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Business Critical Application: An IT Investment Dilemma at a Securities Company¹

Ha Phuong, a customer service manager at one of the top 20 securities companies in Vietnam, TX-Securities, was responsible for testing the recently built million-dollar stock trading system to ensure it satisfied business requirements and trading practices at the company.

The stock market in Vietnam experienced tremendous turbulence during the five years since 2007. Market volume had grown five times with about 500 companies trading shares on the market. There were approximately 60 securities companies competing fiercely in a competitive stock market.

Information Technology (IT) played a critical role in the stock trading system. Most securities companies ran their own stock trading system that was connected to the two central trading systems: one in Ho Chi Minh City (Ho Chi Minh Stock Exchange - HOSX) and one in Hanoi (Ha Noi Stock Exchange – HNX). These stock trading systems could cost up to several million dollars and were developed by both local and overseas IT service providers. IT service providers of the stock trading systems offered customized specification to each client.

There were two main issues that Phuong had identified with the current stock trading system. First, the system was not designed to support the dynamic nature of the business. Core business functions had not been addressed into the design of the system from the start. Additional modules were developed in-house to save development cost and had led to ineffective alignment between business functions and the core system. Second, no longer a well-integrated system as originally planned, the main stock trading system had become over-complex and hard to manage in terms of system quality and supporting future needs of the company.

Given that the company had already invested a million dollars in the current stock trading system, Phuong was in a difficult position. She perceived there to be 2 alternatives. First, the company could continue to use the current system, with a focus on better integrating various system components to match business requirements. She wondered if the current IT resources were capable of performing such a challenging redevelopment task. The second alternative was to start with a new securities trading software application. That could cost even more and would require staff re-training and a lengthy testing process—as well as having a risky outcome.

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Vietnamese Stock Market

Located on the Indochina Peninsula in Southeast Asia (see Exhibit 1 for Vietnam map), the Socialist Republic of Vietnam was one of the fastest-growing economies in Asia. Political and economic reforms (Doi Moi) launched in 1986 have transformed Vietnam from one of the poorest countries in the world, with per capita income below \$100, to a lower middle income country within a quarter of a century with per capita income of \$1,130 by the end of 2010.

In an effort to industrialize and modernize the country, and to maintain stable economic growth and restructure the economy to enhance its efficiency and competition, Vietnam had needed huge capital of investment. Therefore, establishment and development of a securities market in Vietnam to mobilize midterm and long-term capital from both local and international investors into economy through debt securities and capital securities had been an urgent priority. In addition, equitization of state-owned enterprises would create a more open and healthy business environment. On July 10th 1998, the Prime Minister signed Decree No. 48/1998/ND-CP on stock and securities market and a decision to set up two (02) securities trading centers at Hanoi and Ho Chi Minh City.

The Hanoi Stock Exchange (HNX) was established in accordance with Decision No.01/2009/QĐ-TTg by the Prime Minister on the basis of transforming and restructuring Hanoi Securities Trading Center which was established upon Decision No. 127/1998/QĐ-TTg and launched on March 08th 2005. On June 24th 2009, the HNX was inaugurated as a state-owned single-member limited Liability Company with the Ministry of Finance as a representative.

Being an organizer and regulator of the securities market, the HNX had organized share auctions and Government Bond biddings to mobilize capital for the State budget. In parallel, the HNX had operated three trading markets on a modern technological structure, including listed stock market, Government Bond market, and UPCoM (Unlisted Public Company Market).

The ultimate goal of the HNX was to operate a transparent, equitable, and efficient market, and to develop new products, attract domestic and foreign investments, and prove itself as an important capital mobilizing channel of the economy, ensuring the interest of investors and market participants.

Hochiminh Stock Exchange (HOSE) was firstly inaugurated under the name of the Ho Chi Minh City Securities Trading Center (HoSTC) on July 20, 2000, with two initial equity issues listed: Refrigeration Electrical Engineering Joint Stock Corporation (REE) and Saigon Cable and Telecommunication Material Joint Stock Company (SATCOM). Being the major stock trading center in Vietnam, HOSE played the role as the official mechanism through which new government bonds were issued and it also performed as the secondary market for existing bond trading.

The Vietnam stock market had grown rapidly and dramatically, from the two stocks that were traded in the beginning to 586 stocks as of 2010 on both the HOSE and the HNX. It attracted a growing number of domestic and international investors impacting Vietnamese economy and secured its position among the Asian stocks markets when it became Asia's best performing market (Hajrani, 2012). It also became a "crucial channel for companies that want to raise medium- and long-term capital," said Minh Giang Vuong, research officer at Vietcombank Securities.

In the few years leading up to the case, Vietnamese stock traders saw weak performance of the market as a consequence of global financial crisis. Nevertheless, investors still believed that the market remained a good investment opportunity and consequently expected a recovery in the upcoming period. The future seemed secure as long as the investors and stock traders expanded their ability to trade stocks and boosted

their investments, the government supported it through clearer fiscal policies and above all, the Vietnamese economy continued to grow.

Competitive Securities Brokering Market

The Vietnamese stock and securities brokering market focused mainly (52%) in top ten securities companies such as SSI, HSC, VNDS, ACBS, KEVS, BVSC, FPTS, VCBS, and BSB (as of 2012). The remaining 48% of the market was shared by more 95 other securities companies (see Exhibit 2, 3, and 4 for some stock trading figures).

In the Vietnam's competitive brokerage market, securities companies were competing in three main areas to gain market share.

- 1. Competitive transaction fees could be used to entice new customers. Newly established securities companies were more likely to gain market share by reducing transaction fees both directly and indirectly through cash bonus to new accounts. This form of competition was more popular in small and medium securities companies and mainly applied to private investors.
- 2. Value-added technology was offered by securities companies to allow multiple forms of trading, including online transactions, SMS, or telephones, offering speedy online trading, online stock price listing, and stock information searching. Other technological features such as online tools in managing investment portfolio, interest calculation, and advanced buy and sell option were also used to increase customer satisfaction and adding to the competitiveness of securities companies.
- 3. Financial assistance could be offered to investors as a way to win more customers. Securities companies allowed their customers to late pay their purchases and margin call was the main financial incentive tool to attract customers. Margin call was a facility that would allow customers to trade more than the actual money available in their trading accounts.

Investors' Expectation

Local investors became more sophisticated and up to date as the stock market became more comprehensive. Equipped with a wealth of information on share market, improved transparency in policies and regulations, stock investors were asking for professional and accurate report on market and investment opportunities. Local stock investors used to trade on the market for short term gain, reacting to the market in crowd syndrome. As they grew more experienced and sophisticated, they started to focus in medium and long term investment, especially investment funds and large private investors.

Online Stock Trading Technology

Online stock trading technology had become an effective tool for competing among local securities companies. Feature-packed online trading applications would be applied widely to improve efficiency and minimize risk in stock trading. Most stock trading systems commonly offered functions such as:

- Automatic credit granting: offered call margin (lending facility) to investors
- Debt collection: automatically deducting debts from investors' trading account
- Online trading order: placed and sold shares online in real time
- Customer management: offered complete customer transaction management including transactional history, credit rating, and payment transfer

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Such stock trading systems would be used in most securities companies and undoubtedly served as the major foundation for all trading aspects within the stock market.

As for the trading venues, the faster the trading technology could act, especially the more it could achieve and keep up-to-date information, the more valuable to these companies—allowing them to limit the changes of stock prices during the transaction. Many global securities and stock exchange companies had realized the supreme importance of technology in stock trading since they asserted the "dramatic impact of technology onto the company's financial performance" (Flinders, 2007).

In Vietnam, the ability to access to and operate an effective online trading technology was now considered as the decisive element for every securities company's success. To satisfy the key business needs and to support timely and accurate stock transactions, online trading technology therefore demanded better systemization and more detailed specifications that could support different business needs, both at the highest level of accuracy and at the lowest achievable risk.

As the demands on securities companies rose due to its expanding operation and investors' expectation, online trading technology faced some serious challenges. These included huge data volumes, higher efficiency, speed of execution, and, especially, reduction in cost. Overcoming these difficulties could result in companies' stock coverage expansion and remarkably better ability to track and manage stock trading.

TX-Securities Company

TX-Securities was established in 2006 with registered capital of 50 billion VND (around 2.5 million US dollars as of 2012) and recently the capital had increased six fold. The company offered a full-service securities brokerage, servicing individual, corporate, and institutional clients. The company was also a fullservice provider of Corporate Finance Services in Vietnam, taking part a number of major equitization initiatives involving the privatization of Government-owned corporations. TX-Securities set out with the objective of becoming one of the top 20 securities trading companies in Vietnam, first operating with a model that combined discount brokerage and a boutique investment bank, and gradually expanding to financial market in South Pacific Asia. TX-Securities operated in two main locations: Ha Noi and Ho Chi Minh City. TX-Securities strived to be customer-driven and to provide the best quality service and create value for business partners and community alike.

Current Stock Trading System at TX-Securities

Being developed by one of the largest local software providers, the stock trading system at TX-Securities cost over one million US dollars and took more than a year to complete. The system was offered as an open-source core which allowed modification by the company's IT staff. Every department connected to system to utilize various modules of the system. There were 4 main modules in the Stock Trading system (see Exhibit 5) including Customer Contract; Customer CI Account, Customer SE Account, and Customer Order.

- a. Customer Contract (Account opening)
- b. Customer CI Account (Accounting)
- c. Customer SE Account (Securities depository)
- d. Customer Order (Trading)

The open-source core trading system provided a limited set of standardized features only. During its operation, the core trading system was unable to satisfy many business requirements. As a result, several additional features of the stock trading system were further developed by the in-house IT department. Two main modules were developed to add extra features to the core trading system. Module 1 (see Exhibit 6) was an extension to the Customer CI Account core module running on an Internet Explorer browser. Module 1 allowed for a much wider range of financial arrangements to customers, such as: extending credit limit, calculating outstanding debt and borrowing cost. Module 2 (see Exhibit 7) was an extension to the Customer Order module running on Firefox browser which showed a combined listing of all daily transactions for a particular broker and allowed Buy-Sell-Cancellation/Change.

Though providing cost savings in short term, the system was somewhat ineffective in meeting the increasingly complex IT needs of customers and partners. Manual overrides to system operation were frequently required, reducing the creditability of the system. The company's stock trading system was operating unstably and was incurring unexpected errors, demanding immediate action from the IT team. This was a serious issue for IT management that extended across the company.

The company had produced several mandates to address issues of software quality and specifications failing to satisfy key business needs. Reviewing key responsibilities and resources of the IT department to ensure that it focused on what it could do best and was properly resourced—rather than being too ambitious and overreaching—became a priority. Stock trading software, one of the most critical applications in the company, would need to be reviewed thoroughly (including the software core that had been developed externally). It was recognized that the stock trading software needed to be better standardized with other supporting applications used within the company and better positioned to meet the customers' trading needs. Even replacing the current stock trading software was considered—an option that might cost additional hundreds of thousands of US dollars.

Issues with TX Stock Trading System

Phuong had found major issues in the current stock trading system.

First, the "Block" function in Customer SE Account module was having a critical error. Even though a staff blocked some securities in a Customer Account from being sold, a customer could still sell them. It was found that there was an additional unnecessary step to be completed which was not obvious to the system users to really block the securities. Phuong suggested the software provider to combine two steps in to one so that staff could complete the task more easily.

Second, problems were also found with the Customer Order module. For example, every three seconds the system would synchronize customers' stock orders (buy or sell) with the HoSTC and HNX. Under normal market condition, the system worked flawlessly. However, when the system was overloaded with a huge transaction volume, the system froze and lost connection with the central stock exchange. This created a highly adverse situation for customers as buy and sell orders were not completed.

Third, the two extended modules were running simultaneously with the core system and performed duplicate functions leading to system overload at peak trading time. A roll back to core system was required when the extended modules were not working properly. The extended modules to the core system also led to complexity and were hard to manage. Staff had to spend extra time and effort to switch back and forth between the core and extended modules.

Fourth, essential business models had not been incorporated in the original design of the current stock trading system. Module 1 offered extended features for Customer CI account and module 2 offered extended features for Customer SE account. However, the two modules were not integrated with each other. Staff needed to use two modules simultaneously by opening separate windows to access trading information of the same account. To make matters worse, each module worked on different browsers: module 1 worked only with Internet Explorer, module 2 with only Mozilla Firefox. It posed a challenge for new staff who needed to use the system.

Other issues with the trading software were unfriendly system errors (see Exhibit 8). Staff using the system did not know the meaning of the errors. The user, therefore, needed to print the screen and send it to the IT department, which then forwarded it to the software vendor for trouble shooting. Quite often, the software vendor did not provide any explanation as to why the errors happened and sometimes no solution was offered.

Lack of Central Point of Contact for Customer Handling

Phuong had found the current workflow between customers and relevant departments could be improved by reducing the intermediary layer. Developing a single contact point for handling customers' inquiries regarding the online stock trading system was a major objective so that solutions could be offered to customers' inquiries as soon as possible. At least a designated department should take the responsibility of specific problems to avoid pushing around the responsibility between departments.

For example, when a customer logged into the system during trading hours, if the customer needed to analyze a stock, normally the customer would call a stock broker and the broker called a stock analyst who then answered to the broker and broker replied to the customer. Rather than going through the stock broker, it would be more desirable for the customer to contact the Securities Analyst directly, so that the customer would get the stock report faster than before.

Another example occurs when a customer receives an error or a problem with the online stock trading system. Ideally, the customer should be able to communicate directly with IT instead of calling a Broker, who would then invariably forward the issue to the IT department. IT staff sometimes blamed the customer for not using the system properly or not following proper instructions. However, if the customer could speak directly with the IT department, it would be much easier for the IT staff to recognize common types of errors reported (and not to push the responsibility to someone else). The company would know there was an error in the system and fix it promptly.

Currently the TX-Stock Trading System did not allow alteration of the workflow so that a change in the business model could be supported.

Sunk-Cost or Start Afresh?

Starting from a basic core stock trading system that satisfied most requirements for TX-Securities, TX-Trading system had been substantially modified and customized—mostly by in-house IT staff—to meet ever changing trading practice. With the hindsight of saving cost and utilizing existing IT resources, TX-Securities had resorted to in-house customization and development of new modules based on the opensource core system offered by a well-known stock trading software provider. System flexibility and timely response to new business needs were quickly achieved through such an approach. However, as the system grew over time, it became too complex to use and synchronize across all modules and became inflexible to scale.

Phuong had to consider whether the company should continue to use the TX-Trading System to justify the millions of investment already spent or start with a new stock trading system that could be installed to meet full enterprise needs and also provide room for flexibility and scalability. Below were some pros and cons of two options.

Option 1: keep using the current stock trading system

• Pros: reduces substantial re-investment into another system, no staff re-training, no re-running data, time saved in exploring new software and bidding cost.

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• Cons: current system already over complex, containing modules incompatible with the core system. There was lack of integration among the four main functions of the TX-Trading system, which soon became unmanageable in terms of information quality and trading process control. Especially, the current system lacked support for dynamic and changing organization processes.

Option 2: investing in a new stock trading system

- Pros: addresses problems in option 1, conforms to international standardized package which was already used in large securities companies. Most importantly, key business processes are supported right upfront when choosing the suitable system.
- Cons: the company has to accept the sunk-cost lost investment in the current system. The new system would cost even more, require additional staff training, data testing and re-running. It remains unclear if any new system that would provide the level of flexibility and customizability desired that could be managed and controlled so as to avoid previous pitfalls.

Where to start next from here? Phuong picked up the phone to discuss with some major software providers in the financial trading industry.

References and Suggested Readings

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Exhibit 1: Vietnam World Map



Exhibit 2: Market Share of Stock and Fund Certificates (as of 3rd quarter, 2012)

No.	Company names	Abb.	The market share
1	Ho Chi Minh City Securities Corporation	нѕс	12.48%
2	Sai Gon Securities Incorporation	SSI	10.95%
3	ACB Securities Company Ltd.	ACBS	8.08%
4	MayBank Kim Eng Securities Joint Stock Company	MBKE	5.14%
5	Viet Capital Securities Joint Stock Company	VCS	5.07%
6	Vietnam Bank for Industry and Trade Securities Joint Stock Company	VIETINBANKSC	4.04%
7	MB SECURITIES JOINT STOCK COMPANY	MBS	3.60%
8	FPT Securities Joint Stock Company	FPTS	3.56%
9	BaoViet Securities Joint Stock Company	BVSC	3.45%
10	VNDIRECT SECURITIES CORPORATION	VNDS	3.23%

Source: HOSE (Ho Chi Minh Stock Exchange)

Exhibit 3: Trading Activities by Securities in 2011

TỔNG HỢP GIAO DỊCH NĂM 2011 THEO TỪNG LOẠI CHỨNG KHOÁN TRADING ACTIVITIES BY SECURITIES IN 2011

Cổ phiếu (Stocks)

Phương thức Giao dịch <i>Trading method</i>	Khối lượng Volume			Giá trị (tr. đồng) Value (VND million)			
	2011	2010	+/-(%)	2011	2010	+/-(%)	
Khớp lệnh Order-matching	6.540.499.520	10.486.614.950	-37,63%	118.184.067	335.525.484	-64,78%	
Thoà thuận <i>Put-through</i>	1.741.142.889	1.156.731.538	50,52%	40.971.093	40.986.872	-0,04%	
Tổng cộng <i>Tótal</i>	8.281.562.409	11.643.346.488	-28,87%	159.154.159	376.512.355	-57,73%	

Chứng chỉ quỹ (Fund Cer.)

Phương thức Giao dịch <i>Trading method</i>	ŀ	Chối lượng <i>Volume</i>		Giá Valu	i trị (tr. đồng) « (VND million)			
	2011	2010	+/-(%)	2011	2010	+/-(%)		
Khóp lệnh Order-matching	38.231.630	148.210.700	-74,20%	279.957	1.527.370	-81,67%		
Thoá thuận Put-through	23.013.890	29.154.370	-21,06%	144.771	262.162	-44,78%		
Tổng cộng Total	61.325.520	177.365.070	-65,47%	425.032	1.789.532	-76,27%		

Trái phiếu (Bonds)

Phương thức Giao dịch Trading method	Khối lượng <i>Volume</i>			Giá trị (tr. đồng) Value (VND million)			
	2011	2010	+/-(%)	2011	2010	+/-(%)	
Khớp lệnh Order-matching	0	0	0.00%	0	0	0,00%	
Thoà thuận <i>Put-through</i>	17.117.687	28.586.070	-40,12%	1.635.361	2.384.587	-31,42%	
Tổng cộng <i>Total</i>	17.117.687	28.586.070	-40,12%	1.635.361	2.384.587	-31,42%	

Source: Ho Chi Minh City Stock Exchange

Exhibit 4: Monthly VN Index Fluctuation in 2011

HOẠT ĐỘNG GIAO DỊCH BIẾN ĐỘNG CHỈ SỐ VN INDEX THEO CÁC THÁNG TRONG NĂM 2011 MONTHLY VN INDEX FLUCTUATION IN 2011

Tháng Monté	Số phiên giao địch Number of sessions	Đóng cửa đầu tháng Beginning	Cao nhất trong tháng <i>Highes</i> t	Ngày Date	Thấp nhất trong tháng <i>Louvst</i>	Ngày Date	Đông cửa cuối tháng Esding	Khối lượng khóp lệnh Order- Matching volume	Giả trị khóp lộnh (tr. đưn) Order- matching value (million VMD)
1	19	485,97	525,7	24/01/2011	477,41	11/01/2011	510,6	600.923.820	14.860.547
2	15	520,69	528,69	09/02/2011	459,77	24/02/2011	461,37	504.055.130	11.660.084
3	23	466,12	495,06	11/03/2011	449,78	03/03/2011	461,13	679.162.310	14.681.340
4	19	459,17	480,08	29/04/2011	453,59	19/04/2011	480.08	366.074.620	7.511.735
5	20	486,58	486,58	04/05/2011	385,97	25/05/2011	421,37	438.772.720	8.354.856
6	22	435,69	461,93	03/06/2011	422,98	01/06/2011	432,54	639.513.340	10.777.219
7	21	425,29	432,15	06/07/2011	402,78	29/07/2011	405,7	325.219.800	5.499.764
8	23	401,95	424,88	31/08/2011	380,97	11/08/2011	424,71	533.694.080	8.294.141
9	21	435,29	470,87	16/09/2011	426,13	30/09/2011	427,6	920.673.200	43.841.581
10	21	422,12	426,89	31/10/2011	401,15	19/10/2011	420,81	510.487.780	7.730.082
11	22	413,82	418,77	01/11/2011	377,46	22/11/2011	380,69	493.130.110	6.919.248
12	22	380,1	393,92	06/12/2011	346,84	27/12/2011	351,55	567.024.240	7.732.956

Source: Ho Chi Minh City Stock Exchange



Exhibit 5: Open-Source Core Stock Trading System

Exhibit 6: Customized Module 1 – Customer-Cl

		SECU	RITII	ES ®						
⇒ Chức năng •	Nơi lầm việc: Chi nhánh HC	CM			Người d	ùng:	J		Thứ Tư 20/2/	Working Day: 20/02/
Quản lý chung						Infoma	tion Accocu	unt		
Q	5ô tài khoản: ()00000.0		0 👌 Sa	o kê	ACContract	🗘 TranSECI				
Infomation Accocunt	🛈 Thông tin hạn mức									
	* Nhấn F8 để cấp hạn mức T+									
	Tài sàn ròng Margin:					Tỷ lệ ký quỹ hiện tại			(%) Tỷ I	ê ký quỹ chung:
Transfer Data	Tài sàn ròng:					Hạn mức CK tối đa			Cá tiền cá	
0	Sức mua:					Due nor han mise	_			
Auto action	Han mire T0:					bù hộ hại hao]	
	Đã cấp T0:					Dự nợ phi Hạn mức còn lại]	
Aller Post	D Thông tin chi tiết tài khoản									
	Danh mục chứng khoản								Thies die:	GTCK T0:
	STT Mã CK TLKQ CK khả dụng	CK T2	CK T1	CK TO	Giá Margin	Giá trị	Giá TC	Giá trị	-) - /	
			τį.		Tông giá trị:	0		0	Tiên bản:	GTCK T1:
		Tổng gi (Giá	á trị Tài khoả trị này không	n tính theo g sử dụng để	iá tham chiếu: cấp hạn mức)			0	Nợ TO: 0	GTCK T2:
	Danh mục chứng khoán chờ khớp lệ	ệnh mua								
Ung trước	STT MÄCK TLKQ			SL chờ	Giá Margin	GT Margin	Giá TC	Giá trị		
LVMargin	Nợ Chờ khớp:		0		Tổng giá trị:	0		0		
DPMargin										
1+Service	🛈 Thông tin nhà đầu tự									
IReport	Họ tên:							Ngun	ời ủy quyền:	

Exhibit 7: Customized Module 2 – Customer Order

Securities -							
🖳 Hệ thống Thông	; tin thị trường	Lệnh Tra cứu	Báo cáo Hiển thị	Hướng dẫn			
Mua Bán	Hủy-Sửa	1			VN ▶ 490.	7 0.00(0.00%) KL	: 0 GT: 0.00
Thông tin khách hàng	Lệnh đặt tron	g ngày					
Số Hiệu Lênh	TK Sub	Thời Gian	Мã СК	Loai Lênh	KL Đắt	Giá đặt	KL Khớp
0001200213000067	009688-1	08:52:46	СТБ	Mua LO	2,800	22,200	n
0001200213000057	008299-1	08:47:48	СТБ	Mua LO	5,000	22,200	0
0001200213000056	009618-1	08:46:27	SJS	Bán LO	5,000	25,000	0
0001200213000055	008299-1	08:46:14	CTG	Mua LO	6,000	22,200	0
0001200213000053	000885-1	08:41:41	REE	Mua LO	5,000	19,900	0
0001200213000052	000885-1	08:41:27	REE	Mua LO	5,000	20,000	0
0001200213000051	003761-1	08:40:25	MAX	Bán LO	4,400	5,400	0
0001200213000050	000885-1	08:40:17	SSI	Mua LO	5,000	18,300	0
0001200213000049	000885-1	08:40:04	SSI	Mua LO	10,000	18,100	0
0001200213000048	003761-1	08:40:01	MAX	Bán LO	4,000	5,300	0
0001200213000047	000885-1	08:39:32	VND	Mua LO	10,000	9,900	0
0001200213000046	006332-1	08:39:19	VNE	Mua ATO	1,500	7,400	0
0001200213000045	000885-1	08:39:18	BVS	Mua LO	10,000	12,400	0
0001200213000044	000885-1	08:37:31	SCR	Mua LO	10,000	9,000	0
0001200213000043	000885-1	08:37:18	SHB	Mua LO	10,000	7,300	0
0001200213000042	000885-1	08:37:04	KLS	Mua LO	10,000	10,200	0
0001200213000041	000885-1	08:35:59	SAM	Mua LO	10,000	8,500	0
0001200213000040	000885-1	08:35:36	KSS	Mua LO	10,000	7,800	0
0001200213000039	000885-1	08:35:23	KSS	Mua LO	10,000	7,800	0
0001200213000038	000885-1	08:34:16	SCR	Mua LO	10,000	8,900	0
0001200213000037	000885-1	08:33:41	SCR	Mua LO	10,000	8,800	0
0001200213000036	000885-1	08:33:11	SHB	Mua LO	10,000	7,200	0
0001200213000035	000885-1	08:32:50	SHB	Mua LO	10,000	7,200	0
0001200213000034	000885-1	08:32:15	KLS	Mua LO	10,000	10,000	0
0001200213000033	000885-1	08:32:05	KLS	Mua LO	10,000	10,100	0
0001200213000032	003739-1	08:30:11	КТВ	Bán LO	800	8,600	0
Tìm theo tài khoàn	Tìm theo mã ck	Theo giá Khố	ip mua:	Kho	óp bán:	KL chà	r: 235,900
Trần Sản TC M3 0 0 0 0	M2 M1 0 0 0 0 0 0	Khóp B1 B2 0 0 0 0 0 0	2 B3 0 0 0 0				

Exhibit 8: System Error Messages

searching exercise
Enter transaction
Transaction code: 2240 Depository
Posting date 10/08/2011 Internal securities code PTC Công ty cổ phần Đầu tư và Xây dựng Bưu điện
INDEX 3.0
System.Web.Services.Protocols.SoapException: Server was unable to process request> parserexception: Unknown variable IS33331 at position 14 Server stack trace: at Host.txRouter.Transact(XmlDocument& pv_xmlDocument) at System.Runtime.Remoting.Messaging.Message.Dispatch(Object target, Boolean fExecuteInContext) at System.Runtime.Remoting.Messaging.StackBuilderSink.SyncProcessMessage(IMessage msg, Int32 methodPtr, Boolean fExecuteInContext) Exception rethrown at [0]: at HOSTChannel.HOSTDelivery.Message(Byte[]& pv_arrByteMessage) End of inner exception stack trace
ОК

Enter transaction			X
Transaction code: 2245	Inward SE Transfer		
Posting date 10/08	3/2011		^
Internal securities code PTC	Công ty cổ phần Đầu tư và Xá	ây dựng Bưu điện	
Transfer From 040	Cty CP chứng khoán Đại Dương		
Sub Acctno is333	3.1		
Credit contract			
Credit SE Account No	INDEX 3.0		_
Inward price 10,00	00 (1) Invalid input value!		
Quantity			~
	[]	Ōĸ	Cancel