Dependency Analysis for preventing KPI Violation based on Decision Tree Learning

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Abstract:

The performance of business processes is measured and monitored in terms of Key Performance Indicators (KPI). KPI represents a set of measures to address the critical performance of the systems. The execution of processes is often based on a Service Oriented Architecture. The business process model is typically implemented as a service composition, for example in Web Services Business Process Execution Language (WS-BPEL). WS-BPEL is a standard executable language for specifying actions within business processes with web services. WS-BPEL provides a language for the specification of Executable and Abstract business processes. A KPI violation is to be predicted and we have to identify adaptation requirements and adaptation strategies in order to prevent the violation. We will implement additional types of adaptation actions on different application layers of a service-based application. Herein, the adaptation will be considered as infrastructural reconfigurations on the service layer. We will address the cross-layer aspect by looking at how adaptation actions on different layers influence each other, e.g., a reconfiguration of the infrastructure has an impact on all services and process instances running on that infrastructure. Cross-layer adaptation is an integrated framework for adaptation covering all functional layers of the Service Based Application .

Keywords: Web Services Business Process Execution Language (WS-BPEL), Service-Based Application, Service-Level Agreements, Monitoring, Adaptation, Decision Tree, Process Adaptation.

Introduction:

Business process management(BPM) has received large attention recently by business administration and communities of computer science.

Members of these communities are characterized by different educational backgrounds and interests. Business administration people's are interested in improving the operations that are preformed in companies. Increasing satisfaction of customer, reducing business cost, and establishing new products and services at low cost are important aspects of BPM from a business administration point of view. Two communities in computer science are interested in business processes. Researchers with a background in formal methods analyzing structural properties of processes. Since these properties can only be shown using abstractions of real-world business processes, process activities are reduced to letters. Using this abstraction, a observations on structural properties of business processes can be made, which are very useful for detecting structural deficiencies in real-world business processes.

The software community is aimed at providing robust and scalable software systems to the world. Since business processes are realized in complex information technology landscapes, the integration of existing information systems is an important basis for the technical realization of business processes. Business measures are a important term for metrics and key performance indicators (KPIs). Business measures will search for the information that will tell

you how your business is going well . After adding business measures to a process and identify the attributes that to be returned from business process, here the business measures as a monitor model. The monitor model is fed into the WebSphere Business Monitor development toolkit, which runs on WebSphere Integration Developer or Rational Application Developer. A developer completes the monitor model by specifying how the business measures will be derived from incoming events that the running process generates. Then you collect, calculate, and further analyze the business measures results in WebSphere Business Monitor, viewing the metrics and KPIs on dashboards. You can update the attributes of business process in WebSphere Business Modeler with actual values to improve the accuracy of the model.

To be effective, such applications should meet certain business goals, traditionally expressed as Key Performance Indicators (KPIs) of the business processes. These KPIs is typically continuously monitored at run-time using business activity monitoring techniques . If monitoring process shows that KPI targets are not reached, then it is essential to find the factors which strongly influence the KPI and cause KPI target to violate most often .First lets us know what is a Key Performance Indicator.

There are three types of performance measures:

1. Key result indicators (KRIs) -> how you have done in a perspective.

2. Performance indicators (PIs) -> what to do.

3. KPIs -> what to do to increase performance dramatically.

To understand the difference between the above three see fig1. 1

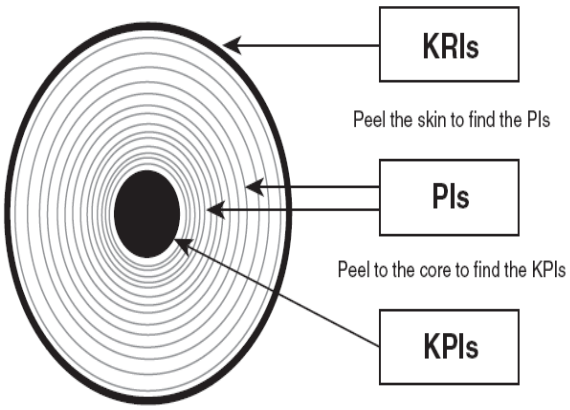


Fig1.1 Three Types of Performance Measures

An onion analogy can be used to understand the relationship of these measures. The outside skin shows the overall condition of the onion, the amount of sun, water, and nutrients it has received; how it has been handled from harvest to supermarket shelf. However, as we peel the layers off the onion, we find more information. The layers represent the various performance indicators, and the core, the key performance indicators.

One of the main disadvantage to the adoption of service-based applications (SBAs) is the concern raised over the trust- worthiness and reliability of third party services utilized in an SBA. The third party software services are usually executed as Web services that understand business activities, such as paying with a credit card or shipping purchased goods, and are beyond the control of the SBA provider. The problem of trust worthiness and reliability becomes more complex when third party cloud computing services are utilized as the underlying infrastructure for provisioning the SBA. Assuring that the SBA provider does not have control over the quality of the third party services, unreliable third party services could threaten the quality of the SBA and result in lower business performance, software faults, and performance degradation that could consequently lead to the total collapse of the SBA. Therefore the dependence of the third party business, software, and infrastructure services utilized in an SBA becomes a major concern for the SBA provider, who is required to adopt mechanisms within the SBA for quality assurance during runtime. An approach to the run-time quality assurance of SBAs is the cross-layer adaptation and monitoring (CLAM), which aims at identifying problems early in the SBA layers and executing correct effective actions across the SBA layers, such that problems are rectified for, or even prevented from occurring.

In this paper, we have proposed the model for preventing KPI violation in the third party level which is in service infrastructure layer in (SBA).

2. Scenario

Here we have used the scenrio of bikedealer service who provide service for selling/buying second hand bikes online.They performs deals between selling and buying users.operations that are done by this service provider are registering the bike that are coming for

sell,contacting the bikeowner when his bike receives a bid by some user and communicates between the two parties.We have shown the simulated business process in the figure 2.1

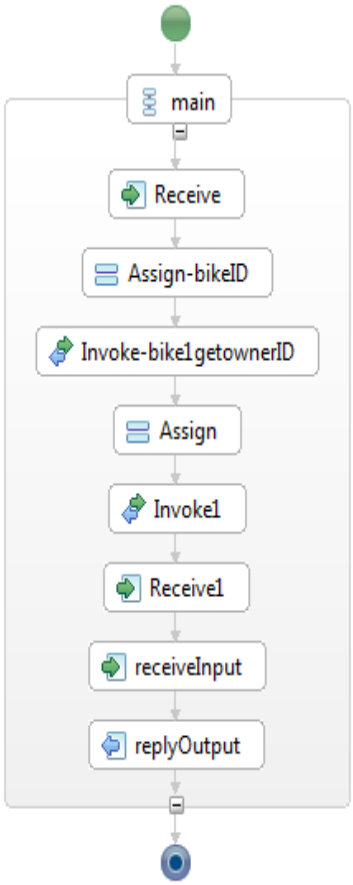


Fig2.1 simulated business process

For detecting the KPI violation we have used the decision tree learning to generate the tree using the tool WEKA.Key performance indicator used for our scenrio to detect the violation of KPI is response time.The WEKA tool uses the j48 algorthim to generate the decision tree which tells the kpi going to violate or not.There are three layers in service based application(SBA).They are Business process management layer,service composition & coordination layer,service infrastructure layer.

In this scenario detecting the KPI violation is done only in the business process management layer but the KPI violation may occur in any of the layers. In service infrastructure layer the KPI violation may occur because of the third party involved in the service**.**

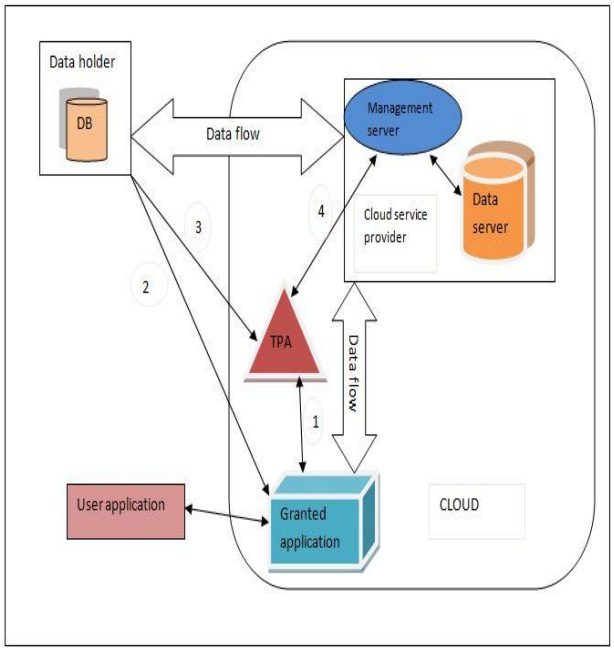
3. Defining Service Level Agreement (SLA)

Business Process Management layers tells all the business aspects of the SBA such as workflow , service network, KPI. SLAs for third party services utilized in each SBA layer are an important element in such approaches, since SLAs specify the expected characteristics of each third-party service, named Service-Level Objectives (SLOs), to be monitored, and possibly adaptation strategies for compensating or even proactively preventing violations of SLOs. We support the research directions towards the run-time quality assurance of SBAs uses CLAM techniques, and we believe that such techniques could greatly benefit from an analysis approach of SBAs for identifying third party services and their characteristics across the SBA layers for the definition SLAs. We present ideas for defining SLAs, by performing analysis of SBAs in order to identify the third party services and their characteristics utilized in each SBA layer.

An SLA includes a set of metrics and a behavioral specification that could be used to determine whether the service provider is delivering the service as agreed. An SLA could also include compensation actions in the event that the agreement was violated. Machine-readable SLAs for the third party services, used in an SBA, are utilized in Cross Layer Adaptation and Monitoring (CLAM). CLAM approaches monitor the third party services for detecting violations of the agreed service characteristics, in order to perform compensation actions across service infrastructure layer of an SBA.

Due the fact that BPM, SCC, and SI layer concern the business, the software, and the infrastructure services respectively, and considering that such services at each layer could be provided by third parties, it is necessary to have separate SLAs for all services at each layer. The SLAs in each of the three layers is required for monitoring the conformance of the services to the agreements**.**

4. Implementation of Cross Layer Adaptation:



1.Queries 2.Permitting operation using secret key 3.Verification 4.Audit

Fig4.1 Architecture for cross layer adaptation

In this paper, we utilized, a cryptographic technique called Provable data possession (PDP) for verifying the data integrity without retrieving it on an untrusted server; can be used to realize audit services. It with random mask technique to achieve a privacy-preserving public auditing system for cloud data storage security while keeping all above requirements in mind. To support efficient Handling of multiple auditing tasks, we further explore the technique of bilinear aggregate signature to extend our main result into a multiuser setting, where TPA can perform multiple auditing tasks simultaneously. Strong security and performance analysis shows the proposed work are provably secure and highly efficient. We also show how to extend our main scheme to support batch auditing for TPA upon delegations for multi-users.

Modules

1. Audit Service System

2. Data Storage System

3. Outsourcing Service System

4. Security and Performance Analysis

Audit Service System:

In this module we provide an efficient and secure cryptographic interactive audit scheme for public audit ability. We provide an efficient and secure cryptographic interactive retains the soundness property and zero-knowledge property of proof systems. These two properties ensure that our scheme can not only prevent the deception and forgery of cloud storage providers, but also prevent the outsourced data leakage in the verification process.

Data Storage System:

In this module, we considered FOUR entities to store the data in a secure manner:

1. Data holder (DH) Who has a large amount of data to be stored in the cloud.

2. A cloud service provider (CSP) Who provides data storage services and has enough storage spaces and computation resources.

3. Third party autority (TPA) Who has the capabilities to manage or monitor – outsourced data under the delegation of the data owner.

4. Granted applications (GA) Who have the right to access and manipulate stored data. These applications can be either inside clouds or outside clouds according to the specific requirements.

Outsourcing Service System:

In this module the client (data owner) uses the secret key to preprocess the file, which consists of a collection of blocks, generates a set of public verification information that is stored in TPA, transmits the file and some verification tags to Cloud service provider CSP, and may delete its local copy. At a later time, using a protocol of proof of retrievability, TPA (as an audit agent of clients) issues a challenge to audit (or check) the integrity and availability of the outsourced data in terms of the public verification information. It is necessary to give an alarm for abnormal events.

Security and Performance Analysis

In this module, we considered to secure the data and give performance to the following:

· Audit-without-downloading

To allow TPA (or other clients with the help of TPA) to verify the correctness of cloud data on demand without retrieving a copy of whole data or introducing additional on-line burden to the cloud users.

· Verification-correctness

To ensure there exists no cheating CSP that can pass the audit from TPA without indeed storing users' data intact.

· Privacy-preserving

To ensure that there exists no way for TPA to derive users' data from the information collected during the auditing process.

· High-performance

To allow TPA to perform auditing with minimum overheads in storage, communication and computation, and to support statistical audit sampling and optimized audit schedule with a long enough period of time.

5. Conclusion:

In this paper, we have suggested the architecture for cross layer adaptation which prevent KPI violation in the service infrastructure layer which is concerned with the third party. we have concentrated on defining the service level agreement in cross layer adaptation and monitoring the business process. As a future work we will implement additional types of adaptation actions on different application layers of a service-based application.

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