Testing the crucial system to enable international access to
Indian Capital Markets

CASE STUDY

About Client
Asia's leading stock exchange

Industry
BFSI

Service
Testing

$ 17,832.21
▲ 59,08%

Lorem
1D 1W 1M 1M

BUY

Business **Need**

The client, in collaboration with India's leading stock exchange, was building a system that would enable its derivative trading (DT) members to trade in India's leading stock exchange's International Financial Services Centre (IFSC). The client wanted a partner to conduct the non-functional testing (NFT) to ensure the system met stringent regulatory standards while being secure, robust, reliable, and scalable with a 99.99% annual uptime.

Business **Challenge**

Globalization has reshaped the world economy. With the vision of globalization, a financial hub was set up in India with tax incentives created by the Indian government with a more relaxed regulatory regime to attract capital to India and export financial services. India's leading stock exchange IFSC set up its stock trading at the financial hub. This exchange enabled easier access for international investors looking for trading opportunities in Indian securities.

The client was Asia's leading and trusted securities and derivatives exchange, operating equity, fixed income, currency, and commodity markets. The client, in collaboration with the Indian stock exchange, built a system to enable its members to trade in the Indian stock exchange's IFSC. These trades executed by the client's DT members will be returned to the client's Derivatives Clearing System for post-trade activities. As a crucial system for able. In addition, the system's architecture must be resilient, with no single point of failure.

For IT disaster recovery (ITDR), the system was expected to adhere to the following recovery key performance indicators (KPIs):

1. Recovery Time Objective (RTO): 4 hours

2. Recovery Process Objective (RPO): 0 RPO for trades for the Indian stock exchange's IFSC. In a disaster recovery (DR) scenario, the Indian stock exchange's IFSC will remove all unmatched orders.

Additionally, the system should be capable of downloading trades from the Indian stock exchange's IFSC for reconciliation and handling exceptions of market outages at the Indian stock exchange's IFSC and system outages at the client's data center.

The client wanted a partner to conduct the NFT for the system to ensure the above conditions are met. While performing the NFT, the following challenges must also be addressed:

- Creation of input test data as per client needs
- Conversion of input test data into Tick by Tick Data via multicast (MTBT)
- Testing of multiple releases due to functional and non-functional issues observed during mock and weekday testing
- Dependency on the weekend mock testing for load testing because of the limited constraint of the Indian stock exchange's IFSC's Quality Assurance (QA) environment
- Customization and use of NSEIT simulator for load testing because of order rate limit constraint of the Indian stock exchange's IFSC's QA environment
- Dependency on the client's team for fail-over testing since NSEIT does not have access to the process server
- Creation of the performance test report for weekend mock
- Publishing test case-wise latency and reconciliation report for weekend mock
- Managing the frequent changes in testing expectations

Business **Solution**

With extensive capital domain expertise and an in-depth understanding of the Indian stock exchange's IFSC functioning, NSEIT became the strategic testing partner for the client. We utilized our robust and flexible order injection tool called the Volume Generation Tool (VGT), which produces liquidity or load on a simulated market, operating like a live market with similar patterns.

For the client, we used VGT to perform the following functions on live market environment as per the client's data requirements:

1. New order generation
2. Order modification
3. Order cancellation

We conducted the NFT as follows:

- Set up a production-like test environment, with real market simulation in terms of volume of transactions and complexity of the order book,
- Customized VGT for Financial Information Exchange (FIX) and Non-NEAT Front end (NNF/TCP) protocols and deployed it at the client's infrastructure,
- Injected orders for load testing of the client's system,
- Enabled customizable order rate varying from 0 to 30 transactions per second (TPS) per user for up to 80 concurrent users,
- Enabled horizontal and vertical scalability to inject billions of transactions,
- Using this load, we evaluated the performance of the client's system through KPIs such as latency, throughput, error rate, and server statistics (CPU and memory),

- Executed fail-over test cases to validate the fallback mechanism of the client's system,
- Conducted detailed planning and estimation throughout the testing process,
- Enabled graphical presentation of order summary, and
- Enabled reconciliation of orders and trades

During NFT, in the Drop Copy receiver, the Clearing Members received orders or trades from their trading members and the Market Data receiver provided access to multicast broadcasts messages and identified the missing responses.

Our dedicated expert team of testers and developers ensured appropriate testing within the assignment. We conducted regular team connect and meetings with the client to address issues and plan solutions. Further, we provided dedicated, on-time support during test executions.
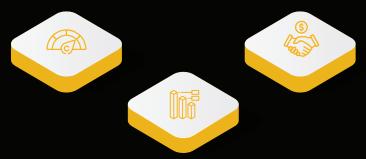
Tech **Stack**

python™

C#

.NET Core

UNIX®
An Open Group Standard

APACHE JMeter™

X Excel

◆ Jira Software

Shell Programming

Business **Impact**

The latency number improved from 4,000 milliseconds to 50 milliseconds after phase II of the performance testing

Enabled the client to build stock index-based products from India's leading stock exchange's IFSC, and bring global investors to India

NFT helped the client's system achieve the following KPIs:
- 250 k trades per day
- 5.5 million orders (new, amended, or cancelled) per day
- Over 2,000 messages per second
- 80 concurrent FIX users
- 20 concurrent users with 200 TPS on the DMA server

Why **NSEIT?**

NSEIT Limited is a global technology enterprise, focussed on delivering excellence in a complex digital environment primarily in banking, insurance, capital market ecosystem, EdTech, and online examinations. With over 20+ years of expertise across large-scale complex digital implementations, we have been recognized as the 'Trusted Technology & Knowledge Partner' for 500+ customers across India, US and Middle East.

From providing seamless next-gen digital solutions to owning and running India's largest network of 229 Test Centers across 227 Cities in India, we aim to catalyse the digital-native movement across the BFSI, EdTech & Online Examination landscape by creating end-to-end business-enabling technology solutions.

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