

Towards Integrating TOSCA and ITIL

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Abstract The integration of low level management functionalities provided by TOSCA and high level processes as defined by ITIL may provide significant improvement opportunities to the application provider as on both levels workflow technology can be employed. In this paper, we present Key Performance Indicator Analysis Plans as first idea how both approaches can be integrated.

1 Introduction and Fundamentals

Topology and Orchestration Specification for Cloud Applications (TOSCA) [3] supports automating Cloud application management by providing a formal method to model the structure of applications as topology and their management functionalities through so called management plans. These plans provide management functionality such as instantiating a service, backup data or scaling out applications. A major issue in this field is the question how to embed these plans in the overall management strategy of the application provider. The correct time to execute a management plan often depends on certain situations which may be expressed as Key Performance Indicator (KPI) [2] values. In this paper we propose an idea showing how to integrate TOSCA with the IT Infrastructure Library (ITIL) [1] to manage the execution of plans in a well-defined but flexible manner by introducing so called KPI Analysis Plans (KPI-APs). Our idea supports using workflow technology on both layers to achieve robust and reliable management. First, we explain TOSCA and ITIL and present our integration idea afterwards before we conclude and give an outlook.

TOSCA is an emerging standard supported by a number of prominent companies in the industry such as IBM, SAP, and Hewlett-Packard. It enables the specification of portable and holistic service models that can be used to automatically instantiate concrete services in the Cloud. A service model basically specifies a service topology (graph) consisting of nodes and relationships between nodes to define the structure of a Cloud service. A node is any kind of component that can be deployed into the Cloud, e.g., a virtual machine or a software component hosted on a virtual machine. First, nodes and relationships need to be specified by defining node types and relationship types. These type definitions include abstract operation definitions and concrete implementation artifacts that are

attached to particular operations. As an example, a “MySQL database” node type may own an “install” and a “configure” operation to set up a MySQL database instance. The operations may be implemented by a set of scripts that are part of the service model as implementation artifacts. Second, the actual service topology is defined by connecting nodes derived from node types using relationships derived from relationship types. An example for a very simple service topology is: “MySQL database [hosted on] Ubuntu Linux [hosted on] virtual machine.” The complete service model including all its parts is contained in a Cloud service archive (CSAR) [3]. Complex composite applications can be created by combining several CSARs. The person who is in charge of creating and maintaining the service model may create and add management plans (workflows) to the service model in order to define any kind of management activity. Examples for such an activity are service deployment, database backup, or updating an application component. Typically, these plans are defined using a workflow language such as Business Process Model and Notation (BPMN). Plans interact with operations defined by node types and relationship types to perform actions on a particular service instance.

ITIL is a widely adopted approach for IT Service Management. It provides an accepted practical framework to identify, plan, deliver and support IT services to the business [1]. All necessary processes, the structural organization and the tools to be used are described. One of ITILs objectives is to gain cost benefits for the applying organization. The framework also includes recommendations for the definition of Key Performance Indicators (KPI) which are necessary for measuring performance and condition of IT services. One requirement in cloud computing is the utilization of ITIL for defining processes and to derive measures to quantify economic benefits and impact. For monitoring and controlling IT organization, KPIs are interpreted and measures can be taken to improve process performance continuously. On operative level adequate tasks are derived from improvement measures, which need to be executed at the time defined to finally improve the IT services in a continuous improvement process [4]. approved within a comparison of operating costs that ITIL based application management in cloud computing supports meeting QoS requirements, safes costs and leads to an overall better service quality. Therefore, we utilize ITIL as a management framework to optimize Cloud application management automated by TOSCA.

2 Integration Idea

To control and manage an IT organization close to the optimum with ITIL the organization should operate in a workflow-based process oriented way – in organizational and technical respect. This enables benefitting from the workflow technology’s properties such as fault handling, recoverability, and compensation mechanisms on both levels. KPIs support the management in its decisions and are modeled on company level as they are used to monitor and control the enterprise performance. Both, technical and organizational KPIs are derived from defined measures out of the processes and need to be integrated.

KPIs are typically contracted in Service Level Agreements (SLA), are continuously renegotiated in service level management processes, and adapted to changing business requirements. To meet these SLA requirements, the specific and adequate measures in TOSCA need to be defined and recorded and to be submitted to the business processes. TOSCA already works in a process oriented manner. The plans are ideal connecting points to and from ITIL based business processes. To connect TOSCA systematically with ITIL based business processes, the measures coming from TOSCA need to be integrated into KPIs defined in ITIL. This problem is tackled in this paper. Of course, vice versa mechanisms for triggering plans and dynamic plan generation or adaption of existing plans need to be provided in future work.

Thus, the integration of TOSCA and ITIL consists of two cyclic steps influencing each other directly: Analysis and Monitoring of Key Performance Indicators and triggering TOSCA management plans based on these results to react to the measured KPIs. The analysis of an application's KPIs is typically a complex challenge. Although there are monitoring frameworks and tools, the integration of different KPI measurements of different application components is difficult and mainly depends on the overall characteristic of an individual application: For some applications a certain combination of KPIs may be appropriate while other applications would lose their key success factors. Thus, there are two challenges: (i) Integrating different KPIs measurements of different application components in a (ii) customizable but well-defined manner. We argue, that a generic approach is not suitable as especially the ability to customize the integration based on individual requirements is of vital importance as stated above. Thus, to tackle this problem, we introduce an analysis method which is tightly coupled to an individual application but benefits from standardized and reusable artifacts: *Key Performance Indicator Analysis Plans (KPI-AP)*. These plans are TOSCA management plans implemented by the application developer of the application itself following well-defined KPI metrics. They are responsible for measuring high level KPIs of the overall application by orchestrating individual low level KPI measurement operations provided by the application's components and provide a standardized way to integrate reusable artifacts and enable portable KPI measurement as they are contained in CSARs. This allows different application providers to embed the plans in their overall ITIL management processes as their functionality and KPI results are well-defined.

3 Conclusion and Outlook

In this paper we presented a first idea showing how to integrate TOSCA and ITIL by using Key Performance Indicator Analysis Plans. These plans provide a portable and self-contained way for integrating KPI measurements into the application providers overall management. In future work, we want to analyze how to embed requesting TOSCA management fully automated into ITIL processes and how the presented KPI-APs may be employed to achieve this.

References

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