High-level Description of Cloud Applications using TOSCA

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Abstract: High-level Description of Cloud Applications using TOSCA

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ABSTRACT

Public sector organizations and SMEs are increasingly considering using cloud services in their everyday activities. At the one hand on-demand access to cloud services in a flexible and elastic way could result in significant cost savings due to more efficient and convenient utilization. Further it can also replace large investment costs with long-term operational costs. On the other hand, the take up of cloud computing by the public sector and Small- and Medium-size Enterprises (SME) is still relatively low due to limited application-level flexibility and shortages in cloud specific skills. To meet these requirements a generic framework is needed to support public sector organizations and SMEs to run large variety of applications in the cloud in a cost effective, flexible and seamless way.

To address these challenges the European funded COLA (Cloud Orchestration at the Level of Application) [1] project is designing and developing a modular architecture called MiCADO (Microservices-based Cloud Application-level Dynamic Orchestrator) [2]. It provides optimized deployment and run-time orchestration for cloud applications. MiCADO can manage applications considering their specific deployment, execution, scalability and security requirements. To further address this challenge COLA uses TOSCA (Topology and Orchestration Specification for Cloud Applications [3] to describe applications to be executed in the cloud. Application developers can create so called Application Description Templates (ADT) to specify and submit their applications to the cloud through MiCADO. ADTs define two key properties of applications: topologies and policies.

There are two approaches to define ADTs: using either command-line interfaces or graphical user interfaces. Command-line interface requires deep knowledge of the TOSCA specification and good YAML knowledge. Since application developers in the public sector organizations and at SMEs may not have this knowledge COLA's priority is providing a GUI–based environment to enable application developers to describe their applications.

The project investigated several GUI-based TOSCA development environments such as, OpenTOSCA Winery [4] and Alien 4 Cloud [5]. Winery generates XML-based specification of application topologies. The current Winery version automatically translates the XML-based TOSCA specifications into YAML to make them compatible with the latest TOSCA specification. Since each translation has its own

limitations, some TOSCA features that are required in COLA, are lost in translation. The other limitation of Winery is that it does not support the definition of TOSCA policy specifications. Fig. 1 presents a simple topology template developed in Winery. Although Alien 4 Cloud supports the definition of cloud applications through a GUI environment, the generated description is not fully TOSCA compliant and cannot be parsed with most widely used TOSCA parsers.

Considering the above listed limitations, COLA is developing a GUI-based environment to support application specification in TOSCA YAML v1.0. The extra feature of this environment will be a wide range support for policy specification, for example enabling development of deployment, execution, scalability and security policies.
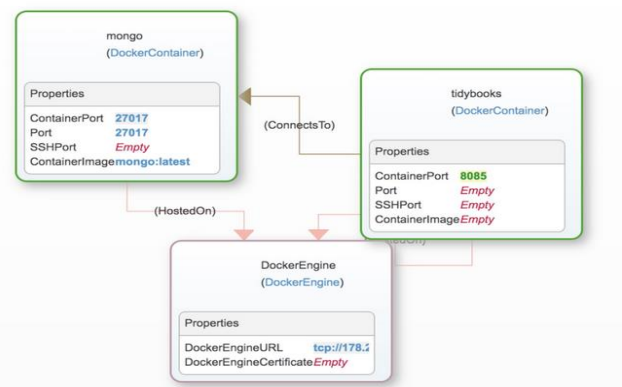

Figure 1: Example of an Application Topology Template

The presentation will outline GUI environment design and how it can be used to develop TOSCA based Application Development Templates to describe COLA applications.

Keywords – cloud, TOSCA, application decription, GUI–based environment

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