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LATEST TRENDS IN TEST AUTOMATION

One of the ongoing trends in the QA industry for the last few years has been Test Automation and Continuous Testing, and this trend is going to continue in 2018 as well. While CI/CD, DevOps and Test Frameworks will remain prominent themes in the coming year, several new technologies are affecting what we test and how we test.

Expect to see more open-source testing frameworks in JavaScript land, more artificial intelligence (AI) capabilities embedded in the tools you use and more innovation coming from commercial tool vendors. Another continuing trend is combination of functional testing with performance testing - (think of it as Selenium combined with your Jmeter tests). Also expect to see lots of new development in Behavior Driven Development (BDD Testing), and how it is adopted in an Agile organization. Automatic test scenario generation is another area which we are working on with several of our clients.

Here is a full rundown of the state of the software test automation.

IoT Testing

IoT (Internet of Things) is affecting the testing field significantly. Traditional methods of automation like Selenium are rendered useless in an embedded environment. We are seeing more and more Python and C/C++ based test frameworks that perform unit testing, integration testing and system testing. Most test frameworks are testing APIs exported by these embedded libraries, where quite a few of them are calling into the embedded code to perform unit testing. This requires specialized test engineers with significant Software Development experience - and we see more Software Developers will be deployed to automation testing roles. Python is probably the language of choice for IOT test framework development - because of its ability to call into C code directly with ctypes package.

Another new trend is the DevOps environment for IoT is starting to get standardized. So far, we have seen mostly ad-hoc implementations of a CI environment - but we have been working on standardizing the IoT CI environment. We have pre-built solutions in place for build management, tests management, image loading, deployment of IoT images on different devices, A/B Testing for IoT devices with different builds etc.

Continuous Testing

Continuous Testing is another trend from last year that still continues to date. We have seen an explosion of DevOps and CI/CD frameworks in the past, and this year the trend continues with newer frameworks like Nevercode and Codefresh.

Another trend in Continuous Testing is AI based risk assessment for each release. Previously, this operation was manually performed to determine which releases can be deployed for an application. We have implemented couple of CI/CD platforms that perform automatic AI based A/B deployment of the application.

AI Based Testing

AI based testing methodologies have become more than just a buzz word and entered mainstream testing practices. AI and automation are two parallel aspects of testing - automation is used for functional testing and AI is used for Visual Testing. AI based visual testing - including look and feel testing and giving a quick run-down of visual changes per build is an immensely helpful method for release validation. We have worked on implementing Applitools based visual testing solutions at different clients in Denver.

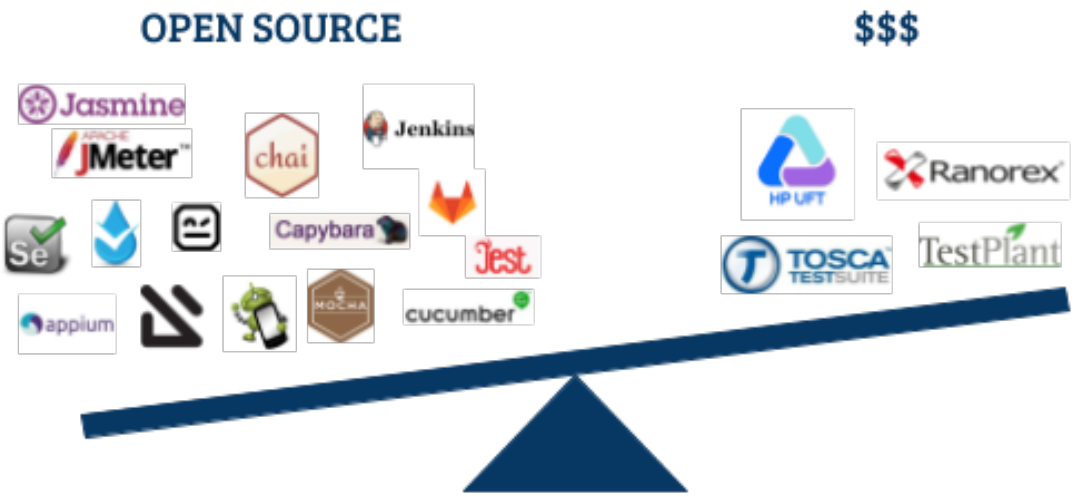
Though strictly speaking, Visual Testing is not AI based currently. The image comparison algorithms are traditional gradient classification based, but most in the industry refer to this this as AI based testing.

Few other unique tools that we have worked on can automate many tasks intelligently.

- Test Suite Optimization: we have developed few tools that analyze log patterns and identify which test cases are repetitive or duplicate.
- Defect Identification using Log analysis: Highlights software defects based on log analysis.
- Automatic Test Scenario Generation similar to Swagger.

Open-source Testing Frameworks

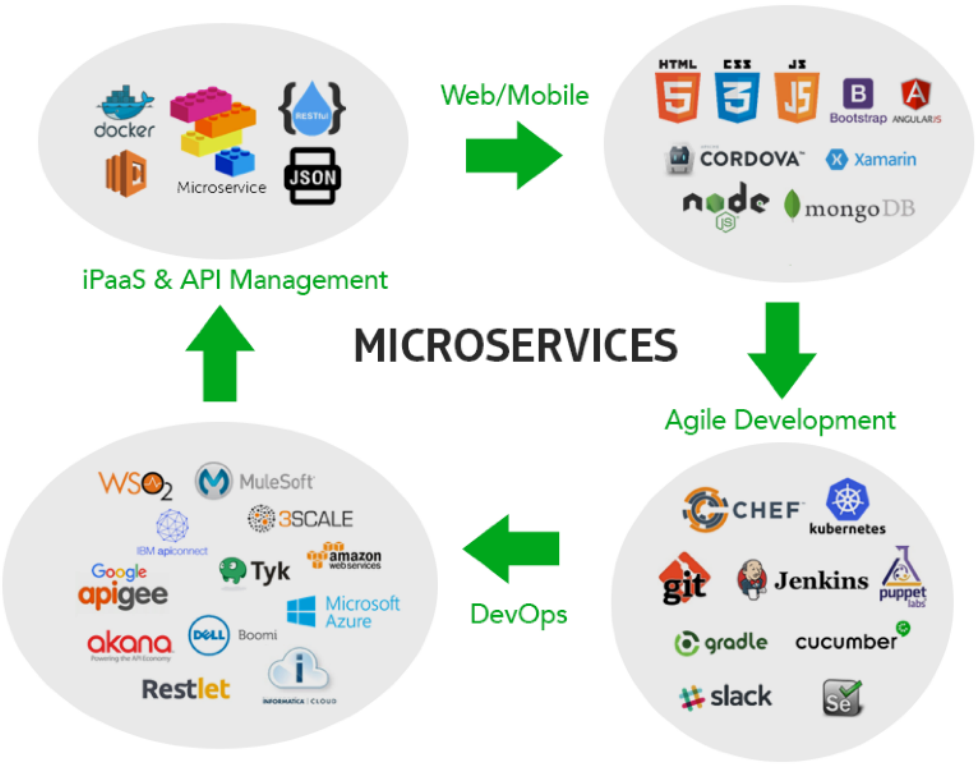
One of the growing trends we have been seeing over the past few years - has been the move away from traditional enterprise Testing solutions like HP QC, ALM, UFT, IBM etc. We are seeing increased adoption of Open-source testing platforms across organizations of all sizes. We have personally migrated several of our clients' Test Frameworks from HP QC/UFT towards other open-source solutions. Though there is coding involved with these open-source solutions, they are highly customizable and maintainable over the long run. We predict that these open-source solutions would continue to gain more traction as we progress into 2018.



Merging of Agile and DevOps

The key principle of DevOps is that the Development team, Test team and Operations Team collaborate to get out the software releases seamlessly. It means centralized or segregated QA departments are now having to merge with development and ops teams to provide testing services on-demand for various releases. Testing is becoming more progressive, iterative and integrated with the application development and deployment processes.

We are seeing adoption of BDD based testing mechanisms that allow iterative testing for new features developed over a sprint cycle. BDD stands for Behavior Driven Development, which itself is derived from Acceptance Test Driven Development (ATDD). BDD forces teams to come up with Test Scenarios along with the requirement gathering. The test scenarios are immediately written down and checked in into CI system to force the CI system to show failures for these scenarios. The goal of the development and QA teams during the Sprint now becomes making these scenarios pass. This new mechanism of testing framework development - is novel in its approach and well suited in an Agile environment. We are seeing a large number of our clients are moving to BDD based test development in their Agile practices.



Performance Testing to Performance Engineering

One of the key trends in testing has been the continuous shift of Performance testing role into a full-fledged Performance Engineering role. Performance engineering now includes not only the testing aspects, but also monitoring performance of the system, automatic scaling of resources, A/B testing, ELBs, database optimizations, bottleneck identifications and monitoring. Several cloud based tools are now available to accurately monitor various performance parameters on different cloud resources and a dashboard monitoring of all resources with alerts has been one of the main part of our work at various clients.

Micro Services Testing

As more and more applications are moving towards the micro-services model, the test architecture is also moving towards micro-services testing model. Previously QA for the product followed a black-box testing model, but now, with micro services testing, we are moving towards a gray-box testing model.

Micro-services testing includes API Testing, Database Testing, Auth Service/Search service testing etc. We can call this testing model as more of a component-testing model instead of testing an integrated product.

Micro-services testing allows us to catch issues in advance and prior to the big-bang integration of all the changes. It is still a level higher than unit-testing, as components have to be completely defined and testing is based on the external APIs of these components.

Testing as a Service (TaaS)

Testing as a Service (TaaS) or Managed QA Services is an outsourcing model where testing activities for the organizations are performed by an external team rather than employees. The external team in many cases is an offshore team, but we have had some instances where we have developed on-shore development teams for initial phases of automation development and project hand-over, followed by an offshore team for QA maintenance.

The advantages of Testing as a Service (TaaS) include:

- **Support for on-demand testing resources**. Testing is a cyclical activity where resource utilization is not constant. Testing as a Service would mean that clients would only have to pay for the hours when the test resources are in use.
- **Lower costs due to offshore resources**: Testing as a Service also helps in reducing costs for the organizations due to lower labor costs associated with offshore organizations.
- **Automation Services are included**: Testing as a Service includes Test automation frameworks, CI/CD frameworks and performance testing and monitoring, thus reducing the varied costs to the organization.

What's needed to enable Continuous Testing?

The latest Gartner Magic Quadrant for Test Automation focuses on what's needed to enable Continuous Testing. Here are some of the key findings of the report on Test Automation and Continuous Testing:

- Test automation across development, QA, and performance testing are critical to achieving the level of Continuous Testing that DevOps requires.
- Avoiding the "test maintenance trap" is one of the greatest challenges of test automation. Practices like model-based test automation, synthetic test data generation, service virtualization, etc. can help.
- The test automation market has changed dramatically over the past year, and more changes are likely to come soon. DevOps will ultimately force organizations to find a sustainable test automation approach that works for their people, processes, and technologies.
- Open source test automation solutions such as Selenium and Appium have made a strong impact on test automation—primarily for developers focused on web and mobile front ends. They have provided a welcome level of "standardization," but aren't yet viable for non-developers such as subject matter experts and business analysts.

Are you looking to streamline QA operations in your organization?

Most organizations are following some level of Agile and DevOps practices in their organizations, but are looking to move to the next step and have a fully streamlined solution that is robust, reliable and easy to maintain. This is where we come in - our Automation Services or Managed QA Services provide the customized solution that our client needs for their specific circumstances.

You can reach us anytime at **www.TestFramework.io** or emailing **contact@testframework.io**. We are located in Denver at **2420 17th Street Denver, CO 80202**.

OUR SERVICES

- **Test Automation Frameworks**
  - Test Frameworks written in JavaScript, Python, Java or C#
  - Web/Mobile Automation using Selenium, Appium, Cypress.io, Jest, Mocha, Jasmine, Karma etc.
  - Embedded IoT Test Frameworks in C/C++ or Python.
  - MicroServices Integrated Test Frameworks (including API testing)
  - BDD Testing Frameworks
  - Performance Testing Frameworks
  - Customized Solutions

- **CI/CD and DevOps Frameworks**
  - Jenkins, Travis, Gitlab CI, TeamCity, Bamboo etc
  - DevOps frameworks using Docker, Kubernetes, Chef, AWS, Azure, GCP, OpenStack.
  - Customized tools and solutions to suit your DevOps environment

- **Test as a Service (Managed QA Services)**
  - US Based or Offshore solutions.
  - Manual QA Engineers, Automation Engineers and DevOps Engineers available.
  - On-demand resources.
  - Flexible resources - use more when you need more.
  - ~60% lower costs than in-house QA management

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