

Testing in the Cloud Era



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1 Motivation

The Cloud is an intricate collection of interconnected and virtualised computers, connected services, complex service-level agreements. The question of *testing the Cloud* seems particularly difficult – and critical for Cloud vendors who rely on customers' trust.

The Cloud is also becoming extremely popular for deploying applications. This has created new challenges for the software verification and testing teams, who need to embrace the new opportunities (lot of data, quick deployment of updates) and understand the new environment (complexity of the connections and threats) when they *test Cloud applications*.

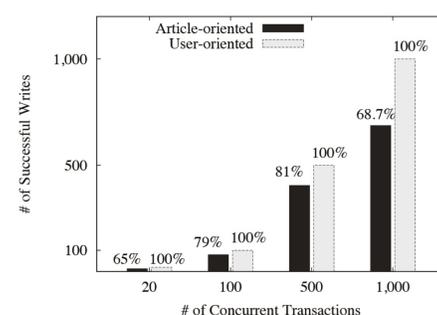
Finally, the Cloud is a great opportunity for software quality people, offering a large variety of systems and connections to *test software artifacts in the Cloud*.

Lero@UCD has organised several events related to the topic:

- » A workshop at ISSTA 2013: Testing the Cloud
- » A workshop at ICST 2014: Testing the Cloud
- » A workshop at ICPE 2014: Large-Scale Testing
- » A Lero Industry event in IBM Dublin in 2015

2 Testing the Cloud

- » Researchers in Lero@UCD are part of TOOM (Testing Orders of Magnitude) with University of Luxembourg. The aim is to identify specific testing methodologies for testing the Cloud.
- » E.g., testing scalability for NoSQL PaaS (e.g., Google App Engine)

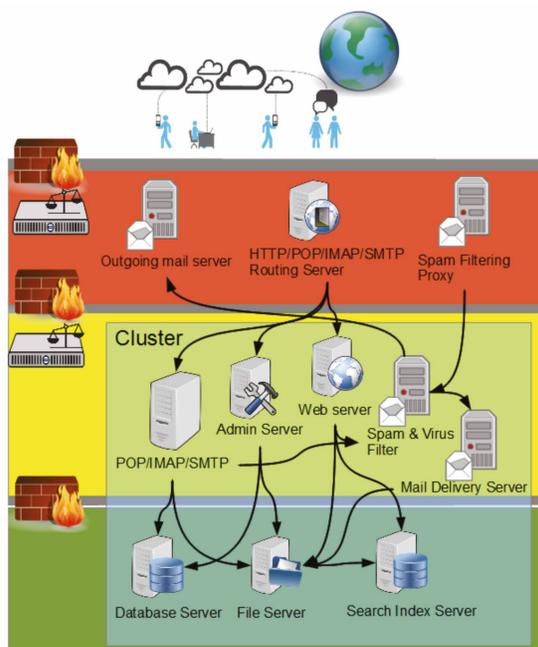


- » We have also been working on several directions:
- » Model-based Testing and Verification of functional and non functional properties for the Cloud. Models help to generate verification scenarios and testing use cases, to identify patterns, bottlenecks, etc. that allow to decide whether data centres/Cloud are able to cope with known issues and satisfy SLAs.
- » Performance Testing of the Cloud, using a testing framework (e.g., PeerUnit) and a supercomputer (e.g., Fionn), to see whether basic features are ensured in all cases and to study the performance of the system in some pre-defined scenarios.

3 Testing a Cloud Application

M. Lynch, T. Cerqueus, C. Thorpe. Testing a Cloud Application: IBM SmartCloud iNotes. In 1st International Workshop on Testing the Cloud (TTC 2013, co-located with ISSTA).

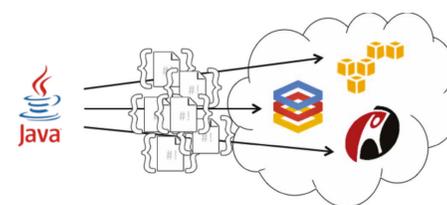
- » Motivation: Cloud applications (e.g., iNotes) are massive: amount of data, number of components, etc. which makes testing hard.
- » Objectives: Find issues quickly; reduce bugs in release updates; increase efficiency/agility of testing phase
- » Solution:
- » Testing Philosophy: integration of testers in the development process; get quality right the first time (stop fixing in production)
- » Release Cycles: (monthly/weekly/on the fly) depending on impact on product
- » Performance testing tool: (RPT) allowing to define and run performance scenarios
- » New testing tools: to follow the (agile) development process



4 Testing in the Cloud

A. Thiery, T. Cerqueus, C. Thorpe, G. Sunyé, J. Murphy. A DSL for deployment and testing in the Cloud. In 2nd International Workshop on Testing The Cloud (TTC 2014).

- » Motivation: Variety of Cloud solutions which in turn means *a variety of (often provider dependent) tools to deploy applications*



- » Objective: To provide Software Testing Engineers with an *automated and provider-independent method to deploy and test Cloud applications*.
- » Solution: *DSL* for the definition of the application deployment process and *a generation process* that produces deployment and instantiation scripts. This significantly simplifies and accelerates the testing process for Cloud applications.

