

CSE498R: Internship

Improving the Website and Automation of Dhaka Stock Exchange

Rabbani Rasha

ID # 1310972042

Faculty Advisor:

Dr. Mohammad Monirujjaman Khan

Associate Professor

ECE Department

Spring, 2019

LETTER OF TRANSMITTAL

May, 2019

To

Dr. K.M.A. Salam

Chairman,

Department of Electrical and Computer Engineering

North South University, Dhaka

Subject: Submission of Internship Report on “Improving the Website and Automation of DSE”

Dear Sir,

With due respect, I would like to submit my **Internship Report on “Improving the Website and Automation of Dhaka Stock Exchange”** as a part of my BSc program. The report depicts the background of Dhaka Stock Exchange Limited (DSE), the largest and oldest stock market of my country, and also discusses how DSE’s overall computing (datacenter, PCs), networking and software systems (for trading and other internal data keeping purposes) work, including its official website and suggests how these things can be improved. This internship gave me both academic and practical exposures. Firstly, I learned about all the hardware and software technology utilized by the Exchange as the market is fully automated, and secondly, it gave me the opportunity to develop a network with the corporate environment.

It will be much appreciated if you kindly receive this report and provide your valuable judgment and find this report useful and informative.

Sincerely Yours,

.....
Rabbani Rasha
ECE Department
North South University, Dhaka, Bangladesh

APPROVAL

Rabbani Rasha (ID # 1310972042) from Electrical and Computer Engineering Department of North South University, has worked as an intern for 12 weeks at **Dhaka Stock Exchange Limited** from 23 January to 18 April 2019 and created this Internship report titled "**Improving the Website and Automation of Dhaka Stock Exchange**" under the supervision of Dr. Mohammad Monirujjaman Khan for the fulfillment of requirement of "**CSE498R: Internship**" course for the degree of Bachelors of Science in Engineering and has been accepted.

Supervisor's Signature

.....

Dr. Mohammad Monirujjaman Khan

Associate Professor

Department of Electrical Engineering & Computer Science

North South University

Dhaka, Bangladesh.

Chairman's Signature

.....

Dr. K. M. A. Salam

Professor

Department of Electrical Engineering & Computer Science

North South University

Dhaka, Bangladesh.

DECLARATION

I, Rabbani Rasha, do hereby declare that all the information in this report is my own original authentic work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

Author's name & Signature

Rabbani Rasha

ACKNOWLEDGEMENT

I would like to express my heartfelt gratitude to the Almighty for giving me the strength to perform my responsibilities as an intern and complete the report.

My deep gratitude goes first to my faculty advisor Dr. Mohammad Moniruzzaman Khan, Associate Professor, ECE Department, North South University for his excellent and kind supervision. His guidance helped me in completing the course successfully.

My sincere thanks to North South University, Dhaka, Bangladesh for designing this internship course as this made me experience the applied field of my major which will be immensely beneficial for my career.

I am highly obliged to Mr. Md. Asadur Rahman FCS, General Manager and Secretary of Dhaka Stock Exchange, without whose help my internship opportunity would not have been possible. I am also very thankful to all the officials who happily spared me some of their precious time for me during the internship period.

I would also like to thank all my contributors, supporters and well-wishers.

Last but not the least, I would like to thank my family as their inspiration and guidance kept me focused, confident and motivated, especially my father.

ABSTRACT

I carried out my internship at Dhaka Stock Exchange Limited (DSE). DSE is the premier bourse of the country serving as equity and bond market since 1954. DSE offers several services like Automated trading system, Over the Counter Trading, Training Academy, Registration and Technical support for Brokerage Firms (simply called brokers), handling investors' queries, dispatching credits, collect prospectus and financial report from listed companies and provide market data. It also offers internship opportunities for students who want to know the share market of the country and DSE's activities. The purpose of this internship is to complete the requirement for the degree of Bachelor of Science in Computer Science and Engineering so as to obtain a practical aspect of the theoretical materials studied at the university and gain experience in applied field. During my internship period a number of methods were used which included hands-on, studying given materials, interrogation, pen & paper explanation, note-taking, researching and developing. I was assigned to different departments of ICT division for 3 months according to schedule which helped me interact with different people and acquire information related to the technological aspect of stock trading, usage of different software and computing infrastructure and software and web development. I used to know little about the concept of modern stock exchange before but this program illuminated my knowledge about the same to an excellent level. In conclusion, this opportunity made me achieve further skills and competencies in my career.

TABLE OF CONTENTS

1. OVERVIEW	9
1.1. The Organization	9
1.2. The Role	11
1.3. The People	12
2. ASSIGNMENT AND CONTRIBUTION	14
2.1. Assignment	14
2.1.1. Web Development Dept	14
2.1.2. System and Market Admin Dept	14
2.1.3. Application Support Dept	14
2.1.4. Network Development Dept	15
2.1.5. IT Infrastructure Dept	16
2.1.6. MIS Dept	17
2.1.7. Back Office Development Dept	17
2.2. Contribution	17
2.2.1. Web Development Dept	17
2.2.2. System and Market Admin Dept	56
2.2.3. IT Infrastructure Dept	56
3. TECHNOLOGICAL ASPECT OF THE INTERNSHIP	59
3.1. Web Development Dept	59
3.2. System and Market Admin Dept	60
3.3. Application Support Dept	61

3.4. Network Development Dept	63
3.5. IT Infrastructure Dept	64
3.6. MIS Dept	65
3.7. Back Office Development Dept	66
4. LESSONS LEARNT FROM THE INTERNSHIP	68
4.1 Web Development Dept	68
4.2. System and Market Admin Dept	69
4.3. Application Support Dept	78
4.4 Network Development Dept	83
4.5. IT Infrastructure Dept	84
4.6. MIS Dept	85
4.7. Back Office Development Dept	88
5. CONCLUSION AND FUTURE WORK	89
5.1. Interaction with reporting manager and coworkers	89
5.2. Roadblocks encountered and solved	90
5.3. Effect of internship on my career plan	91
5.4. If I had to redo my internship	92
BIBLIOGRAPHY	93
APPENDIX	94

OVERVIEW

The Organization

The necessity of establishing a stock exchange in the then East Pakistan was first recognized by the Government in the early 1952 when the Calcutta Stock Exchange prohibited transactions of Pakistani shares and securities. It was felt at that time that East Pakistan should have an independent Stock Exchange. On September 03, 1953 a meeting was held at Dacca-Narayanganj Chamber of Commerce & Industry where it was decided to draw up the Memorandum and Articles of Association of the Stock Exchange based on the prevailing rules of the Stock Exchanges in other countries. The organization was incorporated under the name as the *East Pakistan Stock Exchange Association Limited* on April 28, 1954. At the time of incorporation, the authorized capital of the Exchange was *Rs. 300,000* (three hundred thousand) divided into 150 shares of Rs. 2,000 each. The Exchange started its journey as a Demutualized Stock Exchange from November 21, 2013 with the Authorized Share Capital of *Tk. 25,000,000,000* (twenty-five billion) divided into 2,500,000,000 shares of Tk. 10 each and the paid-up capital of Tk. 18,037,765,000 (Eighteen billion thirty-seven million seven sixty-five thousand) only. Although incorporated in 1954, the formal trading of the Exchange started in 1956 at Narayanganj. It was shifted to Dhaka in 1958 at the Narayangonj Chamber Building in Motijheel C/A. On October 01, 1957, the Stock Exchange purchased a land at the present location in 9/F Motijheel C/A, Dhaka from the Government and shifted in 1959. On May 14, 1964, the name of East Pakistan Stock Exchange Limited was changed to "Dacca Stock Exchange Ltd (DSE)." Trading of the Exchange suspended during the liberation war in 1971 and resumed on August 16, 1976. On August 10, 1998, the Stock Exchange introduced *Automated Trading System* and entered into the new horizon of modern technology-based Trading System. On January 24, 2004, the *trading system of the Exchange integrated with the Central*

Depository System, a new hub of modernization of trading system replacing paper-based shares with electronic based shares. Direct Listing Regulations, 2006 was approved on April 12, 2006, which brought about a revolutionary change in the listing of securities in the capital market. Book-Building method for listing of securities in capital market was approved in the year 2010. DSE Broad Index (DSEX) and DSE 30 Index (DS30) developed by S&P Dow Jones Indices were introduced in the Exchange on January 28, 2013. DSE initiated *Bangla Website* (bangla.dsebd.org) in addition to English Website on February 18, 2013. *Instant Watch* Market Surveillance Software developed by Trapets AB, was installed on February 11, 2014 in the main stream of Surveillance System of DSE for surveillance of the transactions of capital market. *X-stream INET*, the matching engine and *FlexTP*, the Order Management System (OMS) were developed and installed by NASDAQ and Flextrade respectively on December 11, 2014 for accommodating *2000 orders and 1000 transactions per second* without any interruption. In 2015, the combined market cap of listed companies on DSE stood at over \$40 billion. DSE launched its own app *DSE INFO* for Android devices on November 25, 2015 and online trading app powered by FlexTP for iOS, Android (*DSE-Mobile*) and the Web (*DSE-investor* - investor.dsetrade.com) on March 09, 2016. On October 30, 2016, DSE became ISO 9001:2008 certified which upgraded to 9001:2015 on June 8, 2018. DSE obtained the Membership of World Forum of Exchanges on June 06, 2017 and established its own significant place among the leading Exchanges of the globe. On May 14, 2018, the consortium of Shenzhen Stock Exchange and Shanghai Stock Exchange as the Strategic Investor, acquired 25% stake of the organization. With the relentless initiatives, effort of related parties and association of strategic investors, DSE continues to thrive to be a leading Exchange in this region ever since.

The Role

Through my Faculty supervisor, the Human Resource Department (HRD) of Dhaka Stock Exchange came to know about my skills as developer like C++, Java, HTML, CSS, front-end frameworks like Bootstrap and Material Design Lite, PHP, MySQL, PC building, etc. and offered me to take up the role as intern at different departments of ICT division for 12 weeks. I spent one month at the Web Development Department and the rest two months at other departments of ICT division under respective supervisors suggested by the HRD Head and scheduled by the courtesy of the Chief Technical Officer (CTO) of DSE which is given below:

Department	Period	Supervisor
Web Development Dept.	23 Jan to 19 Feb 2019	Md. Rezaur Rahman, AGM
System and Market Administration Dept.	20 Feb to 27 Feb 2019	Mr. Jishan Muhammad Bin Hasan, AGM
Application Support Dept.	28 Feb to 07 Mar 2019	Mr. Md. Mahmudul Hasan, AGM
Network Development (local) Dept.	10 Mar to 14 Mar 2019	Mr. Md. Syful Islam Sumon, Manager
Network Development (distance) Dept.	18 Mar to 24 Mar 2019	Mr. Dewan Md. Sariful Islam, Manager
IT Infrastructure Dept.	25 Mar to 02 Apr 2019	Mr. Hasan Ahmed, Manager
Management Information Systems Dept.	03 Apr to 09 Apr 2019	Mr. A.F.M. Golam Kibria, Sr. Executive
Back Office Development Dept.	10 Apr to 18 Apr 2019	Mr. Syed Md. Raquib Uddin, Manager

I went to the departments according to this schedule and the assigned supervisor explained me how the department works, what software/ hardware they use and tools to develop and what are its tasks with pen and paper. After the briefing is over, I carry out the jobs given to me and observe the department's activities all day, at times letting me see what they are working on.

The People

As of 2018, DSE has 358 employees in total. Its annual report states that out of the employees, 311 (87%) are men and 47 (13%) are women. Most of them are middle-aged (30-50 yr.):

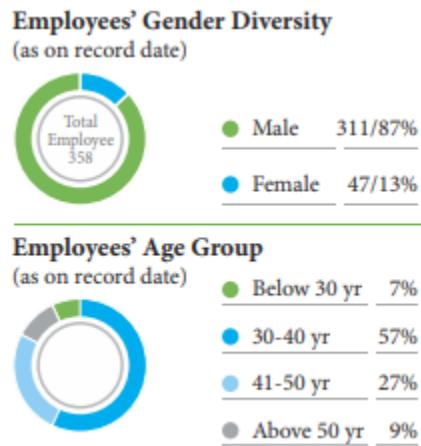


Figure 1: Diversity Diagram [1]

The management of DSE is governed by its Board of Directors consisting of 13 members. The Managing Director is one of the members as *ex officio* with voting rights. Five of the members are elected from DSE shareholder members and the rest seven members are currently:

- Chairman, DSE
- Justice of appellate division, Bangladesh Supreme Court
- Secretary, Government of Bangladesh
- Former Director, Federation of Bangladesh Chambers of Commerce and Industries
- Professor, CSE, Bangladesh University of Engineering and Technology
- Professor, Marketing Department, Dhaka University
- Brigadier General, Bangladesh Army

The office of DSE has six divisions, each comprising several departments. ICT division has the greatest number of departments. Only the Internal Audit department is not under the control of any division and is entrusted directly to the Managing Director's office.

In total, there are 35 departments under six divisions and these are:

Division	Departments
HR & Admin Division	Human Resources Department Common Services Department DSE Training Academy Maintenance Admin Department Security Department DSE Tower Project, Nikunja
Market Development Division	Market Operations Department Product & Market Development Department OTC Market Department Research & Information Department
Finance & Accounts Division	Clearing Accounts Department General Accounts Department DSE FSDP Department Treasury Management Department Risk Management Department
Information & Communication Technology (ICT) Division	Application Support Department Backoffice Development Department IT Infrastructure Department MIS & Development Department Network Development Department (Local) Network Development Department (Distance) System & Market Administration Department Web Development Department IT Strategy & Security Department
Company Affairs Division	Board & Corporate Affairs Department Legal Affairs Department PR & Publication Department TREC Affairs Department
Regulatory Affairs Division	Surveillance Department Monitoring & Compliance Department Investigation and Enforcement Department Listing Affairs Department Investor Complaints, Arbitration & Litigation Dept. Corp. Governance & Fin. Reporting Compliance Dept.

ASSIGNMENT AND CONTRIBUTION

Assignment

Over the internship course, I was assigned the following tasks by the departments mentioned below:

Web Development Department

- Check all the domains of DSE website (dse.com.bd, dsebd.org, backup2.dsebd.org and backup2.dsebd.org/amp) have their time synchronized properly.
- Suggest how the websites can be improved, including its AMP (Accelerated Mobile Page) version.
- Design a page for upcoming SME and OTC market by taking ideas from other bourses of the world.
- Design a page for feeding real-time market data solutions to enterprises and third-parties.

System and Market Administration Department

- Understand how trading works by matching buyers with sellers and vice versa through DSE's Matching Engine called X-Stream INET.
- Observe how the daily routine tasks are carried out.
- Inspect software like X-Stream Admin Interface (XAI), X-Stream Workstation (XW), NagiOS and Check_MK in action.
- Study the DSE Automated Trading Regulations, 1999 and a given document about DSE On-line Trading System.

Application Support Department

- Understand the FlexTP order management system (OMS) interface used by trade operators of all brokers in the country, which means all brokers are centrally connected to DSE.

- Observe how the Broker Admin and Credit Controller Tool (CCT) of FlexTP is used by brokers to carry out their tasks.
- Observe how the Exchange Admin of FlexTP is used by the department to administrate the brokers.
- Inspect how the new version of FlexTP is simulated in UAT (User Acceptance Testing) environment before production (actual deployment).
- Inspect how the department maintains all-time contact with the support team and developers of FlexTP for assistance and modification of its features.
- Understand the configuration of DSE's Datacenter that processes trading of all the brokers of the country.
- Observe how hosts of the Datacenter are virtualized using VMware's vCenter to increase utilization of the Datacenter's CPUs and how data is backed up regularly.

Network Development Department (Local Communication)

- Study and understand the concept of –
 - OSI Model Layers
 - The TCP/IP Reference Model
 - Types, features & classes of IP addresses
 - Classful and Classless IP addressing
 - Subnetting & Network Address Translation (NAT)
 - Bridge mode and Routing Mode
- Understand how the above concepts apply to the network system of DSE
- Understand the topology of the internal network of DSE connecting the PCs to switches, routers, network printers, Wi-Fi Access Points and the Internet.

Network Development Department (Distance Communication)

- Understand how DSE is connected to brokers directly through vendors (ISP).
- Understand the 3 types of network available in DSE – Internal, Core & External.
- Observe how the network traffic is monitored in real-time and bandwidth is controlled.
- Understand how network problems and their source is detected and mitigated.

IT Infrastructure Department

- Understand the main functions of the department like providing technical support to all departments of DSE, preparing requirement analysis and incident reports for purchase or change of all kinds of infrastructure related to computing like PC, Server, PC hardware and components, monitoring the Access Control System and other online systems, arrange IT systems for any events like board meetings, administrating the Windows domain, including organization-wide automatic deployment and activation of Windows updates and user applications, and repairing any hardware or software issues of PCs and servers.
- Remotely assist an employee having an issue of being unable to access a file server.
- Try to solve an issue of not being able to give suitable privilege to a user for accessing a file server.
- Understand and observe the software and technologies used by the department.
- Visit the Accounts Department in person to identify cause of a PC of the department not booting up.
- Change the RAM of a problematic PC.
- Set up a fresh image installation of Windows 10 on a PC.

MIS Department

- Understand the basic functions of the department like Clearing & Settlement, Depository accounting, Electronic Subscription System for IPO, Netting and developing software for internal uses and maintain SQL databases.
- Observe the daily transfer of payout and trade data to the Depository (Central Depository Bangladesh Limited) using the VeDAS web-based software.
- Inspect how the Electronic Subscription System (www.essbangladesh.com) works and note what tools (language, frameworks) have been used to develop it.

Back Office Development Department

- Understand the basic functions of the department like preparing Requirement Specification, database server and tools installation and configuration, design database using scripts, web server installation and configuration for developing their own software, develop and test software and provide training and user manual for it.
- Observe how the DSE-ERP web-based software works and note what tools have been used to develop it. DSE-ERP is used for business process management of employees and resources of DSE.

Contribution

I have studied and understood the functions of each department, theoretical terms, concepts, materials, software, technologies and successfully carried out all the above tasks given to me. Specifically, I made significant additional contributions to some of the tasks described below:

Web Development Department

- Found out the shortcomings of the website of DSE and suggested relevant solutions, like:

Drawback	Solution
AMP site has no input box for searching instruments by name or ticker symbol.	Place a fixed search box at the top of website (usually the navbar).
The brand name “Dhaka Stock Exchange Ltd” at the top stretches abnormally when viewport width goes above 1280px. Probably because five different images in PNG format have been used for five different viewport sizes and one of the images is disproportionate.	Use just one image in SVG format instead of five different PNG images. SVG has the benefit of being scalable so it is suitable for responsive websites.
Search box on the official site is not fixed at the top so when viewport width decreases the existing search box disappears due to sidebar collapsing.	Place a separate all-in-one fixed search box at the navbar (top) that will search everything from company name to ticker symbol to TREC code/holder, to keywords.
Too much table borders	Remove table borders as much as possible for cleaner view.
Instrument page (the page of a company) contains essential information separated in two groups called “Basic information” & “Market information”	Merge the two groups into one group called “Stock information” so that a visitor can see the essential information at a glance.
Title of instrument page is static which just reads “Display company information”	Like NASDAQ website, title of instrument page can be dynamically named “Stock Quote <TICKER_SYMBOL>” e.g. “Stock Quote BATBC” for British American Tobacco page.
The arrow icon for the button used to reveal the sidebar seems non-existent and not familiar to the sidebar’s function.	Use hamburger icon instead of the arrow icon for the button used to reveal the sidebar on AMP site.
The tabs are wrongly shadowed on AMP site	Shadow the inactive tabs and unshadow the active tab

The drawbacks and solution (wherever apply) are illustrated below:



Active tab shadowed – solution: shadow the inactive tabs and leave the active tab white

Brand name too stretchy if viewport >1280px width (above), but fine at <1280px (below)

Place a separate Search input at the navbar

Company Name: Reckitt Benckiser(Bd.)Ltd.					
Trading Code: RECKITTBEN		Script Code: 18460			
Figure in BDT					
Market Information: May 12, 2019					
Last Trading Price	2,145.10	Closing Price	2,151.00		
Last Update	2:45 PM	Day's Range	2,145.00 - 2,174.00		
Change*	-12.8	Day's Value (mn)	4.43		
	-0.59%	52 Weeks' Moving Range	1,601.00 - 3,650.00		
Opening Price	2,158.30	Day's Volume (Nos.)	2,057.00		
Adjusted Opening Price	2,157.90	Day's Trade (Nos.)	209		
Yesterday's Closing Price	2,157.90	Market Capitalization (mn)	10,196.078		

*Based on Yesterday's Closing Price and Last Trading Price.

Basic Information			
Authorized Capital (mn)	250.00	Debut Trading Date	
Paid-up Capital (mn)	47.25	Type of Instrument	Equity
Face/par Value	10.0	Market Lot	1
Total No. of Outstanding Securities	4,725,000	Sector	Pharmaceuticals & Chemicals

Essential information split into two, market info and basic info

Company Name: Reckitt Benckiser(Bd.)Ltd.					
Trading Code: RECKITTBEN		Scrip Code: 18460			
Figure in BDT					
Stock Information: Jan 29, 2019, 12:41pm					
Last Trading Price	2,260.00	Closing Price	unavailable		
	21.7	Day's Range	2,245.10 - 2,285.00		
Change*	0.97%	Day's Value (mn)	2.536		
Opening Price	2,270.00	52 Weeks' Moving Range	1,601.00 - 2,556.00		
Adjusted Opening Price	2,238.30	Day's Volume (Nos.)	1,116		
Yesterday's Closing Price	2,238.30	Day's Trade (Nos.)	87		
		Market Capitalization (mn)	10,575.968		
Authorized Capital (mn)	250.00	Debut Trading Date			
Paid-up Capital (mn)	47.25	Type of Instrument	Equity		
Face/par Value	10.0	Market Lot	1		
Total No. of Outstanding Securities	4,725,000	Sector	Pharmaceuticals & Chemicals		

*Based on Yesterday's Closing Price and Last Trading Price.

Better if the information is grouped in a single place called “Stock Information”

Display Company Information | <https://backup2.dsebd.org/di>

Messenger Google Photos Google Keep Other bookmarks

বাংলা সংস্করণ Mon, 13 May, 19 11:19:45 AM Open

Dhaka Stock Exchange Ltd.

BATASHOE 948.40 ↓ -1.60 -0.17% BATBC 1368.10 ↓ -0.70 -0.70% BBS 28.20 ↓ -0.20 -0.70% BBSCABLES 93.10 ↓ -1.00 -1.06% B... ↑ -3 >

Lite Version

>> Company Name: **Reckitt Benckiser(Bd.)Ltd.**

Trading Code: RECKITTBEN Script Code: 18460

The title (marked green) is too long and static

Stock Quote | RECKITTBEN

Messenger Google Photos

বাংলা সংস্করণ Tuesday, Jan 29, 2019

Better if the title is dynamic like this for convenience

STYLECRAFT 678.10 ↓ -3.10 -0.46%

SUMITPOWER 39.00 ↗ 0.00 0.00%

SUNLIFEINS 23.10 ↓ -0.10 -0.43%

TAKAFULINS 2...

Lite Version

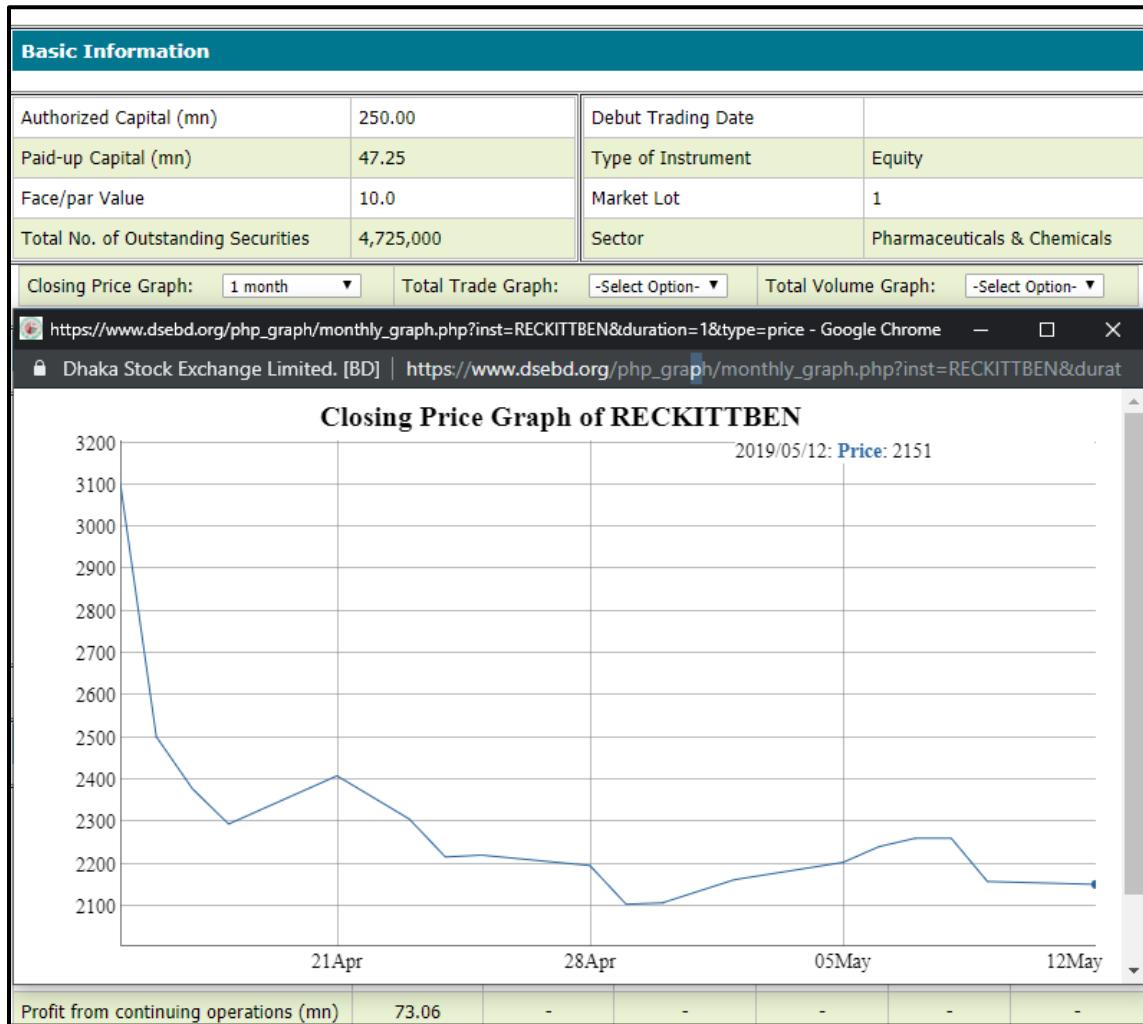
>> Company Name: **Reckitt Benckiser(Bd.)Ltd.**

Trading Code: RECKITTBEN Script Code: 18460

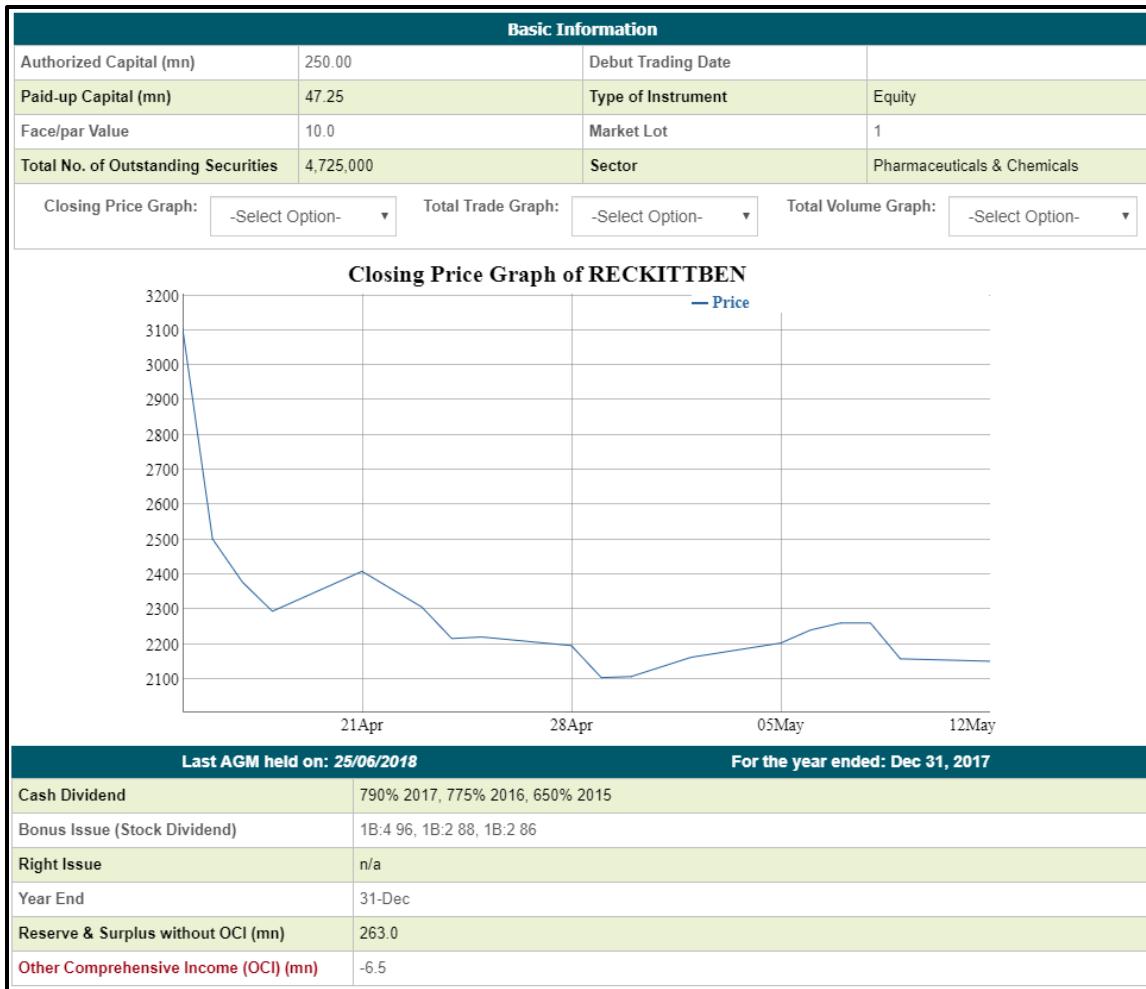
The arrow button is barely noticeable

	<input type="text" value="Search"/>
Last update on Jan 27, 2019 at 1:12 PM	
DSEX Index	5969.17747
DSES Index	1324.18027

Better replace the arrow icon with a bigger hamburger icon for readability



Selecting a graph option opens graph in a new tab which can be a mess



Better if the graph is embedded directly on the page with a default graph shown that can
be changed by selecting the combo options

Figure 2: Suggestions from the DSE Website [2]

- I have also collected the best features of the websites of other Exchanges of the world for department's consideration to improve their responsive and AMP website, these are described below:
 - Accelerated Mobile Page (AMP): Dhaka Stock Exchange has also a lite version of its new responsive website which is an accelerated mobile page. The site looks extremely well and loads very fast, according to my observation, but there are some few inconsistencies.

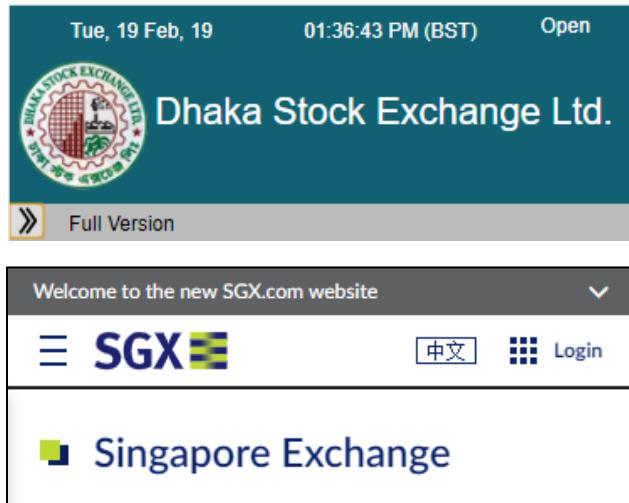
The image shows two side-by-side screenshots of stock exchange websites. On the left is the Dhaka Stock Exchange (DSE) website, featuring a teal header with the date 'Tue, 19 Feb, 19' and time '01:36:43 PM (BST)'. It displays the 'Dhaka Stock Exchange Ltd.' logo and a 'Full Version' link. Below this is a table of indices: DSEX Index (5724.06060), DSES Index (1303.30454), and DS30 Index (1984.91700). A red box highlights the DS30 Index row. Further down are summary statistics: Total Trade (85114), Total Volume (78887025), and Total Value in Taka (mn) (3828). A red box also highlights the 'Issues Advanced' (134) and 'Issues Declined' (140) sections. At the bottom, a red box highlights the 'Explore real time data' section, which contains a note about the Market Data System and contact information for Wasi Azam.

The right screenshot is from the Singapore Exchange (SGX) website. It features a blue header with the SGX logo and language options. Below the header is a banner with the Singapore skyline. The main content area is titled 'Securities' and includes a summary: 'Today's Volume / Value: 871.12M / S\$518.82M' and 'Advancers / Decliners: 159 / 198'. A red box highlights this summary. Below this are tabs for Indices (selected), Stocks, REITs, and ETFs. The 'Straits Times Index (STI)' is shown with a value of 3,269.00 and a change of +0.09%. A red box highlights the STI value. A note below explains the STI is a market capitalisation weighted index tracking the top 30 companies listed on SGX. The bottom part of the SGX screenshot shows a news feed with items like 'BSE Trading Report Package February 4, 2019' and 'Annual General Meeting – Barbados Dairy Industries Limited – 2019/02/19'.

Singapore Exchange's Website (SGX) has more streamlined presentation of *today's volume, value, trade, advancers/decliners* at a glance.

This image shows the SGX homepage. The top navigation bar includes the SGX logo, Chinese language option, and a 'Login' button. The main content area is titled 'In Focus' and features a large chart showing market trends. Below the chart is the text 'SGX reports market statistics for January 2019'. To the right is a vertical news column with the heading '+ More News & Update'. It lists several news items with dates and descriptions, such as 'BSE Trading Report Package February 4, 2019', 'Annual General Meeting – Barbados Dairy Industries Limited – 2019/02/19', 'Trading Suspension Lifted – Barbados Dairy Industries Limited', 'Annual General Meeting – Banks Holdings Limited – 2019/02/19', and 'Trading Suspension Lifted – Banks Holdings Limited'.

There is a news section at the lower section of homepage of SGX and Barbados Stock Exchange but DSE's AMP site has no news section.



The icon to open side menu is a >> double arrow which goes unnoticed, instead of the more known ≡ hamburger icon.



In company page, SGX's Volume graph, price graph and trade graph all plotted on same area (pictured above left) but DSE's graph opens on another page instead of same page.

Figure 3: Difference with SGX Website [3]

Corporate Performance at a glance	
Present Operational Status	Active
Present Loan Status as on December 31, 2017	
Short-term loan (mn)	0
Long-term loan (mn)	0
Latest Dividend Status (%)	600.00 for 2017
Latest Credit Rating Status	
Short-term	
Long-term	
OTC/Delisting/Relisting	
Address of the Company	
Address	New DOHS Road, Mohakhali, Dhaka - 1200
Contact Phone	8822791 - 5, 8827646-8, 8829716 - 8
Fax	88 - 02 - 8822786, 882954
E-mail	md_azizur_rahman@bat.com
Web Address	http://www.batbangladesh.com
<small>Note: All dynamic information of this page are only valid for <i>Public</i> and <i>Debt</i> board.</small> <small>Disclaimer: This page is now under updating process. If any anomalies are found, please inform us. phone: 88-02-5664601</small>	

[MSFT Summary](#) [MSFT Pre-Market](#) [MSFT Stock Price](#)

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MSFT Headlines & News

[Oracle of Omaha Abandons Oracle's Stock After Just 1 Quarter](#) Motley Fool 2/18/2019 6:30:00 PM

[Better Buy: Microsoft vs. Alphabet](#) Motley Fool 2/16/2019 3:00:00 PM

[Don't Regret Buying Nvidia Stock Twice](#) InvestorPlace Media 2/15/2019 4:19:26 PM

[Nvidia Reaction Speaks Volumes — Here's How To Trade It](#) InvestorPlace Media 2/15/2019 2:06:54 PM

[OPINION: Ocasio-Cortez Makes](#)

Figure 4: Difference with NASDAQ website [4]

Company page has no news section related to that company (basically those news from all news on homepage filtered to the company name). Besides, a small paragraph about the company i.e. company profile, could be a welcome addition.

- NASDAQ (<https://business.nasdaq.com/intel/market-data-feeds/equities-market-data/index.html>) and Istanbul SE (<https://www.borsistanbul.com/en/data/data-dissemination/market-data-products>) sells market data as packages to customers and enterprises and earns a good amount from it. Basically, their services are:
 - Sells equity market data
 - Has data levels (level 1, 2 etc.)
 - Organizes into packages (basic, totalView, NLS, etc.)
 - Price list on another page

The designs of their pages are:

U.S. MARKET DATA

Equity Market Data for the United States

Nasdaq offers direct access to its U.S. equity data products from its U.S. data centers and approved redistributors. Our real-time and historical data products provide comprehensive insight into trading activity for multiple exchanges and asset classes.

View the [Product Table](#) to see the full U.S. Equity Market product list.

The homepage of Market Data Service

Nasdaq TotalView »
Displays 18x the liquidity of Level 2. A must have for active traders.



Nasdaq Basic »
Save up to 60% off your current Level 1 subscription. Basic is the easy-to-administer alternative to Level 1 data.



Nasdaq Last Sale »
Real-time last sale data for securities listed on U.S. exchanges - including price, volume and time.



NORDIC MARKET DATA

Equity Market Data for the Nordics

The Nasdaq Nordic Equity products provide real-time market data, including best bid/ask insight into the Copenhagen, Helsinki, Iceland, Stockholm and First North marketplaces.

Coverage includes equity instruments (equities, equity rights, bonus subscriptions, interim shares, convertibles, warrants and mutual funds), index values and company news/disclosures.

Nasdaq Equity Product List

If you have questions as to which Equity products are best suited to your business needs, please contact your Nasdaq Account Manager or submit a [Market Data Request form](#).

Featured U.S. Equity Products

U.S. Equity Products	Service Level/Details
Nasdaq TotalView® > <small>U.S. Equity Products</small>	The standard-setting data feed for serious traders, presenting every single quote and order at every price level for all Nasdaq-, NYSE-, NYSE MKT- and regional-listed securities on Nasdaq, Inc.
Nasdaq Last Sale (NLS) >	A direct data feed that provides real-time last sale data for securities listed on U.S. exchanges - including price, volume and time.
Nasdaq Basic >	Basic is an easy-to-administer alternative to Level 1 data, providing last sale and top of book quotations. On average, saves users 60% off their current Level 1 subscriptions.
Nasdaq Market ReplaySM >	An extremely powerful replay and analysis tool, allowing users to view the consolidated order book and trade data for U.S. exchange-listed securities at any point in time.
Analytics Hub >	Analytics Hub provides fund managers and traders with alpha signals to help augment trading strategies. It derives daily buy-, sell-, and longer-term investment signals unique to Nasdaq from different data sources, leveraging machine intelligence to discover what may or may not be knowable.

[SEE PRICING](#)

Featured Nordic Equity Products	
Nordic Equity Products	Service Level/Details
Nordic Equity TotalView >	<p>Our premier, lowest latency feed. Includes bid/ask price and volume aggregated at 20 price levels or full depth of the book with all quotes and orders, Liquidity Measure Indicators and Level 1 data.</p> <p>Distributor Fees for Nordic Equity Last Sale and Nordic Equity Level 1 and Level 2 included.</p>
Nordic Equity ITCH Glimpse	<p>Glimpse is a complement service to the Nasdaq TotalView-ITCH real-time data feed products. It provides direct data feed customers functionality to obtain a snapshot of an order book in a trading source system at any point during the trading day.</p>
Nordic Equity Level 1	Single best bid/ask order book data, as well as trade and index data.
Nordic Equity Level 2	Top 5 levels of aggregated bid/ask depth in addition to the trade and index data.
Nordic Equity Filtered TotalView Datafeeds	<p><i>Distributor</i> The right to externally distribute Nordic Equity real time data feeds with less depth than Nordic Equity TotalView sourced from the Nordic Equity TotalView-ITCH feed.</p> <p>The fee does not apply for internal distribution or external distribution via controlled display devices.</p>

These are the packages. Opening each link gives us the below pages:

MARKET DATA FEEDS

NASDAQ TOTALVIEW

Know the Open before the Open

[VIEW DEMO NOW](#) / [READ THE FACT SHEET](#)

GREATER INSIGHTS WITH FULL DEPTH-OF-BOOK

For a complete view of the markets, experience Nasdaq TotalView. Beyond Level 1, at 18x the liquidity of Level 2, Nasdaq offers the complete market book with all the information you need to bring your active trading to the next level.

- **Complete Depth-of-Book** – Encompasses all displayed orders for Nasdaq, NYSE and regional securities with 3X the liquidity within 0.05% of top-of-book as compared to alternative products, such as Level 2.
- **Largest Single Liquidity Pool in the US** – Follow pockets of liquidity over time to understand how orders are distributed throughout the market, allowing power users to identify and pursue new and unique trading opportunities by understanding not just where the market is but where it is going.
- **Follow the Auctions** – Access Net Order Imbalance Indicator (NOII) data in real time prior to the official Open and Close, understanding the true Buy and Sell interest with constant updates to the share imbalance, indicative clearing prices and sentiment.

MARKET DATA FEEDS

NASDAQ BASIC

Flexible and cost-effective delivery of real-time market data

[CALCULATE YOUR SAVINGS](#)

[REQUEST A MEETING](#)

GET COMPETITIVE WITH A BETTER MARKET DATA SOLUTION

Looking for a cost-effective, real-time U.S. equity quote and trade solution? Nasdaq Basic is the leading exchange-provided alternative for real-time Best Bid and Offer and Last Sale information for all U.S. exchange-listed stocks*. With Basic, investors access a proprietary data product that provides accuracy, liquidity, instrument coverage and accessibility with significant cost-savings.

* Based on liquidity within the Nasdaq market center, as well as trades reported to the FINRA Trade Reporting Facility® (TRF®) operated in partnership with FINRA/Nasdaq TRF®

- **Coverage** - Covers NYSE, NYSE-American and Nasdaq-listed equities and ETFs.
- **Cost Savings** - Save an average of 65% off Level 1 fees with flexible pricing options focused on lower per-user rates.
- **Upgrade Delayed Users** - Nasdaq Basic is an affordable way to upgrade anyone at your firm still using delayed data.
- **Accurate BBO and Last Sale Source** - A reliable, accurate option for financial professionals that are not directly executing trades nor require detailed depth.
- **Administrative Savings** - Consolidate all of your U.S. exchange data into one easy-to-administer feed.
- **Flexible Implementation Options** - Can be deployed in a wide variety of investor tools including Watch Lists, Portfolio Trackers, Equity Top Ten Lists, Dynamic Tickers, Alerts, Intraday Charts, among others.

AGREEMENTS & FORMS

To order this data on a stand-alone terminal/controlled display product, end users or end-user firms should contact their market data vendor for the appropriate agreements and forms.

To initiate this data on a data feed, firms must submit the appropriate documentation and receive prior approval from Nasdaq:

- [Data Feed Request Form](#) - Required for all firms
- [Nasdaq Global Data Agreement](#) - Required for all firms prior to initiation of the first Nasdaq data service only
- [System Application](#) - Required for firms only if the data will be displayed or used in a system that is not yet approved by Nasdaq

For the complete list of Nasdaq market data agreements and forms, please refer to the [Nasdaq Global Data Products Agreements and Forms page](#).

The forms section available to download related pdfs.

Please note that instead of the 'US' exchange code, the only way to list or enter your tickers one by one with UQ. Eg. MSFT UQ

users as UQ. TotalView on all platforms will only work for users

CONTACT US TO LEARN MORE ABOUT OUR GLOBAL DATA PRODUCTS.

Please complete the form below.

Email Address REQUIRED

First Name REQUIRED

Last Name REQUIRED

Job Role REQUIRED

-- PLEASE SELECT --

Business Phone REQUIRED

Company REQUIRED

Country REQUIRED

PLEASE SELECT...

The data feed request form

ACCESS INSTRUCTIONS FOR BLOOMBERG TERMINAL USERS

To Subscribe

- Simply run the function needed (MDM for depth, IMBA for imbalances, BLP for Launchpad) and TotalView will be auto-subscribed.
- Subscribing will provide automatic access to any TotalView function.

Launchpad

- From the main launchpad toolbar in the search box type: 'Sample monitors', click on it from the drop down.
- When the sample monitor box pops up, type in 'NOII' in the search box.
- Once launched you can click on save a copy and edit it.
- OR you can go directly to it via {MONITOR SAMPLE 55496 }
- Note: a user needs to ensure the ticker is "UQ" instead of the "US" exchange code. The only way to batch replace is in Excel and import a list or enter your tickers one by one with UQ. Eg. MSFT UQ Equity. The sample does show the tickers as UQ. TotalView on all platforms will only work for users entitled to {EIS NASD} - UTP Level 1.

PREFERRED PARTNERS

TotalView Preferred Partners Program recognizes our clients' commitment to providing their customers with the best available experience of the Nasdaq market. These firms have excelled at providing TotalView to traders as the premier source of Nasdaq data.

[VIEW THE LIST](#)

PRODUCT LISTS

TotalView is available on all exchanges operated by Nasdaq; Nasdaq BX, PSX. If you have questions as to which product is best suited to your business needs, please contact your Nasdaq Account Manager or submit the Market Data Request form below.

[MARKET DATA REQUEST FORM](#)

The price list page is given below:

Nasdaq TotalView		
Entitlement Name	Security Coverage	Monthly Fee
<u>Usage Fees</u>		
Nasdaq TotalView	Nasdaq, NYSE, and NYSE MKT Issues	Professional/Corporate: \$76 per subscriber Non-Professional: \$15 per subscriber
Managed Data Solution (Internal Use Only)	Nasdaq, NYSE, and NYSE MKT Issues	Professional/Corporate: \$375 per subscriber Non-Professional: \$60 per subscriber
Enhanced Display Solution	Nasdaq, NYSE, and NYSE MKT Issues	Professional/Corporate: \$80 per subscriber Non-Professional: \$15 per subscriber
Nasdaq Depth Non-Display (Direct Access Only)	Nasdaq, NYSE, and NYSE MKT Issues	1 to 39 subscribers = \$375 per subscriber 40 to 99 subscribers = \$15,000 per firm 100 to 249 subscribers = \$30,000 per firm 250 subscribers or more = \$75,000 per firm
Nasdaq Depth Non-Display Platform	Nasdaq, NYSE, and NYSE MKT Issues	\$5,000 per Trading Platform (up to a maximum charge of \$15,000)
<u>Distributor Fees</u>		
Nasdaq Depth Data	Nasdaq, NYSE, and NYSE MKT Issues	Internal Distribution: \$1,500 per firm External Distribution: \$3,750 per firm Direct Access : \$3,000 per firm
FilterView/NOView	Net order imbalance data only	Direct Access: \$750 per firm
Nasdaq Managed Data Solutions License Fee (For the right to offer Managed Data Solutions to Clients)	Nasdaq, NYSE, and NYSE MKT Issues	\$2,500 per Distributor
Enhanced Display Solution	Nasdaq, NYSE, and NYSE MKT Issues	1 to 399 subscribers = \$4,000 400 to 999 subscribers = \$7,500 1,000 subscribers or more = \$15,000 <u>plus</u> applicable EDS TotalView subscriber fees
<u>Enterprise License Option</u>		
Nasdaq TotalView Enterprise License— Non-Professionals	Nasdaq, NYSE, and NYSE MKT Issues	\$25,000 <u>plus</u> : \$9 per non-professional subscriber \$60 per professional subscriber
Nasdaq TotalView	Nasdaq, NYSE, and NYSE MKT Issues	\$500,000

<u>Enterprise License Option</u>		
Nasdaq TotalView Enterprise License— Non-Professionals	Nasdaq, NYSE, and NYSE MKT Issues	\$25,000 <u>plus</u> : \$9 per non-professional subscriber \$60 per professional subscriber
Nasdaq TotalView Nasdaq Depth Enterprise License— Non-Professionals	Nasdaq, NYSE, and NYSE MKT Issues	\$500,000
Nasdaq TotalView Enterprise License— Professionals	Nasdaq, NYSE, and NYSE MKT Issues	\$100,000 <u>plus</u> : \$9 per non-professional subscriber \$60 per professional subscriber
Nasdaq TotalView Nasdaq Depth Non-Display— Direct Access	Nasdaq, NYSE, and NYSE MKT Issues	\$75,000
Nasdaq TotalView Enterprise License— Enhanced Display Solution	Nasdaq, NYSE, and NYSE MKT Issues	\$33,500 <u>plus</u> applicable TotalView subscriber fees

Nasdaq Level 2		
Entitlement Name	Security Coverage	Monthly Fee
<u>Usage Fees</u>		
Nasdaq Level 2 with Nasdaq OpenView	Nasdaq Issues	Professional/Corporate: \$70 per subscriber Non-Professional: \$14 per subscriber
	NYSE and NYSE MKT Issues	Professional/Corporate: \$8 per subscriber Non-Professional: \$1 per subscriber
Enhanced Display Solution	Nasdaq Issues	Professional/Corporate: \$74 per subscriber Non-Professional: \$14 per subscriber
	NYSE and NYSE MKT Issues	Professional/Corporate: \$8 per subscriber Non-Professional: \$1 per subscriber
<u>Nasdaq Depth Non-Display (Direct Access Only)</u>	Nasdaq, NYSE and NYSE MKT Issues	1 to 39 subscribers = \$375 per subscriber 40 to 99 subscribers = \$15,000 100 to 249 subscribers = \$30,000 250 subscribers or more = \$75,000
<u>Nasdaq Depth Non-Display Platform</u>	Nasdaq, NYSE and NYSE MKT Issues	\$5,000 per Trading Platform (up to a maximum charge of \$15,000)
Managed Data Solution (Internal Use Only)	Nasdaq, NYSE and NYSE MKT Issues	Professional/Corporate: \$375 per subscriber Non-Professional: \$60 per subscriber
<u>Depth Distributor Fees</u>		
Nasdaq Depth Fee	Nasdaq Issues	Internal Distribution: \$1,000 per firm External Distribution: \$2,500 per firm Direct Access: \$2,000 per firm
Nasdaq Depth Fee for OpenView	NYSE and NYSE MKT Issues	Internal Distribution: \$500 per firm External Distribution: \$1,250 per firm Direct Access: \$1,000 per firm
<u>Enhanced Display Solution</u>	Nasdaq, NYSE and NYSE MKT Issues	1 to 399 Subscribers = \$4,000 400 to 999 Subscribers = \$7,500 1,000 or more Subscribers = \$15,000 <i>plus applicable EDS Level 2 and OpenView subscriber fees</i>

Nasdaq Basic		
Entitlement Name	Security Coverage	Monthly Fee

Nasdaq Last Sale (NLS) (Non-Professional use only, see Basic rates for Professional use)		
Entitlement Name	Security Coverage	Monthly Fee
<u>Usage Fees</u>		
NLS	Nasdaq Issues	1 to 9,999 users: \$0.60 each 10,000 to 49,999 users: \$0.48 each 50,000 to 99,999 users: \$0.38 each 100,000 user or more: \$0.30 each
	NYSE and Amex Issues	1 to 9,999 users: \$0.30 each 10,000 to 49,999 users: \$0.24 each 50,000 to 99,999 users: \$0.18 each 100,000 users or more: \$0.15 each
NLS — Per Query Option	Nasdaq Issues	Up to 9,999,999: \$0.0030 each 10 million to 19,999,999: \$0.0024 each 20 million to 29,999,999: \$0.0018 each Over 30 million: \$0.0015 each
	NYSE and Amex Issues	Up to 9,999,999: \$0.0015 each 10 million to 19,999,999: \$0.0012 each 20 million to 29,999,999: \$0.0009 each Over 30 million: \$0.000725 each
NLS — Unique Device Option	Nasdaq Issues	1 to 99,999: \$0.036 each 100,000 to 999,999: \$0.030 each Over 1 million: \$0.024 each
	NYSE and Amex Issues	1 to 99,999: \$0.018 each 100,000 to 999,999: \$0.015 each Over 1 million: \$0.012 each
<u>Distributor Fees</u>		
NLS Distributor Fee	Nasdaq, NYSE and Amex Issues	\$1,500 per firm
<u>FilterView</u> - Nasdaq Trades	Nasdaq, NYSE and Amex Issues (Nasdaq Execution System only)	\$750 per firm
<u>FilterView</u> - TRF Trades	Nasdaq, NYSE and Amex Issues (FINRA/Nasdaq Trade Reporting Facility only)	\$750 per firm

The product table of all its data products and packages are:

U.S. Equity Markets						
Market Data Entitlement	Issue Types	Market of Origination	Market by Order	Market by price level	NOI for Nasdaq Crosses	Trades
Nasdaq						
TotalView	Nasdaq, NYSE, MKT	Nasdaq	Full depth (TV-ITCH)	Full depth (TV-Agg)	X	X
Level 2	Nasdaq, NYSE, MKT	Nasdaq		1 price level per participant		X
Level 1/UTP	Nasdaq	Nasdaq, Nasdaq BX, UTP Exchanges		BBO for UTP participants + Consolidated BBO		X
Level 1/FINRA®	OTCBB	OTCBB (FINRA)		1 price level per OTCBB participant		X
Nasdaq Basic	Nasdaq, NYSE, MKT	Nasdaq FINRA/Nasdaq TRF		Nasdaq BBO		X
Nasdaq Last Sale (NLS)	Nasdaq, NYSE, MKT	Nasdaq FINRA / Nasdaq TRF				X
NLS Plus	Nasdaq, NYSE, MKT	Nasdaq FINRA / Nasdaq TRF BX, PSX				X
Nasdaq BX						
BX TotalView	Nasdaq, NYSE, MKT	Nasdaq BX	Full depth			X
BX Basic	Nasdaq, NYSE, MKT	BX		BX BBO		X
BX Last Sale (BLS)	Nasdaq, NYSE, MKT	BX				X

Nasdaq PSX						
Market Data Entitlement	Issue Types	Market of Origination	Market by Order	Market by price level	NOI for Nasdaq Crosses	Trades
PSX TotalView	Nasdaq, NYSE, MKT	Nasdaq PSX	Full depth			X
PSX Basic	Nasdaq, NYSE, MKT	PSX		PSX BBO		X
PSX Last Sale (PLS)	Nasdaq, NYSE, MKT	PSX				X
Indexes						
Global Index Services	Indexes, ETFs	Nasdaq				X
RussellTick	Global Indexes	Russell Investments				X
Other						
Nasdaq Fund Network Data Service	Mutual Funds, Money Market Funds, UTs, Annuities, Structured Products	Nasdaq Fund Network				

U.S. Derivatives Markets						
Market Data Entitlement	Issue Types	Market of Origination	Market by Order	Market by price level	NOI for Nasdaq Crosses	Trades
Nasdaq Options Market						
Nasdaq ITCH to Trade Options (ITCHO)	Nasdaq	Nasdaq Options Market	Full depth	Full depth	X	X
Best of Nasdaq Options (BONO)	Nasdaq	Nasdaq Options Market		BBO		X
Nasdaq PHLX						
Nasdaq Futures Exchange (Nasdaq Futures)	Nasdaq Futures	Nasdaq PHLX		BBO		X
Top of PHLX Options (TOPO)	PHLX	Nasdaq PHLX		BBO		X
TOPO Plus Orders	PHLX	Nasdaq PHLX	Full limit order book	BBO		X

- Istanbul Stock Exchange: Their webpage also functions like the NASDAQ market data page. There's as much information as required related to market data service.

The screenshot shows the 'MARKET DATA PRODUCTS' section of the Borsa İstanbul website. The left sidebar contains a navigation menu with sections like 'Data', 'Data Dissemination', and 'Market Data Products'. The main content area displays detailed information about various market data products, including 'BORA İSTANBUL DATA' (Index Data, Borsa İstanbul Indices, BIST-KYD Indices), 'Market Data' (Historical Data Sales, Swap Market Realtime Data), and 'Market Data Products' (Data Vendors Directory, Audit of Data Vendors, Dissemination of other Exchanges' Data, Point of Presence (PoP) Service, Equity Market Data Analytics). A breadcrumb navigation at the top indicates the path: Data > Data Dissemination > Market Data Products.

The screenshot shows the 'b. Level 1+ Data' section of the Borsa İstanbul website. It describes additional data beyond Level 1, including best bid and ask prices, trade quantities, and executed trade details. Below this, the 'c. Level 2 Data' section is introduced, which provides more detailed information for the best 10 levels of each instrument. The 'd. Limited Level 1 Data' section covers last trade price, session changes, and end-of-day data. The '1.3. Data Analytics' section is also shown, specifically the 'a. Equity Market Data Analytics' part, which includes order arrival, cancellation, flow, and volume weighted average price analytics, all calculated every second for the BIST 100 Index. A link to the full analytics page is provided.

1.4. Broker ID Information for the Trades

These products are provided at the end of the day, after the close of the markets.

a. Equity Market Broker ID End of Day Data

Detailed information related to the trades executed in Borsa İstanbul Equity Market (such as security name, trade time, trade value and trade price) including information of the parties (brokers) for each trade.

b. Futures and Options (F&O) Broker ID End of Day Data

Detailed information related to the trades executed in Borsa İstanbul F&O Market (such as contract information, trade time, trade value and trade price) including information of the parties (brokers) for each trade.

1.5. Reference Data

a. Borsa İstanbul Index Constituents Data: The constituent data of Borsa İstanbul Indices and weights of the securities within the indices.

b. BIST-KYD Index Constituents Data: The constituent data of BIST-KYD Indices and weights of the securities within the indices.

c. Corporate Action Data: Information related to capital increase/decrease, dividend payment and similar decisions of listed companies of Borsa İstanbul.

d. Equity Market Data: Breakdown of monthly traded values by customer, fund and portfolio, ranking of members by session based traded value, breakdown of Equity Market transactions by members (monthly & yearly), transactions realized on behalf and account of foreign banks/brokerage houses or individuals, short sales (monthly), most active (top-20) equities and members by traded value, basic ratios (weekly & monthly), historical volatility of BIST 30 and BIST 100 Index.

e. Debt Securities Market Traded Values By Member: Weekly traded value by members (sub-market based), breakdown of Debt Securities Market transactions by members (monthly & yearly).

2. THIRD PARTY CONTENT

Borsa İstanbul distributes the following data products of the third party exchanges and organizations:

2.1. MERKEZİ KAYIT KURULUŞU (MKK) DATA

a. Public Disclosure Platform (PDP) Data

News released by Borsa İstanbul and financial statements, financial reports, material events, special disclosures and other notifications of the listed companies required by the capital markets and Borsa İstanbul regulations, which are publicly disclosed through Public Disclosure Platform (PDP).

b. MKK Data

- **Safekeeping Balances on Investor Basis:** Information on safekeeping balance for shares held at MKK with a floating status, exchange traded funds and warrants.
- **Data on Domestic–Foreign Safekeeping:** Information on dispersal of shares that are held at MKK with a floating status on a nationality basis.
- **Report on Actual Shares Outstanding:** Information on actual shares outstanding and capital of each company traded in Borsa İstanbul.
- **Report on Fund Management Fees:** Information on fund management fees and commission of each mutual fund which is monitored at MKK in dematerialized form.
- **Report on Conversion to a Floating Share:** Information on applications of investors to MKK to convert the status of their shares from non-floating to floating.

2.2. İSTANBUL TAKAS VE SAKLAMA BANKASI (TAKASBANK) DATA

a. Takasbank Data

- **Mutual/Pension Funds and Investment Trusts Information:** Institutional Investors' (Mutual/Pension Funds and Investment Trusts) consolidated security balance information, corporate information (fund's capital, market value of the securities under fund's custody, etc.) and portfolio allocation information (the ratio of the market value of government bonds, corporate debt securities, etc. in the portfolio to total portfolio value) sent by the institutional investors to Takasbank daily.
- **Turkey Electronic Fund Distribution Platform Information:** Information on the active funds and members, general information on the funds (founder, manager, etc.), constraint information for the fund trading.
- **Analysis of Mutual/Pension Funds and Investment Trusts:** Daily information for the Mutual/Pension Funds and Investment Trusts given on portfolio TL value, TL volume of the transactions and TL value of the total custody balance, percentage of each security in total custody, % of securities and ratio of the securities included in the indices.

2.3. SARAJEVO STOCK EXCHANGE (SASE) DATA**a. SASE Indices**

Codes and last values of indices calculated by SASE.

b. Level 1 Data

Last trade prices, best bid/ask prices and volume/quantity information for the securities traded in SASE markets.

c. Level 2 Data

In addition to Level 1 data, prices and total quantities for the best 10 levels of bid and ask prices for the securities traded in SASE markets.

d. Limited Level 1 Data

Last trade prices and changes in the price from previous session for the securities traded in SASE markets.

2.4. MONTENEGRO STOCK EXCHANGE (MNSE) DATA**a. MNSE Indices****2.3. SARAJEVO STOCK EXCHANGE (SASE) DATA****a. SASE Indices**

Codes and last values of indices calculated by SASE.

b. Level 1 Data

Last trade prices, best bid/ask prices and volume/quantity information for the securities traded in SASE markets.

c. Level 2 Data

In addition to Level 1 data, prices and total quantities for the best 10 levels of bid and ask prices for the securities traded in SASE markets.

d. Limited Level 1 Data

Last trade prices and changes in the price from previous session for the securities traded in SASE markets.

2.4. MONTENEGRO STOCK EXCHANGE (MNSE) DATA**a. MNSE Indices**

DSE can implement web pages like these for presenting real-time market data.

These webpages should basically function to convey information to its viewers.

Hence it may display as much information as possible.

- Small and Medium Enterprise (SME) market: This is a market especially for companies with a minimum paid-up capital of Tk. 50 million. DSE is looking to assist them to raise funds by making initial public offering (IPO) in the SME

market. Therefore, a new page for SME market is necessary which can be similar to the following:

Euronext Subsidiary, Enternext (<https://www.enternext.biz/en>) for companies under € 1 Billion, has separate website. Financial analysis for SMEs (<https://www.enternext.biz/en/enternext/financial-analysis>). Broker incentive program (<https://www.enternext.biz/en/enternext/financial-analysis/programme>) MorningStar Research Report for each small and medium enterprises (<https://www.enternext.biz/en/enternext/financial-analysis/morningstar-reports>)

The screenshot shows the homepage of the EnterNext website. At the top, there is a navigation bar with links for 'About us', 'Investor relations', 'News', 'Contact us', and '中文' (Chinese). There are also social media icons for LinkedIn, Twitter, and YouTube. Below the navigation bar, there is a search bar with options for 'Search Site' and 'Get Quote'. The main menu includes 'Home', 'Finance your growth', 'Financial analysis for SMEs', 'About Enternext', and 'The TechCorner'. A large banner on the left features the text 'Partnering SMEs' and 'NEXT STEP' with arrows for navigation. To the right of the banner, there is a section titled 'Your financing journey with us' with a link to 'Find out more on your Next Step to grow your business'. Below this, there is a 'NEXT STEP' button. On the far right, there are three columns: 'EnterNext' (listing Belgium, France, Netherlands, Portugal, Finance your growth, Financial analysis for SMEs, and About Enternext), 'Useful links' (listing Contacts, Financial Analysis For SMEs, PEA-PME, Publications, Events, Companies news, Bell Ceremonies, and Notices and decisions), and 'Corporate Services' (listing EURONEXT CORPORATE SERVICES, Your partner for success on capital markets, and Discover our innovative solutions and tailor-made advisory).

News

[NEWS](#) [IPO](#) [EVENTS](#)

DATE	TITLE
17 JAN 2019	Euronext Brussels Awards 2018
16 JAN 2019	Euronext announces the launch of its cash tender offer for Oslo Bors VPS
09 JAN 2019	Baikowski® lists on Euronext Growth
08 JAN 2019	Euronext announces volumes for December 2018
21 DEC 2018	Predilife s'introduit sur Euronext Growth

[More news](#) →

The TechCorner

TechShare

Tech financing through capital markets
The TechCorner is an online communication platform dedicated to offering qualified content on the financing of the Tech sector through the capital markets. It publishes the latest Tech news, in-depth articles, interviews, company and sector analysis and insights from industry experts, plus information about our own markets and indices.

[The TechCorner](#) →

EnterNext's educational programme to familiarise innovative businesses with capital markets
Launched in 2015, TechShare is a unique pan-European programme that helps to familiarise innovative businesses with capital markets and give them all the information they need to reach the next stage of their growth and take their companies to market.
TechShare helps leaders of tech companies to better understand the role of financial markets and how they work. Entrepreneurs will thus be better able to judge the opportunity of listing in tandem with their specific business projects, and to prepare in good time.
Selected for their innovative flair and impressive performance, participants are businesses active in digital technology, life sciences and eco-industries that might consider listing in the three years ahead..

[TechShare](#) →

Baikowski lists on Euronext Growth

40

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ENTERNEXT

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 **Financial analysis for SMEs**

EnterNext's programmes to encourage financial analysis on midcaps.

Pursuing its action plan to forge stronger ties between SMEs and investors since its creation in 2013, EnterNext launched two incentive programmes in 2014 aiming to encourage equity research into mid-size companies:

- A significant trading fee reduction for brokers that publish financial analysis on a regular basis on SMEs. This programme no longer exists. However, as of March 2016, brokers will have access to a new trading fee grid that offers more flexibility and creates a status of "EnterNext champion" targeting local intermediaries supporting liquidity and research on the small and midcap stocks. [New trading fee grid details](#)
- A partnership with Morningstar to provide research analysis on the 330 Small & Midcaps listed Tech companies

 **MORNINGSTAR**

Programme targeting brokers covering mid- **Financial analysis for SMEs** Morningstar's quantitative equity reports on the Tech sector. [Read the reports](#)

Shortcuts

[Contact](#) > [Financial Analysis For SMEs](#) >
[PEA-PME](#) > [Publications](#) >
[Events](#) >
[on www.euronext.com](#) >/
[Companies news](#) >
[Bell Ceremonies](#) >
[Notices and decisions](#) >

Contact us

Contact one of our stock market experts:
EuronextInfo@euronext.com or
[complete the contact form](#)

SME



EnterNext is the subsidiary of the Euronext Group designed to develop and promote its stock markets specifically for small and medium-size enterprises (SMEs).

WWW.ENTERNEXT.BIZ →

SMEs have specific needs to finance their growth. Euronext subsidiary EnterNext is designed to support small and mid caps, helping them find the most suitable financing solution and make better use of the Exchange.

The dedicated pan-European EnterNext team brings together initiatives for companies with market capitalisations under €1 billion. The team is also actively engaged in promoting the market to investors and uniting stakeholders, intermediaries and advisors to form a marketplace that helps contribute to the growth of SMEs.

EnterNext brings together all of Euronext's services that promote the growth of SMEs, helping finance the growth of over 700 companies. In 2014, 31 new companies listed on Euronext markets, raising a total of €740 million. SMEs also turned to the financial markets for:

- secondary capital raisings, doubling in 2014 (from €2.7 million to €5.4 million);
- secondary bond issues, amounting to €2.7 billion in 2014.

To find out more on financing for SMEs please visit: www.enternext.biz

€9 BILLION
RAISED BY SMEs ON EURONEXT
MARKETS IN 2014

31 SME LISTINGS IN 2014
(VS. 26 IN 2013), RAISING
€740 MILLION

Morningstar Reports

Morningstar's quantitative equity reports on Tech companies and Family businesses to develop their visibility

The initiative focuses on the Tech Small & Mid-Caps and family businesses listed on Euronext's four European markets - Amsterdam, Brussels, Lisbon and Paris. Today, many of these shares have no analysis following them. Therefore, this initiative aims to raise the sector's visibility at a pan-European level and expand the pool of potential investors.

For questions regarding the equity reports: EquitySupportFR@morningstar.com

Morningstar Research Reports

Name	- Sector -	- Market Capitalisation -	- Market -
Report  Farming & Fishing	1000MERCIS Report  Media Agencies Euronext Growth	2VALORISE Report Alternative Electricity Euronext	A.S.T. GROUPE Report  Home Construction Euronext
AB SCIENCE Report  Pharmaceuticals Euronext	ABEO Report  Recreational Products Euronext	ABIVAX Report  Biotechnology Euronext	ABLYNX Report  Biotechnology Euronext
ABO GROUP Report  Alternative Electricity Euronext	ACHETER-LOUER.FR Report  Media Agencies Euronext Growth	ACTEOS Report  Software Euronext	ACTIA GROUP Report  Electronic Equipment Euronext

BSE SME (<https://www.bsesme.com/>):

- Introduction

(<https://www.bsesme.com/static/about/about/introduction.aspx#about>)

- Market

(https://www.bsesme.com/markets/SME_streamer.aspx?expandable=4#markets)

- Get Listed

(https://www.bsesme.com/markets/SME_streamer.aspx?expandable=4#getlisted)

- Research reports

(<https://www.bsesme.com/ResearchRptrs.aspx>)

BSE SME EXPERIENCE THE NEW

04 Feb 19 | 13:58 | Open Register Your Interest हिन्दी भ्रष्टाचारी मराठी Group Websites

S&P BSESME IPO 1,762.77 -3.15 -0.18% Get Quote: Enter Scrip Name/Code

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Testimonials

Shri. Nikhil Gupta, M.D Inducto Cast Ltd.

S&P BSE SME IPO
Time : 13:58 Value : 1762.77

Market Statistics ITP Gainers Losers Turnover

No. of Companies Listed on SME till Date 281
Mkt Cap of Cos. Listed on SME till Date (Rs.Cr.) 18,247.57
Total Amount of Money Raised till Date (Rs. Cr.) 2,738.20
No. of Companies Migrated to Main Board 57
No. of Companies Listed as of Date 224
No. of Companies Suspended 5
No. of Companies Eligible for Trading 219
No. of Companies Traded 45
Advances/ Declines/ Unchanged 21/21/3
Mkt Cap of BSE SME Listed Cos. (Rs.Cr.) 11,368.46

Offer Documents - DRHP

- Welpar Pharmbiz Limited
- Kuberan Global Edu Solutions Limited
- Humming Bird Education Limited
- Northern Spirits Ltd
- Ritco Logistics Limited
- Tutorials Point
- Gleam Fabmat Limited

Listing of 200th Company on BSE SME Platform

Notices & Circulars

- Additional Market Maker for SME Scripts
- Change in Group of Equity Shares of K.P.I. Global Infrastructure Limited
- Listing of Equity Shares of K.P.I. Global Infrastructure Limited
- Change in Market Lot Size of Riddhi Corporate Services Limited (540590)
- Additional Market Maker for SME Scripts

04 Feb 19 | 14:03 | Open Register Your Interest हिन्दी भ्रष्टाचारी मराठी Group Websites

S&P BSESME IPO 1,762.77 -3.15 -0.18% Get Quote: Enter Scrip Name/Code

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Live Reports

Market Watch	Market Reports	Circuit Summary	Trading Highlights	ITP	Historical Data
SME Streamer	Gainers / Losers	52 Week High / Low	Market Information	ITP Market Watch	Stock Prices
	Advances / Declines	VaR / ELM		ITP Bhav Copy	Daywise Trading Highlights

Market Watch

Home ➔ Markets ➔ Live Reports ➔ S&P BSE SME IPO Streamer

As on 04 Feb 19 | 02:03 PM

MKT

S&P BSE SME IPO Streamer

Market

Sr. No.	Scrip Name	LTP	Buy(Rs.)	Sell(Rs.)	Buy Qty	Sell Qty	No. of Trades
1	7NR	24.60	24.00	0.00	6000	0	0
2	AAL	60.00	55.20	60.00	2000	2000	0
3	ACFSL	16.65	15.00	0.00	1200	0	0
4	ACML	78.00	79.00	80.50	2000	1000	0
5	ACTIVE	26.25	26.25	27.40	2000	2000	1
6	ADVITIYA	52.45	42.00	48.50	8000	8000	0
7	AFFORDABLE	104.00	102.00	107.00	1600	1600	2

BSE SME **S&P BSESME IPO** 1,762.77 -3.15 -0.18% Get Quote: Enter Scrip Name/Code

About BSE SME Markets Public Issues Get Listed Corporates Market Makers Notices & Circulars Research Reports Contact Us

Get Listed

- [Listing Procedure](#)
- [Criteria for New Listing](#)
- [Migration from SME Exchange to Main Board](#)
- [Guidelines for Listing](#)
- [Benefits of Listing](#)
- [ASBA Banks](#)
- [Glossary](#)
- [Checklist for Listing on SME Platform](#)
- [Check Lists for Listing on SME-ITP Platform](#)
- [Questionnaire](#)
- [Registration](#)

Listing Procedure

The 5 P's of Listing Process on BSE SME

Planning
The Issuer Company consults and appoints the Merchant Banker/s in an advisory capacity.

Preparation
The Merchant Banker prepares the documentation for filing after:

- conducting due diligence regarding the Company i.e checking the documentation including all the financial documents, material contracts, Government Approvals, Promoter details etc.
- and planning the IPO structure, share issuances, and financial requirements

Process
Application procedure:

- Submission of DRHP/Draft Prospectus - These documents are prepared by the Merchant Banker and filed with the Exchange as well as with SEBI as per requirements.
- Verification & Site Visit - BSE verifies the documents and processes the same. A visit to the company's site shall be undertaken by the Exchange official. The Promoters are called for an interview with the Listing Advisory Committee.
- Approval - BSE issues an In Principle approval on the recommendation of the Committee, provided all the requirements are compiled by the Issuer Company.
- Filing of RHP/Prospectus - Merchant Banker files these documents with the ROC indicating the opening and closing date of the issue.

 Once approval is received from the ROC, they intimate the Exchange regarding the opening dates of the issue along with the required

01 Feb 19 | 16:00 | Close Register Your Interest हिन्दी અજરતી મારાઠી Group Websites

S&P BSESME IPO 1,765.92 -2.68 -0.15% Get Quote: Enter Scrip Name/Code

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Home Research Reports

Research Reports

Scrip Code	Company Name	Industry	Group	Initiation Reports	Latest	
536492	Ace Tours Worldwide Ltd	Travel Support Services	MT	-		Historical
537492	Agrimony Commodities Ltd	Comm. Trading & Distribution	M	-		Historical
535916	Alacrity Securities Ltd	Other Financial Services	M	-		Historical
536737	Amrapali Capital and Finance Services Ltd	Finance (including NBFCs)	M			Historical
537785	Anisha Impex Ltd	Distributors	M			Historical
538546	Bansal Roofing Products Ltd	Iron & Steel Products	M			Historical
538576	Bhanderi Infracon Ltd	Realty	MT			Historical
535279	BOTHRA METALS & ALLOYS LTD.	Aluminium	M	-		Historical
535142	CHANNEL NINE ENTERTAINMENT LTD.	Movies & Entertainment	M	-		Historical
534839	ECO FRIENDLY FOOD PROCESSING PARK LTD.	Other Agricultural Products	M	-		Historical
534927	ESTEEM BIO ORGANIC FOOD PROCESSING LTD.	Other Agricultural Products	M	-		Historical
535917	GCM Commodity & Derivatives Ltd	Other Financial Services	M	-		Historical
535431	GCM Securities Ltd	Other Financial Services	M	-		Historical
	HPC BIOSCIENCES LTD.	Other Agricultural Products	M	-		Historical

The screenshot shows the BSE SME website's registration page. At the top, there are links for 'About BSE SME', 'Markets', 'Public Issues', 'Get Listed', 'Corporates', 'Market Makers', 'Notices & Circulars', 'Research Reports', and 'Contact Us'. The main content area has a header 'Register Your Interest' with a back arrow icon. Below it is a form titled 'Registration' with a red border. The form fields include:

- I am interested in becoming* (dropdown: Listed Company)
- Name Of Company*
- Contact Person*
- Email*
- Mobile*
- Telephone No.*
- Address*
- City*
- State*
- Country*
- Pincode*
- Comment

At the bottom right of the form is a 'Submit' button.

At the very bottom of the page, there is a footer note: 'Site optimized for IE8 & above, resolution 1024 X 768 & above. | Disclaimer' and 'Copyright@ 2015. All Rights Reserved. BSE Ltd. (22A)'.

Direct Market Plus of Wiener Börse [Austrian Stock Exchange]

(<https://www.wienerbörse.at/en/issuers/going-public-ipo/directmarketplus/>)

- This is a stock exchange regulated segment for helping young businesses (SMEs) to expand
- It consists mainly of textual information, shown below:

Vienna Stock Exchange | Issuers | Going Public (IPO) | direct market plus

Easy Access to the Capital Market for SME – direct market plus

Our new stock exchange-regulated segment "direct market plus" is a development opportunity for Austrian small and medium-sized enterprises (SME) as well as expanding young companies on the domestic capital market. Our entry-level segment can create the foundation for the next step towards more capital and growth. A total of eight companies are on board at the start on 21 January 2019, four are new at the Vienna Stock Exchange: → startup300 AG, → EYEMAXX Real Estate AG, → VST Building Technologies AG and → Woltank-Adisa Holding AG.

Your benefits:

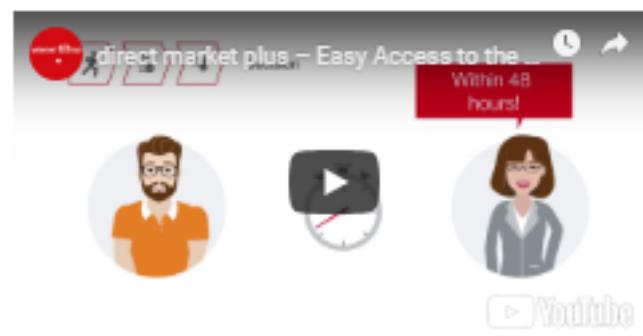
- Shares are tradable on the Vienna Stock Exchange, investors can easily buy and sell via the Xetra[®] T7 trading system
- Around 80% international investors & around 85% of sales traded by international trading participants
- Less strict admission requirements and ongoing obligations
- Capital Market Coach provides assistance
- Low stock exchange fees: One-time fee for inclusion: EUR 5,000, annual fee: EUR 1,000



Higher transparency puts your company in the public eye: Benefit from our tailor-made marketing package for companies in the direct market plus.

We would be happy to provide you with all the information required for your decision-making process.

→ Arrange a personal meeting now



Arrange a personal meeting now

Silvia Wendecker

Head of Issuers & Market Data Sales
→ ipo@wienerborse.at
T +43 1 531 65-243



Henriette Lindinger

Head of Issuers & Market Data Sales
→ ipo@wienerborse.at
T +43 1 531 65-156



More Information about Going Public

- Overview about going public
- IPO process



direct market events

In our calendar you will find all events with a special focus on easy capital market access in the direct market.

→ All events in our calendar

direct market plus

wiener borse

PARTNER

→ Download direct market plus folder

Download

- direct market plus – The Easy Way to the Capital Market (pdf-file 1.2 MB)
- Rules direct market plus (pdf-file 500 KB)
- The Vienna Stock Exchange: The best market for your company (pdf-file 2 MB)
- direct market plus - The easy way to the capital market (pdf-file 1.2 MB - Italian version)
- Graphic of the new market segmentation (jpg-file 260 KB)
- Information memorandum (Annex A) (pdf-file 520 KB)

Tip - Audio & Video:

- Event video: launch direct market plus
- Radio interview with CEO

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Indices

Trading Issues

Technology

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Vienna Stock Exchange houses Going Public (IPO) Family Businesses Austrian family businesses stimulate the economy and the capital market

Family businesses are very important for Austria's national economy. Around 70 percent of the companies in Austria and over one third of the companies in the top segment → prime market of the Vienna Stock Exchange are family companies. With the → ATX Family index the Vienna Stock Exchange created a barometer for the largest family businesses listed on the exchange.

Key facts & advantages of a going public for family companies (source: KPMG, Vienna Stock Exchange):

- 71% of Austrian family businesses increased their revenues in 2017, according to a study by KPMG on family businesses.
- Family businesses on the Vienna Stock Exchange are also expanding. The market capitalization of companies in the ATX Family increased in the past five years by more than one third.
- Dividend distributions by ATX family companies amounted to EUR 340 million in 2017.
- 52% of domestic family businesses want to reinvest the profits in the company.
- 75% of Austrian family businesses view the preparation and qualification of successors as an important success factor. The decision to list on the stock market can also offer an ideal solution for succession planning.



„Listing on the stock exchange brings with it an additional level of transparency and communication. This keeps you fit, promotes innovation and continuous optimization. In addition, the listing on the stock exchange makes it possible to finance investments by means of a capital increase if required. The essential thing is not a singular event, but the stock exchange generally fulfills the function of a fitness motivator.“
Sangfried Menz, CEO, Ottakringer AG



“The success story of Paßinger AG in the past few years is closely related to the initial public offering and would not have been possible without a listing on the Vienna Stock Exchange.”
Herbert Dröner, CEO, Paßinger AG

Arrange a personal meeting now

Silvia Wendeker

↳ ipo@wienerbörse.at

T +43 1 531 65-243



Henriette Lindinger

Head of Ipo & Market Data Sales

↳ ipo@wienerbörse.at

T +43 1 531 65-156



Details about family businesses

→ [Press release: Austria's family businesses get their own benchmark index](#)

→ [Current price information: ATX Family](#)

Family businesses and the stock market are a good fit.

11 stocks in new ATX Family index.

Tip: Video



- Going Public – Boost for Innovation & Growth
- Stocks and Bonds – Listing on the Vienna Stock Exchange

Download

→ [Media fact sheet – Success stories of Austrian companies listed on the Vienna Stock Exchange \(pdf-file 2.70 KB\)](#)

→ [The Vienna Stock Exchange: The best market for your company \(pdf-file 700 KB\)](#)

→ [direct market plus – The Easy Way to the Capital Market \(PDF-file 1.2 MB\)](#)

Junior Market of Jamaica Stock Exchange

(<https://www.jamstockex.com/market-data/listed-companies/junior-market>)

- Describes the market as a platform for SMEs (junior companies)
- Lists SMEs on a table

The screenshot shows the Jamaica Stock Exchange homepage with a navigation bar at the top. Below the navigation, a sub-navigation bar shows 'Jamaica Stock Exchange > News'. The main content area is titled 'Junior Market' with a dropdown menu set to 'Junior Market' and a 'View' button. A yellow box contains text about the launch of the Junior Market on April 1, 2009, and criteria for listing. Another yellow box contains information about the JSE tracks the performance of the market by maintaining indices. At the bottom, there is a table titled 'Listed' with columns for Name, Instrument Code, Currency, Sector, Type, and Website.

Name	Instrument Code	Currency	Sector	Type	Website
ACCESS FINANCIAL SERVICES LIMITED	AFS	JMD	FINANCE	ORDINARY	Website
AMG PACKAGING & PAPER COMPANY LIMITED	AMG	JMD	MANUFACTURING	ORDINARY	Website
BLUE POWER GROUP LIMITED	BPOW	JMD	MANUFACTURING	ORDINARY	-
C2W MUSIC LIMITED	MUSIC	JMD	OTHER	ORDINARY	Website
CAC 2000 9.5% CUMULATIVE REDEEMABLE PREF SHARES	CAC9.50	JMD	RETAIL	PREFERENCE	-
CAC 2000 LIMITED	CAC	JMD	RETAIL	ORDINARY	Website
CARGO HANDLERS LIMITED	CHL	JMD	OTHER	ORDINARY	-
CARIBBEAN CREAM LIMITED	KREMI	JMD	MANUFACTURING	ORDINARY	Website
CARIBBEAN FLAVOURS & FRAGRANCES LIMITED	OFF	JMD	MANUFACTURING	ORDINARY	Website
CARIBBEAN PRODUCERS JAMAICA LIMITED	CPJ	JMD	RETAIL	ORDINARY	Website
CONSOLIDATED BAKERIES (JAMAICA) LIMITED	PURITY	JMD	MANUFACTURING	ORDINARY	Website
DERRIMON TRADING COMPANY LIMITED	DTL	JMD	RETAIL	ORDINARY	Website
DERRIMON TRADING COMPANY LTD 2021 PREF SHARES	DTL9	JMD	RETAIL	PREFERENCE	-
DOLPHIN COVE LIMITED	DCOVE	JMD	TOURISM	ORDINARY	Website
ELITE DIAGNOSTIC LIMITED	ELITE	JMD	OTHER	ORDINARY	-
EVERYTHING FRESH LIMITED	EFRESH	JMD	OTHER	ORDINARY	-
EXPRESS CATERING LIMITED	ECL	JMD	OTHER	ORDINARY	-
FONTANA LIMITED	FTNA	JMD	OTHER	ORDINARY	-
FOODFISH COMPANY LIMITED (SUSPENDED)	FFC	JMD			

The screenshot shows a table titled 'Listed' with columns for Name, Instrument Code, Currency, Sector, Type, and Website. The table lists 20 companies, each with a link to their website.

Name	Instrument Code	Currency	Sector	Type	Website
ACCESS FINANCIAL SERVICES LIMITED	AFS	JMD	FINANCE	ORDINARY	Website
AMG PACKAGING & PAPER COMPANY LIMITED	AMG	JMD	MANUFACTURING	ORDINARY	Website
BLUE POWER GROUP LIMITED	BPOW	JMD	MANUFACTURING	ORDINARY	-
C2W MUSIC LIMITED	MUSIC	JMD	OTHER	ORDINARY	Website
CAC 2000 9.5% CUMULATIVE REDEEMABLE PREF SHARES	CAC9.50	JMD	RETAIL	PREFERENCE	-
CAC 2000 LIMITED	CAC	JMD	RETAIL	ORDINARY	Website
CARGO HANDLERS LIMITED	CHL	JMD	OTHER	ORDINARY	-
CARIBBEAN CREAM LIMITED	KREMI	JMD	MANUFACTURING	ORDINARY	Website
CARIBBEAN FLAVOURS & FRAGRANCES LIMITED	OFF	JMD	MANUFACTURING	ORDINARY	Website
CARIBBEAN PRODUCERS JAMAICA LIMITED	CPJ	JMD	RETAIL	ORDINARY	Website
CONSOLIDATED BAKERIES (JAMAICA) LIMITED	PURITY	JMD	MANUFACTURING	ORDINARY	Website
DERRIMON TRADING COMPANY LIMITED	DTL	JMD	RETAIL	ORDINARY	Website
DERRIMON TRADING COMPANY LTD 2021 PREF SHARES	DTL9	JMD	RETAIL	PREFERENCE	-
DOLPHIN COVE LIMITED	DCOVE	JMD	TOURISM	ORDINARY	Website
ELITE DIAGNOSTIC LIMITED	ELITE	JMD	OTHER	ORDINARY	-
EVERYTHING FRESH LIMITED	EFRESH	JMD	OTHER	ORDINARY	-
EXPRESS CATERING LIMITED	ECL	JMD	OTHER	ORDINARY	-
FONTANA LIMITED	FTNA	JMD	OTHER	ORDINARY	-
FOODFISH COMPANY LIMITED (SUSPENDED)	FFC	JMD			

- OTC Markets: DSE already has a page for OTC (over the counter) market but it is just a group of hyperlinks directing to paragraphed answers to frequently asked questions.

OTC Market

- [About OTC Market](#)
- [BSEC \(OTC\) Rules, 2001](#)
- [Amendments to the BSEC \(OTC\) Rules, 2001](#)
- [Different directives on OTC Market](#)

- [Instruments of OTC Market](#)
- [OTC Company Profile](#)
- [OTC Companies' News](#)

- [Sale Orders By Order Date](#)
- [Sale Orders By Trade Code](#)

- [OTC Companies' AGM, EGM and Book Closure](#)
- [OTC Companies' P/E & Quarterly Performance](#)
- [Today's Bulletin of OTC Market](#)
- [OTC Companies' Circuit Breaker](#)

- [OTC Trading Manual](#)
- [OTC Market's Sale/Buy Forms](#)

About OTC Market

Over-the-Counter (OTC) means the facilities provided by an exchange for the purpose of buying or selling of unlisted or delisted securities from the stock exchanges. The OTC Market provides an alternative to stock exchange listing for securities of issuers that either choose not to be listed on Dhaka Stock Exchange or not to meet the relevant listing requirements. The term "OTC Securities" is a catch -all phrases for any security that is not listed on stock exchange

Dhaka Stock Exchange Ltd. provides Over-The-Counter (OTC) facilities for transaction of share of companies as per SEC's directive no. SEC/CMRRC/2001-16 dated 06 September, 2009 transaction procedure of which is followed by Securities and Exchange Commission (Over-the-Counter) Rules, 2001.

Initially with 51 companies, Dhaka Stock Exchange Ltd. Over-the-Counter (DSE-OTC) has started its journey on October 01, 2009 as per SEC Directive # SEC/CMRRC/2001-16/168 dated 01 October, 2009. Among 51 issues, trading of the shares of United Commercial Bank Ltd. has been resumed in the main market of DSE from 13 June 2010 under "Z" Category as per SEC Directive No. SEC/SRMIC/94-205/369 dated June 08, 2010. As per directive # SEC/CMRRC/2001-16/65 and SEC/SRMIC/94-198/623 dated 28 September 2010 & 05 October 2010 there are 29 (twenty-nine) more companies have been added with the existing OTC instruments with effect from 01 October and 20 October 2010 respectively.

Now the department have decided to incorporate OTC instruments and their market data onto the page. I suggested to design the pages similar to the following pages from www.otcmarkets.com:

The grid contains four promotional banners:

- OTC Markets Group Annual Market Review**: A teal banner with the text "ANNUAL MARKET REVIEW" and "OTC Markets". Below it is a large image of a city skyline with overlaid financial charts.
- Announcing the 2019 OTCQX Best 50**: A dark banner with the text "BEST 50 OTCQX 2019" and "#OTCQXBEST50". Below it is a large image of a city skyline with overlaid financial charts.
- Understanding Short Sale Activity**: A banner featuring a large image of a city skyline with overlaid financial charts.
- Learn about Improving Home Market Liquidity**: A banner featuring a large image of a city skyline with overlaid financial charts. To the right, the text "The OTCQX Advantage: Benefits for International Companies" is displayed.

At the bottom left of the grid, there is a link: [//www.otcmarkets.com/files/2018_Annual_Review.pdf](http://www.otcmarkets.com/files/2018_Annual_Review.pdf). At the bottom right, there is a note: "An independent study shows an increase in US."

A vertical list of news items:

- OTC Markets Group Reports Third Quarter 2018 Results
- Learn more about the Stock Promotion Flag
- Check out our Monthly Newsletter for Company and Industry News
- OTC Markets Monthly Lists of Compliance Downgrades and Caveat Emptor Designations
- Most Active Securities: December 2018
- Listen to the latest OTCQB Podcast

All OTC news organized into a grid, at the bottom

A search box for only the OTC companies

SECURITIES	DOLLAR VOL	SHARE VOL	TRADES
10,531	\$1.2B	11.7B	227,543

At-a-glance view of total OTC companies (securities), total value of shares in money, total volume of shares and total number of trades occurred

MARKET SNAPSHOT			
OTCQX Composite	1,126.25	10.90	0.98%
OTCQX Billion+	1,261.02	12.64	1.01%
OTCQX Dividend	1,197.23	12.06	1.02%
OTCQX Banks	2,016.50	7.85	0.39%
OTCQX International	1,125.48	10.98	0.99%
OTCQX Canada	1,135.10	0.38	0.03%
OTCQX U.S.	1,832.41	5.17	0.28%
OTCQB Venture	634.77	-3.90	-0.61%
OTCM QX ADR 30 Index	1,353.09	15.30	1.14%
OTCM ADR INDEX	1,633.88	17.36	1.07%
S&P 500	2,737.70	12.83	0.47%

List of available indexes with their changes

MARKET ACTIVITY				Most Active	Broker Dealers
SYMBOL	PRICE	% CHANGE	\$ VOL	SHARE VOL	TRADES
QX RHHBY	33.48	+0.22	21,601,368	644,704	2,325
QB FNMA	2.39	-5.16	14,500,811	5,927,541	2,597
QX DANOV	14.86	+0.37	10,567,690	711,690	617
QB SHMP	0.24	+28.83	9,741,576	35,934,214	5,079
QB KSHB	6.19	+4.56	9,404,610	1,543,450	3,610

Intraday activity delayed 15 minutes. [View market activity for all securities >](#)

A table for some highlighted securities with its LTP, change, %change, volume in money, number of shares and number of trades with a link for viewing more securities.

MARKET ACTIVITY		Most Active Broker Dealers		
BROKER DEALER	MPIID	\$ VOL	SHARE VOL	TRADES
Citadel Securities	CDEL	149,302,014	1,502,616,388	32,563
VIRTU Americas LLC	NITE	150,940,259	752,778,294	26,545
G1 Execution Services, LLC	ETRF	19,247,370	529,988,720	5,857
CANACCORD GENUITY LLC.	CSTI	17,091,817	151,829,739	4,616
MCAP LLC	MCAP	21,426,918	1,687,579	3,710

Intraday activity delayed 15 minutes. [View all broker dealer data >](#)

A table for each broker's (like DSE's TREC holder) details, like its code (like DSE's TREC code), the total volume of shares and its value it conducted, and the amount of trades it carried out

CONTACT DETAILS	DESCRIPTION
 Grenzacherstrasse 124 Basel 4070 Switzerland www.roche.com +41 61 688 1111 rocheirna@gene.com 	<p>Headquartered in Basel, Switzerland, Roche is a global pioneer in pharmaceuticals and diagnostics focused on advancing science to improve people's lives. The combined strengths of pharmaceuticals and diagnostics under one roof have made Roche the leader in personalised healthcare - a strategy that aims to fit the right treatment to each patient in the best way possible. Roche is the world's largest biotech company, with truly differentiated medicines in oncology, immunology, infectious diseases, ophthalmology and diseases of the central nervous system. Roche is also the world leader in in-vitro diagnostics and tissue-based cancer diagnostics, and a frontrunner in diabetes management. Founded in 1896, Roche continues to search for better ways to prevent,</p>

Company profile in company page

TRADE DATA					
DATE	TIMESTAMP	PRICE	VOLUME	TICK DIRECTION	CHANGE
02/04/2019	15:59:58	45.50	1,000	▼	-0.03
02/04/2019	15:59:58	45.53	2,000	▲	0.03
02/04/2019	15:59:58	45.50	477	▼	-0.03
02/04/2019	15:59:56	45.53	2,000		0.00
02/04/2019	15:59:53	45.53	500	▼	-0.01

[MORE >](#)

trade history table in the company page

NEWS

Books will close today May 19th, 2017. OTCM | 05/19/2017

Books will close on TCEHY at the close of business today, May 15th, 2014 OTCM | 05/15/2014

Books will close today May 14th, 2014, at the close of business. OTCM | 05/14/2014

MORE >

FILINGS AND DISCLOSURE

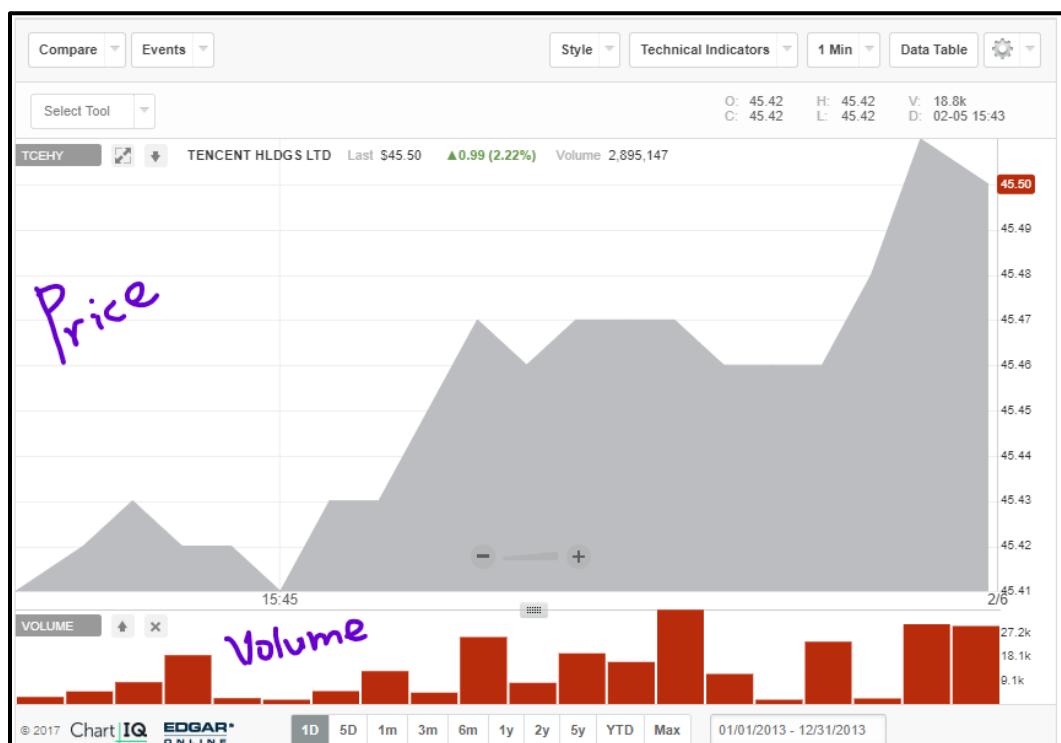
Annual Report - Annual Report 01/09/2009

Form 211 - Form 211 01/09/2009

Form Type—SC 13G 02/01/2019

MORE >

News and disclosure related to that company in company page



Stock price-volume graph over time of the company in company page

TCEHY SECURITY DETAILS	
Share Structure	
Market Cap	428,101,765,182
Authorized Shares	Not Available
Outstanding Shares	9,408,830,004
Restricted	Not Available
Unrestricted	Not Available
Held at DTC	Not Available
Float	Not Available
Par Value	No Par Value

Market details of the company in company page

DAILY ADVANCERS		
QX	OSTBP	+ 25.00 %
QX	ICTV	+ 24.73 %
QX	TMIAF	+ 22.17 %
QX	SMDM	+ 19.69 %
QX	HRSTW	+ 18.00 %

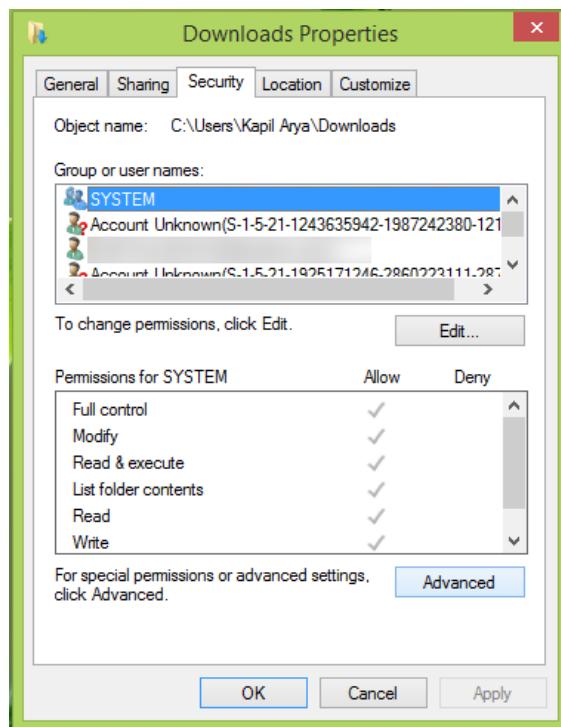
List of companies advanced/declined

System and Market Administration Department

- At 2:30 pm daily when the market closes, the categorized trade summary of that day is copied manually to a Windows server for backup and are dematerialized which includes spot declarations as well. An in-house FoxPro based software is used to carry out the work. I suggested to automate the process by serializing the steps by means of PowerShell scripts that will be triggered every day at the given time. When the process is completed, an e-mail or SMS may be generated to the officers notifying either the process is done successfully or specific errors occurred.

IT Infrastructure Department

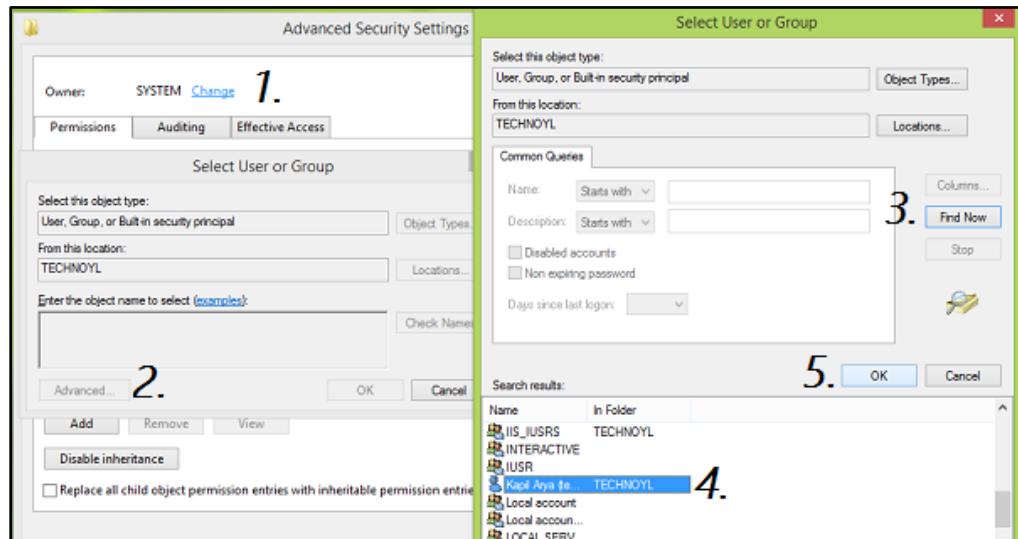
- A problem arose when an employee of DSE could not get access to a resource in a file server and trying to grant explicit permissions of the resource to that person caused “Error Applying Security – Failed to enumerate objects in the container. Access is denied”, even if the person is given full control of the resource.

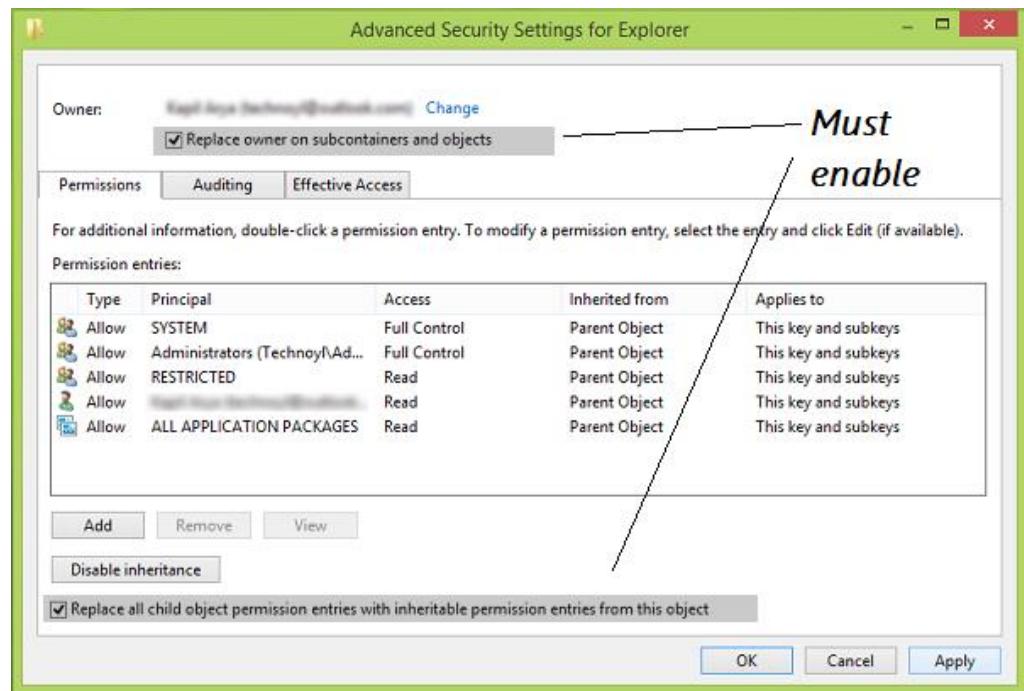




I solved the problem by following the below steps and the employee was then able to access the resource:

1. Click Change for Owner in the Advanced Security Settings window
2. Click Advanced option in Select User or Group window
3. Select the user account
4. In the Advanced Security Settings, check both “Replace owner on subcontainers and objects” and “Replace all child object permissions entries with inheritable permission entries from this object”.
5. Apply then ok





- I also changed the RAM and Hard Disk Drive of some PCs to repair them and also clean installed Windows 10 on them via restoring an image.

TECHNOLOGICAL ASPECT OF THE INTERNSHIP

Because of the computerization of DSE, most of official processes relies on information technology. The trading system, which is the heart of DSE, has been automated and digitalized hence DSE does not have to intervene trading process at all unless absolutely necessary. Perhaps, one thing that is much appreciable is the effort of DSE going green – minimizing the use of paper to almost zero. Nearly all office works like files, documents, reports, orders, intradepartmental, interdepartmental or interdivisional communications, and internal memos are transmitted solely through e-mail under the domain of “<name>@dse.com.bd” powered by Microsoft Exchange using the Microsoft Outlook e-mail client. Reports are printed only when approvals from upper management are required.

During my internship, I have seen different tools and technologies including hardware and software that are used extensively by different departments. Some technical systems are supervised by more than one department while others are supervised exclusively by a specific department. Basically, from what I have seen as a whole, the PCs (desktop, laptop) and file servers run Windows 10 Pro (mostly), Windows 7 (few) and Windows Server 2012 (server), Web Servers run Linux distributions such as RedHat with Apache software and database servers either run Microsoft SQL Server or MySQL.

In details, the tools and technologies each department use and I have used are:

Web Development Department

- HTML and CSS: The frontend webpage designing languages. Custom CSS rules (no third-party) are coded for styling the pages of DSE website.
- PHP: The backend server-side scripting language added with HTML. It shows the dynamic contents of DSE website, for example, market data, date & time, etc.

- MySQL: The relational Database Management System used for storage and manipulation of data that needs to be displayed on the website. Point to be noted that manual data manipulation is prohibited due to business policy of DSE.
- Apache HTTP server: The web servers that are used to host the DSE website is configured with Apache HTTPD software so that the server can send website data to client according to the PHP code.
- Chrome Developer Tools: I used this tool to parse the HTML code of the pages of website and edit the code to make suggestion for improvement.

System and market Administration Department

- X-Stream INET: This is the Matching Engine (ME) of DSE's trading system powered by the datacenter of DSE which runs Linux and is based on Intel x86.
- X-Stream Workstation: This is an alternate order management system (OMS) to the FlexTP system which is the current OMS.
- X-stream Admin Interface: XAI in short, this is the administrative interface accessible only by the department. This is used to add new broker to the ME, or modify or remove broker. Furthermore, important parameters like credit limits and circuit breakers are configured here and things like setting categories for instruments, spot declarations and holiday dates (so that ME shuts down during those days) are carried out.
- NagiOS: It is a monitoring and alerting system software for servers, switches, applications and services. With it, all the ME's hosts and servers are monitored and displayed in real-time.
- Check_MK: It is also a monitoring and alerting software. With it, ME's processes are monitored and shown on a graphical user interface.

Application Support Department

- DSE-FlexTP: This is the central Order Management System of the FlexTP platform that operators of all brokerage firms of the country are bound to use for making stock trades.

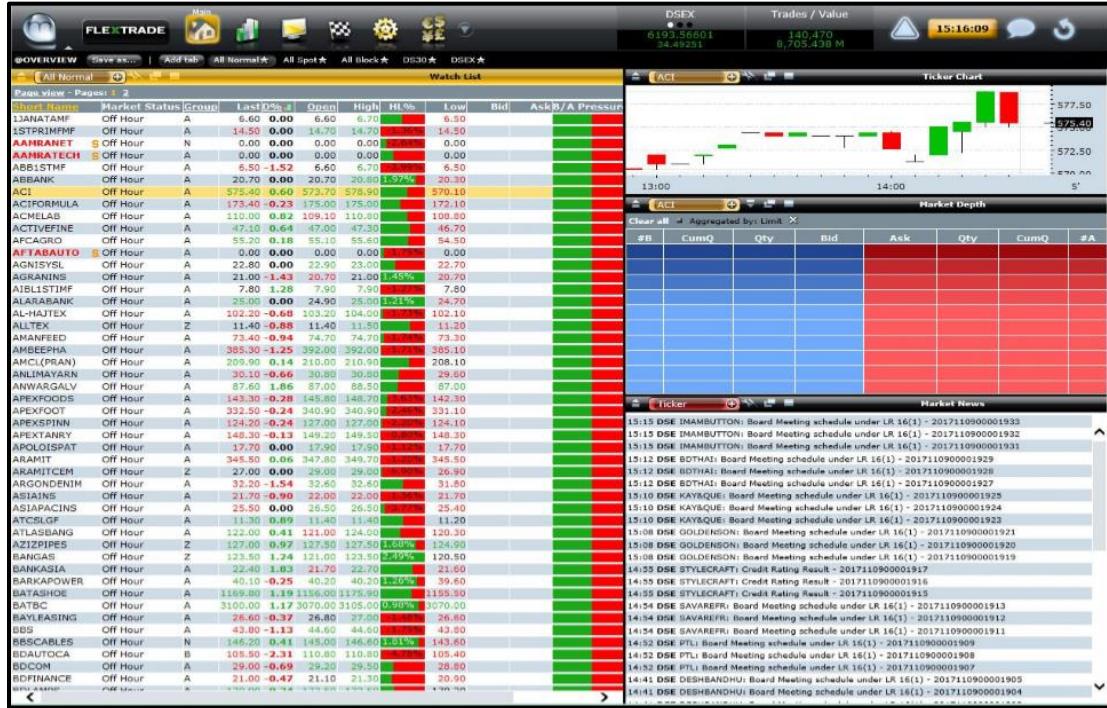


Figure 5: The DSE-FlexTP Interface [5]

- Broker Admin and Credit Controller Tool (CCT): These apps of FlexTP platform are used by Credit Controllers of brokerage firms to administrate things like specifying credit limit of each dealer, purchasing power, instrument restriction, etc., and the admin of brokerage firms to add clients (traders) and create BOS files.
- DSE-Mobile and DSE-investor: These apps of FlexTP platform are used on mobile (iOS, Android) and desktop devices (web) respectively by clients to buy and sell stocks directly by own without taking help from dealers. Clients need to register through their broker in order to use the app.

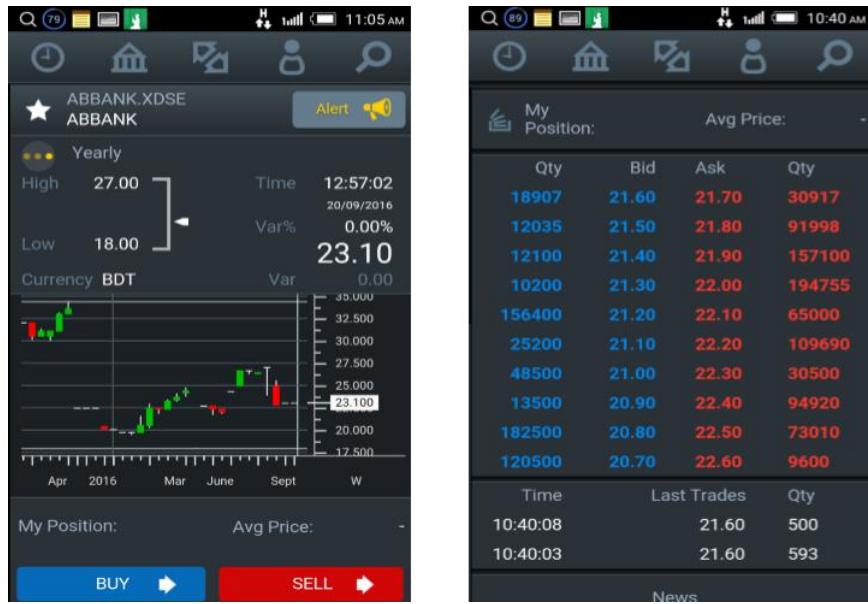


Figure 6: The DSE Mobile App [6]

- Exchange Admin: This app of FlexTP platform, which has the highest administrative level, is used by this department to configure rules and information such as adding new broker, instrument, control user access, user security policy, back office file status check, trading policy settings like how many days needed to clear an order, report generation, etc.
- DSE's Datacenter (DC): It is a highly secured, temperature-controlled facility, equipped with fire protection system where servers, storage systems and routers, switches are situated. The processing system of DSE's DC consists of a total of 40 processors and 6 TB RAM working in parallel.



- VMWare VSphere: This software is used on DC to virtualize the 23 physical hosts to 210 virtual hosts (VMs) to increase CPU utilization. This allows for better handling of processing trades from brokers.
- VMWare VRealize Operations Manager: This is the administrative console which is used to configure virtualization settings and monitor important parameters such as CPU utilization, % of storage occupied, configuring backups, etc.
- Tape Cartridges: These are used to back up data regularly. Each Tape has a capacity of 5 terabytes.
- Load Balancer: Distributes network traffic across a number of servers. This is used to distribute the huge requests from the brokers to the servers in DC.
- Zabbix: This software is used to monitor application or server level issues.

Network Development Department (Local and Distance)

- Vendors: DSE has a contract with a number of Internet Service Providers (ISPs) to establish local connection (LAN, WAN) from brokers to DSE's DC such as BOL, AmberIT, Link3, etc.
- Routers: It forwards data packets between computer networks. DSE uses CISCO router.

- **Switches:** Switches are used to provide multiple connections to devices on the network. DSE uses CISCO switches.
- **Wi-Fi Access Points (AP):** It allows other Wi-Fi devices such as smartphone to connect to a wired network. The AP usually connects to a router (via a wired network) as a standalone device. APs are placed all over DSE so that there's a strong connection.
- **DHCP Server:** When a device wants to connect to the Internet, this server assigns a public IP address to the device from a pool of reserved public IP addresses.
- **SolarWinds Network Analyzers and Managers:** These applications are used to monitor DSE's network traffic and manage bandwidth allocated to each devices.

IT Infrastructure Department

- **Active Directory:** As all PCs in DSE network are under DSE's domain, the department being a domain controller uses this domain management software on Windows Server to administrate all the domain-joined PCs of DSE. It authenticates and authorizes all users and computers in a Windows domain type network - assigning and enforcing security policies for all computers and installing or updating software.
- **Exchange Server:** It is a mail server which runs exclusively on Windows Server. It is responsible for transmission of e-mails that have the “@dse.com.bd” domain, in other words, the official e-mail of DSE.
- **System Center and Configuration Manager (SCCM):** It is also used to administrate the PCs by providing remote access, patch management, software distribution, operating system deployment, network access protection and hardware and software inventory.
- **KMS Server:** Since large number of PCs and Servers use genuine Windows, a single product key is used on multiple PCs to activate the OS (volume licensing) through this

server. In other words, DSE's PCs are activated authentically and legally by connecting with this server.

- WSUS Server: Stands for Windows Server Update Services. It is responsible for receiving OS patches and updates from Microsoft and then deploying the updates to the PCs and servers instead of each PC directly receiving updates, which saves bandwidth. It enables administrators (the department) to manage the distribution of updates and hotfixes released for Microsoft products to computers in a corporate environment. WSUS downloads these updates from the Microsoft Update website and then distributes them to computers on a network. WSUS is an integral component of Windows Server.
- System Center Data Protection Manager (SCDPM): It provides near-continuous data protection and data recovery in a Microsoft Windows environment and delivers centralized backup within the data center by protecting changed files at the byte-level to a secondary disk, which can then be backed up to tape.
- LAPS UI: It provides management of local account passwords of domain joined computers. Passwords are stored in Active Directory (AD) so the department can read or reset it.
- Acronis True Image: This software is used to quickly install Windows in a PC from an image containing pre-installed apps, settings and drivers. From my observation, the process takes about 5-7 minutes in contrast to 20+ minutes in normal installation.
- SharePoint: It is a web-based sharing and collaborative platform and a document management and storage system. DSE uses it in its intranet for collaboration between DSE employees and promoting teamwork.

- KVM switch: a hardware device that allows a user to control multiple computers from one or more sets of keyboards, monitors, and mice. It is used by the department to diagnose one or more problematic PCs using only one monitor, keyboard and mouse.

MIS Department

- Microsoft SQL Server: This is a relational database management system with the primary function of storing and retrieving data as requested by other software applications—which may run either on the same computer or on another computer across a network. This is used to manage the backend SQL database of applications developed by the department such as CnS, ESS, AIT, etc.
- JavaServer Faces (JSF): This is a framework that simplifies construction of user interfaces (UI) for server-based applications by using reusable UI components in a page. The ESS (Electronic Subscription System) website has been developed using it.
- PrimeFaces UI Library: This is an UI component library for JSF based applications.
- Apache: Web server that is used to host the web apps are configured with this software.
- FoxPro: This is a database management system that serves as backend database to applications like Clearing & Settlement (CnS), DSE-CDBL, other in-house software, etc.
- Clearing & Settlement: This is an application that is used to generate trade file which contains a record of all the trades that took place on a given day.
- DSE-CDBL: This is an application that is used to generate trade file (contains record of all trades that were cleared), payout file (contains record of amount transferred of each broker) and market file (contains closing price of each instrument).

- VeDAS: Stands for Versatile Engine for Depository Accounting System. It is a web application from CDBL (central stock depository of the country) that the department uses to upload the three files generated from DSE-CDBL to CDBL via a separate ethernet connection.

Back Office Development

- DSE-ERP: This is an Enterprise Resource Planning software development by the department that holds records of many information and carries out tasks related to DSE and its brokers such as human resource management, accounting and auditing, procurement, incidents, role-based and user-based and mixed privilege management (which tailors the interface of each user, i.e. DSE employee, or a group of users that will be shown when the user logs in).
- C#: This is a programming language which have been used for developing the ERP software.
- LINQ: Stands for Language Integrated Query. This is a query syntax built in C# to insert or retrieve data to or from database objects. The backend database of ERP is queried using this syntax.
- Entity Framework: It is an Object Relational Mapper which is a type of tool that simplifies mapping between objects in a software to the tables and columns of a relational database. This was used in ERP development to map the buttons, input boxes and other objects to the corresponding columns and tables of the backend database.
- Oracle Database 11g: This is a relational Database Management System which is used in the ERP as backend database.

LESSONS LEARNT FROM THE INTERNSHIP

As an intern of DSE, I learnt many things about how the share market works and how information technology (IT) transformed the market, which vastly elevated my knowledge, many of which I was not aware before. I have seen the ways theories and concepts I studied at my university are applied to every areas of IT like software engineering, computing and networking in practice at DSE. In addition, I learned about transition of technology over the course of time that yielded better performance and reliability, and tools and technology that have already been discussed previously. I asked questions when I found some terms and processes perplexing, and the answers I received aided me a lot to comprehend many things in general. The following are the things I learnt in details from my internship experience:

Web Development Department

The website of DSE was inaugurated in 1998. Initially, the website was externally hosted by third-party hosting provider. Later DSE hosted the website on its own server. Only one server was used but gradually the number increased and the servers upgraded. These servers are now situated in the old Datacenter of DSE. The website of DSE has the domain – dsebd.org. Entering dse.com.bd redirects to dsebd.org. The website has 675 pages. HTML and CSS (custom made not third-party) have been used to design the frontend and MySQL has been used for the backend database. PHP has also been used for server-side scripting. The web server is configured with Apache although it might run either on Windows Server or RedHat Linux. The website was developed by Bangladesh Online Limited (BOL) and the department mainly maintains this website and solves any technical difficulties that may arise. The website also has a Bengali version (bangla.dsebd.org). Recently, the PHP version was upgraded to 7 and work is going on to convert the website to a responsive

one and also develop an AMP site that will load very fast and be known as the lite version of the website. The key functions of the department are:

- DSE Official Website: Maintenance, support & troubleshooting.
- Market Data Server (MDS): Providing market data to third parties and enterprises.
- DSE Market Ticker Service: Marquee display of script symbols with prices and changes.
- DSE Data Feed (Internet Based MDS): Feeding market data to websites.
- DSE EOD Data Service: Providing End-of-Day collection of transaction data.
- Mobile application ‘DSE INFO’: Technical support of the android application.
- Advertisement on DSE website: Anyone willing to advertise can contact.
- IPO Data Transmission Software: Used for uploading files by companies seeking IPO.
- Online Payment: Mobile banking or card payments on the website.

System and Market Administration Department

Here I actually understood how the stock market works. There are about 250 brokers (TREC holders officially) registered with DSE. Each broker has a number of dealers (operators) whose job is to sell a client’s stock (seller) to another client willing to buy it (buyer) or vice versa, when instructed. The other client does not necessarily have to be from the same broker. For information, clients are traders, or investors, who invests money to trade stocks and are the customers of a broker. Like an auction, a buyer looks for a seller who asked the lowest price, conversely, a seller looks for a buyer who bid the highest price. When the buyer finds that seller or the seller finds that buyer, a match is made and they can now proceed to make the deal. Some time is taken to transfer the fund and complete the deal. There are three categories of instruments that are stock traded – A, B, G, N, and Z. A, B, G, N are normal group and any instrument can declare to be a spot group.

Traders who reside outside the country are the foreign group. Normal and foreign group takes two days, Spot group takes zero days (instant) and Z-group/category takes nine days.

Before 1997 the process of trading was manual. Dealers would stand on a stage and shout the prices at the traders for matchmaking. After 1997 trading became automated and servers did the job of match-making. After 2014 when FlexTP took over the trading system, the job is done by the dedicated Matching Engine called X-Stream INET and this resulted in handling even more transactions per unit of time. Orders are made using the apps of FlexTP platform. The search for buyers and sellers is automatic and invited parties are arranged by sorting bid prices in ascending order and ask prices in descending order so that buy orders have the highest price and sell orders have the lowest price (the top row). This is the touchline price which is the best price for both parties. The invitation of traders is called the market depth and the more the traders are invited, the higher the market depth is. When the bid and ask price at the top row get equal, then a match is made and the deal can proceed. If multiple traders offer the same bid/ask price then the order entered earliest at a given price limit and the best price at a given time it gets executed first.

Traders can offer prices to buy or sell stocks and it is not required to choose the last traded price (LTP). However, there are some rules to offer prices – the increment (tick size) from LTP must not be greater than 0.10 taka at a time. Furthermore, to counteract any abnormal market activity, circuit breaker (acts on YCP) and filter (acts on LTP) are placed so that if the deviation goes more than the limit then the all the trades of that instrument will halt. The limits are:

Share Price slab	Circuit Breaker Percent % (I)	Not Exceeding Limit in Tk. (II)	Maximum Price Slab considering I & II
Up to 200	10%	TK. 17.5	175
>200-500	8.75%	TK. 37.5	428
>500-1000	7.5%	TK. 62.5	833
>1000-2000	6.25%	TK. 100	1600
>2000-5000	5%	TK. 187.5	3750
Above 5000	3.75%	TK. 300	8000

Share Price slab	Circuit Breaker Percent % (Considering Taka limit)	Current Circuit Filter Percent%	
<=175	10	Same as CB	
> 175 & <=200	<u>17.5* 100</u> YCP		
>200 & <=428	8.75		
>428 & <=500	<u>37.5* 100</u> YCP		
>500 & <=833	7.5		
>833 & <=1000	<u>62.5* 100</u> YCP	Same as CB	
> 1000 & <= 1600	6.25		
> 1600 & <=2000	<u>100* 100</u> YCP		
>2000 & <=3750	5		
>3750 & <=5000	<u>187.5* 100</u> YCP	Same as CB	
>5000 & <=8000	3.75		
>8000	<u>300* 100</u> YCP		

There are three types of order (be it buy or sell) - Partial fill (PF), Partial fill and kill (PFAK) and Full fill or kill (FOK). PF means as much possible of the order quantity shall be executed as soon as the order is submitted to the trading engine. If the order is not fully executed the remaining order quantity shall be stored which shall be visible to the market, PFAK means as much as possible of the order quantity shall be executed as soon as the order is submitted and the remaining order quantity shall be returned to the trader who entered the order, PFAK means either all of the orders

quantity shall be executed as soon as the order is submitted to the trading engine or the entire order shall be rejected and returned to the trader.

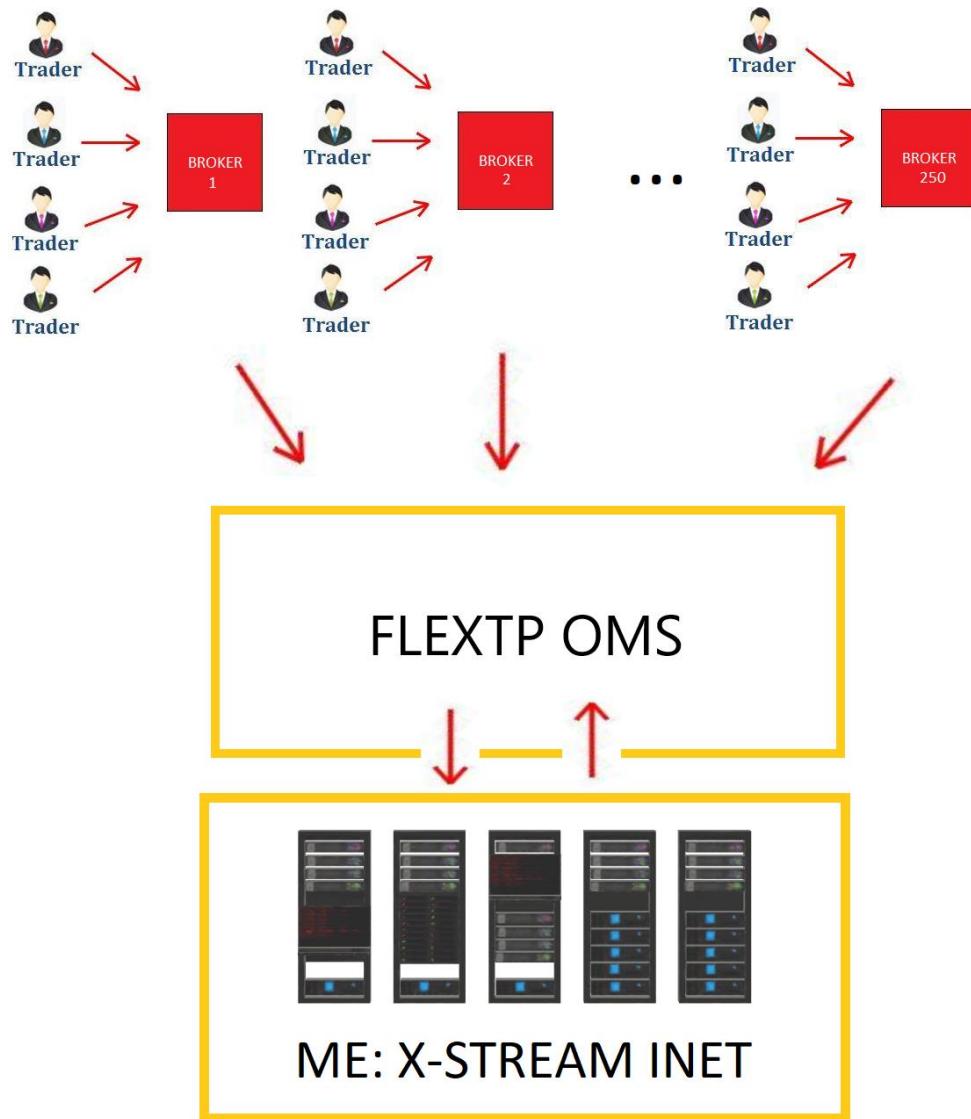


Figure 7: A rudimentary block diagram of DSE stock trading

Servers in the datacenter have been upgraded from time to time for increasing handling the rate of trades as follows:

<u>Implementation Period</u>	<u>Platform</u>	<u>Capacity sizing</u>
❑ August 1998	TANDEM NonStop K204	15,000 Trades/day
❑ August 2005	HP NonStop S7802	50,000 Trades/day
❑ March 2008	HP NonStop S7804	1,00,000 Trades/day
❑ December 2008	HP NonStop S7806	1,50,000 Trades/day
❑ December 2009	Fine tune Existing server	3,00,000 Trades/day
❑ December 2010	HP NonStop S7810	5,00,000 Trades/day
❑ December 2014	HP Commodity server	10,00,000 Trades/day

The current ME, X-Stream INET, has the following features:

- Very fast matching engine;
- High volume trading engine
- System can be designed as per desired trade volume;
- X-Stream Application is 3-tier, open architecture
- High performance, Robust and Scalable
- Low latency and Fault Tolerant
- Support Multi asset and multi market
- Quick Implementation
- Structured interfaces: FIX Gateway
- Industry standard API's - ITCH and FIX
- Support SNMP & Syslog for management/monitoring;
- Supports co-location and establishment of DR site

Electronic Trading has the following advantages:

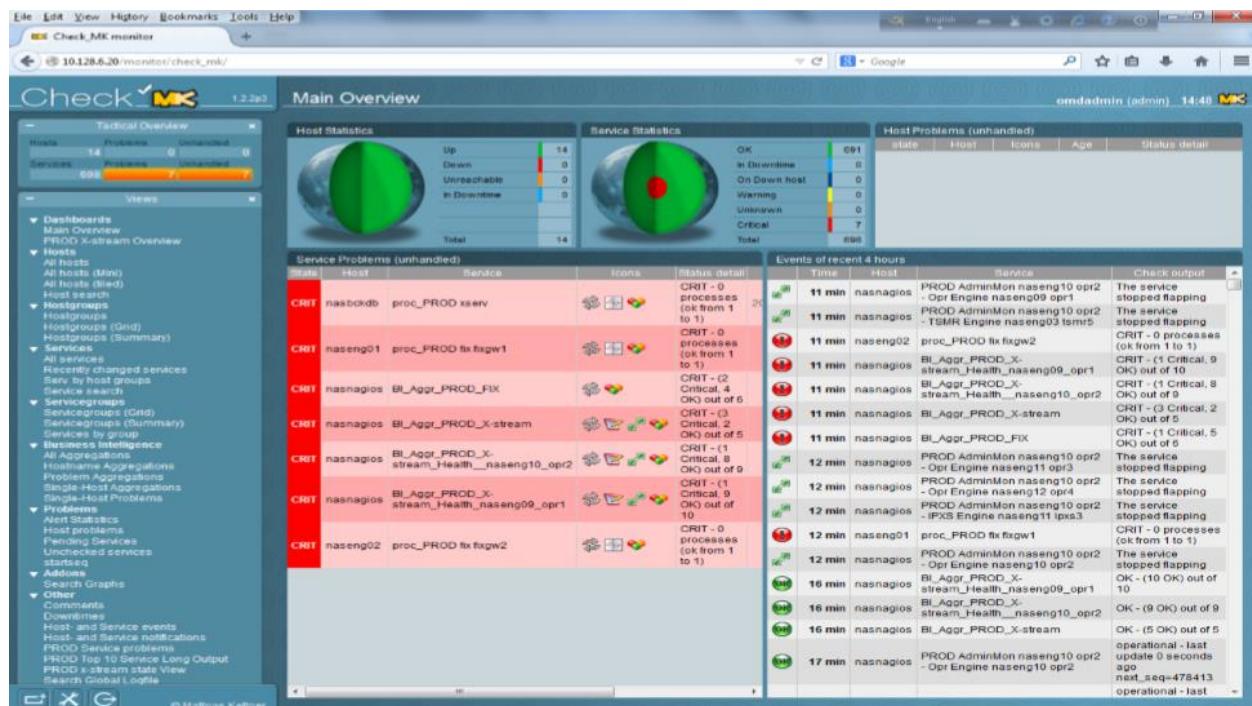
- Reduced cost of transactions
- Greater liquidity
- Greater competition
- Increased transparency
- Improved Order Entry and Execution Speed
- Tighter spreads
- Preserve Discipline
- Diversify Trading

The specification of hardware used for the automated trading system is:

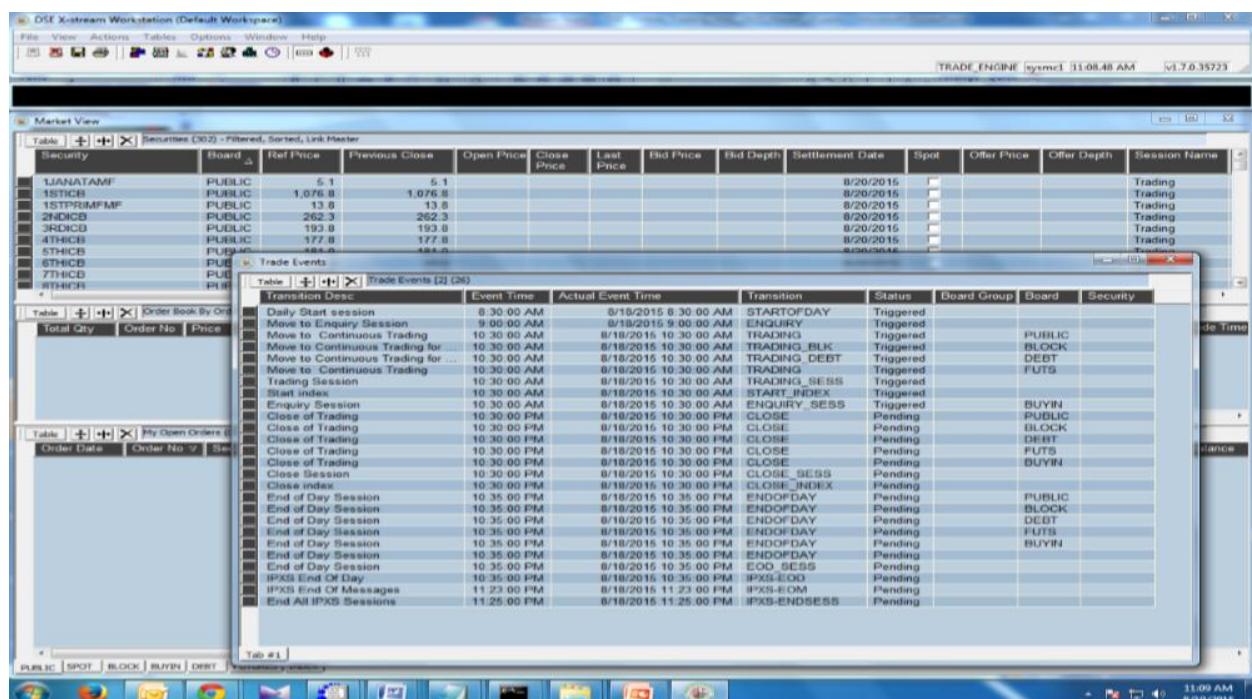
Component	OMS		MATCHING ENGINE	
Time (year) →	Before 2015	After 2015	Before 2015	After 2015
OS	HP NonStop KERNEL	RedHat Linux Windows Server 2012		RedHat Linux 6
Database	NonStop SQL	Microsoft SQL Server		PostgreSQL
Server	Mainframe	DL380p Gen8		DL380p Gen8
Storage		3 Par Storage		3 Par Storage & EMC VNXe3200

Monitoring / Administration Tools used by the department:

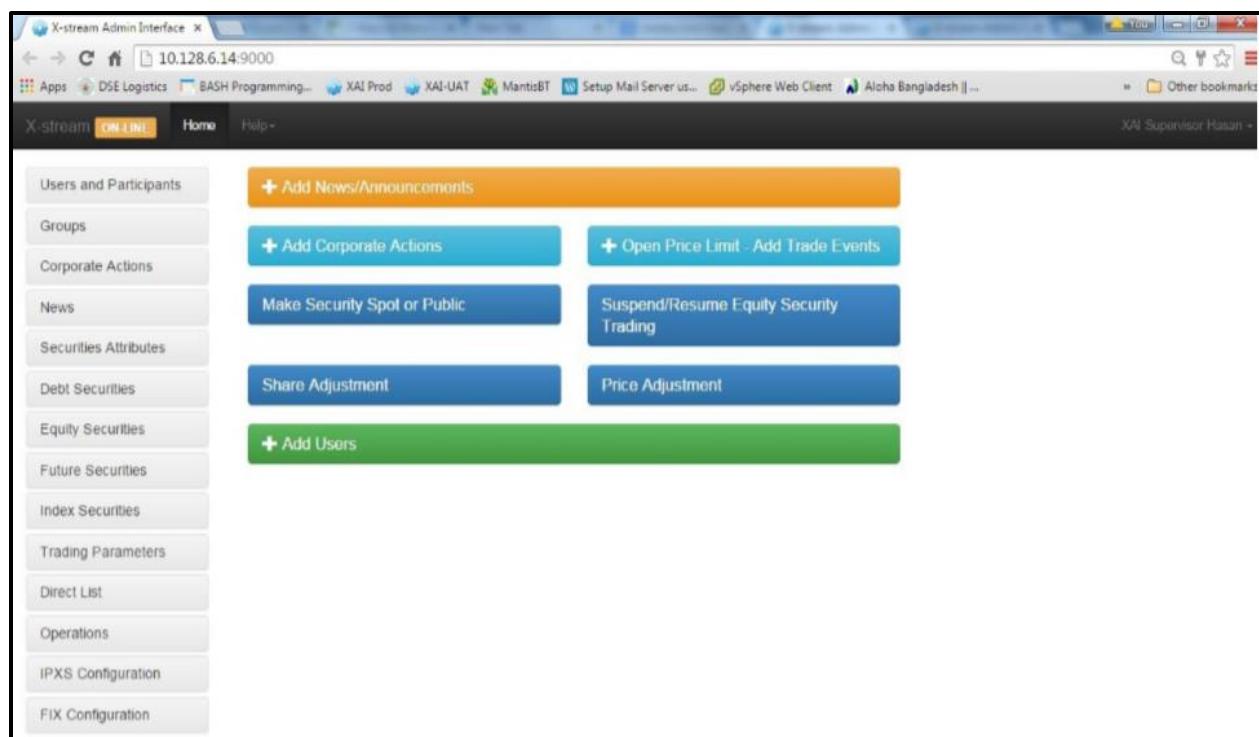
- Nagios and Check_MK
- Shell Script
- XW Terminal and XAI
- Checklist routine tasks through mail and SMS
- ZABBIX for OMS



The Check_MK interface

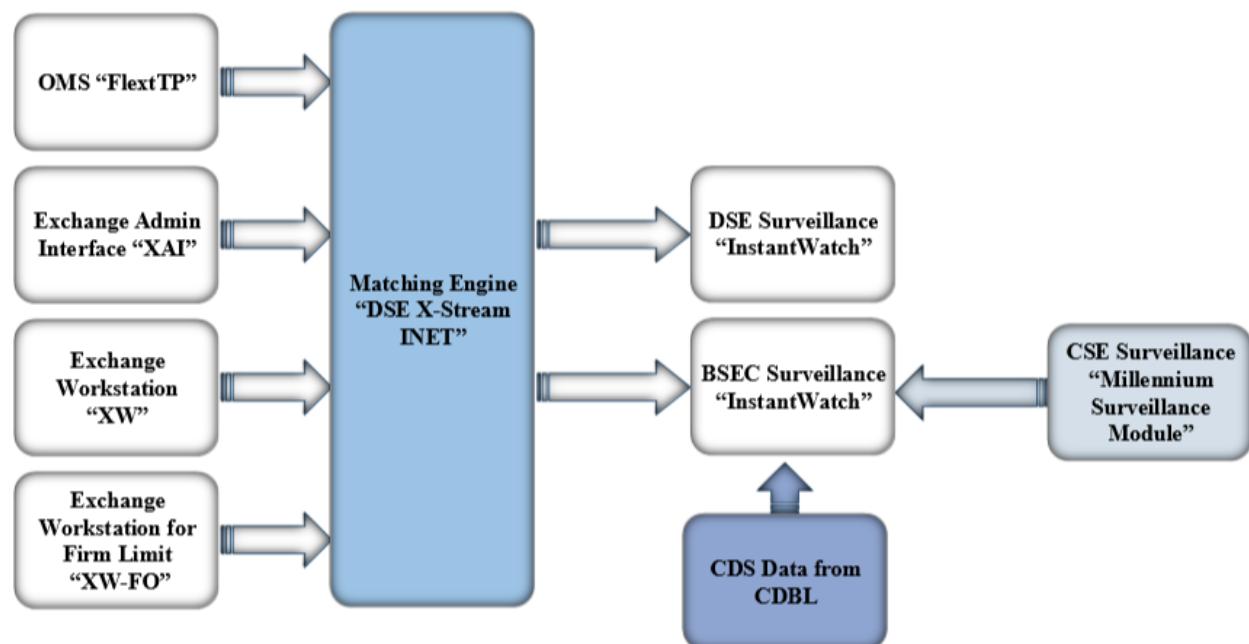


The XW interface



The XAI interface

DSE surveillance system:



Since the IT division is completed automated, the majority of work in this department is about maintaining the system. For information, the market data Web Development Department provides is taken from the database of the matching engine. Every day, there are automatic routine steps according to a schedule for the functioning of servers. At each step, the servers send SMS to the department officers to notify that the step is successful. The schedule is:

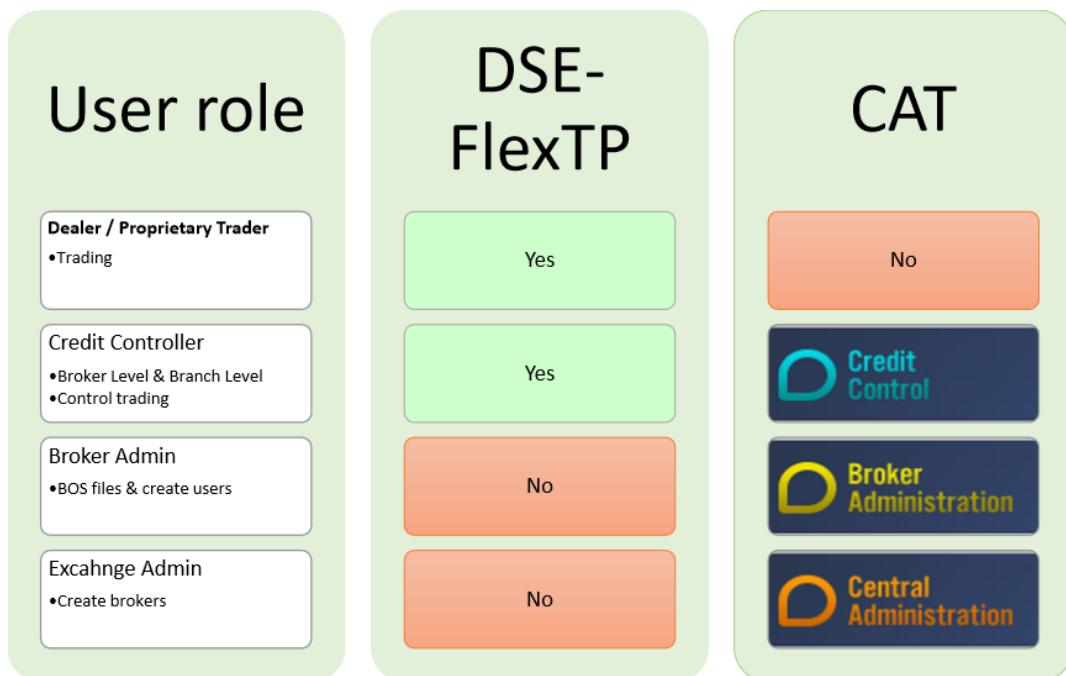
Time	Step
6:00 am	DB Export from HDD to RAM
6:20 am	X-Stream Engine Start (all 25 hosts)
6:30 am	FIX servers start (it connects OMS to ME)
2:30 pm	FIX servers stop
4:05 pm	DB load from RAM to HDD
4:30 pm	X-Stream Engine Stop

A short description of some of the hosts of X-stream INET is as follows:

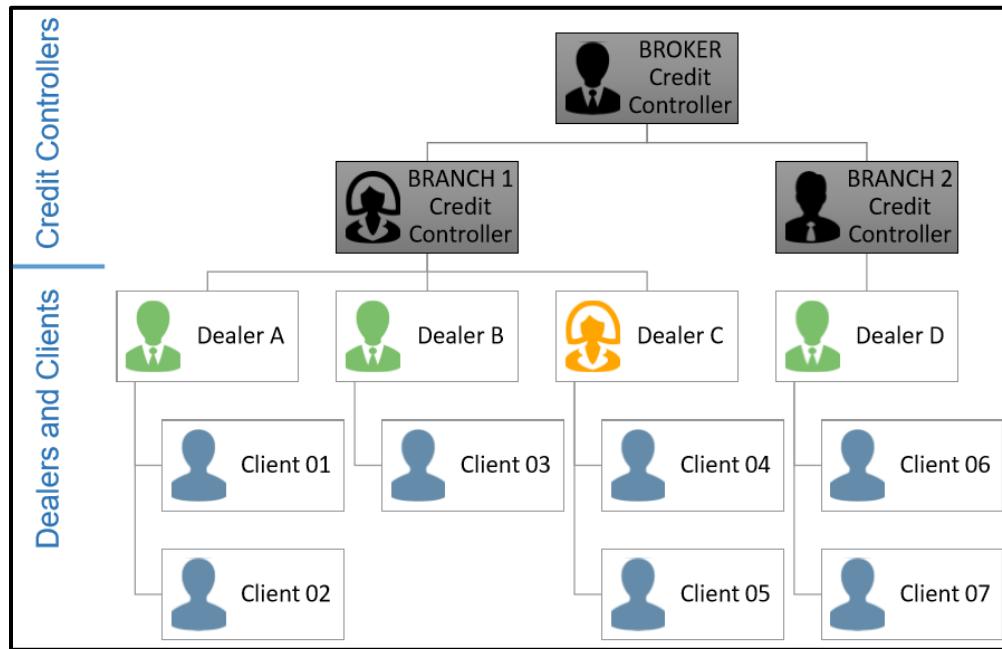
Host Name	Services	Description
naspriseq	Primary Sequencer	Maintains system time
nasbckseq	Backup Sequencer	Processes DB load/export
nasrereqseq	Re requester	Logs memory
naspridb	Primary database	Storing market data
nasbckdb	Backup database	For backing up primary
nasnagios	nagiOS - OMD	For nagiOS software
naseng01	IPXS engine, FIX gateway	Maintains market state, matches orders, calculates market stats. FIX is alternate to using INET API
naseng02		
naseng03 to naseng12	TSMR Engine, OPR	TSMR serves traders connecting to INET

Application Support Department

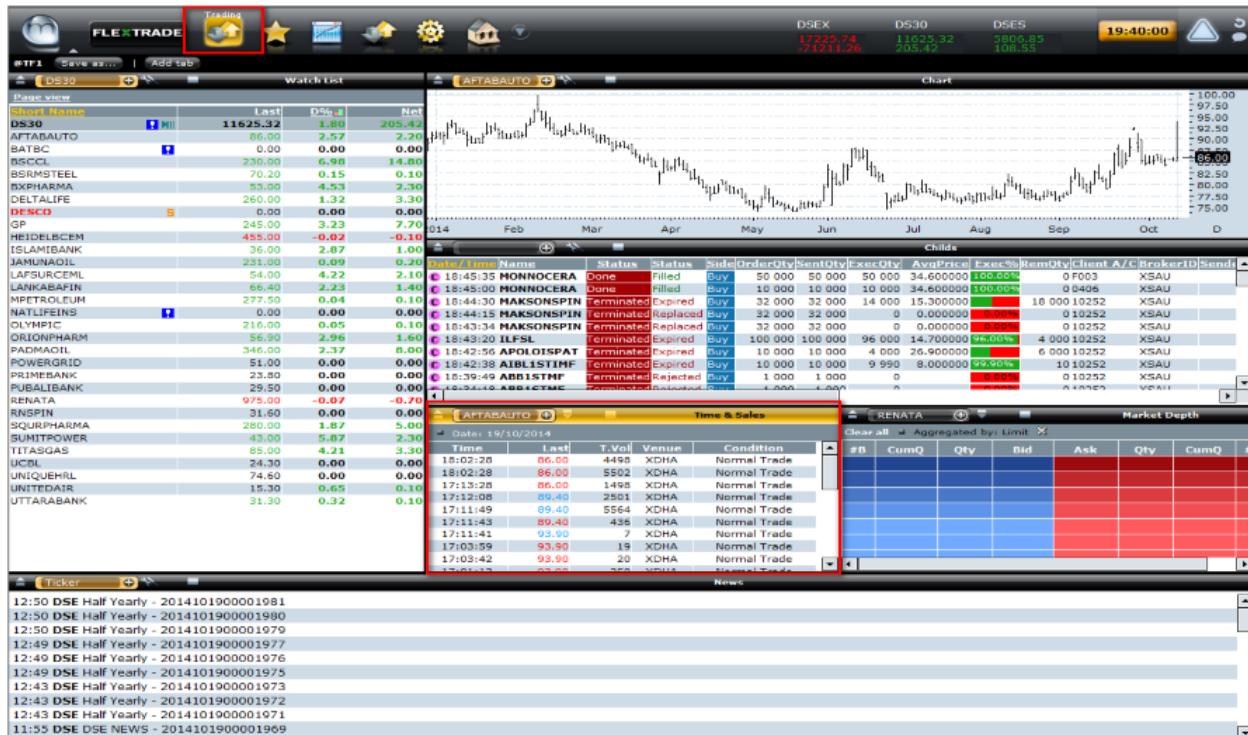
One of the functions of this department are to maintain the FlexTP platform – consists of DSE-FlexTP OMS, DSE-mobile, DSE-investor, Client Administration Tools (CAT) which includes Credit Control (CCT), Broker Administration and Central Administration (Exchange Admin). The former two CATs are used by the brokers to administrate clients and credits, and the latter CAT is used by the department to administrate the brokers like adding new broker, instrument, control user access, user security policy, back office file status check, trading policy settings which means it has the highest administrative power that governs anything related to the trading system – from clients and brokers to instruments. Another function is always keeping in touch with the technical support team of FlexTP developer for any issues. Another function is requesting any feature addition or modification of FlexTP and testing and deploying new versions of it whenever available. Another function is providing support to brokers over e-mail, messages and telephone. Another function is to monitor the servers in Datacenter (DC) which hosts the FlexTP platform and make regular backup of it. The relation of user-role with DSE-FlexTP and CAT is:



As discussed earlier, each broker encompasses a number of dealers who are at charge of a number of clients (traders). The dealers are governed by a credit controller, who is supervised by broker admin. This is illustrated as follows:



The DSE-FlexTP shows completely real-time market data on its interface:



An order for a client is made in the following way:

Press **F1** to open a BUY ticket Press **F2** to open a SELL ticket



All orders and executions can be exported to Excel. Order status can be – Working (New, Partially Filled, Pending cancel), Done (Filled) and Terminated (Cancelled) where parenthesized statuses come from Matching Engine.

Technical Analysis can be performed in the OMS as well:

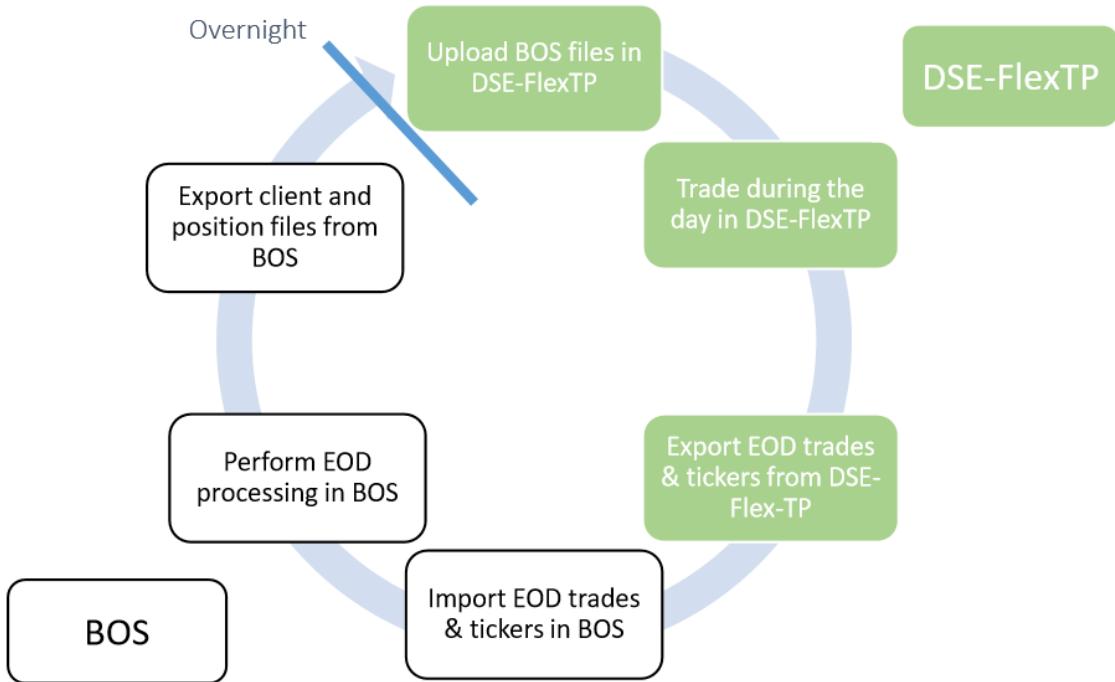


The benefits of using DSE-FlexTP are:

- Centralized web- based solution.
- Workplace can be personalized.
- Multiple workplaces can be designed.
- Individual windows can be configured.
- Workplace can be saved in a file and the same can be used in another machine.
- Real time watch list export to excel and view instrument position
- Link all small windows within workspace.
- View client's position (share balance) and cash balance from own terminal.
- technical analysis and charting tools.
- Historical index can be viewed.
- Individual company information can be shown.

Clients can make buy and sell orders on their own by using DSE-mobile on their mobile or DSE-investor on web. When a new version of DSE-FlexTP becomes available, the department at first runs it in an UAT (user acceptance testing) environment. When the testing is successful, the version is deployed through VPN tunneling.

An important function of the department is to upload back-office (BOS), End-of-day (EOD) ticker and trade files to brokers via FTP (File Transfer Protocol) daily.



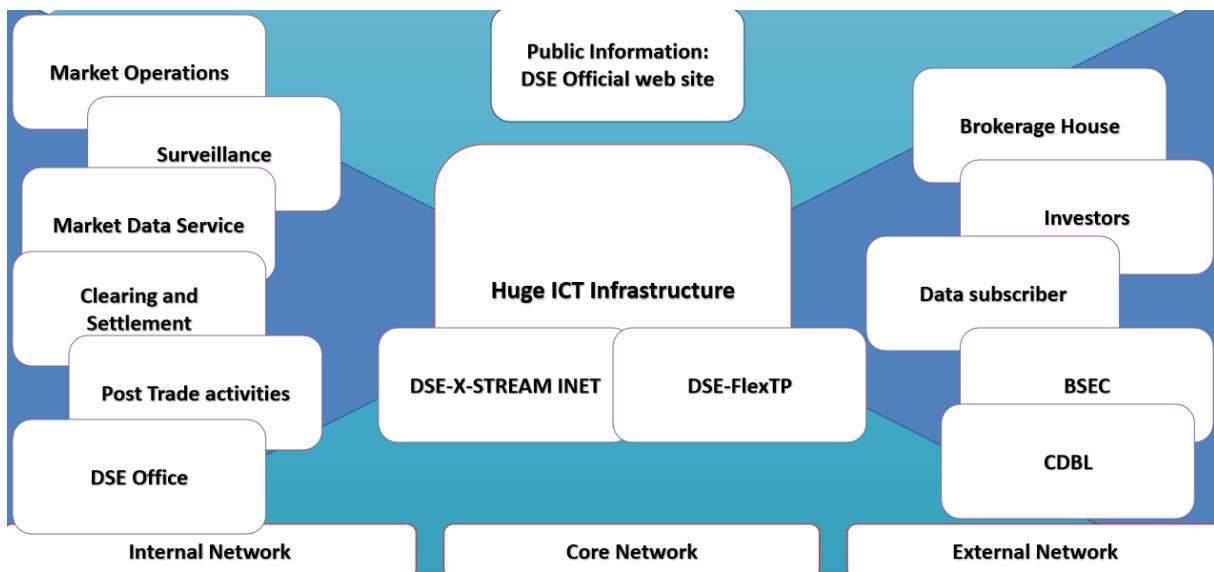
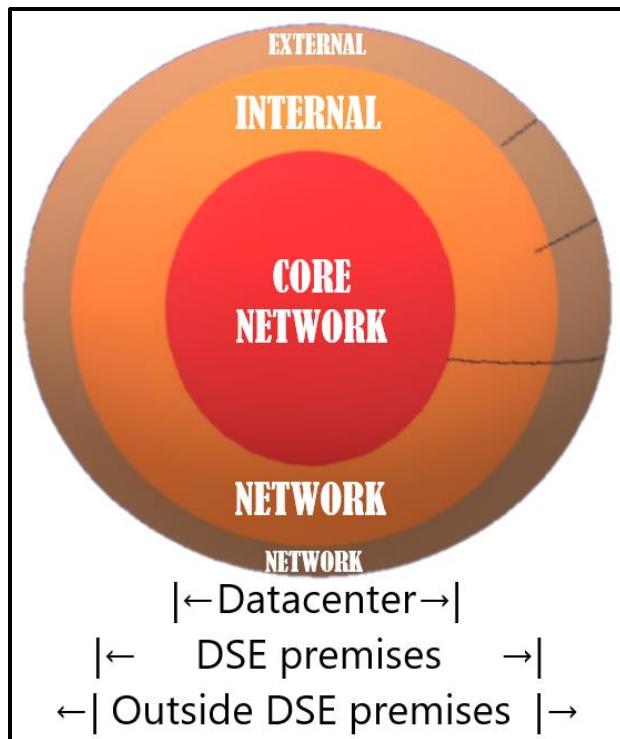
There are eight silos for serving the brokers and client apps. Silo is a repository of data. Each silo contains fourteen copies of the OMS database. Out of these fourteen copies, ten is used for web (Internet Information Service) which includes client apps (called MOGO, uses four), three is open and reserved for checking, and one is used for the FTP to upload BOS files to brokers.

VMware VCenter is used to virtualize the 23 physical hosts (servers) into 210 virtual hosts to increase handling of huge number of requests from all the brokers. Because of the high specification, the % utilization of CPU is very low without virtualization. This number of virtual hosts were created to utilize more CPU resource to handle requests as much as possible.

The servers run 24/7, however, to keep these smooth, automatic shutdown program is set to run every 90 days to reboot them. The OMS and database are backed up daily, apps are backed up every Thursday and full backup is done once per month to tape cartridges.

Network Development Department (Local and Distance)

The computer network of DSE is made up of three segments – Internal, Core and External. Internal network spans within the DSE office up to the servers of Datacenter, the Core network spans the servers and other components of the Datacenter itself which serves FlexTP, X-Stream and Website, and External Network which spans from the outside of DSE, illustrated by the following diagram:



I have learnt about the concept of OSI Model Layers, The TCP/IP Reference Model Types, Features & classes of IP addresses, Classful and Classless IP addressing, Subnetting, Network Address Translation (NAT), Bridge mode and Routing Mode. Furthermore, I understood how these concepts are related to the implementation of the network system of DSE. For example, the TCP/IP layers that are used by different components of DSE's network are:

TCP/IP Layers	Components
Application layer	Hosts
Transport layer	Gateways
Internet layer	Routers
Network Access layer	switches, bridges, hubs, repeaters

When a device wants to connect to a network, it firstly connects with the nearest access point. The DHCP server assigns it a private IP address if connecting to intranet, and public IP address if connecting to internet from its pool of reserved IP addresses for a lease time. Private IP address is translated to public IP address by means of NAT because all devices in an intranet uses the same public IP address.

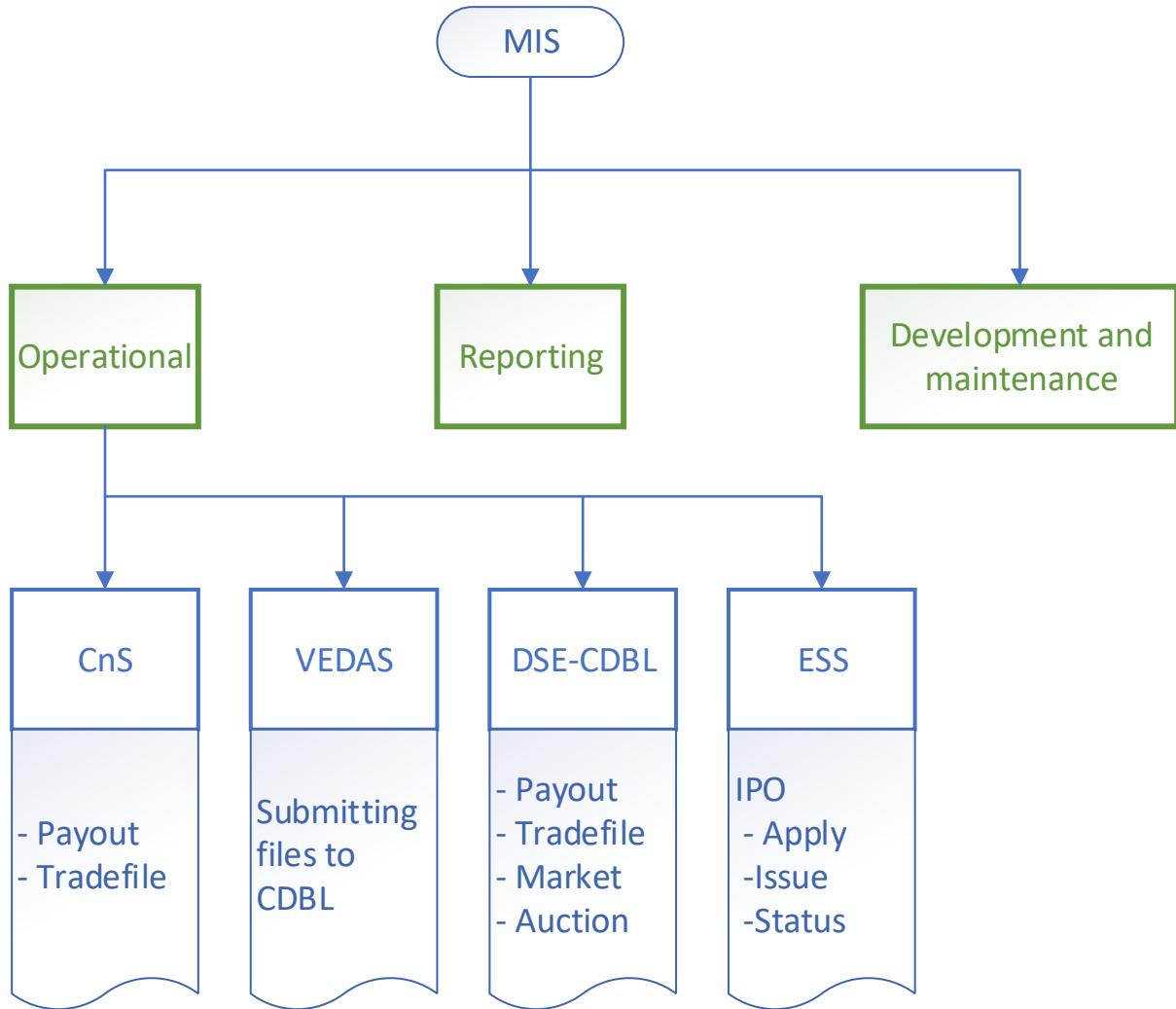
IT Infrastructure Department

This department provides technical support to other DSE departments and employees regarding any IT issues either by telephone, remote accessing or physical inspection. It installs, configures, repairs, administrate, manages and monitors all the IT infrastructure of DSE, including PC, Server, Datacenter Cooling System, Cable management, fire protection system, access control system, UPS, Printer, scanner, CCTV, etc. It is also the domain controller of all Windows PC joined to the DSE domain. It prepares requirement analysis of IT products for users, documentation for various departmental requirements and memo, and makes report of any incidents related to IT

infrastructure, like change of PC hardware by using an in-house data-keeping software. It is responsible for domain-wide deployment and support of software and Operating System like Windows 10, Windows Server, Antivirus, e-mail client, etc. It also provides IT support, like arranging projector, laptop, screen, etc. for any events of DSE inside or outside the premises like Board Meeting, Press Conference, etc. The tools and technologies that are used to accomplish these functions were already discussed previously.

MIS (Management Information Systems) Development Department

This department mainly performs three types of functions – Operational, Reporting and Development & Maintenance. The operational tasks are the daily routine tasks that must be carried out at a specific time. This includes using the Clearing & Settlement (CnS), Versatile Engine for Depository Accounting System (VEDAS), DSE-CDBL interface and Electronic Subscription System (ESS) software. The CnS is used at first to generate the payout and trade file. DSE-CDBL is also used to generate the same. The difference of these two versions is that the former is trades that were supposed to be cleared and the latter are those that are cleared (settled). Then these two versions are compared; if the number of trades is same then the files are correct and these files are then uploaded to CDBL via VEDAS. The Reporting tasks include all the tasks that involves generating reports for approval of upper management like instrument summary and spot declaration report. The Development and Maintenance includes software development and tasks including designing and implementing the software and also make any future changes to it due to requirement changes or bug fixes, like the software mentioned above (CnS, VEDAS, DSE-CDBL and ESS) are developed and maintained by the department. Their functions can be illustrated by the following diagram:



Netting: It is a treasury procedure that consists of grouping multiple cash flows into a single ‘netted’ amount. This practice allows positive and negative values to offset each other, thereby reducing cash flow risk. Used when submitted the files to CDBL.

The daily tasks include: Before trade hours (<10:30 am) - Update CnS listing for Instrument add, share adjustment, Spot declaration, Instrument name change, New Broker, Group (A, B, G, N, Z) change, Sector add, Foreign client verification, generate payout, trade, market, auction file. After trade hours (>2:30) - generate report.

ESS – This software (web app) is hosted at essbangladesh.com which can be used by any incorporated company to get themselves listed on DSE's trade market and go public by the process of Initial Public Offering (IPO).

Issue	Type	IPO Amount	EI Amount	Total Size	EI Size	Bids/Subs	Consumers	Indicative	CutOff	FaceValue	Bid/Subs Start	Bid/Subs End	Status	Details
SEAPERL	LC-FPM	150,000,000.00	75,000,000.00	15,000,000.00	7,500,000.00	880	1744.73%	-	-	10.00	23-Apr-2019 10:00	06-May-2019 17:30	PROCESSED	Details
COPPERTECH	LC-FPM	200,000,000.00	100,000,000.00	20,000,000.00	10,000,000.00	939	1855.35%	-	-	10.00	31-Mar-2019 10:00	09-Apr-2019 17:30	PROCESSED	Details
SILCOPHL	LC-FPM	300,000,000.00	150,000,000.00	30,000,000.00	15,000,000.00	923	1803.34%	-	-	10.00	07-Mar-2019 10:00	19-Mar-2019 17:30	PROCESSED	Details
NEWLINE	LC-FPM	300,000,000.00	150,000,000.00	30,000,000.00	15,000,000.00	899	1751.33%	-	-	10.00	18-Feb-2019 10:00	03-Mar-2019 17:30	PROCESSED	Details
SEMLFBSLGF	LC-FPM	550,000,000.00	275,000,000.00	55,000,000.00	27,500,000.00	1	100%	-	-	10.00	02-Dec-2018 10:00	13-Dec-2018 17:30	COMPLETED	Details
GENEXIL	LC-FPM	200,000,000.00	100,000,000.00	20,000,000.00	10,000,000.00	843	1670.69%	-	-	10.00	18-Nov-2018 10:00	29-Nov-2018 17:30	COMPLETED	Details
ADINTEL	LC-BBM	570,000,000.00	356,250,000.00	19,791,667.00	11,875,000.00	600	1164.47%	-	30.00	10.00	05-Nov-2018 17:00	08-Nov-2018 17:00	PROCESSED	Details

Total Issue: 31

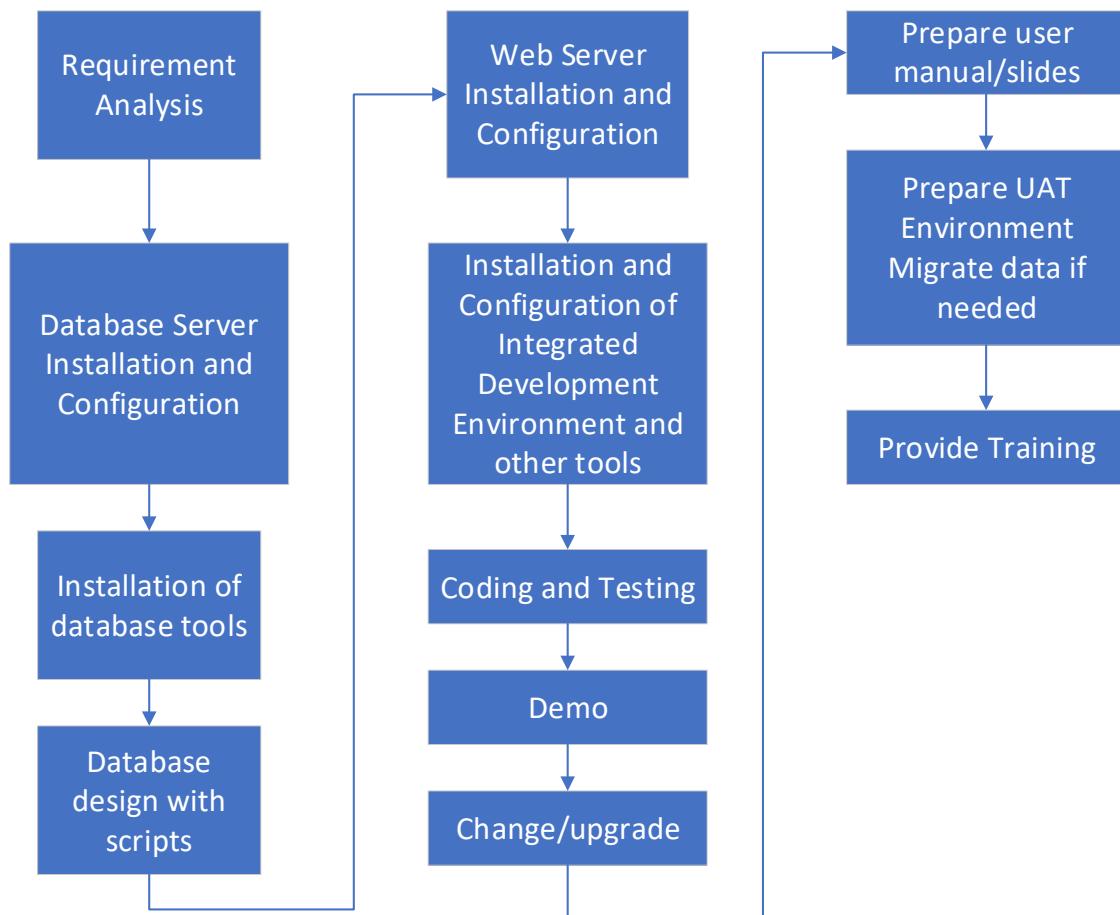
An issue is created when a company applies for an IPO. There are two types of entities who will buy the shares that a company offers (IPO amount) to get listed – Eligible Investors (EI - Institutions) and General Public (GP - Individuals). IPO can be made through two ways – Fixed Price Method (FPM - involves subscription) and Book Building Method (BBM - involves bidding). It is required that in FPM, IPO amount is allocated at a ratio of 1:1 = EI:GP and in BBM the ratio is 3:2 = EI:GP. FPM requires company to pay the IPO amount full in advance, and BBM requires company to pay the IPO amount 20% in advance. After various steps and formalities, when the IPO is done, the status shows “Completed” and otherwise it shows “Processed”.

This ESS web app is developed with JavaServer Faces (JSF) framework as frontend and Oracle database as backend, coded in Java.

Back Office Development

The function of this department is mainly to develop software for use in DSE or DSE's brokers.

The process of developing software in the department is outlined below:



The most significant software this department developed is the DSE-ERP software. This is an Enterprise Resource Planning software that holds records of many information and carries out tasks related to DSE and its brokers such as human resource management, accounting and auditing, procurement, incidents, role-based and user-based and mixed privilege management (which tailors the interface of each user, i.e. DSE employee, or a group of users that is shown when the user logs in). The software has been developed using C# with Entity Framework as frontend, Oracle 11g as backend database and LINQ as query syntax framework for database querying.

CONCLUSION AND FUTURE WORK

Interaction with reporting manager & coworkers

My interaction with the reporting managers (supervisors) and co-workers were very friendly. They were very happy to help and spared me as much time as possible for explaining me concepts and processes very excellently with pen and paper and computers. The supervisors who assigned me works (like Web Development and Infrastructure) politely asked me from time to time about my progress of work after which I submitted the tasks. The tasks that were given to me never felt burdening to me because the tasks were given one after the other completed. I also developed a good connection with most of the co-workers during my internship. The environment was also very pleasing. Co-workers never hesitated to show me their work and they were eager to give me as much knowledge as possible. They valued my feedback despite them being very highly experienced and knowledgeable. I too was very cordial and respected them. During breaks, for example, lunchtime, I made chats with co-workers and exchanged personal information, national issues and other enjoyable topics which strengthened my bond with them. They were also very satisfied with my works. These things consequentially enhanced my university's image to them. I believe that my internship will cause DSE to look forward to more interns and graduates to come from North South University for internship or other professional positions.

Roadblocks encountered and solved

During my internship, I certainly faced difficulties that impeded me from understanding concepts, processes, departmental functions and tasks assigned to me. I had a hard time adjusting to each new department I visited, probably due to new environment and workflows, which I later managed to overcome it by self-studying diligently. As DSE is a financial institution according to its business model, I myself being a Computer Science Student had to grasp all the financial terms as I had no idea related to it beforehand. For any inquiries, I tried to ask as many questions as possible to my co-workers so that I left no stones unturned in terms of required knowledge. I took notes on my journal book whenever needed and went through helpful resources on the Internet. Nevertheless, some of the tasks took more time to complete due to increased difficulty, like the tasks where I was told to find out features from the website of all the bourses of the world which also has an AMP version. I searched websites of at least a hundred bourses, some of which are very inferior and unknown to the rest of the world. The effort by me and the valuable help from the compassionate co-workers and supervisors made me confident and much more proficient.

Effect of internship on my career plan

As I have been nearing graduation, I made a career plan based on my age. I am much older than the typical undergraduates who are 22-25 years old and given the fact that most entry-level jobs in my country require maximum age of 30 years, including the government sector, I was worried about my future after graduation. I wanted to pursue my Masters in Computer Science at a prestigious university abroad but I was in a dilemma choosing between entering a job firstly then take a few years' leave for completing Masters, or the opposite. I also thought about starting up a business out of my knowledge obtained through my studentship. This is when the internship experience cleared me out of the dilemma. As I talked about my career plan with my co-workers, most of them suggested to complete Masters firstly and enter professional life later for it leaves more choices. In addition, they also suggested me to take part in certification examinations like CCNA, CISSP, CCISO, etc. so that I become more potent for employment. Furthermore, as a bonus, I could also become a good stock trader or broker by using the extensive knowledge acquired from the internship experience.

If I had to redo my internship

If I had a chance to be an intern again at DSE, I would certainly make a different approach. When I explored departments like the Web Development and Networking, I valued confidentiality very much so I was very careful in asking too many questions that may result in embarrassment. For example, once when a web server situated inside the Web Development caused problems in rendering the DSE website, and the officers were busy finding out and solving the problem technically, I was carrying out a task assigned to me. I was curious to see what code they were writing on the terminal but I could not observe it due to chance of disclosure. Furthermore, at that time I had a vague knowledge of how the market works. So, if I had to redo my internship, I would visit the latter departments first to obtain a good knowledge and then visit the former department. I would also not spend more time on a department than the other, and request to allocate more time equally in each department, perhaps spending few more departments in other divisions other than ICT division, like Research and Information, market operations and surveillance department. My schedule was also somewhat unfortunate where the allocated days of each department were mostly wasted due to off-days. If I had the chance, I would try to visit each department for two weeks. I would also suggest the departments to use solutions like Slack, Microsoft Flow and Microsoft Azure to increase collaboration, automation and harness the power of cloud computing to decrease the cost of running a datacenter, and also relocate disaster recovery (DR) datacenter to a distant place. If there was an opportunity, I would redo my internship few months later when DSE is slated to shift to a larger state-of-the-art new building, which is also its own, that will possibly feature all the latest technologies.

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APPENDIX