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IJIEMR Transactions, online available on 4th Aug 2021. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-10&issue=ISSUE-08

DOI: 10.48047/IJIEMR/V10/I08/10

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Volume 10, Issue 08, Pages: 59-64

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TRANSACTIONAL BEHAVIOUR VERIFICATION IN BUSINESS PROCESS AS A SERVICE CONFIGURATION

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ABSTRACT

BPaaS (Business Process as a Service) is a new type of cloud service that provides clients with customizable and executable business processes through the Internet. Many questions remain unanswered since BPaaS is still in its early stages of development. BPaaS configuration management is based on software product lines and customizable business processes. The challenge requires consideration from multiple angles, including the various sorts of variable features, restrictions between configuration options, and meeting the client's needs. We employ temporal logic templates in our approach to elicit transactional criteria from customers that the configured service must meet. Feature models are used to formalise configuration restrictions. To address all of these issues during BPaaS configuration, we created a structured process that uses formal procedures to guide customers through the process of defining transactional needs and selecting customizable features. After that, the Binary Decision Diagram (BDD) analysis is performed to ensure that the customizable features chosen do not break any restrictions. Finally, model checking is used to ensure that the configured service meets the set of transactional requirements. Several validation scenarios and performance evaluations are used to illustrate the viability of our method.

Keywords: ***Business Process as a Service, formal methods, verification, transactional requirements, model checking***

I INTRODUCTION

In recent years, cloud services have had significant Research [1] and effects in both the industrial and service-based computing landscapes. A supplier of cloud computing has become a popular paragraph. Software applications, computing capabilities, storage, and virtual platforms are only some of the services available. Cloud service providers can make these utilities available to customers through the internet in exchange for a fee. The following are some of the characteristics of cloud services: Availability is determined by public or private network access, the most popular of which being the Internet [2]. Server resources, such as police resources, applications, CPU time, and storage, are used. The animated reaction of widespread supply and resources to the task continues.

Features of service behaviour settings to fulfil the needs of each unique customer. The conventional organisational structure of cloud service types consists of three levels, each of which can offer the foundation (basic framework or platform) for the operation of top-layered services [3]. Infrastructure The service layer underneath is an infrastructure as a service (IaaS) that provides access to virtual material resources, as well as storage and writing capabilities. The motivating force behind the BPaaS concept of driving Throughout the business process, there are numerous providers. Built-in features that can be provided to buyers at a later time Your assistance is much appreciated. BPAS Provider will naturally target Business procedures that are widely used or have been proved to work are used. It is necessary to have a huge prospective market or to have good management. This appeal has a lot of intricate elements. As a client, it offers low-cost, low-pollution options. Business practises that are optional.

II RELATED WORK

As cloud-based administrations gain popularity in both individual and social areas, Scott Bourne, [1] 2017 disseminated this article as cloud purchasers are still lacking in apparatuses to confirm that these administrations are true to form. Business Process as a Service (BPaaS) is a new type of cloud company that provides clients with customizable and executable business processes through the Internet. Many unresolved concerns exist since BPaaS is currently in its early stages of study.

The problem requires consideration from several angles, including the various types of variable features, limitations between configuration options, and meeting the client's needs. We utilise short-term way of reasoning formats in our approach to transfer esteem-based necessities from clients that the configured organisation must follow. Integrate models are used to formalise barriers over configuration. To address all of these issues during BPaaS setup, we provide a well-organized system that employs formal techniques when planning customers by showing esteem-based needs and selecting customizable features. The Binary Decision Diagram (BDD) test is then used to ensure that the customizable features chosen do not conflict with any requirements. Finally, model checking is used to verify that the configured organisation is in compliance with the value-based essential set. With a few endorsement scenarios and execution assessments, we demonstrate the viability of our method.

According to Daniel Seybold, [2] 2017, distributed computing is the assurance of providing adaptable IT setups. This corresponds to a growing demand for the flexibility of business formats in companies. Regardless, there is still a massive gap between business and IT leaders. The development of cloud administration models aims to bridge this gap by introducing fine-grained and multi-dimensional assistance models. Business Process as a Service (BPaaS) is one of the newest support models, promising to break down any barriers between business procedures and distributed computing. However, when it comes to distributed computing properties, the BPaaS

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viewpoint isn't entirely grouped. Presenting an initial version of the BPaaS worldview, with a focus on standard cloud characteristics.

III SYSTEM ANALYSIS

EXISTING SYSTEM

Existing business process configuration management techniques maintain domain limitations over configuration options while enabling fundamental client needs such as selected features or control flow changes. During BPaaS design, one area that has yet to gain study focus is guaranteeing both domain restrictions and client transactional needs. These criteria might include acceptable process commit or abortion circumstances, needed recovery operations for important activities, or legitimate forms of process compensation, and they're tough to validate in a cloud-based situation with numerous stakeholders. Service clients will have more faith in outsourcing potentially sensitive business processes if a configuration approach assures complicated requirements within a viable runtime.

PROPOSED SYSTEM

We present a BPaaS modelling method with a three-step configuration and verification procedure that is based on a modelling paradigm. We may record transactional needs and then validate them using this approach. Our approach is expressive and reasonably simple for stakeholders to utilise, while yet being rigorous enough to allow us to employ formal methods for verification. We propose a BPaaS configuration process that uses formal techniques to guarantee that the configuration is legitimate in terms of provider domain constraints and that the process fulfils the client's transactional needs. We first give an overview of the process that helps customers through BPaaS configuration, and then we go through how the Binary Decision Diagram (BDD) analysis and model verification are employed at different stages.

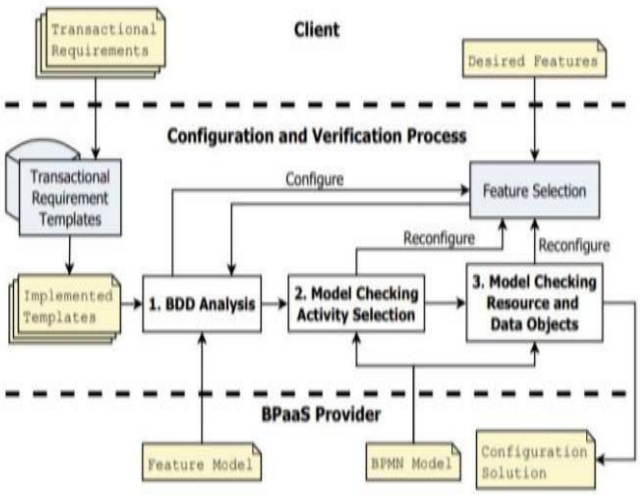

Fig1: ARCHITECTURE DIAGRAM

IV METHODOLOGY

Transactional needs must first be represented inside the BPaaS environment before they can be validated. Consider the case of a customizable Web shop checkout BPaaS to better explain our approach. Small and medium-sized Web retailers will be the clients of this procedure, and customers will be the users. This BPaaS is designed for companies who offer physical or digital items as normal orders or pre-orders. For physical items, the procedure sets shipment orders, and for digital goods, it obtains download links. Validating customers, getting payment data, updating inventory and accounting systems, and processing client payments are just a few of the activities involved in the process. Clients can customise the framework of this procedure to meet their own business

needs. Businesses that only offer digital products, for example, may eliminate all processes connected to product shipment, while stores that do not keep customer information can limit the process to dealing with unregistered guests.

Modelling Domain Constraint

Domain constraints are rules that allow providers to limit BPaaS configuration options to to those that are legitimate. For example, for a particular payment activity, many credit card transaction management resources may be available, but at least one must be selected in any arrangement. Feature models from the software product line engineering area are adapted in our BPaaS modelling methodology [20]. Feature models are tree-like structures that may formally and graphically represent domain restrictions. Feature models are often used to describe the restrictions between optional features in a customizable system to convey variability. We modify them in our method to codify restrictions between a BPaaS' customizable actions, resources, and data objects. We may also establish constraints that straddle various configuration views by utilising a single feature model to specify all BPaaS domain restrictions. Certain customizable actions, for example, may necessitate the selection of certain resources. To model domain restrictions, we use six feature model relationship structures. If the head feature is chosen, the first four relationships apply to one or more leaf features.

Modelling Activities and Control Flow

We utilise BPMN to model activities and manage flow since it formalises the BPaaS structure while still being simple to understand for clients (see Figure 4 for checkout BPaaS). Furthermore, because BPMN is a widely utilised language for formalising and executing business processes, our method has a larger potential client and supplier base. Because the alternation events and functions do not need to be preserved, BPMN configuration is also less difficult than alternatives like C-EPC [16]. Several actions in the checkout BPaaS make use of customizable resources and data items, as illustrated in Tables 1 and 2. Microguru9 for inventory management, SaaSu10 for accounting, and FTP or FTPS for digital product file transmission are among the customizable esources. The supplier provides cloud storage for a client repository and digital product hosting. Physical and digital product details, permitting product quantities, as well as payment and shipping details, are all configurable data objects.

Modelling Transactional Requirements

While BPMN offers lifecycle state charts that reflect the transactional state of particular activities, verification against process level transactional criteria requires a view of the transactional state of the whole process. Specifying important activities for successful execution, required activities to complete prior to aborting, or needs for acceptable process compensation are examples of such requirements. We utilise a transactional behaviour model to describe the global transactional state of the process, using the separated behaviour model from our earlier work on transactional Web service compositions.

CONCLUSION

With the rise of cloud computing in recent years, the idea of Business Process as a Service (BPaaS) has emerged, in which service providers may provide clients standard or established business processes to automate and/or outsource elements of their operations. We solve the challenge of BPaaS configuration management in such a way that the resultant service I is legitimate in terms of provider configuration restrictions, and ii) meets transactional requirements derived from the client's business rules. BPMN for business process structure, statecharts for transactional state, and feature models for configuration constraints are among the modelling tools used in our approach. We build a BPaaS configuration process based on these models, which employs Binary Decision Diagram (BDD) analysis and model verification. Model checking checks the configured BPaaS against transactional requirements supplied by the client, whereas BDD analysis guarantees that BPaaS features selected during configuration do not break the service provider's domain restrictions. We use a state-space reduction technique and split model verification into two phases to limit the impact of state-space explosion. These steps divide the verification of distinct configuration views, allowing the state space and temporal logic characteristics to be decreased even further. The suggested configuration approach can validate models with hundreds of activities, resources, data items, and requirement sets in seconds, according to our performance analysis.

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