



Consultants



What is the best test automation approach?

$$E[e^{-sX_{+,i,u}} | A(X_{-,i,u}) = k] = \sum_{i=1}^k \left[\frac{1}{2Li!} \frac{d^i}{dz^i} \Big|_{z=0} \left(\frac{G_p^*(z)}{z} \right) + \frac{1}{2L(k-i)!} \frac{d^{k-i}}{dz^{k-i}} \right]$$



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1. Record & Playback

We are regularly called upon for advice on designing and deploying testing automation tools and frameworks. Choosing the right automation approach is vital for ensuring proper testing, minimizing development cost and delivering the lowest possible ongoing maintenance expenses. This dialogue usually begins with a simple but important client question: which automation approach works best? Based on our experience delivering hundreds of automation projects, we can confidently answer: it depends.

Below is an overview of five different but industry-standard automation approaches to help the client narrow down their options and support a more informed decision.

Summary

This is the most basic automation testing approach, with limited flexibility and long term utility. Record & Playback functionality allows testers to interactively record user actions and replay them back any number of times, comparing actual results to those expected. These techniques use only hard-coded data; the utility is very dependent on the automation tool used. Record & Playback can be used by non-coders if customization is kept at a minimum level and the verification points are graphical.

Usage

Record & Playback is very useful for basic automation projects of short duration like automated data entry or exploratory testing that feature re-record from scratch, have short test flows and automated data entry.

Pros

Record & Playback is an ideal way to get into testing automation. This approach has a number of advantages including low development cost, relatively simple design and ease of deployment.



Cons

The basic nature of Record & Playback comes with a functional price. This technique has limited performance (e.g., minimal test flow coverage), robustness (e.g., can break on build) and flexibility . Ongoing maintenance costs can be high especially when manual intervention is required.

2. Record & Playback Enhanced

Summary

This framework provides more functionality, supports parameterized data and enables more use cases than the basic Record & Playback approach. However, its value is highly dependent on the automation tool employed and the testing and programming skill of the team. A good return on investment can be obtained within a single project.

Usage

Like standard Record & Playback, this approach is useful for testing projects with modest automation requirements featuring: short term tests with short flow test cases and a limited number of checkpoints and relatively stable environments.

Pros

Record & Playback Enhanced has some advantages including low cost development and deployment (i.e. limited programming needed).

Cons

Like its cousin Record & Playback, this approach has a number of drawbacks including: modest performance (e.g., limited test flow coverage); moderate usability and flexibility with no multi-environment support; high maintenance costs due to manual intervention (for analysis and validation) and the need to address checkpoints.



3. Data-Driven Frameworks

Summary

Data-Driven techniques involve the creation of test scripts to run together with their related data sets within a framework. The test environment settings and controls are not hard-coded. A Data-Driven framework is ideal when the workflow is repetitive but the data input is large – meaning different combinations of data are required to successfully test the application. A skilled team is needed to implement this approach.

Usage

This automation framework effectively satisfies more advanced testing needs like testing single applications in multiple environments with big data sets, a limited number of checkpoints and stable test cases. Batch run tests are possible with extra development effort. Decent support is provided for distributed testing teams.

Pros

Data-Driven frameworks have a number of benefits including: very good usability and re-usability of test scripts, solid test flow coverage and reproducible test results.

Cons

There are watch-outs in using these methods. Automation performance is based largely on the automation skills of the person(s) undertaking the implementation. These techniques also require regular maintenance (increasing costs) and manual intervention upon failure.



4. Keyword-Driven Frameworks, also known as table-driven or action word testing

Summary

A Keyword-Driven framework is an advanced type of automated testing. Its methodology divides the test development process into two distinct stages: a design & development stage, and an execution stage. A Keyword-Driven approach is ideal for many projects, environments and data sets. However, it also requires sophisticated coding skills plus an up front investment in development time and tools to maximize value. The design of the framework can play a major role in determining the return on investment.

Usage

This testing method is suitable for many automation testing projects across multiple applications, platforms and environments, featuring large data sets, short & straight test cases and a limited set of checkpoints. Keyword-Driven frameworks are also ideal for batch run tests.

Pros

Keyword-Driven frameworks are a very good approach to leveraging automation. They have many advantages including: very good script usability and re-usability as well as test flow coverage and the ability to reproduce test results. Moreover, test development does not require sophisticated programming skills.

Cons

Higher performance does come with a cost including a significant upfront investment for the design and implementation of the framework. Keyword limitations restrict the complexity of test cases. Employees will require knowledge of meta-languages. These



techniques also require regular maintenance (increasing costs) and manual intervention upon failure.

5. Hybrid Keyword/Data-Driven Framework

Summary

Hybrid frameworks are the most sophisticated types of automated techniques available. For example, they feature script-less test creation, the ability to import/export data from various sources, a variety of checkpoints, and the power to integrate external objects. They can generally accommodate grammar and spelling as well as information input. However, the upfront investment, specialized skills prerequisite and ongoing maintenance costs can limit its long term value and applicability for simple projects.

Usage

Hybrid Keyword/Data-Driven Frameworks are designed to satisfy an organization's most wide-ranging automation requirements covering multiple applications, platforms and environments. They are suitable for testing situations with large and changeable data sets and data transitioning cases. These frameworks typically provide strong support for distributed testing teams.

Pros

Hybrid Keyword/Data-Driven Frameworks are among the most comprehensive and flexible functional testing frameworks available. They feature high usability, re-usability and test flow coverage and offer built-in consistency and severity validation.

Cons

There are some challenges with this approach including the need for a significant upfront investment in development and skills for design and implementation. Ongoing maintenance costs could also be noteworthy, potentially limited ROI. Finally, these frameworks may also be overkill for many testing projects.



The above analysis offers a general rule of thumb on which approach to use. What method you ultimately choose will depend on your budget, timing, skills and environment as well as your project's testing goals. Fundamentally, test automation is a software development activity; your team will need solid design and programming practices plus quality tools. A low-risk way of getting into test automation is by building a smoke test that will quickly run for each new build. This strategy allows you to learn automation as you go and to better understand your organization's capabilities. Finally, cost, complexity and technical considerations will make many testing projects unsuitable for an automated testing framework.

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