

Business-IT Alignment in Cloud environment Proposed Framework

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Abstract. Nowadays, business process reuse is becoming a trendy topic in the enterprise as well as in scientific research to reduce the cost and time of process development for the benefit of the enterprise. Moreover, with the emergence of cloud environments and the various advantageous and competitive aspects of cloud computing, it becomes necessary to develop non-installable or so-called multi-tenant applications. In this sense, BPM researchers are working on improving the BPaaS (Business Process as Service) model, which enables business processes to be managed in the context of the cloud. However, the problem of aligning IT operations in the cloud, bridging the gap between business requirements and technical cloud solutions, remains an emerging issue in digital transformation, as cloud solutions are purely technical and do not allow stakeholders, who are usually not fluent in the language of business, to properly evaluate or choose the most appropriate cloud solution. Identifying the most appropriate cloud solutions in this context, therefore, requires specifying service requirements and capabilities at both the business and IT levels.

1 INTRODUCTION

The considerable evolution of information and communication technologies and their integration in the management of companies have allowed the digitization of business processes, giving birth to Business Process Management (BPM). BPM has become a success key for organizations in various fields (industry, services, administrations...) by allowing the continuous and progressive improvement of their global performance and processes by ensuring the automation of the latter through IT approaches.

At the same time, seeking to avoid or minimize the upfront costs of their IT infrastructure and resources, companies are starting to adopt a service virtualization strategy via cloud computing. This concept has appeared and progressed from early service models (IaaS, PaaS, SaaS) [12][13] that focus primarily on the technical part of IT to more refined, multi-dimensional service models [14] that encompass both the storage and network dimension and have become an important driver of business models and innovation. Reducing costs and improving flexibility are the initial factors that led to the outsourcing of all or part of the business processes. But, by working with 100% commercial customers with a non-IT business-oriented vision [15] and also to strengthen the existing processes, the invention of new and more innovative cloud service models was absolutely necessary by choosing relevant solutions that can grow (and shrink) according to the size of the company.

The main idea that comes to answer this problem is Business Process as Service (BPaaS). This concept now enables the design and description of business process management in the cloud, applying both conceptual models and semantics to align business processes with

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workflows deployed in the multi-cloud. In short, BPaaS has become the fundamental key to addressing the alignment needs between IT and business in the cloud environment [1].

Most of the work that has addressed the topic of cloud computing and enterprise alignment, and specifically the alignment of the BPaaS layer with the lower layers of cloud computing, has based their modelling approaches solely on the CloudSocket architecture while adopting informal, non-automatic contribution methods. So, before contributing and proposing solutions to these various limitations, let's start by understanding the CloudSocket approach and explaining its elements, in particular, its environments and the models used, and then its limitations as the base of our critique. That is precisely the purpose of this article.

This paper is structured as follows: Section 2 briefly describes the fundamental notions for understanding the subject. And in section 3, we summarize existing works that have dealt with the same topic. Then, we propose our working approach and initial perspectives.

2 BACKGROUND

First and foremost, it is important to define the concept of a business process (BP), which has been defined as a sequence of activities designed to meet specific organizational needs by aligning them with all actions within the company and ensuring optimal use of resources without focusing on the person performing them.

In a traditional approach, business processes are represented using standard modeling languages - such as BPMN (Business process model and notation) - relying on the designer's opinion and experience to effectively meet the client's needs. This approach can also rely on process mining (PM), which is a set of technical methods linking IS domains to business process management (BPM) to support business process analysis based on automatic process discovery and knowledge extracted typically from event logs.

We distinguish three basic types of process mining: (a) discovery, (b) compliance checking or conformance, and (c) enhancement [6].

The second important concept to understand is Business Process as a Service (BPaaS). This concept is introduced as a cloud-based service model for BP and a new cloud service layer, joining the other three fundamental cloud services: SaaS, PaaS and IaaS, which provides configurable and executable business processes to customers [5].

The BPaaS layer defines BPM in a cloud computing. Thus, in a cloud-oriented approach, the size of the IT infrastructure can scale as needed, and the potential third-party services used to implement and automate a business process are not necessarily statically linked [3].

The ultimate goal behind business-IT alignment is the use of information technology in the most efficient way possible to easily achieve business objectives and improve financial performance or market competitiveness [4]. In addition, business-IT alignment transforms domain-centric controls into workflow-centric technologies by leveraging automation [3].

Business-IT alignment consists of mapping IT-layer services to business-layer processes to maintain coherence between the two and facilitate change management.

In a cloud environment, BPaaS implementation requires flexibility for many steps in Business-IT alignment [3]. Business-IT alignment to transform a domain-specific BP into a cloud-compatible BP is applied in five levels of transformation: Level I (business process), Level II (technical workflows), Level III (executable workflows), Level IV (deployed workflows), Level V (Instance workflows) [1] [3].

3 RELATED WORKS

3.1 Traditional non-cloud approach

The traditional non-cloud approach of IT-Business alignment [7][9][10][11] consists in establishing a correspondence between SOA (Service-Oriented Architecture) and PAIS (Process-Aware Information System). Research on PAIS has highlighted the need to align business processes and the application layer to manage the traceability of business requirements expressed at the business layer and their realization as services in the application layer.

A process-oriented information system (PAIS) is a system that manages and executes business processes involving people, applications, or information sources based on process models [19]. So, in a classical framework, PAIS is realized following SOA where the information system (IS) is considered a set of connected services linked together using the processes.

Several works have been done to align business processes modeled by different business-oriented modeling languages, such as BPEL and BPMN focusing on a specific SOA. For example, the work on web services [7][9][10][11] where the goal was to align the BPMN models with the application layer (web services) by establishing mapping rules that map different BPMN model's elements, as a source modeling language, and the SOAML's elements as a target modeling language.

3.2 CloudSocket Approach

In a cloud environment, the most common architecture for establishing Business-IT alignment is the CloudSocket architecture [1][2][3][8]. To make business processes digital, CloudSocket aims to provide a platform for the global lifecycle of BPaaS, their transformation into cloud-executable workflows, and the actual operation of these workflows by leveraging cloud services [1].

3.2.1 *Business Process in cloud computing*

The various cloud services used by the workflow are predefined and managed by the entire environment. Thus, the idea of BPaaS is not to focus on composing another IT service in the cloud but to support the design of domain-specific services and their alignment with IT services. The CloudSocket approach addresses the transformation of a domain-specific BP into a cloud-aware BP (Cloud-Enabled Business Process) on five levels (see Figure 1) [1][3]:

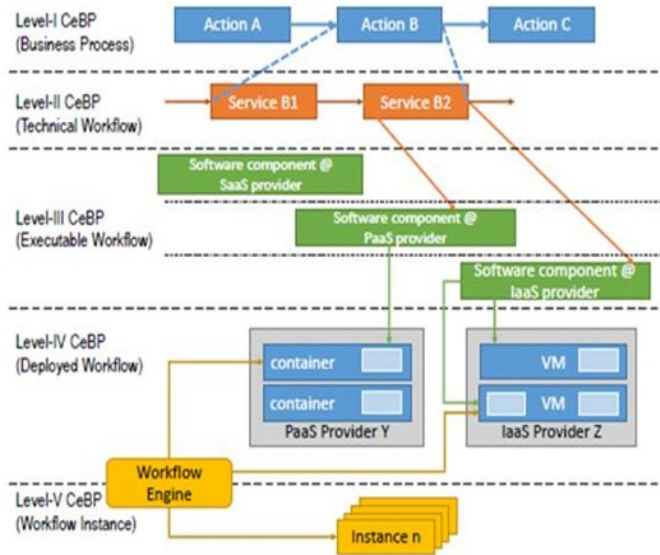


Fig. 1. Levels of the BPaaS process (Source: [1][3])

Each level depends on the one before it, and they are represented as follows: Level I (business process level), which describes the business activities in a non-technical way. Level II (technical workflows) defines workflows for automation and service allocation [20] by modeling the mapping between BP actions and cloud services (resources). Next comes Level III, which includes executable workflows. These workflows determine which specific service we must use. In other words, they decide which cloud offering to use (SaaS, IaaS, or PaaS). Thus, at this level, the information needed to access the service (deployment description) is specified. Level IV, therefore, represents the service deployment workflows and the acquisition of the necessary resources defined previously in level III. That is to say: the release of executable WFs (passage to the instantiation of a deployed workflow). Finally, we find level V which defines the workflow instances that are triggered by the users (we can have several arbitrarily). [1][3]

3.2.2 CloudSocket Architecture

The CloudSocket platform consists of four architectural blocks: (i) design, (ii) allocation, (iii) execution, and (iv) evaluation. These components are organized into environments that address specific tasks and research questions [1]. The CloudSocket architecture presents the four main building blocks based on the five stages of the Business Process Management System (BPMS) when applied to BPM in the cloud: design, model, execute, monitor, and optimize.

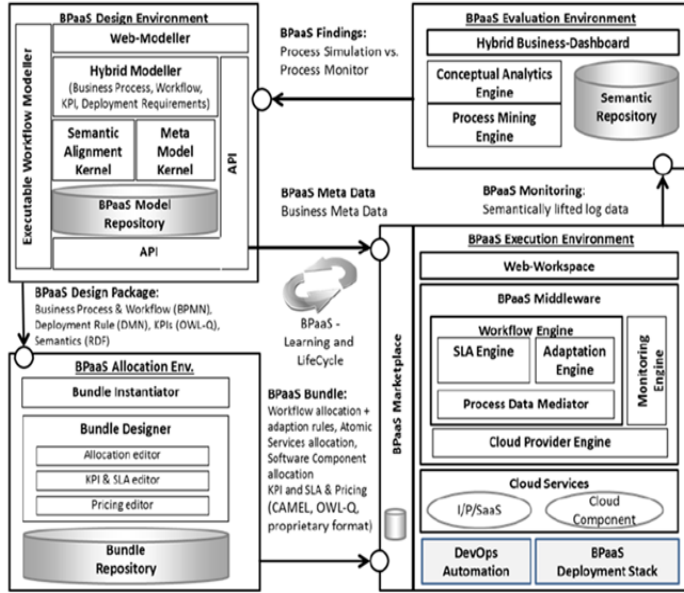


Fig. 2. Architecture of CloudSocket (Source: [1][3])

Once the respective business processes and workflows are defined in the design environment, the allocation and execution environments are responsible for deploying, provisioning, executing, and monitoring the workflows in the cloud. The allocation environment maps abstract workflows to deployable and executable solutions, namely BPaaS bundles, by receiving semantically enriched models from the design environment, using BPMN (for business processes) and DMN (for decision management) models. Next, the evaluation environment consists of linking monitoring and log information to business KPIs and provides other types of BPaaS analysis. To browse, search or select BPaaS offerings, BPaaS customers have a dedicated marketplace.

4 PROPOSED FRAMEWORK

As said before, when looking for existing studies on business-IT alignment in the cloud environment, we find that most (if not all) works that deal with this topic are generally based on the CloudSocket architecture as a standard projecting all the phases of the BPMS paradigm as well as the different levels of the BPaaS process on the CloudSocket architecture environments.

On our side, we also intend to work on the same architecture but add other tools and innovative technological aspects, such as process mining, the use of event logs, as well as the formalization of the mapping approach using the MDA (Model Driven Architecture) method to improve the alignment process and make it more innovative.

We based our approach on a comparative and critical study of existing works [21] where we found a lack of automation and formalization between the different phases and environments of the architecture, especially the mapping rules. Therefore, our principal goal will be to work on these existing approaches' limitations to give a result that responds more effectively to the need for business-IT alignment in the Cloud.

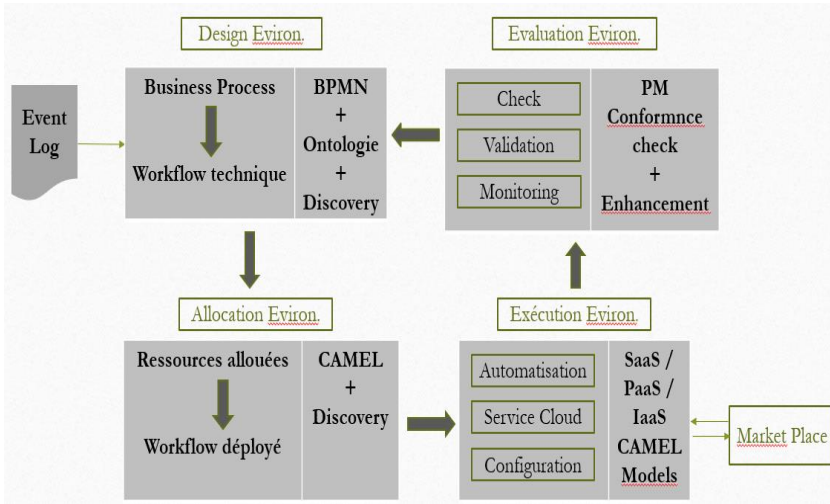


Fig. 3. Our Proposed Framework

Initially, we will focus our work on the first part of the framework (of the architecture), which is the passage from the Design environment to the Allocation environment having as a prerequisite the BPMN model (or DMN) as an initial business model, the KPIs necessary for the allocation of resources in the Cloud environment and also the Event log to be enriched for use via the process mining (Discovery or Conformance)

All this is to allocate and choose the right resources to meet the business needs in the cloud.

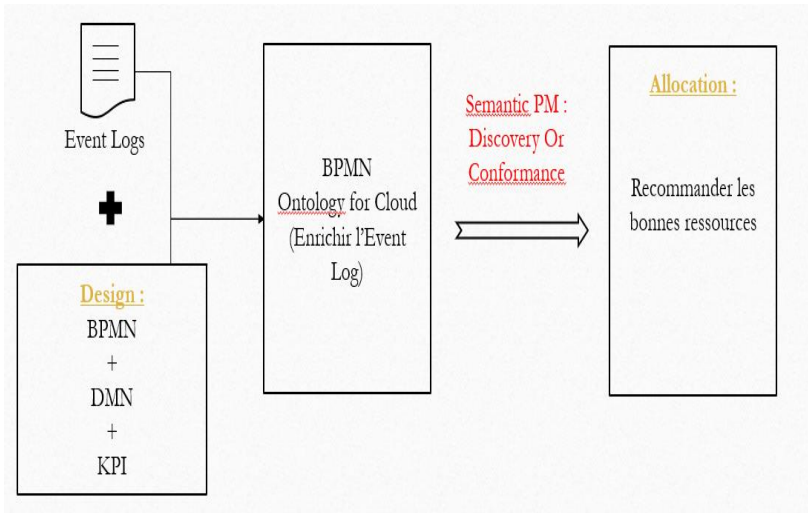


Fig. 4. Proposed Framework for Design to Allocation CloudSocket's environments

5 CONCLUSION AND PERSPECTIVES

The need to align business processes and information technology (IT) to increase business performance and profit has led many researchers and experts to work on this issue, and several approaches and achievements have emerged and are used by companies looking for innovative and cost-effective solutions. Then, with the evolution of IT service virtualization and the migration to cloud computing, the divergence of Business-IT alignment in a cloud environment becomes a necessity and the subject of several current and trending scientific studies.

This paper presents an overview of the Business-IT alignment problem in the cloud, explaining some basic notions useful for the research topic and discussing the different main approaches that have evoked this problem before and that we wish to work on in our future realizations to be able to extract the limits of the existing architectures. Then, propose our framework that will answer the problem using formal approaches, process mining [19], and semantic process tools [20].

Thus, our main perspectives are based on the validation or modification of our framework in order to propose a more complete and innovative Business-IT alignment approach while applying process mining methods and then the MDA approach (mixing process mining and MDA) to finally formalize the alignment process using logs.

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