Case Study: Capacity and Performance Testing of a Global Equity Trading System

1. BACKGROUND

Comprehensive performance and capacity testing of a complex and critical trading platform can be a daunting task. To assess and improve capacity and performance of a product at the heart of its equity trading infrastructure, a leading investment banks' Global Equity Trading Group sought out a partner with proven expertise in both quality assurance and the trading industry.

2. CHALLENGE

The client, a leading global investment bank with 20,000 employees and offices in 29 countries, needed to analyze performance and capacity of its trading platform. The platform, which connects the bank's clients and proprietary traders to more than 60 exchanges around the world, consists of three main sub-systems:

- Request system (FIX engines receiving orders/amends/cancellations from clients and delivering back responses from exchanges)
- Order management system (processing orders, recalculating balances, checking risks, credit, etc.)
- Execution system (providing connectivity to the market)

To find opportunities to increase the platform's performance and capacity, management needed a clear picture of current limitations. Each sub-system, as well as the platform itself, had unique performance issues. While it was clear that the system was underperforming, its complexity prevented the client from assessing its real capacity and locating potential bottlenecks.

The project presented several technical challenges:

- **The "R&D" nature of the project** | Besides reporting every identified issue to the client, Allied's specialists were also expected to track each observed problem back down to the code level in and to suggest possible workarounds or improvements.
- **Extreme complexity of the platform's test environment** | In order to free up client's resources from supporting the test environment, Allied's experts were asked to take over the knowledge of the environment and to find ways of automating and simplifying the existing support procedures.

3. ALLIED'S APPROACH

At the start of the project Allied's specialists acquired in-depth knowledge of the system through extensive interviews with the development teams. This enabled the Allied team to translate the general project requirements into a clear testing approach, and to develop a set of performance and capacity KPIs for each of the 3 sub-systems, as well as for the end-to-end system performance and capacity. Allied's consultants also suggested an effective approach to automating the support of the test environment.

Allied's specialists built the appropriate testing tools for the project using our proprietary testing frameworks developed over the years specifically for the trading industry, and by adapting the client's existing program libraries and modules for testing purposes. The Allied team also created the necessary test data: in order to simulate a realistic flow of client orders, they analyzed production logs and implemented the logic in customized test data sets.

The testing itself was performed in stages. While testing for one set of KPIs and investigating issues identified at that stage, Allied's analysts were developing the tools for testing of the next set of KPIs in parallel. In addition to the scope that was initially agreed upon, the Allied team also addressed all questions raised by the client after reviewing the testing reports.

4. RESULTS

The project was completed 100% on budget and on schedule, with the following results:

- Allied provided the client with a set of clearly defined KPIs, repeatable test scripts and corresponding test results. These results now serve as performance and capacity benchmarks for further system improvement.
- The Allied team identified multiple performance limitations and suggested approaches to address them:
  - For the Request sub-system, several code amendments were suggested, and some partially implemented. This resulted in an immediate performance increase by 100%. Implementing all recommendations is expected to increase performance by another 200%.
  - For the Execution System, the Allied team was able to recommend code improvements to reduce latencies and increase throughput.
- Our consultants identified capacity limitations, investigated their cause, and provided an approach to mitigate them.
- Allied delivered a set of automated tools for the support and maintenance of the platform's test environment accompanied by detailed documentation such as user and configuration manuals.