



ElasTest

The demand for larger and more interconnected software systems is constantly increasing, but the ability of developers to satisfy it is not evolving accordingly. The most limiting factor is software validation, which typically requires very costly and complex testing processes. This project aims to improve the efficiency and effectiveness of the testing process significantly and, with it, the overall quality of large software systems.

AT A GLANCE

Project title

ElasTest: an elastic platform for testing complex distributed large software systems.

Project coordinator

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Partners

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Tikal Technologies S.L., Spain
IBM Ireland Limited, Ireland
Relational Technology A.E., Greece

Duration

01.2017 – 12.2019

Total cost

4,270,187.50 €

EC Contribution

4,270,187.50 €

Programme

H2020-ICT-2016-1

Context and motivation

Large distributed software systems are common nowadays. This software is promised to be fault-tolerant, elastic (it scales in and out) and cost-efficient, among other features. However, it is difficult to assess that distributed software complies with the quality demanded by users. For this kind of software, testing from the user's perspective (i.e., end-to-end tests) is a task that consumes much of developers' time. It is estimated that about 70% of the time in a project is devoted to testing. In addition, testing certain real world conditions is prohibitive, and hence not tested at all. In essence, all these problems are due to the fact that there is no systematic approach to end-to-end testing.

Challenge

ElasTest's objectives can be divided into business outcomes and process outcomes. The project focuses on providing real business value to its users. In this regard, the project expects to achieve the following list of objectives:

- To maintain compatibility with current testing practices and tools.
- To reduce the overall time to market by an average factor of 20%.
- To increase the reusability of code, tools, and architectures devoted to

non-functional software testing by a factor of 6.

- To increase the overall tester productivity (measured as lines of code tested per time unit) for integration and system tests by a factor of 2.
- To decrease the corrective maintenance effort of large distributed systems by a factor of 50%.

- To decrease field failure reports of large distributed systems by a factor of 30%.
- To increase the scalability, robustness, security and Quality of Experience of large distributed systems by an average factor of 20%.



Solution

We propose to apply the “divide-and-conquer” principle, which is commonly used for architecting complex software, to testing by developing a novel test orchestration theory and toolbox enabling the creation of complex test suites as the composition of simple testing units. This test orchestration mechanism is complemented with tools that include:

- Capabilities for the instrumentation of the Software under Test enabling to reproduce real-world operational conditions.
- Reusable testing services solving common testing problems including Browser Automation as a Service, Sensor Emulator as a Service, Monitoring as a Service, Security Check as a Service, Log Ingestion and Analysis as a Service, Cost Modeling as a Service, etc.
- Cognitive computing and machine learning mechanisms ingesting large amounts of knowledge and using it to generate testing recommendations and answer questions about the testing process.

ElasTest will be generic enough to be useful in IT industry, but also provide added value to current tooling. This is challenging, as most tools are either too generic or too specific. To achieve this goal, ElasTest will be demonstrated using

four IT domains: web and mobile development, telecommunications, real-time video communication, and Internet of Things.

Expected impact

The ElasTest platform thus created will be based on a flexible Free Open Source Software and a community of users, stakeholders and contributors will be built around it with the objective of turning ElasTest into a worldwide reference in the area of large software system testing and guaranteeing the long-term sustainability of the results obtained in the project.

ElasTest will impact on three different stakeholders: testers, developers, and product owners. Testers will have a platform where all tests are run, with the possibility of adding new tests and defining the runtime conditions of each, being able to reproduce real-time conditions. In addition, they will be able to explore tests result in an integrated way. Developers will feel more confident with their code, and they will be able to define new kinds of tests. Product owners will see a reduction in failure reports, with an increase of the overall end-user satisfaction, and a reduction in time-to-market deliveries and time spent on solving bugs.

All in all, ElasTest will make any software development team capable of delivering software faster, more confidently, more securely and with fewer defects.