customers. It reduces the time consumed with the evaluation of TS and QS Estimators. This proposed method called analysis estimator service system is more suitable to evaluate the service insecure transaction and the service quality.

2. MATERIALS AND METHODS

2.1. Analyzer Estimator Service (AES) System

Web service is a basic role play of service oriented architecture. Generally in SOA services are loosely coupled with different platforms. Transactions, security and quality services are one of the criteria during the generation of services. This study mainly focuses on these three issues in the proposed approach Analyzer Estimator Service (AES) system. It has the two types of estimation to do the evaluation of service transaction, security and QoS factors, they are.

2.2. Transaction Security (TS) Estimator

2.2.1. Quality Service (QS) Estimator

Figure 1 shows the analyzer estimator service system starts the functionality with the customers. Making the huge transactional services per day is a difficult criterion to providers. The proposed system has introduced the two types of estimators to reduce the burden of congestion and produce the valuable agreement to the customers. From the proposed system user have accurate analysis and estimation of data with TS and QS Estimators. In online web services retrieval clients can choose the offered and selected services. During transactions, clients have to transmit the authorized information to the providing services. The evaluation of transmission securely analyzed and processed with the Collector and Informer, TS Estimator, QS Estimator and Order and agreement Approval.

2.3. Collector and Informer (CI)

The collector and Informer processor are used to collect and inform the agreement information to the customers. Major two parts are doing the collection and transmission they are:

- Collector
- Informer

2.4. Collector

During processing the authorization is validated with the proper user ID. Generally user details are collected with User ID, password and transaction ID. The intention of collector is to collect the multiple users' data with the preferred service provider's transaction ID. The collected data is authenticated in the TS Estimator.

2.5. Informer

Other part of CI is the Informer has to inform the confirmed agreement to the customers. Finalized agreement has generated based on the prompt service, reliability and availability of the services. If the agreement has been satisfied with the customer supplementary processed with the particular service provider.

2.6. Transaction Security (TS) Estimator

The authorized details are evaluated with the TS-Estimator; it has the three sub evaluating parts of:

- Analyzer
- Data Valuator
- Security Generator

2.7. Analyzer

User Id, password and selected provider transaction ID are collected with the collector. The collected details are estimated and authenticated only with this estimator. Analyzer part is to verify the user name, User ID and transaction ID with the matched service provider. If any user have provided any anomaly data is traced in the analyzer. The irrelevant or unmatched data with the service provider are discarded initially in the analyzer. Data identification can be done with the service account details which have been already created with the particular service provider. Such as, if any clients want to access any provider service should have verifiable account with the provider.

2.8. Data Valuator

Improper user details with invalid data are discarded and passed to the next part of Data Valuator. User accessing date and timing are notified with this valuator; according to the time randomly thirty keys are generated for thirty days. Along with that, the filtered data are classified with the corrected samples and false samples. From the corrected and false samples are measured with the total number of samples. The data valuator classifies the samples and the verified samples are passed to the security generator.

2.9. Generator

Security generator has used the 128 bit Encryption and Decryption. Two types of Encryption and Decryption happens with respect to the random keys, password and transaction ID. First type of Encryption will be done with the random keys and the 128 bits of received data.

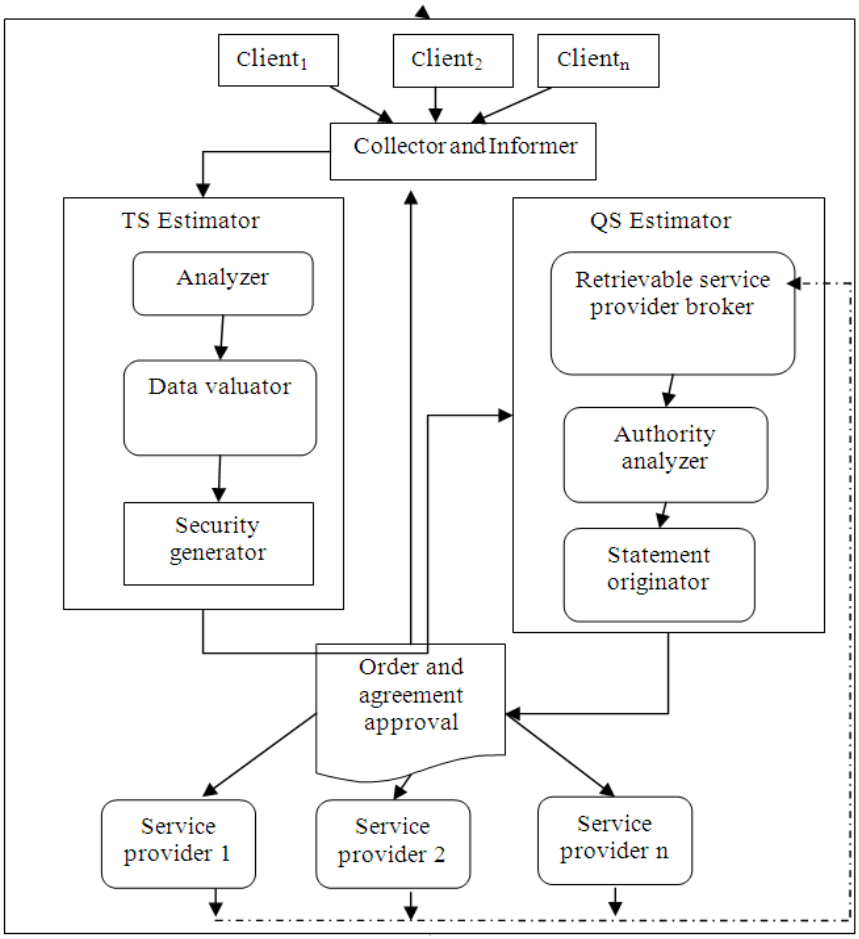

Fig. 1. Analyzer estimator service system

Based on the output of first type encryption, the second encryption made with encrypted1 cipher text and password. Second decryption is done with the encrypted2 cipher text and User ID. Last decryption of cipher text happens with Decrypted2 cipher text and transaction ID. From the secured valid evaluation the data next moves on to the Quality Service (QS) Estimator to verify the quality offered services to the clients.

2.10. Transaction Security (TS) Estimation Algorithm

- Verify and collect the User name, user ID, password, service provider transaction ID in the Collector and Informer
- Generate the random key tokens for each set of retrieved data package
- Classify the packages based on the True samples and false samples
- True samples denote the filtered data set and false samples denote the discarded data set

Data Verification is checked with the defined formula of…..
Data Verification = Valid samples-Error rate

Where:

Valid samples = Number of samples correctly classified

Total number of samples:

Error rate = Number of samples false positives

Total number of samples

- Check the security processing in the security generator with two types of encryption and decryption
- First encryption1 can be done with the plain text and random keys
- Second encryption can be done with the encrypted text1 with password
- Decrypt1 happens with the cipher text data with the User Id
- Finalize to change the string by Decryption2 using decryption1 cipher text with Transaction ID

2.11. QS-(Quality Service) Estimator

The quality estimation of services processed with the three types of estimators namely:

- Retrievable service provider broker
- Authority analyzer
- Statement Generator

2.12. Retrievable Service Provider Broker

Retrievable service provider broker is a warehouse to store the collective multiple provider services with the customer preferred service providers. Often in **Fig. 1** the dotted line shows the connectivity from the service providers and the retrievable broker. The purpose of defining the retrievable broker is to have the collection of different types of services that can be retrieved by authority analyzer. The analyzer defined as a mentor to filter the service provider services according to the suggestions from the existing collection of database and feedbacks from the customers. Nearly, more than 200 sets of legacy data are collected in the broker and 200 sets of customer's feedbacks are collected and matched with the customer preferred service.

2.13. Authority Analyzer

The retrieved collections of services are matched in the Authority analyzer with respect to the service availability, reliability and cost. Three criteria's are analyzed and produce the prompt service... i.e.:

$$\text{Prompt service} = \text{Availability range} + \text{Reliability range} + \text{price factor}$$

Prompt service is analyzed with the more, less, average factors of the accessibility of services. From the prompt service accumulation the comparative service are selected and finalized. The service details are noted and prepared as an active document called the statement generator.

2.14. Statement Generator

The statement generator has the filtered list of services with their desirable quality factors of reliability, availability and price factor. To get the approval from the customer the statements are passed to the order and agreement approval, generate an agreement and finally produce to the customers.

2.15. Quality Service (QS) Estimator Algorithm

- Approve the secured decrypted data from the TS Estimator
- Select the customer preferred services with the desirable quality factors of service availability, reliability and price order
- More, Less and Average criteria are chosen according to the selected services in authority analyzer
- Compare the filtered services with the existing service provider Database and customer feedbacks
- Generate the comparative statement in the statement generator
- Make the final agreement and get approval from the customers

2.16. Order and Agreement Approval

From the statement generator the final agreement generation can be passed on to the Order and Agreement approval. The customer preferred quality services are made as an agreement and produced to the customer. If the customer has satisfied with the agreement they can buy secured and offered quality services. Generated agreement report finally passes on to the collector and Informer. The CI can play the two active roles to collect and produce the final agreement generation to the customer. Finally the approved agreement is passed on to the service provider.

3. RESULTS

Implementation results are tested with the 150 customers with 3 service providers. To start the Estimation of the service transaction the 150 user's username, user ID, password and preferred transaction ID are collected in the collector. Before beginning, any transaction with the any provider the user should have the valid account details. The Analyzed Estimator Service system can estimate the services only with the valid account.

Table 1. Classified samples of TS estimator

Parameters	Total samples To be taken	Correctly classified samples	False samples	TS Estimator Analysis (%)
User Id	150	95	55	63.33
Password	150	85	65	56.66
Transaction Id	150	90	60	60.00

Table 2. Qualified analysis of services from QS Estimator

Service providers	Prompt service factors		
	Availability (%)	Reliability (%)	Price factor
SP1	20 to 45	45	>8000
SP2	50 to 68	75	>=15,000
SP3	70 to 85	80	<7600

Table 3. Analysis of AES with existing system

Prompt service level	AES (%)	Existing system (%)	Service providers
Availability	65	55	SP1
Reliability	75	60	SP2
Price factor	80	75	SP3

User ID, password, transaction ID are analyzed and securely evaluated with the Analyzer, Data Valuator and Security Generator. Based on the formula calculation the filtered and securely defined data is send to the QS Estimator. In this Estimator the plain text data are gathered and matched with the collective service providers. Retrievable service broker has the collective services that have to be matched with an authority analyzer and produce the statement to statement generator. Finally the agreement get approved and satisfied further the service can be brought by the customer.

The tested experimental results are compared with the existing methods to produce the correct efficiency measure. Valuable secured data is transmitted using the User Id, password and Transaction ID and the proposed experiments are compared with respect to these parameters. Existing data are taken and compared with respect to the filtered samples. The samples are categorized into correctly classified and false classified. Based on the two criteria the results are matched with the TS Estimator analysis.

Table 1 represents the classified samples based on the parameters of User ID, password, Transaction ID. Here the total samples to be taken of 150 and tested with the three parts of estimators and calculated with the formula of Data Verification. From the calculation it shows that the correctly classified User ID samples are 95 and false of 55 from that the final total TS produce the estimation of 63.33% performance. In second the parameter password correctly classified are 85 and false of 65, so the TS Estimation is of 56.66%.

In third, correctly classified transaction Id samples of 90 and false of 60 the TS Estimation is of 60%. Based on the first estimation analysis only the data get transmitted to the next estimator.

TS Estimator has tested with the filtered data and the quality services are tested in three types of analyzers. This estimator analyzes the parameters with respect to availability, reliability and price factor. The given authenticated data are matched in the authority analyzer database and produce the filtered service. Filtered services may comes in the range of more, less and average factors. In the test series **Table 2** categorized filtered services are drinkable and used to produce the prompt service.

From the above defined analysis the customer can choose the prompt service and make agreement with the service provider. The three sampled services called Service Provider1 (SP1), Service Provider2 (SP2) and Service Provider3 (SP3) are tested and produce the qualifiable service to the customers. From the testing, SP1 produces the availability ratio of 20% to 45% with 45% reliable service with the price factor of 8000.

SP2 provides the availability ratio of 50% to 68% and the reliable service of 75% and accessed with the price factor of >=15,000. Finally SP3 has the availability of 70% to 85% with 80% reliable service and accessed with the price factor of <7600. From the above three SP analysis SP3 provides the better analysis than the two providers.

In **Table 3** various prompt service factors are stated with the different ratios and compared with the existing systems. From all above estimation analysis states that the SP3 provides the better offered service than comparative to other two service providers **Fig. 2** gives the presentation of the analysis report of the AES and the existing system. The factors show that the analyzed factors of AES system have more effective performance than the existing approach. The X axis defined with analysis factors and Y axis has taken the number of providers. The increased blue bar denotes the high measurable performance than the red bar. The comparative analysis produce the proposed system produces the effective offered services with the high price factor and trustworthy services.

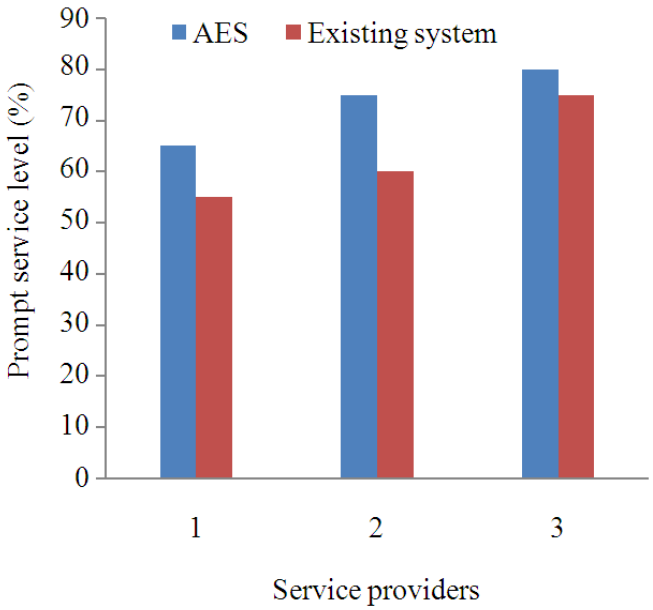

Fig. 2. Performance analysis of analysis estimation service system

4. DISCUSSION

Interoperability is one of the significant issues discussed for the loosely coupled systems. The loosely coupled systems tackle with the parameters of scalability and reliability. To accompany a group of services Agrawal *et al*. (2002), designed an architecture called Vinci that compose a platform oriented services with low cost and a high-quality security. Here, the services transfer messages with the concept of XTalk as like of RPC protocol. Development of this architecture will improve the rapid development of services with a fast and efficient manner. Cloud computing can be accessed with the two types of categories public and private cloud. While accessing the services through cloud computing the resources are scheduled and provided to multiple service providers. To equally offer the resources a new OCRP algorithm is introduced by Chaisiri *et al*. (2012). The algorithm reduces the overall cost accessing with the Stochastic Integer Programming and Deterministic Equivalent Formulation. Using this algorithm will reduce the provisional charges for customers.

Web services are communicated with the SOAP protocols with HTTP protocol from source to the destination. During the transmission of messages the vulnerabilities occur with different types of attacks. To prevent the Daniel-of-Service attacks Gruschka *et al*. (2011), presents a streaming based WS-Security processing system. The system filter, verify and validate the policy of SOAP messages. From the validation different attacks are prevented and messages are secured during transmission. In service oriented architecture, real time business services are easily interacted and accessed with different business platforms. The researcher Karnouskos (2012), proposed a monitoring system to monitor and improve the performance for the smart grid applications. The three layers-meter data management, concentrator and smart meter layers connect the interacted grid applications and provide the better accessing to the customers. During composition of services the service quality evaluates with the Quality of Services (QoS). Ko *et al*. (2008), discuss the quality of service for the composed web services. In this research web service composition algorithm is proposed to combine the two techniques-tabu search and meta-heuristics. Using this technique a client can easily search the service from a group of services.

Li *et al*. (2012), introduces and designed the Service Oriented Architecture (SOA) framework for smart home applications. From this a customer can access the required smart home applications from the given choice of services. With utilization of this architecture the customers can easily deploy and execute their

requirements. Tekli *et al*. (2012), discuss the survey about the SOAP message with the traditional SOAP generation. Also the survey presents the structure formats, policy method SOAP messages with traditional approach. Business process is the evolving methodology for the corporative world. To achieve the high abstractive business Telang and Singh (2012), presents the business techniques using Quote to Cash (QTC) techniques. Using this technique the contractors can easily identify the defects. Wang *et al*. (2012a), identifies the issues with the cloud computing with respect to security using precomputation and error verification. So, that the cloud users can update, append and delete the relevant data in particular cloud storage.

Wang *et al*. (2012b), discuss the business process services in hierarchical steps. The classification prepared based on the impact analysis and pattern analysis of the services. From these types of classification the user can easily recognize multiple tasks and improve their working applications. The researcher Xu *et al*. (2012), propose a polynomial time algorithm (QDA) for the shortest sequence web composition. The algorithm proves and states the overall efficiency of composing multiple services gets improved for the composed services. Zhu *et al*. (2009) designed a collaborative work for the digital city framework. The collaborative city portal is planned with the geographic system, traffic system and E-Gov system; from this architecture the residents can access the immediate response at an accurate time.

5. CONCLUSION

The proposed Analysis Estimation System work presents the evaluation of services in the form of transactions and quality services. The huge amount of transactions can be easily evaluated with the two types of TS and QS Estimators. Transaction Service Estimator can estimate the transactional services, provide security and reduce the vulnerability of services. Similarly, Quality Service Estimators can analyze and filter the quality offered services from the retrievable broker and finally produce the quality preferred services to the customers. From the two types of estimations the service transactions are easily evaluated and offered quality services to the customers. The future work considered with the priority based queuing technique to prioritize the transactional data during execution of the services.

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