bizle
PROFESSIONAL SERIES

BUSINESS KNOWLEDGE FOR IT IN TRADING AND EXCHANGES

A COMPLETE HANDBOOK FOR IT PROFESSIONALS

Business Knowledge for IT in Trading and Exchanges

A complete handbook for IT Professionals

Essvale Corporation Limited
The Forward Thinking Company

PROFESSIONAL SERIES

Essvale Corporation Limited
63 Apollo Building
1 Newton Place
London E14 3TS
www.essvale.com

This is the first edition of this publication.

A CIP record for this book is available from the British Library

ISBN (10-digit) 9780955412486
ISBN (13-digit) 095541248X

Cover design by Essvale Design Team
Design and typesetting by Boldface, London EC1
Printed by Lightning Source Ltd, Milton Keynes

Preface

Good customer service is the lifeblood of any business. The concept of customer service is essential to the way in which the IT function in any organisation interacts with the business. The primary role of IT is to support the business and hence the need for IT professionals working in any organisation to look upon their business counterparts as customers. The question that springs to mind is: how do you provide a service to the customer if you don't have a thorough understanding of their requirements?

To gain an insight into the customer's specific requirements, IT professionals have to understand the way in which the customer's business works. To achieve this, they need business knowledge of any industry to which they offer their support services.

The trading industry, as well as the exchange industry, is no exception. It is crucial for the IT professional to understand the business practices in both these industries to ensure the provision of a good level of service.

The trading industry is growing at a fast pace, given that trading of securities is no longer restricted to exchanges. Retail investors now trade financial products from currency to contracts for difference (CFDs) through a number of providers over the internet and this has, in part, led to the growth of the trading industry.

Traditional exchanges have to adapt to a rapidly changing business environment in the face of stiff competition from relatively new entrants into their industry. The advancement in technology has allowed electronic communication networks (ECNs) and other alternative execution venues to threaten the dominance of the traditional exchanges. In response, traditional exchanges are looking to strengthen their positions through mergers and acquisitions and also investment in technology that can enable them to offer the same levels of service as these alternative execution venues.

Contents

Introduction

The impact of trading on the state of the global economy is underscored by the events of September 2008, notably the short selling of banking stocks by traders in the wake of the financial crises that led to the collapse of Lehman Brothers, once the world's fourth largest investment bank, the rescue of Merrill Lynch by Bank of America and the bail-out of AIG, the world's largest insurer, by the US Federal Reserve to the tune of $85 billion in exchange for nearly an 80% stake in the company.

The Financial Services Authority (FSA) in the UK and the Securities and Exchange Commission (SEC), both regulators, banned the short selling of financial stocks and decreed that hedge funds, the ardent adopters of "naked" short selling, had to disclose their short positions.

When the news broke, the US markets soared, with the Dow Jones index closing up 400 points or 3.86% on the day.

Understanding the effects of the activities of traders on the workings of the financial markets is key to the self-development of the modern-day IT professional and students as well.

This book provides a springboard for the discerning IT professional or student to achieve business alignment to the business of trading and an understanding of the business models of exchanges.

It is laid out in the customary 12 chapters that make up the other titles in the series. It opens with an overview of trading and exchanges. In this chapter, topics such as the roles of traders and investors in the financial markets, trading sessions, insider trading and the business models of exchanges are discussed. The next chapter is on the trading activities in different asset classes from equities to fixed income.

Chapters 3 and 4 are about the types of orders used for trading assets and the business environment in trading and exchanges respectively. Chapter 5 contains information about the recent trends in trading and exchanges while Chapter 6 discusses the concepts of liquidity and volatility in the financial markets.

Arbitrage is the subject matter of Chapter 7 and the discussions therein include the theoretical underpinnings of arbitrage and the different types of arbitrage.

Chapter 8 is where IT meets business in trading and exchanges as it discusses the concepts of electronic and algorithmic trading.

Chapter 9 is about the common systems used in trading and exchanges and contains a discussion of the procedure of online execution that contests the conventional thinking amongst individual investors about how their trades on internet-based trading platforms are executed.

In Chapter 10, several IT projects that could be executed in investment banks, brokerages and exchanges are discussed.

The last two chapters, 11 and 12, discuss the terminology commonly used in trading and exchanges and the future of trading and exchanges from both an IT and business perspective respectively.

Readers are advised to read this book in conjunction with other titles in the series such as Business Knowledge for IT in Investment Banking, Business Knowledge for IT in Investment Management and Business Knowledge for IT in Hedge Funds in order to gain a broader insight into trading as well as exchanges.

Case Study on the Implementation of Cloud Computing

A case study on the implementation of Nasdaq Market Replay will be used in this section to illustrate cloud computing.

Nasdaq Market Replay[86]

A universal experience in the stock market is wondering "what happened?" A trader sees a situation flash by on their trading screen and wonders whether a similar opportunity may arise again. An investor receives a trade confirmation and wonders why the trade occurred at a price they weren't expecting. What these people need is a way to rewind and replay the market, slow it down and zoom in to the second and even the millisecond level to see exactly what happened.

Since its inception, the NASDAQ stock market has continuously invested to increase market transparency by rolling out new and improved data products. As trading accelerated over the years, NASDAQ OMX realised that even their most sophisticated market participants were losing the ability to understand what was happening. Market events happen too fast and the datasets are too large and expensive to store and retrieve. Even participants with large budgets have to take older data offline to prevent their databases from becoming too slow and expensive. NASDAQ saw the problem and began looking for a way to provide low-cost, permanent instant replay for the market.

Unfortunately, they met the same hurdle faced by their customers. The NASDAQ stock market trades all NASDAQ-, NYSE-, and AMEX-listed stocks, some 6,000 companies in all. Even limiting their product to the most fundamental information produced 50 GB of data each day. The cost of keeping years of data in a database ready for immediate retrieval looked set to put their product at a price point that would have been prohibitive to most investors.

During the summer of 2007, they learned about two new technologies, Adobe AIR and Amazon S3, and realised that they could combine them to solve their data challenges. Adobe AIR enabled them to build a powerful client-side application that would do most of the data manipulation and rendering on their client's computer. That enabled them to build a very simple data service, storing the market data in text files that they could make available on Amazon's inexpensive, scalable and reliable Simple Storage Service (S3).

Data model

NASDAQ OMX could avoid using a database on the server side because the data required for replay and analysis is very well organised. It's entirely sequential by date, stock symbol and time. There is a very clean and simple way to break the data into individual files. One file covers a single stock symbol on a single day for a single 10-minute time period (all time periods are standardised

86 By Claude Courbois, Associate Vice President, Global Data Products, NASDAQ OMX Group.

9:25–9:35, 9:35–9:45, etc.). The filename identifies the stock, date and time period of the data in the file. They run a process that transforms real-time market data into the required files and sends them to Amazon S3.

A user begins a replay by entering a stock symbol, date and time. The client application translates that symbol, date and time information into a filename. The client then reaches out to S3 and asks for the file that it needs. S3 is very, very fast at finding files and sending back the contents.

There are many advantages to building their data product on a commodity service like Amazon S3. The most important is that they have a huge ability to scale their product in terms of the amount of data they store and the number of customers they serve. Amazon S3 already contains billions of files and has no problem handling millions of requests incredibly quickly. Even their most ambitious growth expectations will not tax the infrastructure.

Amazon provides them with a level of reliability that would have been very expensive to build in on their own. All of the data is stored on servers in three different data centres. If one copy is overloaded or corrupted, another copy immediately takes its place.

On the cost side, there are two main advantages to building the product in the cloud. The first is that they get this enormous scalability in very small increments. They pay only for what they use, but always have more capacity available. Buying the same level of scalability on their own would require large incremental costs, part of which would be for servers that would be sitting idle.

Second, their costs are entirely predictable. Amazon has a published price list of each increment of service that they use. They know exactly how much it costs to store their data and they know exactly how much it costs for each customer query. This facilitates planning and enables them to price the service as competitively as possible without any "padding" for unexpected costs.

User interface

Because of the size and complexity of stock market data, NASDAQ OMX could not have stored the data in text files on Amazon S3 without a powerful client application. They needed the capacity to prepare the data for the visualisations and calculations required by users. The combination of Adobe Flex and AIR enabled them to create the client application they needed.

AIR supports more robust data processing on the client side than they could have achieved in a browser. This made it possible for them to push most of the workload of creating a replay and other analysis to the user's desktop. For example, the client application calculates the consolidated best bid and offer for every millisecond in a replay without any help from their servers.

NASDAQ OMX also had the benefit of beginning their application user interface with standard Adobe Flex 3 components. They made modifications to those components for their particular application, but it saved development costs to start with tools that were already available and tested. As an additional benefit, the components they built can now be shared across web properties, enabling them to share the maintenance cost of the application components across multiple products.

These advantages helped NASDAQ OMX create a user interface with the latest Web 2.0 features that were not offered by other historical market data clients. Market Replay enables users to view the quotes and trades at any point in time, replay the market in simulated real time and zoom to view events at the millisecond level. Investors can validate the quality of their trades. Brokers and traders can review events at the time when their trades occurred to determine whether there was a problem or a missed opportunity. Brokers can send clients a NASDAQ-validated screenshot of the moment a trade occurred to validate their performance.

Conclusion

Web 2.0 and cloud computing enabled NASDAQ OMX to launch a revolutionary stock market tool by dramatically reducing the cost of storing, distributing, and manipulating that data. They can provide every quote and trade update for every US-listed security to an unlimited number of end-users without delays and without ever needing to take data offline. And they do it in a user interface that brings the latest Web 2.0 features to financial data for the first time.

For professional market participants, Market Replay has greatly reduced the cost of analysing market data. For example, brokers can reduce the time and costs associated with fielding calls from customers or regulators about the quality of their trades. Analysts can quickly revisit the market impact of news and other events to find opportunities they can use in the future.

For individual investors, Market Replay increases confidence in the market by enabling them to see exactly what happened at the time of their trades. This is a level of accessibility to market information that has traditionally only been available to the most sophisticated professional traders. NASDAQ OMX now makes this level of access available at a price point that makes it possible for individual investors to get access through online brokers and financial portals.