

Internship on Software Development and Network System

by

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An Internship submitted to the Department of Computer Science and Engineering
in partial fulfillment of the requirements for the degree of
Bachelor of Science in Computer Science

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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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Approval

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Abstract

In the following Internship Report, I describe detail of my intended study and actual experience at Square Informatix Ltd. which is a start up technology company. Hence, by highlighting the key areas I have interned with the specific company, the report sheds light on the company's work culture, organizational structure apart from exemplifying how theoretical knowledge is applied in practice. Before highlighting the specific solutions which will be discussed in the report, it was necessary to provide a brief information about Square Informatix Ltd. and its key objectives, mission, and business areas. Altogether, the following comprehensible account summarizes my position and roles in the organisation together with the analysis of the particular projects assignments and challenges I encountered throughout the internship.

Keywords: Internship, company, knowledge, projects.

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Table of Contents

Declaration	i
Approval	ii
Ethics Statement	iii
Abstract	iii
Dedication	iv
Acknowledgment	iv
Table of Contents	v
List of Figures	vii
1 Introduction	1
1.1 About Internship	1
1.2 Aims and Objectives	2
1.3 Methodology	2
1.3.1 Primary Data	2
1.3.2 Secondary Data	2
2 Company Profile	3
2.1 Overview	3
2.2 Vision and Mission	3
2.3 Technology and Framework	3
2.4 How Does Square Informatix Work	4
2.4.1 Software Development	4
2.4.2 Mobile Application	4
2.5 Website Design	4
2.6 Website Maintenance	5
2.7 Network and ISP	6
2.8 Routing	7
2.8.1 Routing Diagram Example	8
2.9 SPL Medicine	9
2.10 Partners and Sponsors	9
2.11 Training Phrase	9
2.12 Beta Apps	9
2.13 Project Planning	10

2.13.1 Quality Assurance	12
2.14 Working Environment	13
2.15 Tutorial and Assistance	13
2.16 Meetings	13
2.17 Reflection	14
2.18 Conclusions	14
Bibliography	16

List of Figures

2.1	HTML code	5
2.2	ISP diagram	7
2.3	Routing Diagram	8
2.4	Workflow of Square Informatix Ltd	11

Chapter 1

Introduction

1.1 About Internship

Internship is a short term employment which is aimed at providing the people especially from the academic world an opportunity to get working experience in a certain discipline or organization. Most internships are a form of learning that provides learners with working experiences that enable them to implement knowledge gained in academic environments. Internships can range from short term to long term and can entail wages or not.

Unlike many universities all over the world, in BRAC University, students are required to undertake an internship or write a thesis paper. Although there may not be a large number of students opting for BRAC as their internships organization, the students who do so get do get good support from the school as well as are motivated to learn as much as they can from the workplace. Another advantage is a wide choice of concentrations because students can choose any specialization of their degree, if it is connected with an internship. To be considered as qualified, an internship-Please also note that for an internship to qualify you need to have interned for at least six months at a reputable organization and you must have earned more than 75 University credits or its equivalent.

Hence, instead of doing a thesis paper, I took an internship with BRAC University as I am a student here. Square Informatix LTD was be the subject of my internship for the period of my degree program. The company is the flagship unit of one of the largest business conglomerates in Bangladesh which is named SQUARE Group. Nowhere is it more true than in Bangladesh; where Square InformatiX can rightly be described as the pioneering ISP and data communication service provider. When the Telecommunications Department laid foundation of a satellite earth station called HUB, at Savar, the government made largest ICT investment of the first of its kind in the country and thus was implemented a VSAT communications possible throughout the country regardless of geographical limitations. I find myself working in the capacity of the intern for the position offered in their network system and software development section of the company. My aim and objective of joining the University and being part of the institution is to acquire as much knowledge as possible for future academic and professional life.

1.2 Aims and Objectives

The main aim of this report is to reflect on the internship experience, detailing the challenges I faced, lessons I learned, and the overall contribution to personal and career development. And the goal is to show the companys' profile in details, how the Square Informatix Ltd works, how projects are handled professionally, explain the type of work they taught me.

1.3 Methodology

This performance report is mainly centered on my work experience and the things which I learnt during my internship at Square Informatix. Most of the data and examples used in the course of the work were obtained from personal observation. Besides, some data has also been collected from specific sites as well.

1.3.1 Primary Data

- My personal experience at work
- Training lesson from senior colleagues and sir and ma'am

1.3.2 Secondary Data

- Square Group website
- Internet

Chapter 2

Company Profile

2.1 Overview

SQUARE was founded in 1958 with Samson H. Chowdhury as its helmsman, and this company was to step up towards the path of growth and consolidated expansion. Having established operations in over 50 countries the SQUARE Group has made annual imports and exports worth over 1 billion dollars. Developing into a conglomerate, the firm today is managing business across an array of sectors such as – media, IT, F and B, healthcare, textile, and cosmetic and toiletries. It is currently one of the largest corporate bodies in the country and the largest employment of trained personnel and highly qualified labor force.

SQUARE was formed with the vision of supporting the improvement of people's quality of life by providing them with products and services. That is the culture of innovation, SQUARE is fostering global companies with massive investment in all over the world. The notion, which goes deep into the essence of owning a business, has been incorporated as a key component in the strategic development of every process within a business organization. Owing to the facets on quality standards, legal factors and business best practices the recognized group has benefited from several awards of national and international prominence.

2.2 Vision and Mission

Our vision is to provide value for the society and to introduce positive changes in quality of life and health of society members. Thus, the aim of our work is to increase the useful productivity to create and provide the society with more effective products and services.

2.3 Technology and Framework

- SDK
- Oracle
- AGILE Methodology, JIRA tool

- REDIS

2.4 How Does Square Informatix Work

Square Informatix Ltd. is innovative business organization established for offering innovative and strategically more sustainable services in the field of website design and developments as well as website quality assurance, software development, and of course mobile applications. The business is situated as a rapidly growing market expert in the rapidly growing business of technology with a quality emphasis and a wealth of curiosity.

2.4.1 Software Development

Software development is Square Informatix Ltd's forte; it develops trustworthy, scalable solutions that are customized to each client's specific requirements. The company employs a team of skilled and experienced software engineers who leverage the latest technologies and development methodologies to create efficient, high-performance software applications. Square Informatix Ltd makes sure that all of its software solutions, from conception to implementation, perfectly fit customer goals and industry norms.

2.4.2 Mobile Application

Square Informatix have many mobile application for their clients. They work with many other companies to build mobile app but that information is confidential. Square Group have multiple apps such as PAAI for poultry, ESO, SAMANI ELS for e-learning, SPL e-learning, SPL VetNet, SPL AgriNet. Square Informatix is home to a group of very talented individuals that excel in comprehending the requirements and goals of your business in order to create and develop mobile apps that meet your expectations.

2.5 Website Design

Square Informatix Ltd places a strong emphasis on creating visually appealing and functionally robust websites. The company's web design team creates websites that not only attract consumers but also complement their customers' brands and business objectives by fusing creativity and technological know-how. Square Informatix Ltd guarantees that its websites offer a smooth and captivating online experience, starting with responsive designs and ending with user-friendly interfaces.

I have learned two methods of updating web page with new information. One is, through FTP for uploading files and another one is through HTML.

For FTP, we need to install FTP client like FileZilla at first and open it then enter server details like ip address, username, password and port. And then navigate to the local folder containing the website files and drag & drop the updated files.

For HTML, the below mentioned codes should be applied:

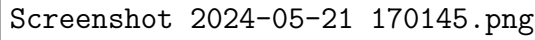
A rectangular box containing the text 'Screenshot 2024-05-21 170145.png'. The box is empty, suggesting the screenshot content is missing or redacted.

Figure 2.1: HTML code

2.6 Website Maintenance

We are going to cover basic tasks of website maintenance that are ongoing and encompass a set of procedures for site functionality preservation, protection from cyber threats, content update and usability improvement. There's only one employee who is responsible for regular updates to the official web page. Here's a short brief of how Square Informatix normally maintains its website:Here's a short brief of how Square Informatix normally maintains its website:

- **Regular information Updates:** Arguably, one of the greatest responsibilities that may be associated with managing a website is updating the information that is posted regularly; and this is for several reasons. Meaning that the website should often post new articles, blog posts, product updates or other content that the visitor may find useful. Content updates help to attract more visitors, encourage them to stay on the website longer, affect the rating in the search engines , and let people know that the company is ready to provide professional services and products.
- **Software Updates and Patches:** Plug-ins, themes, content management systems (CMS), and frameworks are applications commonly employed in the creation of websites. To ensure that its web-based interface remains safe from vulnerability, the organization regularly revises these parts to the most recent versions as well as bug fixes and security patches. This assists in protecting the website from the bugs and malicious attacks that could compromise the site or account, and with leaking personal details.
- **Monitoring and Performance Optimization:** SIL's web presence ensures that the site it exercises consistent availability and readiness to fulfill visitors' expectations. This is often done by dint of indicating and evaluating the following factors such as: Page response time , Server response time, Site availability acceleration, graphic acceleration, and Code shortening are instances of performance enhancement techniques that could be applied so as to facilitate website speed and functionality.
- **User Experience (UX) Improvements:** The software firm is constantly assessing and enhancing the website and the utility and value that it provides to citizens

so that it meets their requirements and even their expectations. This may involve:

- Following up on the qualitative part of the research that is usability testing and getting user feedback.
 - Enhancing on the design part that can improve on the navigation, readability, and beautification of any layout and designs.
 - Due to the increased popularity of the visitors using their mobile phones in accessing the website, it will be developed to fit the small screens of the phones.
 - Specifically, introducing such enhancements as search capabilities in a given context, breadcrumb navigation support, and precise calls-to-action to increase the site’s overall usability and conversion success.
- Communicating with the customers : There is a “Email Us” button available on the website under which any customer can send their concern or complaint and the website maintenance officer check those mails and reply them.

2.7 Network and ISP

Computer networks are like communication systems or infrastructure for the devices to connect and communicate with each other. In its simplest form, a computer network is interconnection of computers and other devices including mobile devices, printers, servers and others that share resources and data. The main types of networks are the LAN, MAN, PAN and WAN. IP address is given to each device in order to pass data over the network. Whenever you are sending a message or a request over the network, the message or request is divided into small packets which are again called packets and these packets travel over the network and then gets assembled at the other end. Square Informatix provides high speed internet connection irrespective of the connectivity location but it should be within the geographical boundaries of Bangladesh. From its onset, Square offers its services to all of Bangladesh’s prominent firms, prominent business conglomerates, other corporate IT divisions, and new rural businesses operating similarly effectively while catering to clients’ disparate requirements. Square prioritizes customer pleasure.

Square offers broadband Internet access through many distinct methods:

- Fiber : It provides efficient and separate internet connectivity to smart organizations in Dhaka through leased underground cable. Square’s optical fiber Internet now enables everyone in Dhaka to access the internet that is of high quality, high speed, and always on seven days a week, 24hours a day.
- Wimax : It also positioned three WiMAX terminals in the three locations of Mirpur, Motijheel and Mohakhali. Clients, both large and small, utilise these terminals for their high speed internet connection.
- Radio : In places without optical fiber or WiMAX terminals, Square provides Internet access via radio communication. The company serves a large number

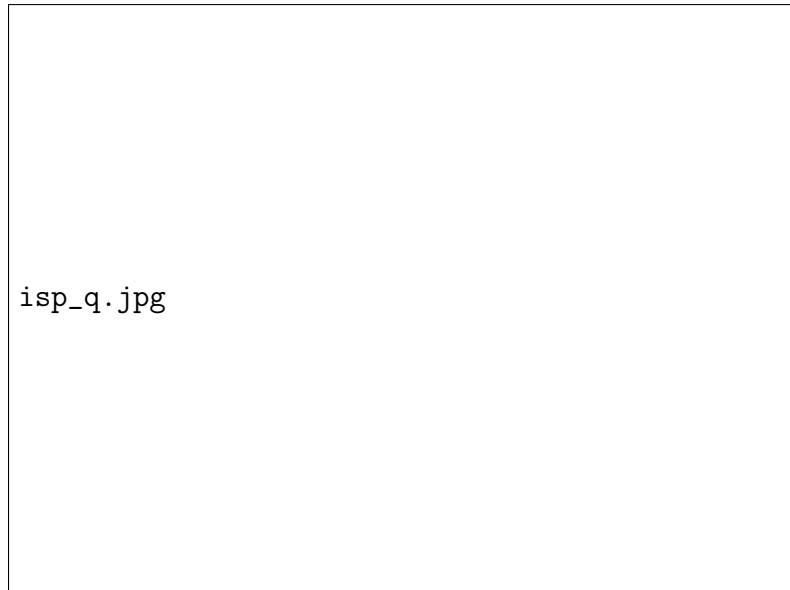


Figure 2.2: ISP diagram

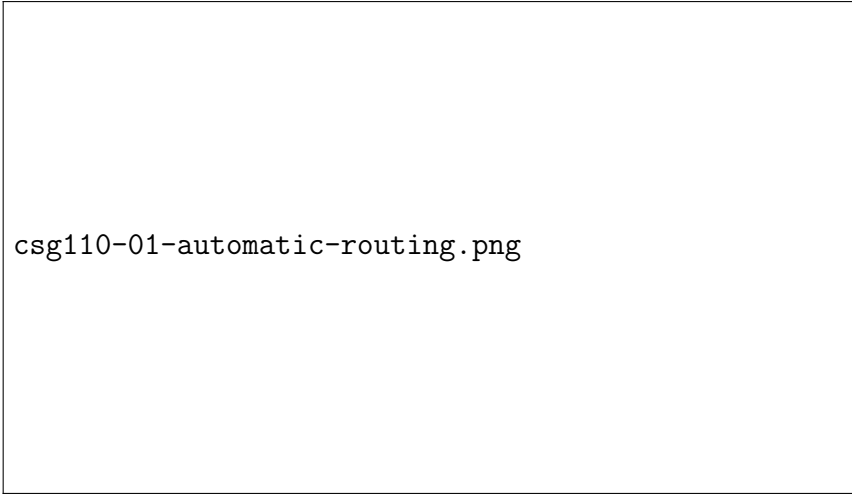
of consumers outside of the capital city of Dhaka, mainly in industrial districts on the outskirts of Dhaka, who are linked to the Internet via radio.

- VSAT : In the areas where there are no other networks available, VSAT remains the only option to get connected with Internet. Square has its own hub station, which is a satellite of sorts. It can provide Internet connection through VSAT technology regardless of your geographical location is in the mountainous areas.

2.8 Routing

A router interconnects many networks. It performs an intermediate role in the process. It has several interfaces. When it captures a packet on an interface it reads the destination address of the packet and transmits the packet using the interface linked to the destination address. If no interface is linked with the target networks, the router simply throws the packet. This method is known as routing. In order for a router to make a forwarding decision, it has to acquire, store, update and manage information about the related networks. Routers have routing tables to help them know the network they are in. The routing can be added, updated and maintained in three ways/methods. They are given below:

- Automatic Routing : This is a method that includes a router providing and maintaining routing information. The router contains the routing information from the IP settings of the active interfaces. Whenever the administrator modifies the IP setting or the state of the interface, the router uploads the new data to the routing table. This method is not helpful for office work since ip addresses are automatically assigned.
- Static/Manual Routing : In case of a small network or where there are few routers then the static routing can be employed. This method is easier. The



csg110-01-automatic-routing.png

Figure 2.3: Routing Diagram

routing information is configured through the routing table by the administrator. If there is any change within the network, then the administrator needs to renew the routing table. Static routing is preferable for usage in smaller networks.

- **Dynamic Routing :** Through this routing, the administrator establish a routing protocol on router. The routing protocol is able to learn and manage routes into the routing table on its own initiative. If the network is large, dynamic routing is the best way to go through.

2.8.1 Routing Diagram Example

However, I will draw a diagram below to make it easier to follow; And here is the well-drawn diagram: The components used in this diagram are: The components include four power circuitry components known as PCs (PC0, PC1, PC4, and PC5) a toggle switch, and a switch router.

Consider this scenario: 192 is a PC0 (Primary Coaxial segment 0), in the terminology of OSI reference model used in the Ethernet standards. 168. 1. As indicated in Figure 1, 10 wants to communicate with PC4 with address 192. 168. 2. 20. The basic configuration has PC0 connecting to Router0 (192. 168. 1. 1) as its default gateway by default. After analysing the information available in the routing table, the router determines that the destination IP address is on a different network 192 168 2 20. Switch1 forwards the packet towards Switch2. Switch 2 is the last component in this case, what means that when Switch 2 will receive a packet, he forward it to PC3.

Square Informatix provides different kind of services based on their client's demand. They build mobile application, develop software, design website. Its' clients most of the time are Square groups' another departments like pharmaceutical, hospital, agro etc.

2.9 SPL Medicine

This mobile application is for pharmaceutical employees. They can read information regarding any medicine before talking about it to the doctors. Also they can order medicine from the factory for supplying to pharmacies.

2.10 Partners and Sponsors

Square Groups' clients information are confidential.

2.11 Training Phrase

Working at Square is a great opportunity for me for my professional career. I was able to get a deep dive into the exciting world of technology while I was an intern at Square. I collaborated extensively with seasoned experts. The cooperative setting encouraged lifelong learning as I worked with modern technology. I got the opportunity to learn about initiatives aimed at developing mobile applications. I was able to increase my technical skill set and broaden my knowledge thanks to the guidance I got from seniors. Additionally, I got to know about quality assurance processes, participating in testing and debugging activities to ensure the delivery of high-quality software. This experience sharpened my attention to detail and sharpened my ability to see any problems and fix them. The internship underscored the significance of proficient communication and teamwork in a work environment, in addition to technical proficiency.

Overall, my internship at Square was a life-changing opportunity that gave me a strong basis for my future work in the tech sector. The gaining of practical knowledge and exposure to the work culture of the organization has greatly aided in my professional development as a technologist.

2.12 Beta Apps

Square informatix have beta versions for their all mobile applications. They first update any new features on that beta app and then test for errors and fix them. After that they update new features on the main app. The purposes behind beta app:

- To find and report bugs, malfunctions, and other issues that might not have been found during the earlier phases of development, beta apps are made available to the public or a small number of users. Prior to the official release, this aids the development team in identifying and resolving possible issues.
- Through beta testing, developers may get insightful input from people who aren't actively working on the project. Users can offer feedback on features, usability, and the overall user experience, which can assist developers in making well-informed choices on additions and modifications.
- Evaluation of the application's functionality in real-world scenarios is made easier by beta testing. In order to optimize the program for a range of hardware

configurations, developers can use it to collect data on system requirements, resource utilization, and overall performance indicators.

- By having actual users confirm that the program satisfies their wants and expectations, beta apps function as a type of user acceptability testing. This procedure helps in guaranteeing that user preferences and criteria are met by the final release.
- Developers may learn how the application could be accepted in the market by participating in beta testing. Based on actual customer experiences, this can be helpful for improving pricing models, marketing tactics, and other business choices.

2.13 Project Planning

A part of the project life cycle is the commencement which is the development phase after the formulation and certification of the project plan that I observed through out my time at SIL. This is the time when the team members at SIL are expected to be greatly involved most especially because they have to continuously meet and report any incidence, any problems faced or challenges encountered, and even developments made within a certain period of time and technical assistance to a team member if any is needed. In the meantime, the Quality Assurance and Audit functions of SIL are accomplished to determine how the program corresponds to the set standards and requirements and to check if the determined targets have been achieved. They also have a set of testing techniques such as unit testing, integration testing for example and system testing and generally the last one which includes the final user acceptability testing. A proper test carried out will help the project to detect defaults early in the development of the project hence few or no reformation on the style sheet and also ensures the final product in his/her /their approval.

The fifth phase involves the following: deployment. Once the software has been developed together with going through the testing phase, then the software firm at SIL takes the solution to the market to be delivered to the customers or end users. Some of these are implementing and converting data from the old system, training the users and creating any documentation required. From my experience at there, I can say that the organisation provides support and consulting services to address issues, improve efficiency, and maintain the reliability and security of such critical applications Besides, the organisation can also have other obligations, including upgrading the applications when necessary.

When the project plan has been completed and signed by everyone a person is granted permission to go ahead with the development phase. Here, as per the requirement got, it is possible to state that there is an establishment of software solution provided. Activity under development may be done in iterations or sprints or stages depending on the technology development cycle such the Agile Model, Waterfall Model or the DevOps Model. In this phase, members of the team need to work together, to share information and status and have several meetings to ensure program development progresses as required and any problems are quickly identified and resolved.

At the same time, the use of quality assurance and testing standards is applied

to check whether the program reaches the necessary criteria and operates correctly. This encompasses area of testing as well as testing techniques for example, unit testing, integration testing, system testing as well as user acceptability testing (UAT). Testing identifies and corrects the errors before the software is developed to the final phase thereby minimizing instances of having to redo a phase that has already been completed and meeting the client's expectations.

The final two phases of SW-LCA are the development and testing phases, followed by the deployment phase where the solution is ready to be delivered to the customer/user. This may refer to installation and setup of a given system, transferring data into it, customer training, and any other pertinent materials. After that, the organization offers sustained or remedial support services to restrain any problems, optimize its features, and make it fast, safe, and modern.

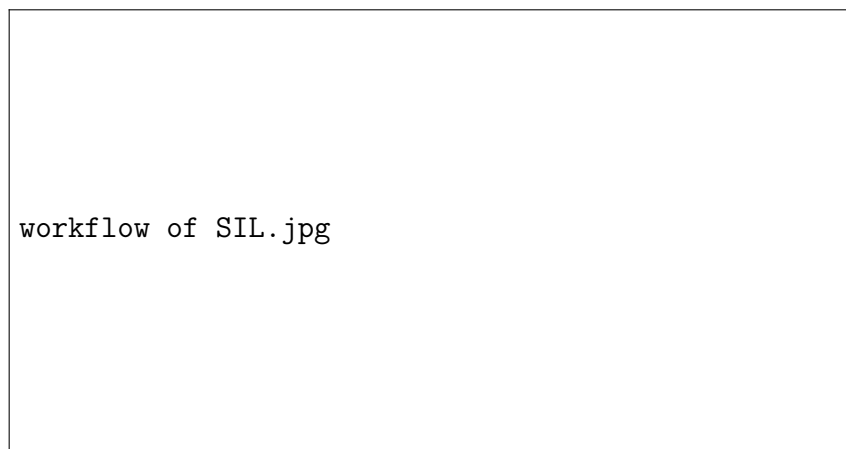


Figure 2.4: Workflow of Square Informatix Ltd

SDLC Models

Thus, choosing the most suitable SDLC model within any large corporate environment is always dependant on the type of project, organizational culture, and the specific requirement or conditions pertaining to the individual project. However, some other of the SDLC models that are closer to the actual practice and to the real projects are more appropriate for large scale projects and if the project lies in the larger scale software development task. Here are a few commonly used models at Square Group: Here are some of the common model being used at Square Group:

- Scaled Agile Framework (SAFe): SAFe is an important enables of practice that was designed as an evolution of Agile methodologies for large organizations. It includes questions about how you can do Agile in teams, in organisations, and the even the act of getting Agile into an organisation. It is pertinent to mention here that there is nothing called “big-landscape” in SAFe and therefore it is well suited to be applied where size and integration capabilities do matter.
- DevOps : As we already pointed out it, DevOps is not simply a SDLC model, which has to be applied and implemented in an organisational structure; it is a cultural and management frame that involves the cooperation between development (Dev) and operation (Ops) teams. DevOps when applied within

a large organisation employs methods used in creating big software to endeavour to ensure that more is developed at a faster rate, several steps are for automated and the product created to be of the right quality, stability and security.

- **Iterative/Incremental Development** : They are some of the techniques which incorporate breaking down of the project into some levels or phases and within each level or phase we get a part of the overall functionality. This means that one can always get feedback about it and make improvements on the tool thereafter, to introduce new features from time to time. In the large software business organizations, SDS can be quite useful for the customers as well as the developers to handle iterative or incremental development by explaining complexity, and mitigation of risks during the development in the maintenance of stakeholder engagement.

2.13.1 Quality Assurance

It was also a chance for me to learn some about QA at Square such as how Square-QA operates, who is working on it etc. QA is crucial in Square Informatix Ltd because to ensure quality and durability of its products, a Quality Assurance Officer, QA Tester or QA Analyst checks and ensure that the products offered by the company are of high quality an reliability as they are delivered to the clients or users. Here is given a short explanation how QA department works:

- **Creating Test Plans and Cases**: This also enhances the effectiveness of test run and the QA Officer is in a position to present the total test plans and test cases as from the development team before the start of the testing phase. More specifically, under test plan, detail on the amount of testing that will be done, the areas that will be tested, the approach that will be taken during the process of testing and the results that are expected from the testing process will be included. The QA Officer endeavours to ensure the accurate and structured testing implementing comprehensible test cases and results of the test stipulating the particular functioning of the related software.
- **Testing Software Products**: Indeed, there is much necessary for a QA Officer since his/her main duties are to provide an all-embracing evaluation of the software products developed by the Square Developer team. This involves include functional testing, usability testing, performance testing and security testing by reviewing the software as it is developed and undergoing tests to check on any variant or defects. A QA Officer has a significant role to identify issues that may change the user interfacing or the functionality of the product. All the time that he or she is conducting tests from various angles.
- **Identifying and Reporting faults**: When conducting test, the QA Officer capture various test cases and where there are problems or defects in the program these are well recorded and these impediments are reported to the developers right away. This includes explaining how the behaviours can be duplicated, including presentation of screen outputs or system logs if necessary, and categorizing defects into those that have significant, moderate, mild, or negligible effects on the performance of a system. In particular, the QA Officer ensures

the program satisfies specific quality requirements before its release as the person reports all the defects to the development team.

- **Regression Testing:** To ensure that new changes do not impact on existing features, if there are new changes in some aspects or changes in the features of the product, the QA Officer has to conduct regression testing. This means testing specific functionalities that had previously been tested; again to confirm that these functionalities work as required after the change. Performing regression testing the QA Officer effectively assists in enhancing the software's reliability and stability, which is critical in different stages of the software development processes.
- **Continuous Improvement:** The QA Officer is directly involved in process improvement activities that are aimed at increasing the quality and effectiveness of the software development processes implemented in the Square Company. This might involve giving advice on the current processes, proposing changes to the testing process and procedures, or insisting on the use of better tools as well as technology to facilitate the testing processes. Through this continuous development process, it is possible for the QA Officer to ensure that Square Informatix is able to meet its ongoing promise to clients in terms of quality service delivery through the ordeal of creating high quality software.

2.14 Working Environment

A key component of Square's workplace culture was a good work-life balance. The organization fosters a culture that emphasizes both productivity and relaxation time and acknowledges the significance of employee well-being. I had an amazing work atmosphere at Square Informatix Ltd. during my internship, which blended teamwork, mentoring, creativity, and a dedication to professional growth. The encouraging environment not only made my internship experience better but also gave me the drive and excitement I need to pursue a career in the exciting and cutting-edge IT sector. I am appreciative of the chances I was given and the experiences I had while working at Square.

2.15 Tutorial and Assistance

I met many trainers who works at Square for a long time, they all helped me to understand things and taught me so many things about office work. They gave many helpful advises. They recommended so many tools and resources for me that can help me later in professional life.

2.16 Meetings

As I earlier said, their sponsors and clients and their projects are confidential so they did not let me join any important meeting for security purpose.

2.17 Reflection

As an intern at Square Informatix have been nothing short of life-changing, providing a deep dive into the exciting realm of technology and software development. I have improved my abilities, gained invaluable insights, and experienced significant personal and professional progress during this journey.

- **Technical Proficiency:** I got to explore a range of software development aspects. In addition to improving my technical proficiency, the practical experience has helped me get a deeper awareness of industry best practices.
- I was able to gain a comprehensive grasp of project management by being acquainted with an Agile framework. Thanks to this experience, I was able to observe directly how a systematic approach to project management can improve flexibility, encourage teamwork, and guarantee the timely delivery of high quality software.
- A lasting impression has been made by Square Informatix's dedication to innovation, teamwork, and a great work environment. My expectations for a successful company have been molded by the emphasis on a healthy work-life balance and a culture that recognizes individual contributions.

2.18 Conclusions

Starting my internship at Square Informatix has been a life-changing experience that has expanded my knowledge of the tech sector and given me valuable abilities and insights that will surely influence my future pursuits. Throughout my internship, I had had the opportunity of working for a firm that is very curious about creativity, professionalism and quality. On the perfection of the facilities and production, there was a lot of emphasis put on the production of quality goods beyond industry average, which was evidenced by the tests that were conducted and the concern on the quality of goods to be produced or imported. First, the measures of work accomplishment and devotion to perform that the organization had set when it comes to problem-solving mechanisms and future steps. Also, it has also been nice working with Square Informatix, especially in terms of the reception each of us received and how helpful it was to my overall career growth. All that is necessary for a constructive and inspirational atmosphere in the course of work are present here, including a positive attitude towards interaction and useful criticism. Reflecting on my three months with Square Informatix I believe that having such opportunity was an absolute privilege, sure enough, I do not doubt in recommending the actual experience, the enhanced technical development and the expanded professional database that has been my honor to address during the internship. Thus, my internship at Square Informatix has not only been an experience of growth professionally but also the preparation for what is to come-that I will be more ready, more confident and more willing to contribute to this world of technology which is advancing so rapidly now. I need to add that I got one of the best internships at Square Informatix and I was very fortunate to have a great host.

This internship was pursued by me for the period starting from 02nd October, 2023. More to it, it was a six month internship program so I have interned until April 2,

2024. This final thesis is based on my overall internship of 6 months in the aforesaid company.

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