A Survey on Business Policy Violation in Web Service Integration

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Abstract— Rapid changes in the business rules in the world of business have proved to be an ethical factor in the assessment of the business logic. The ever-changing business world and the competitive nature of the process have led to the business logic to be an invaluable property for enterprises. The Web Service is the rising innovation in the field of business forms where the services offered by the association are overseen through the system called Change Management Framework. This framework is helpful for an organization to develop itself by satisfying the client requirements in a self-governing way. Service integration plays a major role in service discovery where there is a need to concentrate on the changing business logics .This is an arduous and time-consuming task. So the current attention is to have an automatic system to investigate the Business logics and distribute the felicitous style to integrate them. This paper gives an overview of recent research efforts made for dynamic web service integration and the methodologies adopted to understand the business policies and the techniques for identifying the business policy violations.

Keywords— Change Management Framework, Web Service Integration, Business Policy Violation

I. INTRODUCTION

1.1. Web Service

A Web Service is a standards-based, language-agnostic software entity that accepts specially formatted requests from other software entities on remote machines via vendor and transport neutral communication protocols producing application specific responses. The simplest Web service system has two participants. One is service producer and a service consumer the provider presents the interface and implementation of the service and the requester uses the web service

A Web service is an application that:
• Runs on a Web server
• Exposes Web methods to interested callers
•Listens for Hypertext Transfer protocol (HTTP) requests representing commands to invoke Web methods
• Executes Web methods and returns the result

Web Service is self-Describing and independent applications which are conjured from anyplace over a disseminated framework. The HTTP is an application protocol which is used for data communication in World Wide Web [1].In web service HTTP are used to invoke the web methods from a distributed information system.
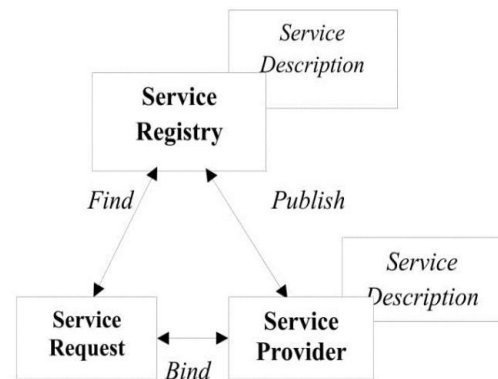

Fig 1: *Web Service Processes*

1.2 Web Service Integration

Web service integration has been adjusted as a noteworthy device that enables to achieve its development to incorporate between different services. The present market demand more often it is satisfied by integrating request and services as a substance.

There are three key difficulties at this dimension of Integration. To begin with, first the Degree of coupling among them must be kept up whenever a partner needs to keep a tie up or converging with others. Second, the requirement for business logic to be situated and it should be

kept up appropriately when integrating. Third, the recovered logic must be integrated tightly as interoperability issues are reached. It is in fact a troublesome errand for the designers to perceive the entire administrations and identify a most ideal path for mix of the administrations. So it is required to build up a mechanized framework to coordinate the Web benefits powerfully as changes emerge.

1.2 Business Policy

Business processes are event-driven, when more than one service is required, multiple services can be integrated as a single composite service and it should be capable of handling the dynamism of enterprise [2]. Dynamism includes change in partner, partner strategies, policies, and exception handling. Business Policy defines the scope of an organization within which the decisions can be made by the members and the tasks that can be carried out. This policy should be considered during the service integration and care should be taken in order to not violate the policies [3]. In case the business policy is violated during the run time of the service the transaction gets aborted in the middle.

1.3 Service Level Agreement (SLA)

A service level is utilized to characterize the normal execution conduct of conveyed Web services. During the deployment of web service, the assets of a basic Web service holder can be reconfigured to give a specific service level. Even a similar Web service can be offered at various service levels to various customers by progressively distributing assets for execution of individual Web service demands. Consequently, to get affirmations on the service level, a customer makes from the earlier an SLA related with this Web service with the service provider.

In a wide range of business situations, effective organization and utilization of Web services are fundamentally subject to ensuring and dealing with the service level of deployed Web services. With the developing models of dynamic business process, where an application specialist organization (ASP) gives a redistributed support of numerous customers, similar services might be offered at various service levels for an alternate price. Regardless, the clients expect a specific execution level as ensured by the specialist organization through individualized SLAs. Infringement of any violation in service levels results in a punishment evaluation with respect to the specialist service provider. Also, a service application might be facilitated by a foundation asset supplier ensuring a service level for this facilitated service utilizing a SLA. The SLAs also keep track of the Business policies of the organization whose services are being integrated. These business policies play a very important role in the integration of the services from different service providers.

1.4 Change Management Framework (CMF).

A Web Service which is made out of many Web Services is dependably on demand. They are the coordinated effort of independent Web benefits that gives an esteem services dynamically. The self-governing Web service are spent significant time in their very own space and thus furnish an expanded nature of Service with diminished expense to different business substances and their clients. The created Web service can be classified into two types [1].

- Short Term Composed Service (SCS)
- Long Term Composed Service (LCS)

The Business objectives and partnership between the Web services are temporary and for a short period of time for a SCS. The partnership among the services is broken once the business objectives are accomplished. A Trip Planner could be said as an example for SCS. The planner could be a collaboration of Travel Service, Hotel Service and Taxi Service. Once the planning process is complete, the partnership among the services is dissolved. LCS is services that are available online by combining various services to provide a value added service to the customers [4].

The section I shows the introduction of web service and the basic concepts related to the topic, Section II contain related work of different authors. This section mainly focus on business policy violation and service integration, Section III shows the methodology and contribution of different authors related to the survey and finally section IV contain the conclusion.

II. RELATED WORKS

At whatever point there is a requirement for change in the officially existing Web Services, there emerges a need to coordinate Web benefits that could be given as esteem added service to the clients. Each service provider and the services given by them have its very own business strategies confined amid improvement.

The term 'Business Policies' alludes to the procedure and techniques of an organization. It is significant for an entrepreneur to deliberately manage the business policies which shapes the particular techniques for running the everyday exercises of an organization. Policies are characterized with consideration and arrangements are explicit for a particular business. At the point when Web services are considered, business strategies have to be managed in all respects cautiously. These business policies are confined in the Services Level Agreement (SLA). A reasonable report is made to comprehend the significance of business policies and the impacts of business policies volitions in Web service integration.

Philipp Leitner (Philipp Leitner et al.) proposed an approach for predicting the Service Level Agreement (SLA)

at runtime [5]. It is essential for service providers to keep track of the SLA violations to be detected properly to enhance the business process and customer satisfaction. In this approach the QoS parameters and their values are taken as inputs for the proposed system. The model also uses a machine-learning regression technique for SLA violation detection.

C.Muller (C.Muller et al.) proposed a general monitoring system and reference model for analysis the policy violation of the composing service [6]. QoS parameters are usually included in the Service Level Agreements of each service. These parameters may also be useful for detecting the policy violations of the composing services. This could notify the client with the violations and the causes for violations in an easy-to-understand manner.

Li (Li et al.) had presented a dynamic policy and charging control (PCC) framework [7].This framework helps to control and optimize network usage and to provide network information-measure resources to their subscriber. It also works according to the user's real time profile and subscription information of the user and to avoid or minimize operator's network congestion. It also helps in optimizing the operator's existing and potential network investment. The authors predicated the key value of optimization that was based on the convergent competence of the rating and charging functions on knowledge service flows and the subscriber account profile and lifecycle.

Philippe Leitner (Philippe Leitner et al.) Proposed a system that predicts the violations prior [8]. SLA compliance is most important for the providers because the violation of the policies in those SLA could lead to customer dissatisfaction. This system allows the operators to take timely remedial actions. The system is also designed to detect violations before they occur. Instance-level prediction and forecasting are the two techniques proposed by the authors.

Yanhua Du (Yanhua Du et al.) proposed a Petri Net-Based model which addressed the issue of detection of temporal violations in a holistic manner [9]. The proposed approach not only compare the web services by adding a prediction net predict message mismatch but also checks the compatibility of the composing services using a modular-timed state graph.

S.Tiroumalmouroughane(Tiroumalmouroughane et al.) proposed a algorithm for policy detection[10] .Change requests for service integration demands infinitesimal effort for producing the new logic as per the change request without any sort of code injection. During the processes of service integration the main objective is to detect the policies as well as the violations of the business policy assessment of the services. The author proposed an algorithm to find the

policy detection point (PDP) in each service that is to be integrated. The policies points are found in rule level and function level so that the reason for policy violation can be known in case violation occurs. Then these PDP arrays can be used as an input for policy violation detection algorithm. Here the state transaction method is used to compare the result with actual transaction to identify the policy violation.

Marcos Palacios (Marcos Palacios et al.) have proposed a practical approach to test SLA-aware SBAs [11]. An SLA of an organization includes a set of terms that promise the guarantees that it must fulfil during the provisioning of service to the customers and while consumption of the services. The violation of such guarantees will lead to application of potential penalties. This approach identified the test requirements that represented the situations that are most appropriate to be tested. The evaluation technique has been proposed by an author that is a four values logic which evaluated both the individual guarantee and the logical relationships between them.

Mariano Vargas-Santiago proposed a diagnostic approach based on fuzzy logic [12]. In these approaches fuzzy non-functional requirements are define to make inferences, it can take necessary action in the system change in different workload conditions. This method will increase the functionalities of the web services platform.

Mirsaeid Hosseini Shirvani proposed a bi-objective genetic algorithm which is sustainable against a single objective algorithm which minimizes the service costs and disregards security risks [13]. Web service composition technology attracted a lot of attention for the purpose of reduction in software development cost. In the business process many of them pay attention only on QoS and network parameters and do not take security into consideration. In this approach based on the cost function and current population the most and least security risk is produced.

III.METHODOLOGY

The detection of business policy violation is an important role in web service integration. Table 3.1 shows the various contributions towards business policy violation in service integration.

Author	Title	Proposed Approach
Philipp Leitner et al.	Runtime predictions of Service Level Agreement Violation for composite services	Machine learning regression technique is used for detecting SLA violation

C.Muller et al.	SALMonADA: A Platform for monitoring and displaying violations of WS-Agreement Compliance Document	System has been developed that notify the client with the violation in easily understandable way.
Li et al.	Dynamic service integration for reliable and sustainable capability provision	A framework called Dynamic controls and charging controls have been developed which helps to control and optimize network usage.
Philippe Leitner et al.	Data-Driven and Automated prediction of service level agreement violations in service composition	This system allows the operators to take timely remedial actions when a policy violation is detected.
Yanhua Du et al.	Timed Compatibility analysis of Web service composition: A Modular Approach based on Petri Nets.	A Modular timed state graph is used to check the compatibility of composing services and compare the web services by adding a predication net to predict message mismatch.
Marcos Palacios et al.	Coverage-Based Testing for Service Level Agreements	Both the individual guarantee terms and their logical relationships are evaluated using Four-valued logic.
S.Tiroumalmouroughan et al.	Identification of Business Policy violation in Service Integration of Long Term Composed Services	The Policy detection algorithm is proposed, which is used to detect business policy and the policy violation in LCS. The main objective is to detect the policies during the integration as well as the violations of the business policy assessment of the services during the process of service integration.

Mariano Vargas-Santiago et al	Towards Dependable Web Services in Collaborative Environments Based on Fuzzy Non-functional Dependencies	Non-Functional requirements are define which will take necessary action in the system change in different workload conditions.
Mirsaeid Hosseini Shirvani	Web Service Composition in multi-cloud environment: A bi-objective genetic optimization algorithm	Bi-objective genetic algorithm is used to minimize the service costs and disregards security risks.

Table 3.1:-Contribution towards Business Policy Violation

Several parameters have been taken to give a thorough comparisons on the techniques adapted for service integration and to identify various policy violations that occur during the process of integration. This has been shown in the table 3.2.

Authors	Contribution	Aspects of Survey in terms of Domain knowledge with policy detection and service Integration		
		Business Policy Detection	**Domain Knowledge**	**Dynamic Integration**
Philipp Leitner et al.	Machine learning regression technique is used for detecting SLA violation	✓		✓
C.Muller et al.	System has been developed that notify the client with the violation in an easy way.	✓		
Li et al.	Dynamic service integration for reliable and sustainable capability provision		✓	✓
Philippe Leitner et al.	Automated prediction of service level agreement violations in service composition	✓		

Yanhua Du et al.	A Modular timed state graph is used to check the compatibility of composing services		✓	✓
S.Tiroumalmo uroughan et al.	The Policy detection algorithm is proposed	✓	✓	
Marcos Palacios et al.	Both the individual guarantee terms and their logical relationships are evaluated using Four-valued logic.	✓	✓	

Table 3.2:- Comparative Analysis of various methodologies

IV. CONCLUSION

This study focuses on service integration and business policy. An automated model is needed to take care for the change arises during service integration. From the study it is inferred that the authors doesn't talk about the Finite state machine in Total Turing machine and also the time complexity of a service integration is not discussed in detail. So there is a scope for analyzing whether the automation of policy matching among services are accepts by total Turing machine within time bound. In future the above said issues can be considered for dynamic service integration and provide value added services to the customer.

REFERENCE

[1] Tusha Agarwal, Neeta Sharma."*Efficient Load Balancing Using Restful Web Services in Cloud Computing: A Review",* International Journal of Scientific research in Computer Science and Engineering, Volume6, pp 67-70, 2018.

[2] XuminLiu,AthmanBouguettaya,QuYu,ZakiMalik."*Efficient Change Management in Long Term Composed Services*", Springer, pp 87-103, 2010.

[3] Zakir Laliwala, Amee Desai, Sanjay Chaudhary "*Policy-based Services Aggregation in Grid Business Process*", Annual IEEE India conference, 2009.

[4] XuminLiu,,Athman Bouguettaya,Jemma Wu, and Li Zhou." *Ev-LCS: A System for the Evolution of Long-term Composed Services*".IEEE Transaction on Services Computing, pp 102-115, 2011.

[5] Philipp Leitner,Branimir Wetzstein,Florian Rosenberg,Anton Mic hlmayr, chahram Dustdar and Frank Leymann, *"Runtime predictions of Service Level Agreement Violation for composite services"*, Service-Oriented Computing, Springer-Verlag Heidelberg, 2010.

[6] C.Müller, M.Oriol, M.Rodríguez, X.Franch, J.Marco, M.Resinas and A.Ruiz--Cortés, "*SALMonADA: A Platform for monitoring and displaying violations of WS-Agreement Compliance Document*", Proceedings of the 4th International Workshop on Principles of Engineering Service-Oriented Systems, PP 43-49 ,June 2012.

[7] Lu Liu , Jie Xu, Duncan Russell, John K. Davies, David Webster, Zongyang Luo and Colin Venters, "*Dynamic service integration for reliable and sustainable capability provision*", International Journal of Systems Science ,Volume 43, Issue 1, 2010.

[8] Philipp Leitner, Johannes Ferner, Waldemar Hummer and Schahram Dustdar, "*Data-Driven and Automated prediction of service level agreement violations in service composition"*, International Journal of Distributed and Parallel Databases, Volume 31, Issue 3, 2013.

[9] Yanhua Du , Wei Tan and MengChu Zhou , "*Timed Compatibility analysis of Web service composition: A Modular Approach based on Petri Nets*", IEEE Transactions on Automation Science and Engineering, Volume: 11 Issue: 2, 2013.

[10] S.Tiroumalmouroughane,P.Thambidurai,"*Identification of Business Policy violation in Service Integration of Long Term Composed Services*" International Journal of Applied Engineering Research, Volume 10, 2015.

[11] Marcos Palacios , José García-Fanjul , Javier Tuya and George Spanoudakis, "*Coverage-Based Testing for Service Level Agreements*", IEEE Transactions on Services Computing , Volume: 8 Issue: 2, 2015.

[12] Mariano Vargas-Santiago, Saul Pomares Hernndez, Luis, Morales-Rosales, Houda Khlif,Hatem Hadj-Kacem "*Towards Dependable Web Services in Collaborative Environments Based on Fuzzy Non-functional Dependencies*" 5th International Conference in Software Engineering Research and Innovation (CONISOFT),2017.

[13] Mirsaeid Hosseini Shirvani *"Web Service Composition in multi-cloud environment: A bi-objective genetic optimization algorithm"* Innovations in Intelligent Systems and Applications (INISTA), 2018.

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