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Item Type	Meetings and Proceedings
Authors	Thorpe, Christina;Cerqueus, Thomas;Thiery, Adrien;Sunyé, Gerson
Citation	1st IAIS Workshop on Cloud Computing Research;
Download date	2026-04-16 15:04:54
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Link to Item	https://hdl.handle.net/10344/3487

Towards The Deployment of Cloud Applications Using a DSL

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Motivation

Cloud infrastructures offer facilities to develop and deploy large-scale applications. Nevertheless, testing Cloud applications is an intricate task because applications themselves are very complex, infrastructures are highly distributed and heterogeneous, the amounts of data are massive, and the interconnections between services/components are sophisticated. From a business point of view, testing is generally not seen as an interesting phase of software development because, unlike the development of new features, it does not offer a direct return on investment. We think that providing accurate methodologies and tools to test Cloud applications will allow companies to speed up testing (and thus save time and money), and produce better software (and thus increase their competitiveness). In this research, we aim to ease the deployment of Cloud applications. This task is painful in the context of Cloud applications because testers have to write different scripts to test their applications with different Cloud vendors (e.g. Amazon EC2¹, Google Compute Engine²). Our objective is to define a generic language that allows writing deployment scripts disregarding Cloud vendors.

State of the Art

Many different configuration management tools have been developed to maintain applications across multiple hosts in a distributed environment e.g., Cfengine (Burgess, 1995), Puppet (Kanies, 2006), and Chef³. A similar tool described by Juve et. al. (Juve, 2011; Juve, 2011), Wrangler, enables users to define application's layout using a declarative language, and provides a robust service to automatically provision, configure and manage the application. Such configuration tools are often

¹ <http://aws.amazon.com/ec2/>

² <https://cloud.google.com/products/compute-engine>

³ <http://www.opscode.com/chef>

heavy weight and involve a complex architecture, including: clients, servers, repositories, etc. The set-up alone can consume a significant amount of time and require expert knowledge. A review of the literature shows that DSLs are a popular approach to application deployment in Cloud environments. However, many of the existing solutions target just one Cloud vendor and cannot support multiple or federated Clouds (commonly used to avoid vendor lock-in [6]). Sledziewski et. al. (Sledziewski, 2010) propose a DSL to ease the design of high-level models and specifications, enabling a non-expert to understand and develop the system. Kirschnick et. al. (Kirschnick, 2010) describe an architecture that uses DSLs to automatically deploy and manage VM instances, and applications in the Cloud. DSLs are used to describe the desired state of the virtual infrastructure and components, and how they should be installed, configured and managed to achieve it.

This abstract proposes a DSL to provide a lightweight, platform-independent solution for application deployment in the Cloud with support for multiple vendors.

Future contributions

The objective of our research is to propose a generic language that allows writing deployment scripts independent of Cloud vendors. In order to achieve this objective, we plan to define a Domain Specific Language (DSL). Testers will then be able to write deployment scripts in the proposed DSL. To apply the script to a specific Cloud vendor, a transformation must be defined between the DSL and the language used by the vendor. Each vendor may have its own deployment language, which is likely to present some specifics (e.g. use of a specific library, specific ordering of instructions). In order to deploy an application on N vendors platforms, a script must be written in the DSL. It is then translated into vendors' specific scripts: N scripts are automatically generated from the initial script. This approach offers the following advantages: (i) only one script needs to be written for each application (rather than one for each Cloud vendor), (ii) if a Cloud vendor changes the way to deploy applications, testers don't have to modify their deployment scripts: they just have to modify the transformations accordingly, and (iii) the introduction of a new Cloud vendor just requires a new transformation to be written (no need to write new deployment scripts). This work is still in at a preliminary stage as we just started to investigate this topic.

Acknowledgement

This work was supported, in part, by Science Foundation Ireland grant 10/CE/I1855 to Lero - the Irish Software Engineering Research Centre (www.lero.ie).

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