

A Winning Test Strategy for Financial Robo Advisors

Practice Head:

Janaki Jayachandran
VP – Testing Services

Authors:

Ashish Viju
Research Analyst

&

Srinivasan Sankar
Practice Manager – Digital Assurance



Since time immemorial, the financial sector has always been in the forefront of adapting cutting-edge technologies to come up with innovations in handling money. Right from ATMs, core banking, online banking, mobile banking, real time transfers and even online only banks, the examples are numerous. Robo Advisory is one more instance of technology easing out money management for the common people. With the use of data analytics and algorithm-based decision making, the customer can perform complete investment planning and management without spending huge commissions on financial planners and fund managers. This has set the alarm bells ringing throughout banks and other financial organizations that are keen to make full use of the machine learning based technology to take money management to customers fingertips.

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Robo Advisors are no more a mere innovation but turning out to be a must have for banks and financial institutions that would like to retain and grow their clientele that largely comprises of millennials and for generation Z in the future.

Implementing Robo Advisors

Be it custom built or off-the-shelf, implementing a Robo Advisory platform involves various complexities and challenges. Seamless integration with existing systems, a simple and likeable user interface, intuitional navigation, low error rates, secured access, continuous uptime, faster performance are just some of the features that are absolute must-haves in a Robo Advisory. In addition to this, being a portal on the digital platform, the ability to roll-out new features at-will be a game changer to stay ahead of competition. Hence the organization must prepare itself to shift to agile development and testing practices if they haven't done it already. With these many hurdles in front, the last thing that the organizations want is an outdated testing strategy that doesn't meet the needs to scale and be effective and efficient.

Testing Robo Advisors

Robo Advisors throw up a variety of challenges from a testing standpoint. Being a portal accessible for customers over the digital platforms, usability, performance, security, compatibility and accessibility are some key aspects of the product quality that need a strong focus on top of the functional quality and seamless integration to services, that are at a minimum need extensive testing. Of course, the other key challenge in testing Robo Advisors is the different data combinations of customer profiles that need to be tested.

And not to mention, all the testing mentioned above will need to fit in the small window allocated for testing and this is where a wholesome test automation can come in handy.

This is strengthened by the fact that assets under Robo Advisors globally amounts to almost a billion dollars and is expected to touch a little over **2.2 billion dollars by 2022** with an annual growth rate of **31.4%**.



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An integrated approach for testing

With functional and non-functional aspects of the product quality playing a vital role in the success of Robo Advisory platforms, the test strategy too should focus on coverage across functional and non-functional parameters of quality. Also the strategy has to take into account the need for organizations to release new features and defect fixes at a very short time interval. An integrated testing strategy helps in this regard to cover the various quality parameters. Including test automation to complement and enhance the testing would be a wise choice to make. Taking test automation one step further, building an automated test pack that can test the application functionality, performance security vulnerabilities and of course the API calls and integrations. An integrated automation approach also helps in improved test coverage, faster test feedback, reduced operational costs, all without compromising on the quality of testing.

In order to keep the cost of quality low, reliance on simple but effective test automation tools is necessary.

A wholesome test automation framework

The selenium test automation framework solution that we have built at Aspire (Aspire Framework for Test Automation or AFTA 2.0) was is aimed at addressing the challenges and objectives discussed above. This framework not just stops at functional / regression test automation, it also extends beyond to leverage the same scripts for security & performance testing as well.

The framework exploits Selenium Web Driver, Appium & Grid to its fullest on various parameters – Design patterns, parallel / distributed / cloud / cross browser / device execution, custom report, CI, web security & performance. It is built based on highly maintainable & scalable design patterns using Page Object Model, Page Factory & Loadable components which greatly reduces the boilerplate code in tests.

Test Data

Data plays a very important part in Robo Advisory testing since the financial planning happens based on the risk profile of the users. Hence it is important to test the many different scenarios with multiple data sets that cover exhaustingly all possible risk profiles. However, this is virtually impossible to be tested in a short time frame and does not always present an efficient way of doing it. Hence reliance on techniques that reduce the data combinations while ensuring maximum coverage would be the right data strategy. Techniques such as pairwise testing splits the different data combinations into pairs and ensures each of the data parameter is tested at least once. This method practically reduces the test scenarios in hundreds if not in thousands. And to support this, the automation framework should be flexible enough to pick data from different sources and iterate.

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Non Functional Tests using AFTA 2.0

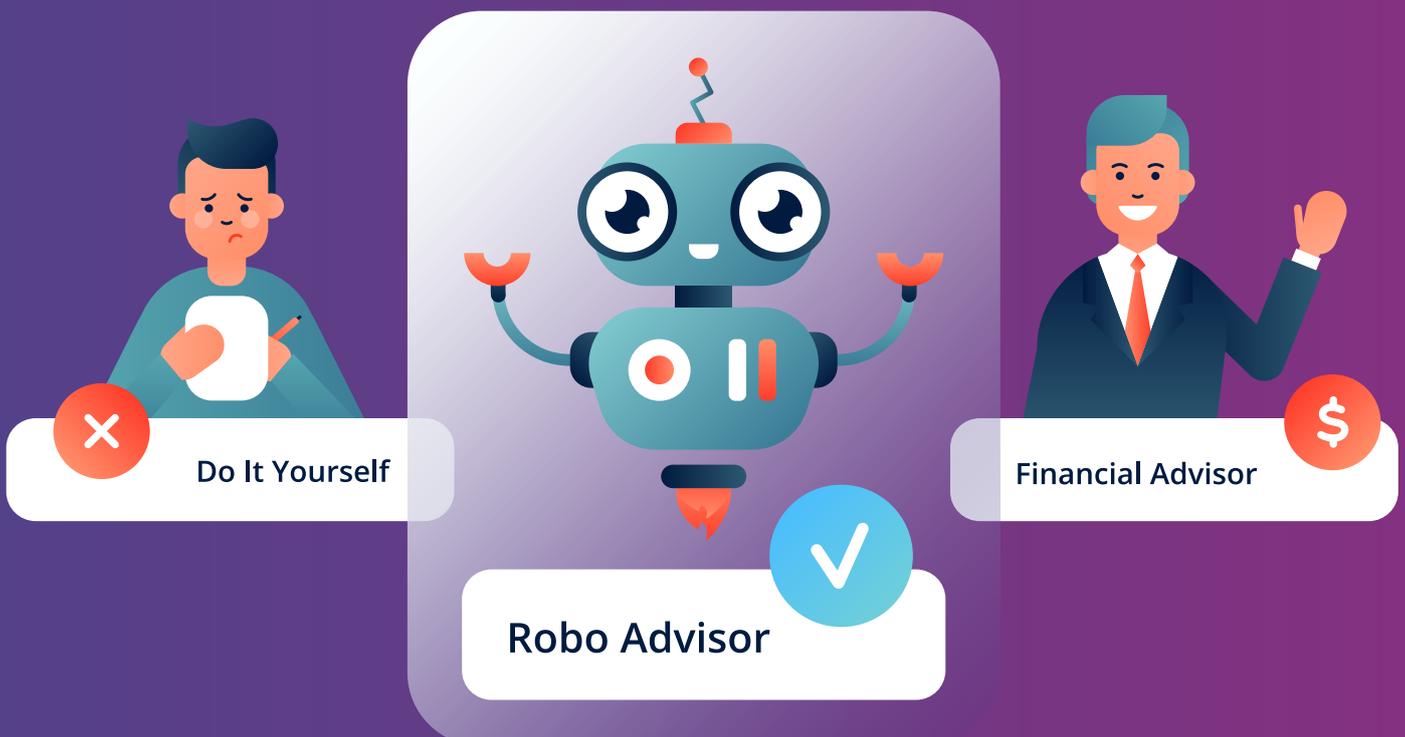
OWASP ZAP Integration with Selenium

AFTA 2.0 has a seamless integration with OWASP ZAP tool for uncovering vulnerabilities in web portals. This is especially critical in Robo Advisory platforms which are in most instances targeted to individual customers on the web. Spider Scan and Active Scan are effectively used here to perform security vulnerability assessment using the existing test automation scripts that helps to unearth many of the Top 10 Security vulnerabilities without any significant additional effort.



SOAP and REST API Scripts Integrated with Selenium

With easy integration with webservices testing tools such as SoapUI and Rest Assured, one can perform functional, regression and load testing of the services. Robo Advisors typically integrate with many third party services for customer verification, Anti-Money laundering checks, core banking applications, rules engines, real-time market data etc and hence an integrated approach to testing these services becomes imperative. Additionally, since the service calls interact with servers without the need for an UI, AFTA 2.0 can use these tools to create and supplement large sets of data for test automation and performance test packs in a matter of minutes, if not in seconds.



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JMeter for Performance Testing

A few seconds delay in loading the application can cause the customer to move to a competitor. Application performance plays a key role in providing a great user experience. And hence it becomes necessary to invest time and money to verify and validate the application availability and performance. But if one can be a bit wise, the same can be achieved at a fraction of the cost by reusing existing test automation scripts for performance testing. And that is precisely what we have achieved through AFTA 2.0. The test scripts within AFTA 2.0 can be converted into executable jar and can run the same test from JMeter with required parameters / data and AFTA 2.0 provides with a custom sampler to select & run the same test from JMeter. With this enablement, simulating multiple requests and validating the application load is made easier. Also, Java based implementation and execution provides flexibility for any further integration with other tools (like Dynatrace).

Continuous Integration

Robo Advisories being a touchpoint to end users, organizations cannot afford to lose time in releasing new features and defect fixes to overcome the competition. Dev Ops has been a boon for these kind of situations and having an automated test solution that can complement this will be a huge value. Integration of test automation into Continuous Integration pipeline has proven to be the closest to being a silver bullet solution for challenges in frequent code deploys and resulting inadequacy in testing for code quality. AFTA 2.0 offers seamless integration with CI tools like Jenkins, Bamboo, MS build and the selected automation scripts are triggered as and when a new build is committed to the version control tool.

With continuous integration, much more effective usage of the test automation framework is achieved and the return on investment is achieved faster as well. Other benefits include:

- ✓ Early defect detection by shifting left the testing cycle
- ✓ Improved application stability
- ✓ Enhanced test coverage
- ✓ Reduced test cycles resulting in cost savings
- ✓ Improved resource utilization and productivity
- ✓ Less piling up of defects
- ✓ Drive testing on par with the pace of development and delivery

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Conclusion

It is essential that organizations implementing a Robo Advisory platform consider all the factors listed above while working out a test strategy. While it is important to have integrated test automation as the cornerstone of the test strategy, organizations should also factor in the scalability and usability of the tools themselves in order to build an automation solution that is robust and long lasting. Such an all encompassing strategy can only be a great complement to releasing the product with quality with lightning speed turn around time.

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SINGAPORE
+65 3163 3050

NORTH AMERICA
+1 630 368 0970

EUROPE
+44 203 170 6115

INDIA
+91 44 6740 4000

MIDDLE EAST
+971 50 658 8831

For more info contact
info@aspresys.com or visit www.aspiresys.com