



Case Study: Order Audit Trail System Testing Solution

1. CHALLENGE

Our client, one of the leading US online brokers, introduced a new functionality (conditional orders) to their premier trading platform. This functionality had Order Audit Trail System (OATS) reporting implications. Besides testing the new functionality as such, we were also assigned the responsibility of performing OATS testing.

This was a very demanding task for a variety of reasons:

- ▶ Possible consequences of non-compliance with FINRA OATS requirements may lead to millions of dollars in fines and disciplinary actions.
- ▶ We did not have any exposure to OATS testing previously because it had been performed by a handful of SMEs from the brokerage technology support group (same people who were overseeing OATS reporting procedures in production environment). At the same time there was no OATS testing experience within the client's internal QA team.
- ▶ Functional requirements for OATS reporting for conditional orders have not been documented in sufficient detail and code changes were expected to affect several components of the trading and back-office infrastructure.
- ▶ We had to act quickly in order to meet an aggressive roll-out schedule.

2. SOLUTION

We formed a special OATS task force from the testers in our trading and back-office test teams in order to capitalize on our existing experience with the systems that were affected by OATS changes. As the very first step, we performed an extensive review of the then-current version of FINRA OATS Tech Spec and our client's requirements for reporting of conditional orders. It was immediately evident that there were some gaps which would lead to incompliance.



We requested that the project manager call a meeting with our client's product developers, system designers, compliance director, and OATS primary and technical contacts. At that meeting we discussed our questions regarding reporting requirements and the issues we had identified, as well as presented the draft of high-level test scenarios that we compiled. It was then decided that we should also regression test OATS reporting for regular orders, because there was a concern that changes made to support reporting of conditional orders could affect reporting functionality for regular orders. We accepted the test effort scope increase and moved ahead with development of our high-level test cases that now covered both regular and conditional orders. In the review sessions that followed, we were able to effectively finalize the reporting requirements, and clarified all outstanding issues with FINRA OATS Help Desk representatives. Another benefit of this process was that we gained exact understanding of OATS reporting responsibilities and procedures within the firm.

When we started to develop OATS regression test scripts, we found that even though generation of order events was automated, we still had to manually verify individual OATS Reportable Order Event (ROE) records for correctness against order events log, which was a very slow and error-prone process. We conducted a brain-storming session with our automation and dev team and came up with a two-layered solution:

- ▶ We decided that each of our automated scripts should compile reference OATS file capturing ROEs for the order events generated during the script execution. These reference OATS files could then be compared with the real OATS files produced by the OATS reporting application.
- ▶ Since the comparison of reference OATS files (expected results) against real OATS files (actual results) had to be automated as well, we developed the OATS Tester application. OATS Tester supported two modes of work:
 - Review mode: check OATS file for structure, format, syntax and context correctness. Any errors were visually highlighted in the review panel and summarized in the test report log.
 - Comparison mode: compare reference OATS file against real OATS file (in addition to verifications mentioned above for review mode). Any errors and inconsistencies were visually highlighted in the comparison panels and summarized in the test report log.

OATS file format definitions and data dictionary items in *OATS Tester* were designed to be configurable, so that we could easily modify these elements without making any code changes. Going forward, this saved us a lot of time to make updates mandated by subsequent requirement changes in official OATS Tech Spec.

As the work on *OATS Tester* was completed, we also finalized OATS regression test suite. After a couple of trial test runs and additional fine-tuning, we had our OATS testing solution signed off by the client and were ready to put it to work. It turned out to very effective as we were able to detect a lot of OATS bugs not only with the new functionality (conditional orders) but also with the old functionality (regular orders). OATS testing was part of each testing cycle for this project and we were able to assist our client in fixing these high-priority compliance issues. For additional verification, we enlisted help from the brokerage technology support group to validate OATS files in FINRA OATS test environment.

The project was completed in time and, what's most important, there were no OATS-related issues upon its release.

3. BENEFITS

By assuming full responsibility for OATS testing, we allowed the client's brokerage technology support group to fully focus on production support. And, as the scope of our work was eventually increasing, we provided OATS testing support for all our client's trading platforms (retail and institutional order flow).

We included OATS testing in regression test scope for scheduled maintenance releases on consistent basis, thus preventing future OATS defects from slipping to production environment and exposing our client to regulatory and compliance risk.

Our newly formed QA center of expertise in OATS testing, as well as the robust and scalable OATS testing solution that we developed, allowed us to seamlessly support further OATS-related changes – both those that had to do with FINRA subsequent OATS Releases and those that were related to new functionalities introduced in our client's trading platforms.

When NYSE introduced Order Tracking System (OTS), we immediately picked up OTS testing responsibilities. Our existing testing engagement with OATS (and the similarities between OATS and OTS design) allowed us to quickly develop a comprehensive OTS regression test suite to cover our client's needs. And as we updated *OATS Tester* application to also support OTS testing, we renamed it to *O(A)TS Tester* to reflect this.

With the invaluable experience that we gained over the years, we stand ready to provide a complete range of compliance testing solutions for OATS and OTS reporting regardless of the system complexity.