Chapter 7

Enterprise Tomography:
Maintenance and Root–Cause–Analysis of Federated ERP in Enterprise Clouds

Jan Aalmink
University of Oldenburg, Germany

Timo von der Dovenmühle
University of Oldenburg, Germany

Jorge Marx Gómez
University of Oldenburg, Germany

ABSTRACT

Cloud Computing is finding its way into the architecture of current IT landscapes. The present chapter depicts an algorithm-based methodology supporting the Root-Cause-Analysis in the context of malfunctioning Federated ERP (FERP) software in Enterprise Clouds. The challenge is to standardize the error-finding procedure and increase the efficiency. For a given error symptom it is shown that the error location is approximated iteratively with help of generic operators in a semiautomatic manner. This approach of Semantic Debugging outperforms classical methods of Technical Debugging in efficiency regarding prerequisite knowledge and time consumption. Semantic integration and maintainability correlate strongly. The Delta-Operator enables the reconstruction of semantic FERP integration in the course of the error reproduction session. In combination with the Join-Operator, the defect approximation can be performed along the dependencies of semantic artifacts.

INTRODUCTION

Enterprise Cloud Computing becomes more and more prevalent in the IT and Business Application Industry. The quality of integration, i.e. the extent of vertical and horizontal Business Process Integration and its efficient management is a key IT asset in Enterprise Data Centers. The scientific approach now is to overcome most of the drawbacks of legacy on-premise solutions regarding maintenance. Therefore, existing different research streams, requirements, and semantic perspectives

need to be converted into one central ubiquitous, optimized, and standardized architectural approach. The goal is to perform on-demand and cross-enterprise business processes in the context of Very Large Business Applications (VLBA). Also in this context, cloud standardization is one of the major challenges of the Open Cloud Manifesto. This chapter discusses and outlines the realization of automated semantic debugging for Federated ERP Systems in Enterprise Clouds. Furthermore, it is discussed, how enterprises can develop and maintain enterprise software solutions in the Cloud Community in an evolutionary, self-organized way complying Cloud Standards. In this context, a metric driven Semantic Service Discovery and the Enterprise Tomograph can be seen as an entry-point to an organic, gradable marketplace of processes exposed by cloud based Service Grids and Data Grids in graded levels of granularity and semantic abstractions.

Regarding Enterprise Cloud Computing, areas of conflict like requirements and design principles need to be resolved. It is possible to observe a convergence of the polymorphic streams towards a shared, cloud-based platform. The main motivation in utilizing Enterprise Cloud Computing for a customer is the reduction of the Total Cost of Ownership (TCO) in different aspects: Pooling of resources and services regarding consumption peaks or simplification of legacy infrastructure from on-premise solutions towards an on-demand solution. From the perspective of an Enterprise Cloud Provider, virtualization with multi-tenancy functionality proves as suboptimal. There is a higher degree of sharing and reuse possible. This leads to federated service-based cloud software, which can grow organically. The scientific challenge is to provide a controllable reference model, which serves as a common standard, where standards overcome the typical vendor-lock-in phenomenon and are prerequisite for acceptance.

In general, FERP Systems based on Web Services are heterogeneous software systems processing business data complying integration rules, so different customers can have different views, i.e. access points to the FERP. Since the typical software ownership (provider-consumer) is transformed from a 1:n relation to a m:n relation (Brehm, Marx Gómez, & Rautenstrauch, 2006, pp. 99-111; Brehm, Luebke, & Marx-Gómez, 2007, pp. 290-305) and the complexity of such information eco-systems is increased in the course of the life cycle, the superordinate goal in the context of Enterprise Cloud Computing is to provide methodologies and mechanisms for streamlining and controlling the integration in FERP systems. The organic growth of interlinked Enterprise Services Networks needs to follow compliance rules. Therefore, semantic deviation-analysis of enterprise service consumption, Monitoring and Tracking becomes essential in distributed consumer-provider networks along the life cycle.

The Enterprise Tomography approach enables monitoring of the complete life cycle of federated Enterprise Software or Corporate Environmental Management Information Systems 2.0 (CEMIS) described in Marx Gómez (2009): With Enterprise Tomography it is possible to make consumption patterns comparable. This comparison is based on a common interlingua represented as lightweight hierarchical ontologies and is succeeded by applying the Delta Operator which determines the status differences between system A and system B in a cloud. To be more precise, the comparison and evolution tracking of integrated business process scenarios in a cloud represented as interlinked enterprise services assemblages is possible. The Enterprise Tomography approach provides the possibility to visualize differences with help of tomograms, which aggregate indicators, metrics and serve as a decision basis in the governance process and Integration Lifecycle Management (ILM) of an Enterprise Cloud (Aalmink & Marx Gómez, 2009).

Figure 1 illustrates an overview of the topology of a Cloud Farm. It shows different aspects and fundamental pillars of the FERP reference model. The procedure, how Enterprise Cloud Evolution can be controlled is outlined in Figure 2.

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