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User Impersonation as a Service in End-to-End Testing

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http://elastest.io

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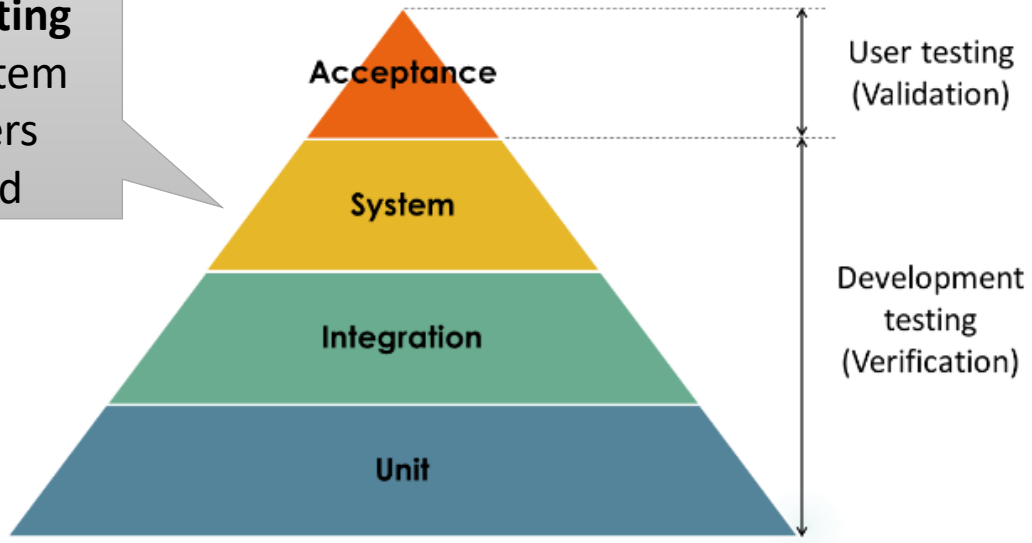
1. Introduction

- Large distributed heterogenous systems are more and more common (e.g. microservices architectures, cloud native apps, etc.)
- Testing this kind of software is complex, especially to verify the system as a whole

End-to-end testing happens at system level with users impersonated



ElasTest

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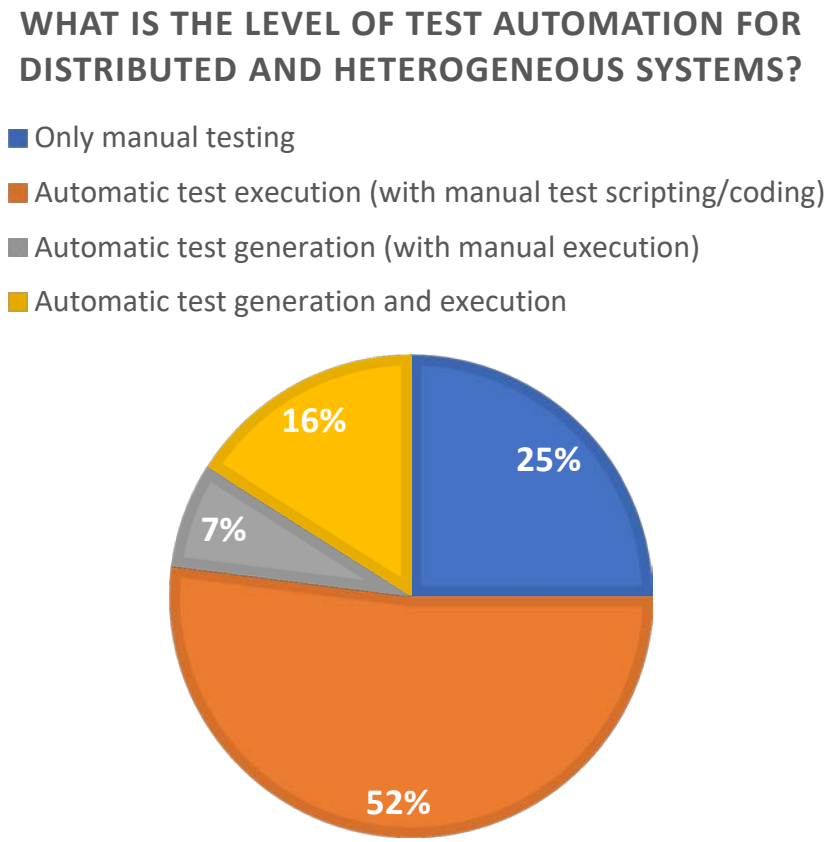
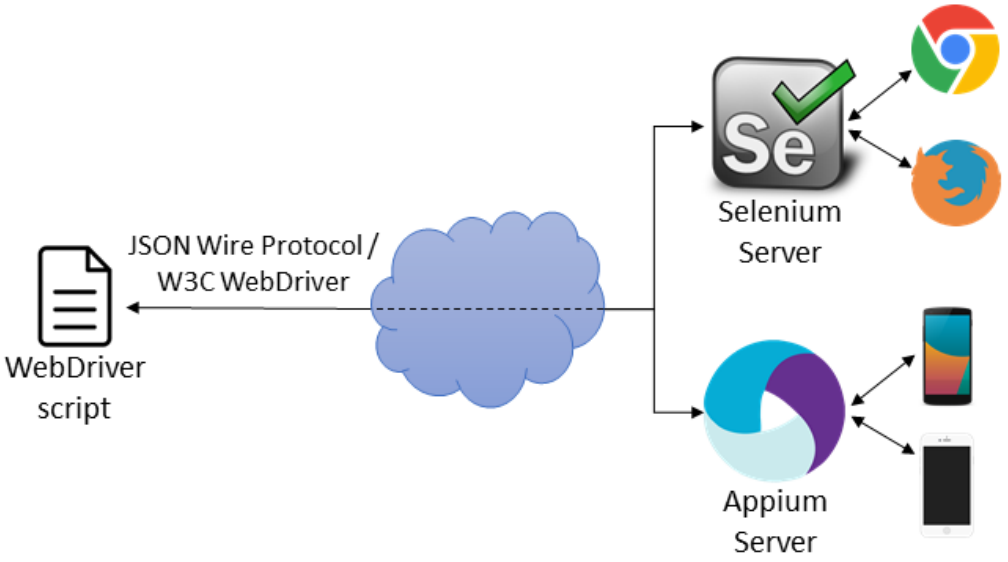
2. Background

- Recent surveys confirm the existence of gap between the current and the desired status of test automation for distributed heterogeneous systems, prioritizing the relevance of test automation features for these systems (Lima, 2016)



2. Background

- The main mechanism used in the current state-of-the-art for the functional testing of web and mobile applications consists on impersonating a user through some kind of GUI automation
- **Selenium** is the most popular solution:



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3. ElasTest: platform for end-to-end testing

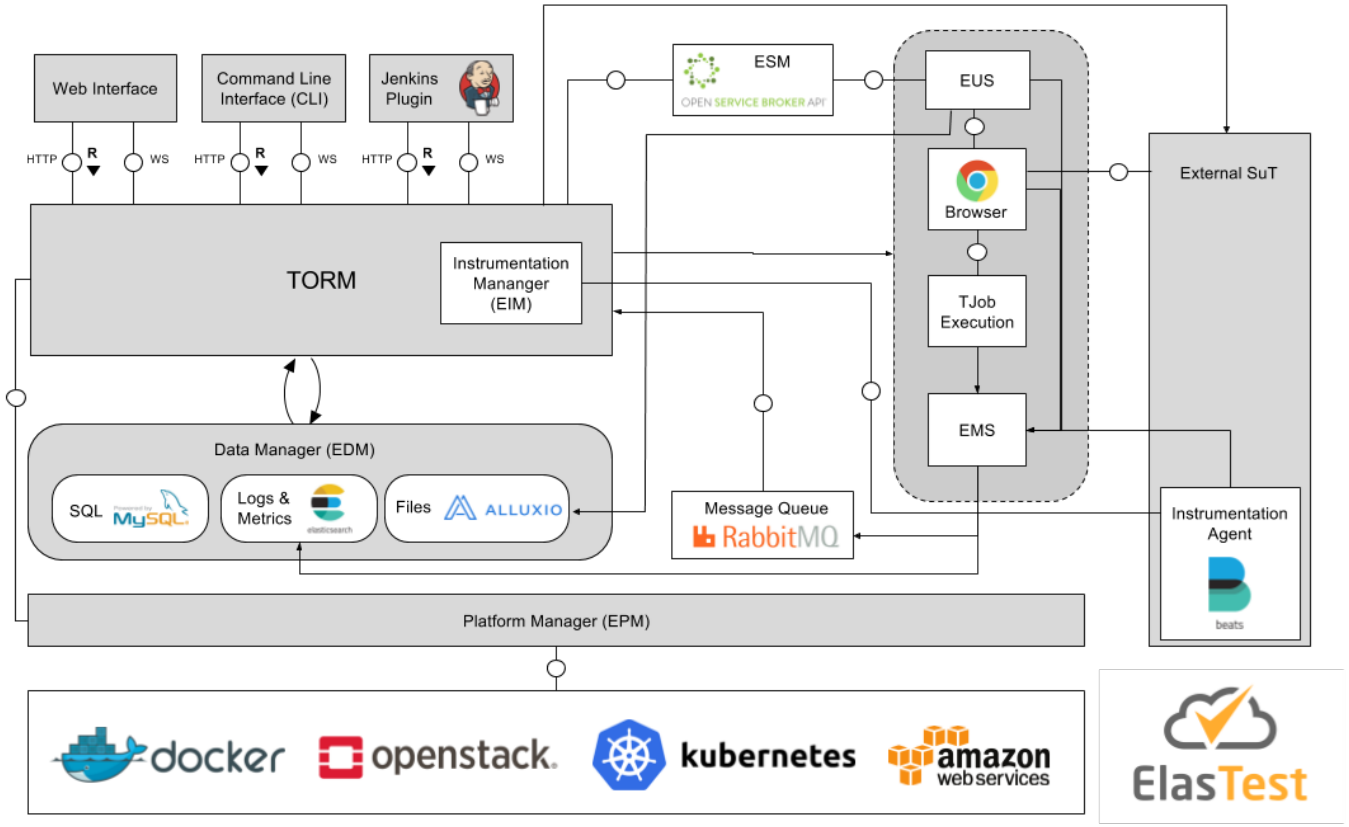
- ElasTest is an open source platform aimed to ease the end-to-end testing activities for different types of distributed applications and services
- ElasTest manages the full testing lifecycle, deploying and monitoring the SUT, executing the end-to-end tests and exposing the results to software engineers and testers

ElasTest

http://elastest.io/

3. ElasTest: platform for end-to-end testing

- ElasTest architecture:



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4. User Impersonation as a Service

- ElasTest implements an user impersonation as a service capability that provides Software as a Service (SaaS) extending the W3C WebDriver with advanced capabilities:

1. Evaluation of the perceived Quality of Experience (QoE) of users on real-time multimedia applications
2. Equivalent automation capability for sensors and smart devices for Internet of Things (IoT)

4. User Impersonation as a Service

- Extension to W3C WebDriver recommendation by ElasTest User Impersonation Service:

Method	Path	Description
POST	/session/{sessionId}/element/{elementId}/event	Subscribe to a given event within an element
GET	/session/{sessionId}/event/{subscriptionId}	Read the value of event for a given subscription
DELETE	/session/{sessionId}/event/{subscriptionId}	Remove a subscription
GET	/session/{sessionId}/vnc	Get remote session
DELETE	/session/{sessionId}/vnc	Delete remote session
POST	/session/{sessionId}/usermedia	Set user media for WebRTC
GET	/session/{sessionId}/stats	Read the WebRTC stats
POST	/session/{sessionId}/element/{elementId}/latency	Measure end-to-end latency of a WebRTC session
POST	/session/{sessionId}/element/{elementId}/quality	Measure quality of a WebRTC session

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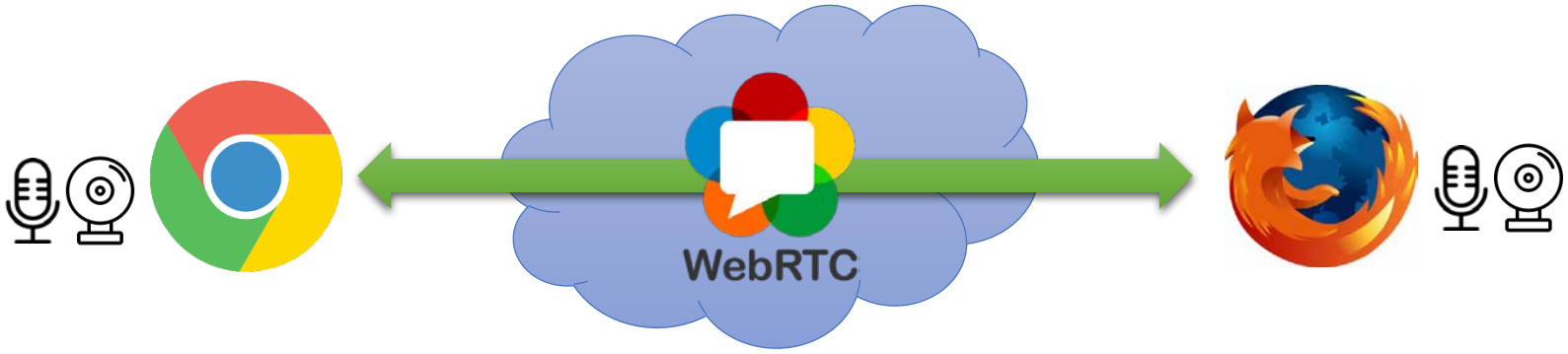
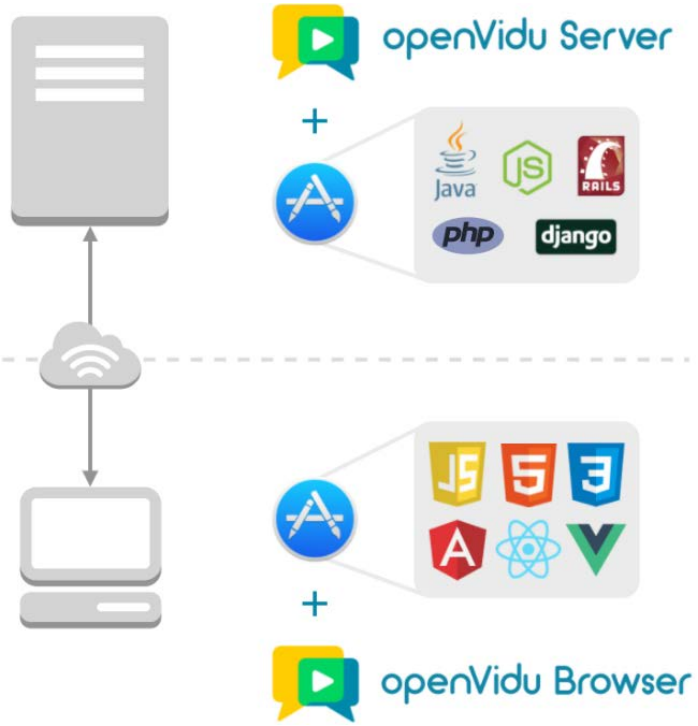
5. Case study: testing WebRTC applications

- **WebRTC** is the umbrella term for a number of technologies aimed to bring Real Time Communications to the Web
  - W3C (JavaScript APIs): *getUserMedia*, *PeerConnection*, *DataChannels*
  - IETF (protocol stack): ICE, SDP, TURN, STUN, …



5. Case study: testing WebRTC applications

- Our case study is based on OpenVidu, an open source videoconferencing WebRTC framework
- Question driving this study: *“Is the ElasTest user impersonation service capable of improving the end-to-end testing process within the OpenVidu project?”*

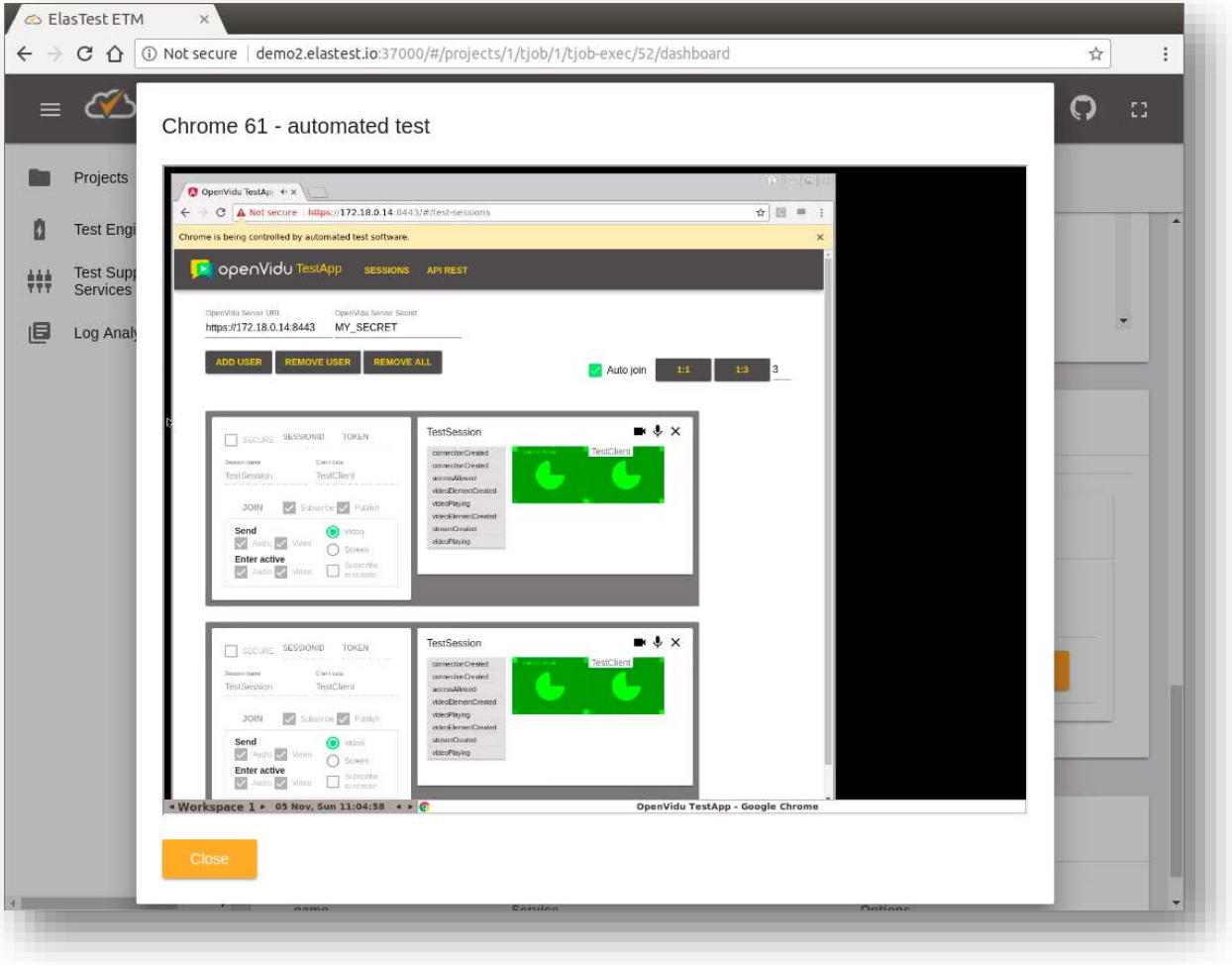


openVidu

http://openvidu.io/

5. Case study: testing WebRTC applications

- Demo



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6. Conclusions and future work

- ElasTest is an open source platform aimed to ease end-to-end tests for heterogenous large distributed systems
- ElasTest implements a User Impersonation as a Service (UIaaS) extending the W3C WebDriver recommendation
- Existing test codebases with Selenium and Appium are completely compatible with ElasTest
- Some features are still under development, such as measurement of the end-users' perceived QoE or support for IoT devices