

**Internship On
Multi factor authentication in network security**

BY

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Computer Science and Engineering.

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DAFFODIL INTERNATIONAL UNIVERSITY

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APPROVAL

This Project/Internship titled “**Multi Factor authentication in network security**”, submitted by Maria tuz zannah (141-15-3191) to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on Monday 7th May 2018.

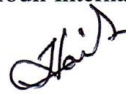
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I hereby declare that, this Internship has been done by us under the supervision of **Md. Ahmed Al Marouf, Lecturer, Department of CSE** Daffodil International University. I also declare that neither this Internship nor any part of this Internship has been submitted elsewhere for award of any degree or diploma.

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13.5.18

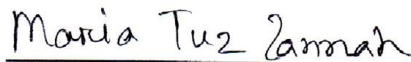
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Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

As a student of CSE, I have continue my internship report in ITCL under “network and security dept.”, Activities of Information Techonology Consultant Limited. During my internship program, I have tried my best to collect the information related to the topic that is on the “multifactor authentication” and prepared the report within a short time. The project is all about security and the privacy of the account holder of bank account or any social media user. It is also useful for the government security in the long run because now ‘multifactor’ is a security term which proves very much useful in network security. And the other part of my internship is that observing the data center of a renowned company ITCL, which is a registered company of Dhaka stock exchange and also Chittagong stock exchange. That is actually a major opportunity for me to work on a project. then I regard for my mistake in this report. The report is a requirement of the internship program for my Bachelor of Science course, degree. The organization attachment started on February 2018, and end on April 2018 in ITCL as a full time. Lastly I give to my opinions about my learning report and recommendation there by.

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CHAPTER 1

Introduction

1.1 Introduction

Multi-factor authentication (MFA) is a method of confirming a user's claimed identity in which a user is granted access only after successfully presenting 2 or more pieces of evidence (or factors) to an authentication mechanism: knowledge (something they and only they know), possession (something they and only they have), and inherence (something they and only they are).

Two-factor authentication (also known as **2FA**) is a type (subset) of multi-factor authentication. It is a method of confirming a user's claimed identity by utilizing a combination of *two* different factors: 1) something they know, 2) something they have, or 3) something they are.

A good example of two-factor authentication is the withdrawing of money from a ATM; only the correct combination of a bank card (something that the user possesses) and a PIN (personal identification number), something that the user knows) allows the transaction to be carried out.

Two-step verification or two-step authentication is a method of confirming a user's claimed identity by utilizing something they know (password) and a second factor other than something they have or something they are. An example of a second step is the user repeating back something that was sent to them through an out-of-band mechanism. Or the second step might be a 6 digit number generated by an app that is common to the user and the authentication system.

According to proponents, multi-factor authentication could drastically reduce the incidence of online identity theft and other online fraud, because the victim's password would no longer be

enough to give a thief permanent access to their information. However, many multi-factor authentication approaches remain vulnerable to phishing, man-in-the-browser.

1.2 Motivation

I am currently pursuing my bachelor in computer science engineering at our University, we understand the importance of gaining practical knowledge which will complement the textbook knowledge and help a student gain a wider perspective of the subjects.

During the course I have found that I am decently skilled in the area of computer networking security, as my teachers and other students of 4 years will rightly testify. I've had a knack of getting my point across very well, communicating with people, understanding their needs and providing them with a value proposition which is truly hard to refuse. My skills lie in my ability to comprehensively read and understand the situation and act quickly and yet smartly.

1.3 Goals

- Learn details about the networking components,
- Setup better secure connection,
- Network management,
- Server configuration,
- How to communicate with clients.
- How to provide better service to clients.

1.4 Internship Objectives

- The main objective of education is to acquire knowledge.
- I choose an internship because I wanted to benefit from the experience.
- I wanted a new challenge and to learn, improve and develop new sets of skills.
- Working as a Network Support Engineer performing duties and activities and analyzing them from different perspectives.
- To fulfill the requirement of the internship program under CSE program.
To gain detailed knowledge about Authentication security

1.5 Introduction To The Company

IT Consultants Limited (ITCL), a public limited company and the Licensed Payment System Operator (PSO), and first ever PCI DSS Certified Company in Bangladesh formed in 2000 and introduced its technology and business operations in the year 2001. IT Consultants Limited, a local leader in providing end-to- end payment services enabler and the winner of BASIS-Daily Star ICT Award 2015 for best IT Solution Provider (Local Market Focus). ITCL deploys world-class payment infrastructure, services and technology to Banks, Governments, Financial and Non-Financial Institutions. ITCL's payment systems solutions are further recognized, accredited and certified by organizations and governing bodies such as Visa, MasterCard, AMEX, while continuing to develop their partnership with clients and associates so that it remains dynamic and maintaining its cutting-edge offerings even as market needs become more and more sophisticated. By providing a broad range of payment solutions, ITC today deploys its products and services to multiple clients across various vertical segments not limited to banking and financial services institutions, telecommunications, transportation and retail.

In short we implement and support:

Services:

- Transaction switching
- Debit Management
- Credit Management
- e-Commerce
- Mobile Financial Service (MFS)
- Postal Cash Card for Bangladesh Post Office
- Online Tax Payment
- POS Terminals
- Smart card personalization
- ATM processing and Account Aggregation
- Merchant Transaction Processing
- ATM Network

- ATM Sales
- Card Management , 24/7 Help Desk

CHAPTER 2

Organization

2.1 About The Company

Established in 2000, IT Consultants Limited (ITCL--owns payment processing consortium, which is popularly known as 'Q-Cash') is the local leader in the rapidly evolving arena of Electronic Payment & Transaction Processing System. The Company has converted to Public Limited Company under The Registrar of Joint Stock Companies and Firms (RJSC) in 2009.

ITC Limited provides to major Banks, Financial Institutions, Government organizations and retailers with an advanced infrastructure for Transaction Processing Services while operating one of the largest Bank driven independent ATM network in Bangladesh.

ITCL is always thrives and innovate new ideas to build a growing electronic transaction processing capacity in Bangladesh through further investment and R&D. Presently the company provides credit and debit card processing services, Q-cash ATM & POS sharing to more than 26+ Banks in the region, ATM sales & support, POS sales & support, KIOSK-Deposit machine sales & support, SMS Solution, Biometric Solution, Remittance management services and manages the most extensive shared ATM networks. Moreover, ITCL has arranged Network sharing facility with Dutch-Bangla Bank Limited Network & OMNIBUS Network.

ITCL, provides total end-to-end card solution, banking technology and information solution as well as solutions for card personalization, key management, ATM installation and maintenance and EFTPOS (Electronic Fund Transfer at Point Of Sales) machine installation and maintenance and the entire transaction processing. We also provide consultancy services to financial institutions to get certifications from Global Payment Card associations to assist them in getting issuing/acquiring licenses.

ITCL also operates with a rapidly rising number of ATM terminals strategically located across the country and wide spread of POS terminals at various Merchant locations and Bank branches to serve the Card transactions of our clients.

ITCL started its operation with proprietary Smart Cards, now extends to various International Brands and Proprietary labeled Credit, Debit, Pre-paid, Remittance cards with Chip based and MagStripe.

2.2 Product and Market situation

Switching Solutions:

ITC provides a high-performance scalable multi-card processing solution enabling efficient electronic funds transfer, inter-network switching and the handling of an unlimited number of devices and delivery channels. Choosing a system to meet current requirements is relatively straightforward, the real challenge lies in finding one that is flexible enough to meet the demands of the future. In retail banking, card front or back office are reluctantly replaced due to the immense amount of time, human and financial resources involved. Therefore it is important to invest in a fully customizable and future proof solution. TranzWare Switching (TranzWare Online) is a highly efficient, fault-tolerant engine for the switching, routing and authorization of electronic payment transactions as well as for terminal network driving. The system was specifically designed to deliver great flexibility and options for system expansion unrestricted by hardware, operating system, networks and host systems, financial products, types of transactions, devices and delivery channels. Its unrivalled advantage lies in the advanced customization capabilities, extensive library of interfaces, near-linear scalability and a number of advanced modules allowing customers to build a unique processing system that easily meets all industry requirements and accommodates customer expectations.

E-Commerce through Q-cash Payment Gateway:

ITCL has successfully established & launched the secured Q-cash Payment Gateway (Q-cash PG) to facilitate valued cardholder's for purchasing goods and services and transfer of funds through on-line electronic payments. Q-cash payment gateway is providing host-to- host interaction with issuers and acquirers as well as International Payment networks. It will perform authentication of electronic transactions in compliance with 3-D secure standards and allows customer identification from an issuer as well as acquirer's side. Our Q-cash PG also has additional security features including various access certificates, digital signature verification, as well as support of DPA/CAP (Dynamic PassCodeAuthentication / Chip Authentication Program). The solution is designed to be suitable for issuers as well as acquirers. Any VISA/Master/AMEX or Q-cash proprietary branded

cards will be able to transact through this payment gateway. Currently 100+ Merchants are receiving online payment through Q-cash Online Payment Gateway.

- Online TAX, VAT, Custom Duty Payment
- Online Passport Fees Payment
- Online Payment for Bangladesh Cadet College

Mobile Financial Services:

We have successfully launched our Mobile Financial Services/M-Commerce to facilitate your valued cardholders' buying goods and services and transfer of funds through mobile phones. This is also to inform we have implemented a unique idea of Digital Wallet/Money which is an Electronic Virtual Prepaid Card with M-Banking Facilities that utilizes ATM and all kinds of electronic Communication Technologies including mobile phone. In addition, Electronic Prepaid Card would be used to deposit or draw cash directly from the ATM and other delivery channels. Digital wallet / money enable subscribers to quickly, easily, and securely transfer balances to other subscribers via mobile phones. Transfers are carried out electronically, requiring no intermediary. Any mobile subscriber can avail the mobile money services.

Postal Cash Card:

In sync with the "Digital" concept of The Honorable Prime Minister, and to more dynamic and service oriented, Bangladesh Post Office has also introduced Electronic Fund Transfer (EFT). IT Consultants Limited and Bangladesh Post Office has rolled out this massive project under joint collaborations and revenue sharing basis. ITCL/Q-Cash is giving total technology solution and knowledge transfer for these services. The EFT Solution and Postal Cash Card is also integrated with Mobile Payment Platform (MFS).

Moreover, EFT POS Terminals are GPRS-enabled; as a result there is no limitation on mobility. Postal Cash Card can be used by all Government entities and subsidiaries to facilitate value added services by tagging this card with their system. Card to Card (P2P) transfer, account to card, card to mobile wallet, G2P subsidies, pension, grants and P2G taxes and other Governmental revenues can also be facilitated. The Postal EFT Money Order Service shall be available with an extensive

network of nearly 10,000 Postal Branches across the Country.

Online Tax Payment:

The National Board of Revenue (NBR) in collaboration with the World Bank are jointly introducing an e-payment system using Q-cash Network through Sonali Bank with an objective of reducing taxpayers' hassles by automating the payment of taxes, VAT & other regulatory taxes. After the introduction of the e-payment method, people will be able to pay taxes online, or through the ATM booth by Debit or Credit cards from anywhere in the Country through Q-cash.

EGPP (Employment Generation Program for the Poorest) Project:

The Government of Bangladesh Introduced the Employment Generation Program for the Poorest (EGPP) in 2008 to cushion the negative effects of the food crisis on the poor and was then reconstituted to provide short-term employment during agricultural lean seasons to poor and vulnerable households. The EGPP is one of Bangladesh's largest safety net programs and is poised to, with assistance from the World Bank; introduce policy and implementation changes to improve its operations. The implementation ministry for EGPP is the Disaster Management & Relief Division (DMRD) of the Ministry of Food and Disaster Management (MoFDM). One of the important aspects of EGPP project is Attendance Verification Service (AVS). ITCL (IT Consultants Limited) was appointed as the AVS provider of the project by the World Bank and had the opportunity to introduce a new system of keeping a track of all the workers that were present at the worksites.

CCT (Conditional Cash Transfer) Project:

The objective of the project is to make Electronic payments to the beneficiaries under Conditional Cash Transfer (CCT) for Human Development Through Local Governments. Ministry of local government, rural development and cooperatives along with Bangladesh Post Office (BPO) is responsible to Transfer Cash benefits through Postal Cash Card. ITCL rolls to act as the technical partner of BPO for a secured disbursement system.

ATM Driving:

ITCL operates the country's largest ATM driving Network. More than 2500 different model ATMs are directly connected and derived through Q-Cash Network. Q-Cash Network is also connected with other ATM networks and National Payment Switch of Bangladesh.

Online Tax Payment:

The National Board of Revenue (NBR) in collaboration with the World Bank are jointly introducing an e-payment system using Q-cash Network through Sonali Bank with an objective of reducing taxpayers' hassles by automating the payment of taxes, VAT & other regulatory taxes. After the introduction of the e-payment method, people will be able to pay taxes online, or through the ATM booth by Debit or Credit cards from anywhere in the Country through Q-cash.

Banking Solution:

ITC provide a leading universal banking software solution that is SunGard System Access. Though we are new in the core banking solution business but we have already negotiated different prominent Bank who is actively considering our solution. We have already given the demonstration also.

POS Terminals:

ITC provides a cutting-edge POS solution that is capable to operate as Merchant POS and Bank POS. The competitive advantage for ITC is, the POS application software has developed by ITC itself and it can customize the POS application as per Bank/client requirement.

KIOSK-Deposit Machines:

ITC has captured market through its own manufactured KIOSK. The KIOSK application software has developed by R&D team of ITC; hence ITC can provide total support to clients resulting almost 90% market share controlled by ITC.

Remittance Distribution Solution:

As ITC is the only player in the field, so there is no scope of competition and ITC is determine to control the market.

SMS Solution:

ITC is the only entity in the country to offer card-based SMS solution which is totally capable to interface with Switching Software, resulting real-time transaction notification without core banking access. Biometric ATM Solution ITC has developed Biometric ATM solution first time in Bangladesh and has implemented in Cambodia. No other organization in the country to offer such solution.

In addition, ITC has taken enormous initiative for cross-border Network sharing arrangement with different international organization in Malaysia, Singapore, Middle East, etc.

Situation now:

In relation to the products and services provided by IT Consultants Limited; the market situation is very positive. If we think about overall IT Sector; Software and IT service industry in Bangladesh has crossed a long road over the last few decades. It has matured. The industry no more remains at the sideline. It joined the mainstream. The presence of high number of young professional is one of the distinctive features of this industry. In last decade many tech savvy young graduates, some of them returning from abroad after finishing education, have engaged in the IT business or job. Despite various local and global challenges, these young spirited have done remarkably well in building sustainable IT Infrastructure through their hard work and passion.

If we think about IT Infrastructure of Banking industry that has been dealt by IT Consultants Limited for years, it is our pride that the Banking industry in Bangladesh is most developed in usage of Information Technology. Almost all the Banks in Bangladesh have been using IT equipment for general banking and office operation. Almost all the banks are using Core Banking Solution and facilitating their customer with 'Online Banking' services.

In addition, more than 95% banks are using Card management System, Electronic Fund Transfer System, Debit, Credit or Prepaid Cards. Which is remarkable. At least 90% banks have their own ATM or POS terminals. More than **80%** Bank customers are availing e-Commerce Services. Like other developed countries, Bangladeshi people are also enjoying online shopping facility.

Currently there are **more than 7000 ATM; 35,000 POS terminals are in operation. More than 200** companies are selling their goods and product using online Payment Gateway. Bangladesh government has also been using all these Electronic Banking system for long. Different government organizations have already been automated and facilitating citizens with IT enabled services.

Moreover, Bangladesh bank recently have launched National Payment Switch that made all banks in Bangladesh to use inter-operable transaction between banks. And using this facility fund transfer, money withdraw, money deposit shall be very easy and useful.

Considering the above facts, we can say that the market situation of Bangladesh (Considering Banking IT Sector) is growing and positive. The business opportunity is vast.

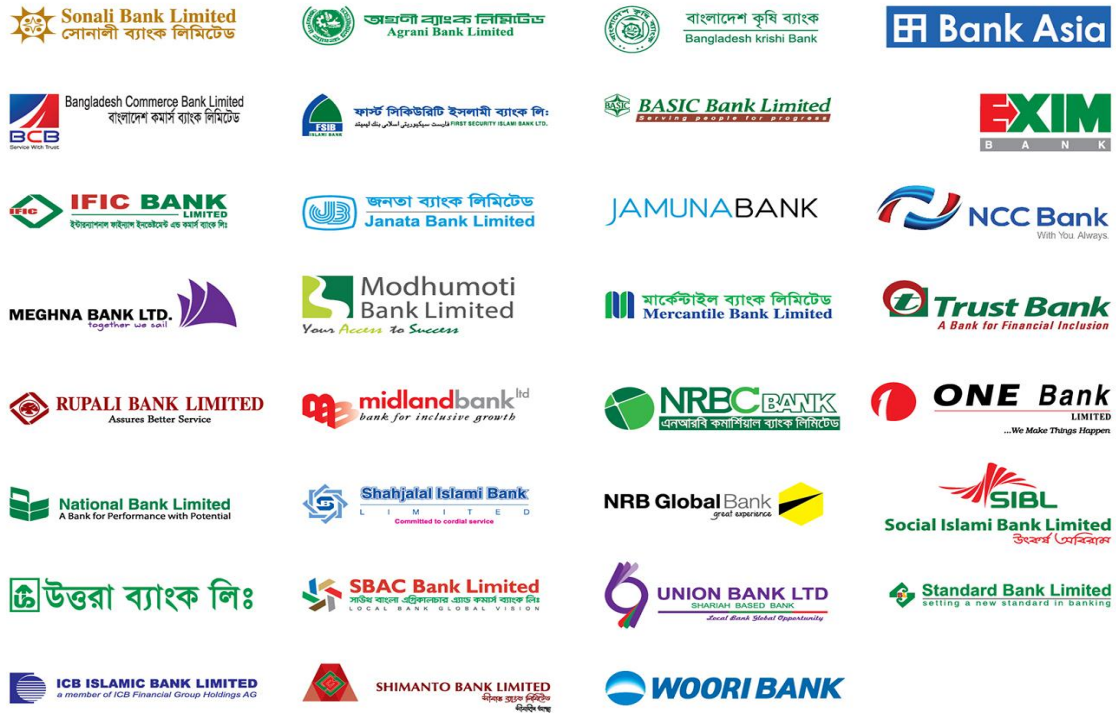
2.3 Target Group

Given the current state of the economy, having a well-defined target market is more important than ever. ITCL targets various group of industries including Banks, NBFI, Government entities, financial institute, client banks, etc....

SO, for today's time this company has so many target group those are gathered in a figure above:

ITCL - Client List

Name of the Members Banks



Other Financial Institution



Other Client Banks



Government Entities



Fig1:target group[ITCL website, www.itcl.bd]

Targeting a specific market does not mean that you are excluding people who do not fit your criteria. Rather, target marketing allows you to focus your marketing dollars and brand message on a specific market that is more likely to buy from you than other markets. This is a much more affordable, efficient, and effective way to reach potential clients and generate business.

2.4 SWOT Analysis

A SWOT analysis is an analytical technique used to determine and define several key characteristics: Strengths, Weaknesses, Opportunities, and Threats – SWOT.

SWOT analyses can be applied to an entire company or organization, or individual projects within a single department. Most commonly, SWOT analyses are used at the organizational level to determine how closely a business is aligned with its growth trajectories and success benchmarks, but they can also be used to ascertain how well a particular project.



Fig

2 -SWOT analysis [how to do SWOT analysis,<https://www.wordstream.com>]

IT Consultants Limited: SWOT Analysis

Strength

1. Skilled resources:

In IT Sector, lack of skilled resources is the main problem of most IT based company. It is true that we have lots of graduates with IT background but most high skilled people are working in abroad. On the other hand, our local IT market is growing day by day. Therefore, high skilled IT resources become insufficient and expensive. There are many example where small IT business has been shut due to not having skilled resources. Considering the above fact, IT Consultants Limited is in better position than many other ICT Companies in Bangladesh. It has more than 350 skilled technical resources who know their job very well and satisfying their clients for last 17 years.

2. Exclusive Partnership:

ITC has exclusive partnership with some local and international companies and it has been maintaining its exclusive business as per vendors' expectation. For example, ITC has exclusive partnership with European switching solutions vendor as well as ATM vendor. Therefore, ITC does not have to compete with other partner with the same branded solutions. Obviously ITC has to compete with other companies with other branded solutions but not the same branded solution.

3. End-to- end Solutions

It should be considered as the most unique business policy of ITC. To enable anelectronic payment system or IT based banking project it needs several solutions that includes several software a compatible hardware system, data center etc. ITC realized this fact and prepared its business in a way so that it can provide an end-to-end solutions for an electronic payment system. ITC provides software, hardware, data hosting and a complete solution for a project.

4. Nationwide coverage:

Almost all the services and products of ITC are designed to cover whole Bangladesh and in some content overseas link as well. ITC made a consortium of 32 banks and provides all services to all members. Therefore, one particular service become available for all member banks and therefore, it covers whole Bangladesh very easily.

Weakness

1. ITC does business with its vendor exclusively. Therefore it cannot supply any software or any hardware. Sometimes many business opportunities become available but due to exclusive contract with its' vendor ITC cannot grab some business.
2. ITC is following central divisional management system. It became difficult to manage overall operation all over the countries. ITC has only few regional offices. It needs to spread its divisions to different regions in Bangladesh.

Opportunities

1. Even though ITC has been engaged with different kinds of IT business; many business opportunities are still available. In Bangladesh IT sector is growing. ITC is mainly working with electronic Payment for banking and financial organizations. However, now a days many other opportunities are available. Like electronic security, since IT usage is increasing, electronic threats are also increasing. Therefore, it is the right time to start work on this solutions before other companies'.
2. E-Commerce is the finest as well as most successful IT business in developed world. Even though ITCL has been engaged with e-Commerce business and successfully launched several e-Commerce projects with some government organizations; it is time to engage with retail e-Commerce business.
3. Since ITC is the exclusive partner of some European product & solutions; it may spread its

business in some South-Asian countries.

Threat

1. ITC is providing hosted model IT based service and the main clients of this company is different banks and government organization. All these entities has enough fund to establish their own system. Even though IT sector is still growing; some of ITC's clients found that establishing their own system is commercially unprofitable, but still it's a threat to ITC's business.

2. The solution costs and operational expenses of IT services are increasing day by day but the IT clients willing to decrease service fees every year. This issue become a threat to ITC and this company needs to work on this.

2.5 Organizational Structure

Organizational structure is a system that consists of explicit and implicit institutional rules and policies designed to outline how various work roles and responsibilities are delegated, controlled and coordinated. Organizational structure also determines how information flows from level to level within the company.

The typically hierarchical arrangement of lines of authority, communications, rights and duties of an organization. Organizational structure determines how the roles, power and responsibilities are assigned, controlled, and coordinated, and how information flows between the different levels of management.

Functional Organizational Structure. As you can see, companies use this type of structure when they want to organize their operations into departments, grouping employees with shared skills and knowledge, such as marketing or sales, together.

The 6 Building Blocks of Organizational Structure

- 2) Span of Control. Span of control refers to the number of subordinates a superior can effectively manage.
- 3) Centralization. Who makes the decisions in an organization? ...
- 4) Specialization.

- 5) Formalization.
- 6) Departmentalization.

Organizational structure examples

There are several types of organizational structures, but 3 of them stand out, with the first presenting 3 sub-types.

Let's discuss the characteristics of each of them and exemplify business areas that best fit these different organizational structure styles.

1- Inline, functional and staff aligned structures

The traditional inline structure is organized in such a way in which a president or CEO is at the top. Then there are directors or VP's of specific areas, followed by managers and so on. And operational personnel are at the bottom, like in this figure:

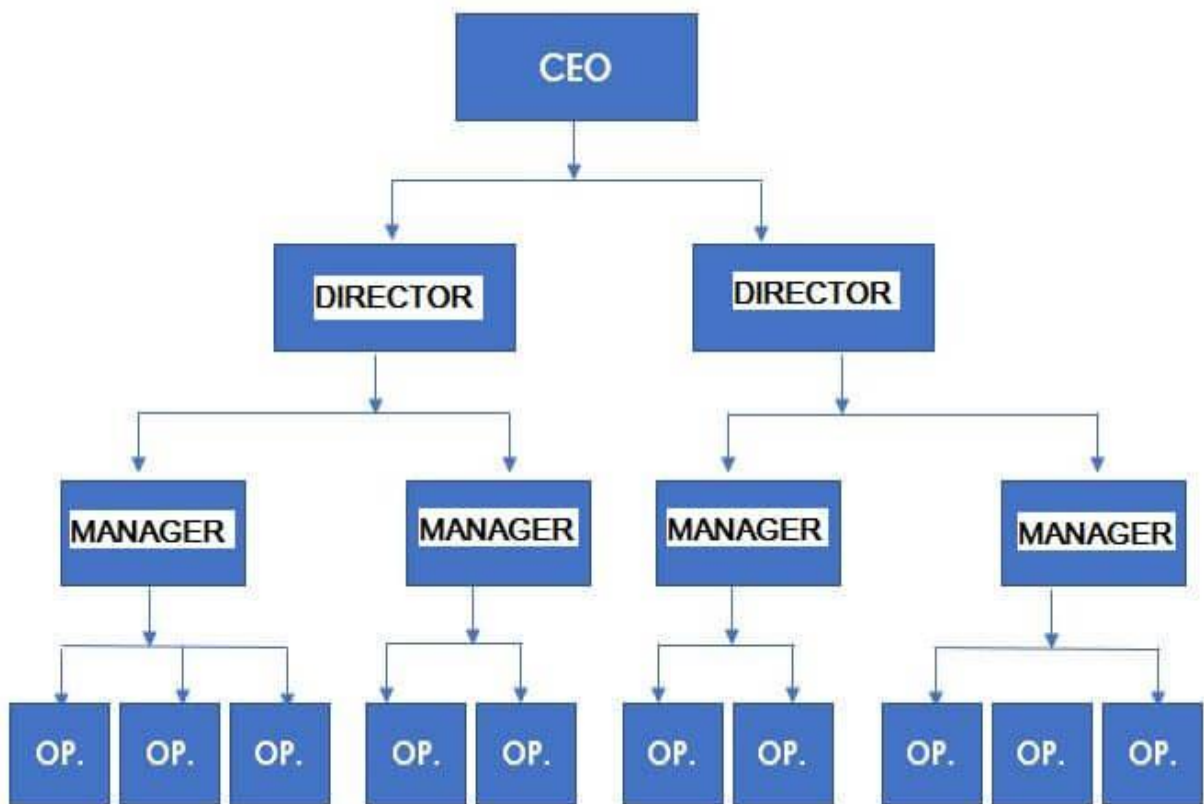


Fig 3 -In line structure

This is a very rigid structure, with little information exchange, typical of bureaucratic companies in which there is little collaboration.

Nowadays, it's not usual but still practiced on the military, religious, and even academic organizations. In this way, one area doesn't interfere with the work of the other and staff only obey the 'orders' of the immediate superior.

Organizational structure examples – Functional

The functional organizational structure is similar to the Inline structure; the difference is that **employees in an area need to report to many directors**. Bottom of FormFor instance, an HR manager may call upon a finance department employee to handle a matter related to this area, as well as that of IT and others. This is a way to combat centralization and excessive specialization in tasks in your area.

Here's what this hierarchy looks like:

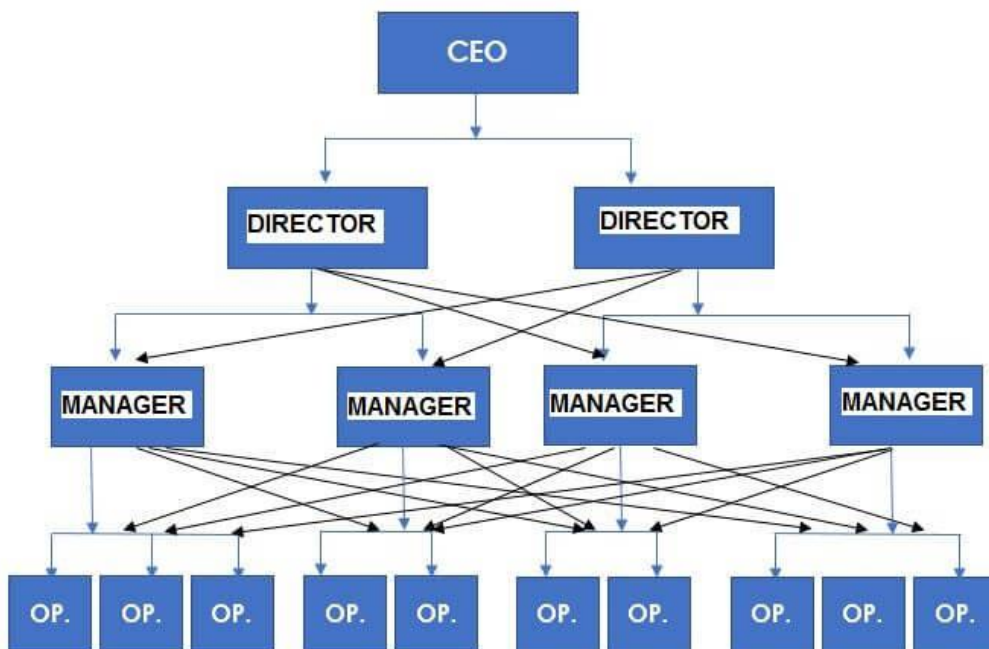


Fig 4 -functional structure

This is the most active structure today in many companies and organizations, but this doesn't mean that it's the best.

Everything will depend on the relationship between managers and, especially, on the appropriate use of Information Technology to aid in internal communication.

This is one of the best organizational structure examples, which is in use in manufacturing, hotels, medium-sized car repair shops, medical clinics, or another type of businesses, where informal structures allow for functional control over employees without generating conflicts between managers.

Organizational structure examples – Staff aligned

In this case, the organizational structure of the company is similar to the Inline structure. The difference is that there is staff that advises, gives opinions, makes reports, authorize and support the organization.

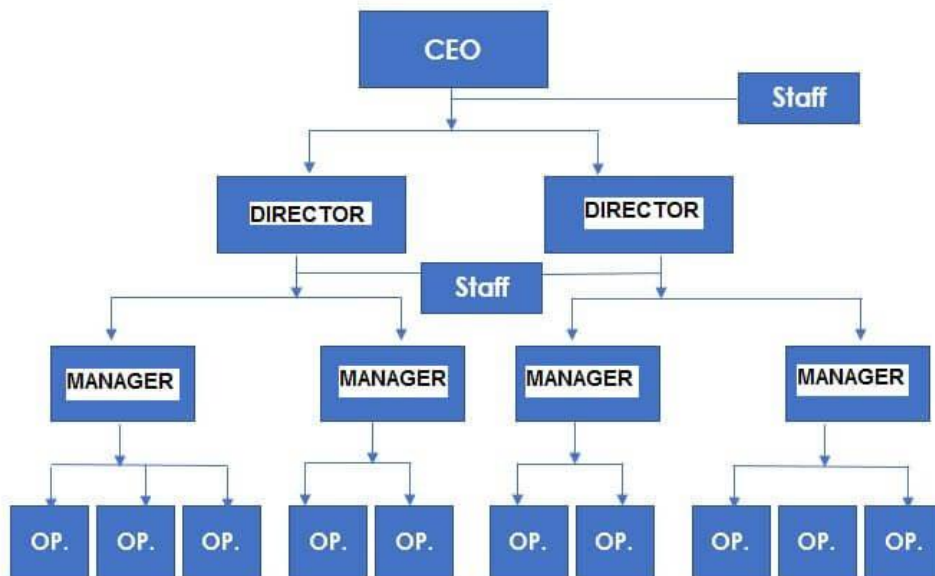


Fig 5 -staff aligned

Organizational structure examples of this type are insurance companies, engineering firms, law firms, regulatory agencies, and other organizations where a company needs to isolate technical advice to assist employees who handle or manage the day-to-day operations on the front line.

2- Project-based structure

Highly dynamic and creative companies, such as software developers, architecture firms, special industrial equipment installation projects, event organization companies and others typically use this structure. A series of specialized employees, ready to compose a work team as needed characterize this structure.

With each project, these collaborators report to a different leader. Once they complete the project, manager assigns them a new project and a leader.

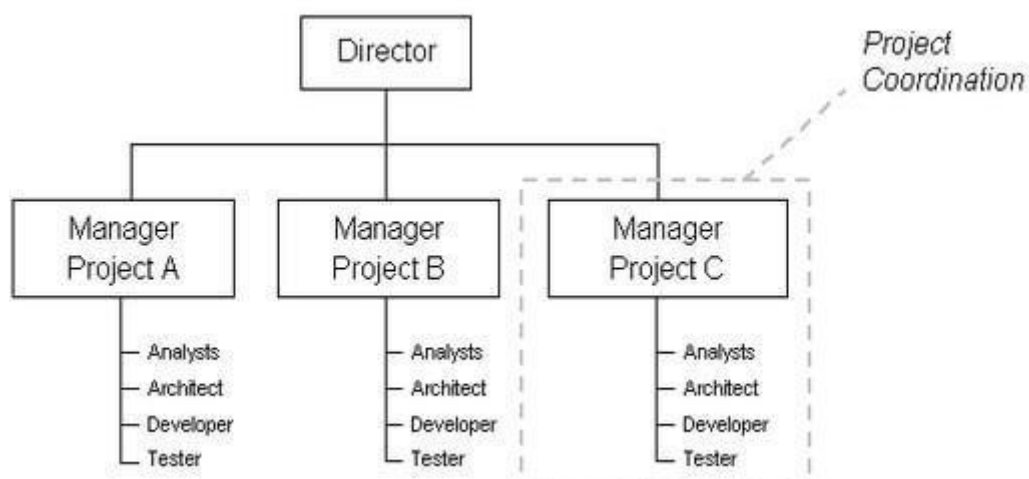


Fig 6 -project-based structure

	Marketing	Operations	Finance	HRM
	<i>Marketing Manager</i>	<i>Operations Manager</i>	<i>Finance Manager</i>	<i>HR Manager</i>
Project A (Team Leader)	Marketing Team (A)	Operations Team (A)	Finance Team (A)	HR Team (A)
Project B (Team Leader)	Marketing Team (B)	Operations Team (B)	Finance Team (B)	HR Team (B)
Project C (Team Leader)	Marketing Team (C)	Operations Team (C)	Finance Team (C)	HR Team (C)
Project D (Team Leader)	Marketing Team (D)	Operations Team (D)	Finance Team (D)	HR Team (D)

3- Matrix structures

This structure is widely used both by companies that are constantly launching new products and **marketing campaigns**. For example, companies that have project based structures, but also believe that functional supervision is necessary and important.

Fig 7 -matrix structures

An example of a business that would benefit from this type of organizational hierarchy is a consultancy for installing ERP Software.

Each project must act independently. Therefore, it's important to have a senior manager of each department (finance, operations, HR, marketing etc.) that can verify that everything is in accordance with policies and the level of services appropriate for the company.

Above all the examples and alkalization we could understand enough about the ins and outs of the organizational structure and ITCL mainly follows the IN Line structure system.

CHAPTER 3

Tasks, Projects and Activities

3.1 Daily Task and Activities

My daily task activity was monitoring ITCL external IPS and core system. Monitoring is very necessary for Banking and non-banking IT. Continuous monitoring not only check system and network health but also important for any security incidence.

Scope of monitoring:

1. ISP Link Monitoring
2. ITCL Core Network Monitoring
3. Environment monitoring system (EMS)
4. System Health Check Monitoring
5. Network Health Check Monitoring

There are several ISP connected with the ITCL network system. The following ISP internet link & gateway are monitored by the DUDE.

Network Monitoring method:

1. Ping
2. Traceroute/ tracer
3. snmp based monitoring system

Server Monitoring method:

1. Ping
2. CPU usages
3. Memory usages
4. Disk Space
5. Virtual Memory status

EMS Monitoring Method:

1. Temperature & Humidity sensor
2. Motion Detector
3. Air Flow Sensor
4. Vibration Sensor
5. Security Process-Se

- 6. E-Sensor –B
- 7. Device Alarm Monitor
- 8. AC Voltage Monitor
- 9. Door Contact Monitor
- 10. E-OPTO-15
- 11. Strobe Siren

Q-Cash E-Commerce Service Monitoring:

Service Name	Website Address
Banglalinki-Top up	www.qcash.com.bd
NBR Sonali Bank E-Payment Portal	www.nbrepayment.gov.bd
EXIM –MFS (WAP, USSD & WEB Service)	http://exim.qcahbd.com

Q-Cash NBR e-Payment System Check:

- URL: <http://www.nbrepayment.gov.bd>
- To check the online TAX payment service

Enter Card Information

Pan:

CVV2(CVC2)₁:

Cardholder₂:

Expiration Date: Month Year

Use this page to enter information about your card

To pay for the order, enter information about your card. This information could not be corrupted or become known to the third party, as all transmitted data is encrypted by the SSL protocol.

Note

- To know CVV2 (CVC2) look at the back side of your credit card. The strip with your signature also contains a 19-digit record. The first 16 digits are your PAN, and the last 3 digits are your CVV2 (CVC2).
- The cardholder's name should be entered in Latin chars, just as it's written on the card.

Information about order	
Currency:	BD
Amount:	5 000.00
Invoice number:	16342
Description:	Test Merchant

Verified by VISA
learn more

MasterCard SecureCode
learn more

Figure 8: Q-CashNBR e-Payment System

Q-Cash Banglalinki-topup System Check:

- URL: <http://www.qcash.com.bd>
- To check the Banglalinki – Topup service



Figure 9: Q-Cash Banglalinki-topup System

3.2 Events and Activities:

Reports:

Server Critical Log Report

Critical Log Alert					
Name:					
Date:		Session: Shift	Time :		
SN	Server Name	IP	LOG	Physical status	Action
1					
2					
3					
4					

Submitted By

Checked By
System Admin

Server Analysis Log Report

Name:

Date:

Section 01: Failed login attempts

SN:	System Name	System IP	User Description
01			

Section 02: All account, group, and role changes

SN:	System Name	System IP	User and Change Description
01			

Section 03: A summary of the executable file event report above

SN:	System Name	System IP	Executed Commands
01			

Section 04: All auth attempts and their result

SN:	System Name	System IP	Date	Time	User	IP	Protocol
01							

Section 05: Account modification attempts

SN:	System Name	System IP	Date	Time	UserID	Change Command
01						

Section 06: Deleted file Attempts

SN:	System Name	System IP	Date	Time	File deleted	User
01						

Section 07: Modification on user information

SN:	System Name	System IP	Date, Time, Modified File, UserID , Change Command
01			

Section 08: Report file rotation time

SN:	System Name	System IP	Date, Time, Modified File, UserID , Change Command
01			

Section 09: Total Event Summary of today

SN:	System Name	System IP	Date, Time, Modified File, UserID , Change Command
01			

Section 10: Unauthorized Access to Files

SN:	System Name	System IP	Date, Time, Modified File, UserID , Change Command
01			

Submitted By:
Verified By:

Date:

System Admin

Network Health Check report

Network Health Report				
Name:				
Date:		Session: Morning/ Evening/ Night		
ISP- Internet Link				
<i>ISP Name</i>		<i>Status</i>	<i>Description</i>	<i>Time</i>
<i>Link3 CommunicationLtd</i>				
<i>Drik ICT Ltd</i>				
<i>Telnet CommunicationLtd</i>				
<i>Comments</i>				
Firewall & Router				
<i>Device Name</i>		<i>Status</i>	<i>Description</i>	<i>Time</i>
<i>Primary ASA</i>				
<i>Secondary ASA</i>				
<i>Primary Router</i>				
<i>Secondary Router</i>				
<i>LAN-Firewall</i>				
<i>Internet Firewall</i>				
<i>ACS-Firewall</i>				
<i>Comments</i>				
Production/LAN/WAN SWITCH				
<i>Switch Name</i>		<i>Status</i>	<i>Description</i>	<i>Time</i>
MASTER-SW				
CLIENT-SW				
PROD-SW-2				
PROD-SW-4				

DMZ-SW1			
PROD-SW-6			
PROD-SW-7			
PROD-SW-8			
PROD-SW-10			
DATA-CENTER-WAN-SW			
NOC-WAN-SW1			
NOC-WAN-SW2			
NOC-WAN-SW3			
Office-LAN-SW-1			
Office-LAN-SW-2			
Office-LAN-SW-3			
Office-LAN-SW-4			
Office-LAN-SW-5			
Office-LAN-SW-6			
Office-LAN-SW-7			
Office-LAN-SW-8			
Office-LAN-SW-9			
Office-LAN-SW-10			
Office-LAN-SW-11			

.....
 Submitted By Next Duty Person N&S Admin Mr. Iftekhhar DCTO
 CTO

Data Center Temperature Report:

Temperature Reading (Data Center)										
	Date:									
Time	STATUS			DC	PAC -1	PAC -2	PAC -3	PAC-1 HUMIDITY	PAC-2 HUMIDITY	PAC-3 HUMIDITY
	PAC -1	PAC -2	PAC -3							
8.00am										
9.00am										
10.00am										
11.00am										

				&DATE
1				
1	Faizul Islam	Chief Technology Officer	Technology	
2	Muttahidur Rahman	Deputy Chief Technology Officer	Technology	

UPS and Power Room Access Log Report 01:

POWER ROOM .FORM – 01	UPS MONITORING LOG - SYSTEM (3RD FLOOR) POWER ROOM
------------------------------	--

PERIOD (MONTH YEAR)	- APRIL - 2018	ACCESS FOR	ITCL Power Team Personnel
----------------------------	-----------------------	-------------------	----------------------------------

PART I: PREPARED BY				
SL	NAME	DESIGNATION	DEPARTMENT	SIGNATURE & DATE
1			Technology	

PART II: AUTHORIZED / VERIFIED BY				
SL	NAME	DESIGNATION	DEPARTMENT	SIGNATURE & DATE
1	Faizul Islam	Chief Technology Officer	Technology	
2	Muttahidur Rahman	Deputy Chief Technology Officer	Technology	

UPS and Power Room Access Log Report 02:

POWER ROOM .FORM – 02	UPS MONITORING LOG - SYSTEM (3RD FLOOR) POWER ROOM
------------------------------	--

PERIOD (MONTH YEAR)	- APRIL – 2016	ACCESS FOR	Power & UPS Vendor authorized Personnel
----------------------------	-----------------------	-------------------	--

PART I: PREPARED BY				
SL	NAME	DESIGNATION	DEPARTMENT	SIGNATURE & DATE

1			Technology	
---	--	--	------------	--

PART II: AUTHORIZED / VERIFIED BY				
SL	NAME	DESIGNATION	DEPARTMENT	SIGNATURE & DATE
1	Faizul Islam	Chief Technology Officer	Technology	
2	Muttahidur Rahman	Deputy Chief Technology Officer	Technology	

3.3 Project Task And Activities

Project Task :

The minimum control requirements for multifactor authentication for which each Bank or NBFIs must adhere. The primary objectives are below :

- a) To establish a standard ICT Security Policy and ICT Security Management approach .
- b) To help the Banks and NBFIs for secured setup of its ICT infrastructure .
- c) To establish a secured environment for the processing of data .
- d) To establish a holistic approach for ICT Risk management.
- e) To establish a procedure for Business Impact Analysis in conjunction with ICT Risk Management
- .f) To aware stakeholders’ roles and responsibilities for the protection of information.
- g) To prioritize information and ICT systems and associated risks those need to be mitigated.
- h) To establish appropriate project management approach for ICT projects.
- i) To aware and train the users associated with ICT activities for achieving the business objectives.
- j) To define procedure for periodic review of the policy.
- k) To ensure the best practices (industry standard) of the usage of technology that is not limited to this guideline.
- l) To analyze security risks against faster adoption of Bring-Your-Own-Devices (BYOD) m) To minimize security risks for electronic banking infrastructure including ATM and POS devices, payment cards, internet banking, mobile financial services, etc.

Tasks of the Security committee by ITCL:

- a) Monitor management methods to determine and achieve strategic goals.
- b) Aware about exposure towards ICT risks and controls.
- c) Provide guidance related to risk, funding, or sourcing.
- d) Ensure project priorities and assessing feasibility for ICT proposals.
- e) Ensure that all critical projects have a component for “project risk management”.
- f) Consult and advise on the selection of technology within standards.
- g) Ensure that vulnerability assessments of new technology is performed.
- h) Ensure compliance to regulatory and statutory requirements.
- i) Provide direction to architecture design and ensure that the ICT architecture reflects the need for legislative and regulatory compliance

The project task was every day about the given task and the follow up about the project like:

Discussion :

Every day on office time first my supervisor would give me instructions like how to do switching, routing, how to check the server , the temperature calculating of the data center.etc....

Problem solving:

Everyday I face so many problems with my given tasks. So my supervisor gives me various tasks for solving my problems to go on. He gave me time every day for discussion and problem solving.

Information gathering:

The more and more information about the security departments and the tasks every detail information.scope, existing infrastructure and various information gathering about the data center and various equipments.

Purchasing decisions:

Which is basically a education about the switches, routers, firewalls, servers and so on are needed for any bank, organization, and other non banking organizations. And that would be effective for the

information that is necessary for the security of customers. Configuring and installing the servers and network equipment, and testing connectivity and functionality.

Customer acceptance:

Whatever we made, we make for our customers own reliable and comforting way. OTP will provide much more security assurance for their card data information to be shared for the atm machines and many more accounts information to be shared.

Documentation:

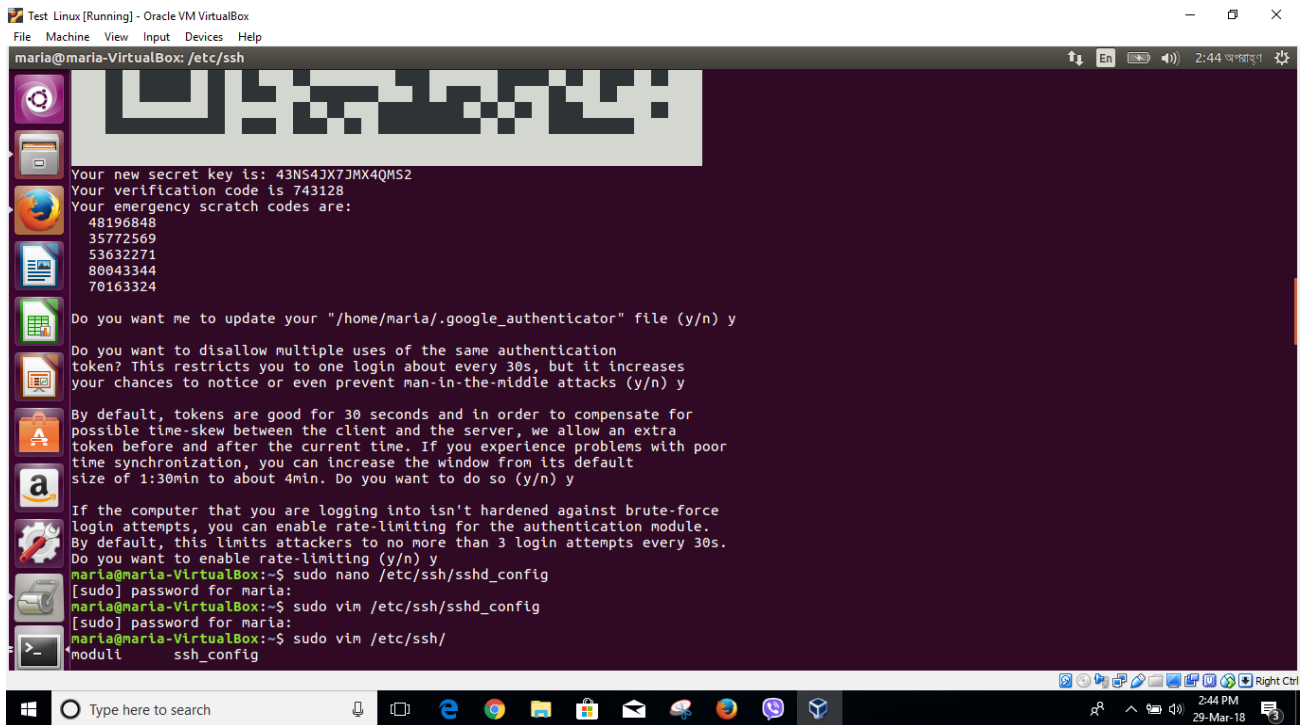
To collect every information in a specific way. Collect every work details for the work ever done by me. Like Server Critical Log ReportFailed login attempts, All account, group, and role changes, A summary of the executable file event report above, All auth attempts and their result, Account modification attempts, Deleted file Attempts, Modification on user information, Report file rotation time, Total Event Summary of today, Unauthorized Access to Files,Deleted Files (String – K),Network Health Check report,Data Center Access Log Report,UPS and Power Room Access Log UPS and Power Room Access Log.

Activities:

Two factor authentication, also known as two-step verification, requires you to enter two pieces of information in order to login. Google Authenticator generates a one-time password using a shared secret key and the current time. Not only do you need to provide the correct username and password, but also have to enter a one-time password generated by Google Authenticator to log in to your SSH server.

Please note that enabling SSH two factor authentication with Google Authenticator will also enable password authentication. If you use public key authentication only, then you may not want to do this. If you have some system that must allow password authentication, then this is a good way to make your system more secure.

Without further ado, let's see how to set up SSH two factor authentication on Ubuntu 16.04 server.



Install Google Authenticator app via Google play or Apple app store on your mobile phone and scan the QR code. The QR code represents the secret key, which is only known by your SSH server and your Google Authenticator app. Once the QR code is scanned, you can see a six-digit one-time password on your phone. By default it lasts for 30 seconds.

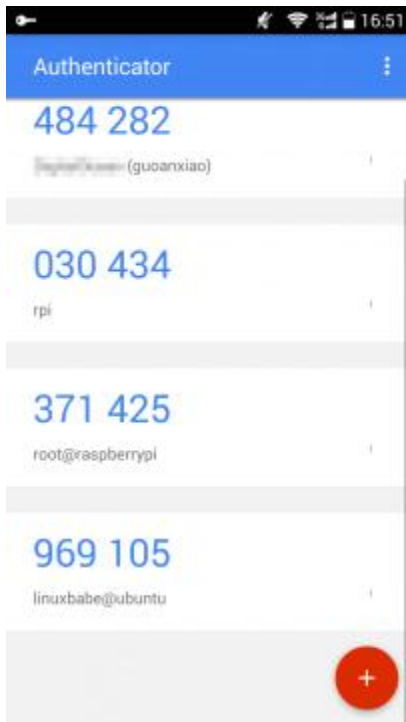


Fig: google authenticator

There was a server problem so according to the rules the above procedure will be done again.

```
Test Linux [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
maria@maria-VirtualBox: /etc/ssh

Your new secret key is: 46LERPT7A2VKBNKL
Your verification code is 766419
Your emergency scratch codes are:
19532899
63435181
48794672
27698664
99438206

Do you want me to update your "/home/maria/.google_authenticator" file (y/n) Y

Do you want to disallow multiple uses of the same authentication
token? This restricts you to one login about every 30s, but it increases
your chances to notice or even prevent man-in-the-middle attacks (y/n) Y


By default, tokens are good for 30 seconds and in order to compensate for
possible time-skew between the client and the server, we allow an extra
token before and after the current time. If you experience problems with poor
time synchronization, you can increase the window from its default
size of 1:30min to about 4min. Do you want to do so (y/n) Y

If the computer that you are logging into isn't hardened against brute-force
login attempts, you can enable rate-limiting for the authentication module.
By default, this limits attackers to no more than 3 login attempts every 30s.
Do you want to enable rate-limiting (y/n) Y
maria@maria-VirtualBox:~$ cd /etc/ssh/
maria@maria-VirtualBox:/etc/ssh$ ls
moduli      sshd_config      sshd_config.save  ssh_host_dsa_key.pub  ssh_host_ecdsa_key.pub  ssh_host_ed25519_key.pub  ssh_host_rsa_key.pub
ssh_config  sshd_config.org  ssh_host_dsa_key  ssh_host_ecdsa_key  ssh_host_ed25519_key  ssh_host_rsa_key  ssh_import_id
maria@maria-VirtualBox:/etc/ssh$ vim sshd_config
maria@maria-VirtualBox:/etc/ssh$ sudo vim sshd_config
[sudo] password for maria:
```

```
Test Linux [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
maria@maria-VirtualBox: /etc/ssh

[sudo] password for maria:
maria@maria-VirtualBox:/etc/ssh$ sudo vim sshd_config
maria@maria-VirtualBox:/etc/ssh$ sudo systemctl restart ssh
maria@maria-VirtualBox:/etc/ssh$ sudo systemctl restart ssh
maria@maria-VirtualBox:/etc/ssh$ sudo vim /etc/pa
pan.conf  pan.d/  papersize  passwd  passwd-
maria@maria-VirtualBox:/etc/ssh$ sudo vim /etc/pam.d/ssh
maria@maria-VirtualBox:/etc/ssh$ google-authenticator

Do you want authentication tokens to be time-based (y/n) y
https://www.google.com/chart?chs=200x200&chld=M|0&cht=qr&chl=otpath://totp/maria@maria-VirtualBox%3Fsecret%3DNPX7ZRCTXMEJ6JNL


```

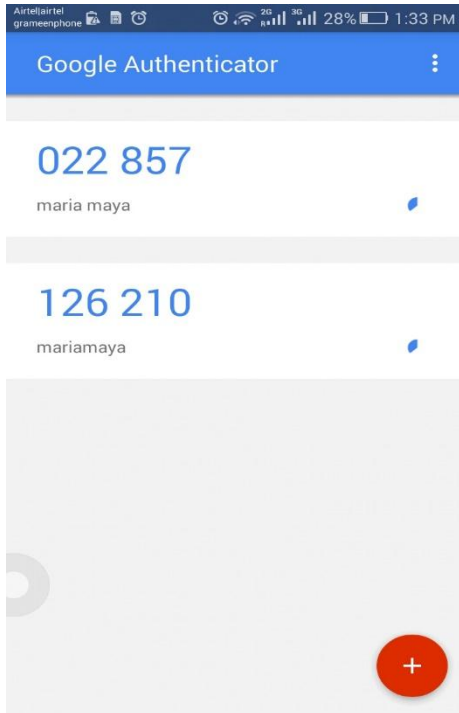
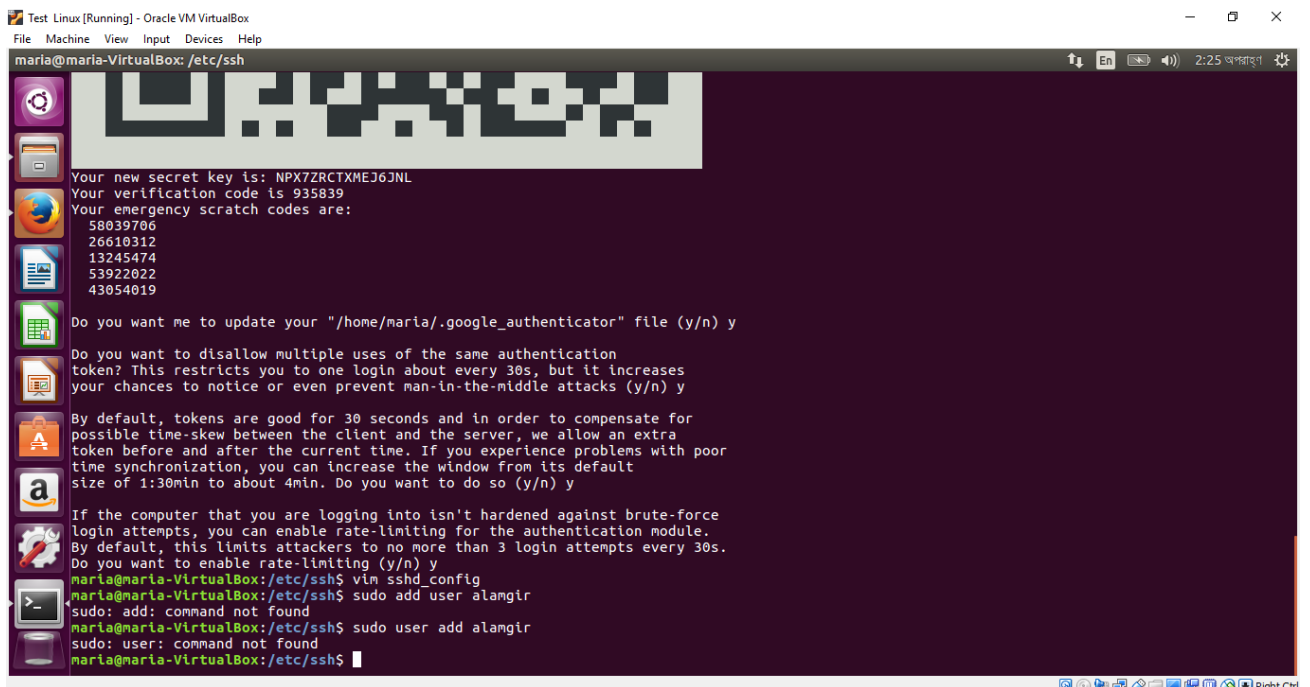


Fig : google authenticator

Then finally the authenticator code work properly and gives a OTP by using that we will be able to ntication security.



If we want to work with another operating system like for windows we would have to install a software named PUTTY. After installing we would use the command prompt to try to work virtually with the software using username, password and provided OTP.

Below attempts are failed attempts. Because the IP of the computer didn't provided correctly .

```
Command Prompt
Microsoft Windows [Version 10.0.16299.309]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\Users\localuser>ping 192.168.11.18

Pinging 192.168.11.18 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.11.18:
    Packets: Sent = 3, Received = 0, Lost = 3 (100% loss),
Control-C
^C
C:\Users\localuser>ping 192.168.11.24

Pinging 192.168.11.24 with 32 bytes of data:
Reply from 192.168.11.24: bytes=32 time=59ms TTL=128
Reply from 192.168.11.24: bytes=32 time=25ms TTL=128
Reply from 192.168.11.24: bytes=32 time=67ms TTL=128
Reply from 192.168.11.24: bytes=32 time=181ms TTL=128

Ping statistics for 192.168.11.24:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 181ms, Average = 83ms

C:\Users\localuser>
C:\Users\localuser>
C:\Users\localuser>ping 192.168.11.16

Pinging 192.168.11.16 with 32 bytes of data:
Request timed out.
Request timed out.

Ping statistics for 192.168.11.16:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),
Control-C
^C
C:\Users\localuser>arp -a

Interface: 192.168.11.17 --- 0x4
```

```
Command Prompt
192.168.11.1      dc-38-e1-24-84-02    dynamic
192.168.11.16    ad-db-38-a6-07-12    dynamic
192.168.11.18    60-57-18-e1-af-64    dynamic
192.168.11.24    5c-ac-4c-be-66-f8    dynamic
192.168.11.255   ff-ff-ff-ff-ff-ff    static
224.0.0.22       01-00-5e-00-00-16    static
224.0.0.251     01-00-5e-00-00-fb    static
224.0.0.252     01-00-5e-00-00-fc    static
239.255.255.250 01-00-5e-7f-ff-fa    static

Interface: 192.168.56.1 --- 0x9
Internet Address  Physical Address      Type
192.168.56.255   ff-ff-ff-ff-ff-ff    static
224.0.0.22       01-00-5e-00-00-16    static
224.0.0.251     01-00-5e-00-00-fb    static
224.0.0.252     01-00-5e-00-00-fc    static
239.255.255.250 01-00-5e-7f-ff-fa    static
255.255.255.255 ff-ff-ff-ff-ff-ff    static

C:\Users\localuser>ping 192.168.11.15

Pinging 192.168.11.15 with 32 bytes of data:
Reply from 192.168.11.17: Destination host unreachable.
Reply from 192.168.11.17: Destination host unreachable.

Ping statistics for 192.168.11.15:
    Packets: Sent = 2, Received = 2, Lost = 0 (0% loss),
Control-C
^C
C:\Users\localuser>arp -a 192.168.11.15
No ARP Entries Found.

C:\Users\localuser>ping 192.168.11.15

Pinging 192.168.11.15 with 32 bytes of data:
Reply from 192.168.11.17: Destination host unreachable.
Reply from 192.168.11.17: Destination host unreachable.
Reply from 192.168.11.17: Destination host unreachable.
Reply from 192.168.11.17: Destination host unreachable.

Ping statistics for 192.168.11.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\localuser>
```

After giving the proper IP of PC we can work with windows 10 giving the needed information.

```
Command Prompt

Ping statistics for 192.168.11.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\localuser>

C:\Users\localuser>ping 192.168.11.15

Pinging 192.168.11.15 with 32 bytes of data:
Reply from 192.168.11.15: bytes=32 time=1793ms TTL=64
Reply from 192.168.11.15: bytes=32 time=1ms TTL=64
Reply from 192.168.11.15: bytes=32 time=1ms TTL=64
Reply from 192.168.11.15: bytes=32 time=1ms TTL=64

Ping statistics for 192.168.11.15:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1793ms, Average = 449ms

C:\Users\localuser>
```



```
maria@maria-VirtualBox: ~
login as: maria
Using keyboard-interactive authentication.
Password:
Using keyboard-interactive authentication.
Verification code:
Welcome to Ubuntu 16.04.3 LTS (GNU/Linux 4.10.0-28-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

391 packages can be updated.
226 updates are security updates.

Last login: Wed Apr  4 14:04:32 2018 from 192.168.11.17
maria@maria-VirtualBox:~$
```

Fig : working with windows through linux

3.4 Challenges

New industry guidance may soon force financial institutions to provide multifactor authentication for their Web-based customers. The new "guidance" from the Federal Financial Institutions Examination Council (FFIEC) essentially says banks will need to have multifactor authentication for their online customers. Though multifactor technology exists and has been implemented elsewhere (e.g., Europe), the challenge I see is getting general acceptance from the everyday American bank customer. For the information security officer (ISO) or chief information security officer (CISO), the challenge is how to go about selecting and implementing a multifactor authentication product that interfaces significantly with the bank customers vs. an internal process. Consumer adoption of mobile technology has occurred at rates faster than any other previous technology adoption and businesses are struggling to keep up. Financial institutions no longer have that luxury. Traditional

financial institutions – banks and credit unions are facing ever-increasing competition from online banks without branches, and mobile-only banks are about to make their debut. Consumers are demanding new ways to perform transactions, and FIs are accelerating their technology adoption and app creation to keep up. Regulators, too, are trying to keep pace, which is why it isn't surprising that EU, the Federal Financial Institutions Examination Council, and New York State have already put stronger cyber security rules to ensure that the greater technological and product-focused risks are paired with strict consumer protections. All three regulators directly address the requirement to use multifactor authentication to protect against unauthorized access of confidential, PII, and other protected information, as well as to reduce and mitigate transactional risk. The entire spectrum of regulatory agencies agrees that multifactor authentication is an essential way to strengthen security. Behavioral biometrics does it with the least hassle and the strongest results: significantly reducing risk and delivering a competitive edge by allowing your customers to perform higher-risk transactions than other financial institutions. As biometric security technology has continued to develop, biometrics in banking has emerged with many new ways of implementing biometrics into the banking world. Banking is only one of the industries that are being profoundly affected by the advances in this security technology. Banks around the world are increasingly opting biometrics to authenticate customers accessing their services. This trend is not limited to banks; other financial outfits are also taking up biometric authentication to identify customers and safeguard resources. Increasing cases of financial fraud, identity theft, and threats from cyberspace have made banks to restructure their identity practices and biometrics in banking and financial services offers the solution. Most of the world renowned bank like Lloyds Banking Group plc, KB Kookmin Bank, Australia and New Zealand Banking Group (ANZ) etc are using this authentication for the security of their customers. The main challenge is to provide the best service for them. The agencies consider single-factor authentication as the only control mechanism to be inadequate for high-risk transactions involving access to customer information or the movement of funds to other parties. Financial institutions offering Internet-based products services to their customers should use effective method to authenticate the identity of customers using those products and services. Consistent with FFIEC Information Technology Examination Handbook Information Security Booklet December 2002 financial institutions should periodically:

- Ensure that their information security program:

1. Identifies and assesses the risk associated with Internet-based products and services.
2. Identifies risk mitigation actions, including appropriate authentication strength and
3. Measures and evaluates customer awareness efforts.
4. Implement appropriate risk mitigation strategies.

An effective authentication program should be implemented to ensure that controls and authentication tools are appropriate for all of the financial institution's Internet-based products and services. Authentication processes should be designed to maximize interoperability and should be consistent with the financial institution's overall strategy for Internet banking and electronic commerce customer services. Financial institutions offering Internet-based products and services should have reliable and secure methods to authenticate their customers. The level of authentication used by the financial institution should be appropriate to the risks associated with those products and services. Financial institutions should conduct a risk assessment to identify the types and levels of risk associated with their Internet banking applications. That will be their greater challenge.

CHAPTER 4

Competencies & Smart Plan

4.1 Competencies Earned

As I work in ITCL as the assistant of the network and security department there were so many study on the MFA security. The team is working on the best security that they can provide to the client they have. So as I work with the team I learned about the monitoring of a proper IT section. They have so many machine to maintain the server of their client, their own server for internal purpose, when the machine needs to be checked like if the monitoring PC shows that they can't ping with server the machine should be checked immediately. There were three PAC machine which is also needs to be checked all the time. There were employee who is always monitoring the machines day and night. I didn't watch all the time but only in the office hours. There were so many connected cables that should be learned by the inspecting team but generally three months is not the enough time to be knowing all of that. Then there is my project which I work on with them I observe about their connections and the works with the banks and other clients about establishing the MFA with the machines. I also work with the operating system linux to add the factor through the google authenticator that is connected to the other operating system windows 10 with a software named PUTTY. If we want to secure our information in windows 10 we can secure them through virtual process that done by the linux. So installing the software's, operates with them personally was a achievement for me that could lead me properly on for my future career.

To help guide users toward making better choices, IT organizations have employed a couple tools. One of them is enforcing more stringent passwords by utilizing password complexity management solutions. This forces users to add in characters, numbers, and uppercase letters to strengthen their passwords or just lengthen them. However, one of the strongest defenses IT admins have started to leverage is second factor authentication. Generally, passwords are considered something that you know. By adding a second factor – something that you have – it is much harder to compromise an account because both are required to gain access.

This desire to increase security is what is driving the growth of the identity management category multi-factor authentication. With the advent of smartphones, the process to leverage MFA

technology has become easier than ever. Historically, security technology has been difficult to implement and use. Now, though, MFA has become nearly ubiquitous. In fact, no longer do IT organizations need to purchase third party MFA solutions.

4.2 Smart Plan

Any smart plan should be very effective for the future research and that future work will be able to make benefit for the inventor and the user as well. As I work on network and security department on multifactor authentication for the purpose of tighten the security it has some future plan to enriched its steps. Multifactor authentication is a great research subject to increase the security to protect the privacy of the user of technology. Now a days often we see that ATM machine has some hardware machine that is portable and only use for the purpose to show the OTP that uses to have any kind of transactions. When a user type the user name and pin number for withdraw money from bank or ATM machine or CDM machine they also have to put their OTP in the portable machine then the transaction would finally happen. ITCL is the biggest company in Bangladesh that's main business is the payment gateway, for this they have to deliver the maximum security to the client bank and other non-financial organization. So they should have the future plan as well. They are having many plans right now about to add up to three factors or bio-metric is the top of the security and even the security that is related to the recognition password. Which is matching the body part like eye, full face. That is something the security panel is working on right now. If they succeed to add more factors that would be very helpful in the field of security. And moreover it would be helpful for make mark in the Govt. security as well. Apart from my project I worked on a little about the other project that is on "Digital Forensics". It is not only the basic need but also the primary work that when the security system is invented it should be protected as well. When a criminal is hacking the password or the system that provides the security that should be investigated and also should take actions against that crime. So the forensics helps to catch the criminals most. Cyber criminals are very intelligent to identified. That's why the Digital Forensics is essentials for any office and the departments should be experts by taking the proper training.

4.3 Reflections

The primary goal of my internship is to apply knowledge that gained in the classroom to solve practical real-world problems in a professional setting, and to develop professionally relevant competencies and relationships in a professional setting. We work together with the supervisor and internship instructor to develop a learning agreement. The learning agreement specifies how we have planned to sharpen and develop the knowledge, skills, and abilities necessary to serve effectively in a professional setting. Relationships with the supervisor and other professionals add to the professional network. I have Gain exposure to a professional field and an understanding of professional etiquette and able to learn from observing the professional behavior of the supervisor and other employees, as well as through interaction with clients. I am also practices proper business etiquette while fulfilling my internship responsibilities. I have understood a professional organizational culture, how decisions are made, thow work is structured, how problems are shared, how colleagues interact, how an organization's mission/vision is implemented. Internship provides an opportunity for me to receive professional feedback through ongoing individual meetings with the supervisor and an evaluation at the end of the internship experience. The internship experience allows me to expose my knowledge to practical life of service in an IT sector.

CHAPTER 5

Conclusion & Future Career

5.1 Discussion & Conclusion

The internship was an excellent and rewarding experience to me. I have been able to meet with so many people and make a professional network to others I am sure that will be able to help me with opportunities in the future. One main thing that I have learned through this internship is, time management skills as well as self-motivation. When I first started I did not think that I was going to be able to make myself sit in an office for eight hours a day, six days in a week. Once I realized what I had to do I organized my day and work so that I was not overlapping or wasting my hours. I learned that I needed to be organized and have questions ready for when it was the correct time to get feedback. From this internship and time management I had to learn how to motivate myself through being in the office for so many hours. Although I am still keeping my options open for new opportunities. I am enjoying this line of work. I will continue to work hard in my position and hope to continue to learn about the network and security about the factors that can add much more security to the field of privacy of a person who hold any kind of account like specially bank or social media. Any other non-financial bank accounts about their transactions and also the bank's transactions through ATM as well. Now a days we can see that even the traffic police using their own POS machine to file a case instance of road rule breaker. So technology is growing very fast and the user also. It's a great responsibility to the people of country to ensure the security of their own and others. Moreover I learned about the monitoring section of a entire office IT related connections and cables and their run time and other thing. That is a great experience for me to be a part of such big thing. I enjoyed my period of internship because it learned me so many things that I couldn't imagine that helped me a lot in my education life.

5.2 Scope for Further Career

As our country is growing so fast about using the internet. In that case security would be the first thing that should be maintain in this fast growing digital world. I did work on such a field that

make sure to strong the security in a advanced level. So the career would have been so much enriched if I work further more about the network and the security field. There are every bank in Bangladesh who seeks a CSE engineer about to maintain their network and security. And also so many organization like ITCL who also needs experts to maintain their security as well. Even in the Govt. sector network and security is the most important to maintain the security about the national information. Security field is very strong now a days in the whole world. I also have some knowledge on the operating system linux which is a operating system that ensures the security most. That would be very helpful in the job market.

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