REPORT ON INTERNSHIP

Course No: SWE 420

Submitted by

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Institute of Information and Communication Technology
Shahjalal University of Science and Technology

Letter of Transmittal

Date: July 16, 2022.

Prof M. Jahirul Islam, PhD., PEng.
Director,
Institute of Information and Communication Technology
Shahjalal University of Science and Technology.

Subject: **Letter of Transmittal.**

Dear Sir,

It gives me great pleasure to present the internship report to you for your thoughtful review. This semester, I finished my internship at "**Orbitax Bangladesh Limited**" as a requirement for our **SWE420** course. I am ever grateful to the Institute of Information and Communication Technology for providing me with this wonderful opportunity to connect and bolster my academic understanding with practical experience.

This report is based on the knowledge I've acquired and the experiences I had between September 1, 2021, and February 28, 2022, during my internship. This report details the technical abilities I've acquired as well as my participation in teams, projects, professional development, and other relevant matters. The report captures my internship's overall experience and results.

My work life will benefit greatly from the experiences I have gained. Please accept my report; I would be very thankful. Thank you for your consideration.

Sincerely yours,

Souhardya Saha Dip
Reg Number: 2017831024
SWE, 4th Year, 1st Semester
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Letter of Endorsement

To Whom It May Concern

Subject: **Approval of the Report**

This letter is to certify that all the information mentioned in this document is true and not confidential to the company and at the same time it does not break the NDA which has been signed by Souhardya Saha Dip with this organization at the start of his internship. The projects mentioned in this report have had the successful involvement of Souhardya Saha Dip, Institute of Information and Communication Technology, Shahjalal University of Science and Technology.

I wish him all the best in his career.

Hasan Shahriar Masud
Chief Technology Officer
Orbitax Bangladesh Ltd.

Orbitax Bangladesh Ltd. ★ Dhaka ★

Shamim Ahsan Shaon
Principal Software Engineer
Orbitax Bangladesh Ltd

Acknowledgment

First of all, I would like to thank the Institute of Information and Communication Technology, SUST for arranging the internship program for me. I am also grateful to Orbitax Limited for recruiting me as an intern.

I would like to express my heartfelt gratitude to Prof M. Jahirul Islam, PhD., PEng., Director, Institute of Information and Communication Technology, Shahjalal University of Science and Technology for running the internship program and giving me the opportunity.

I am also thanking honorable teachers Quazi Istaque Mahmud Rafi and Fazle Mohammed Tausif, Lecturer, SWE-SUST, for their contribution and hard work in getting us admitted to different companies.

I am extremely grateful and remain indebted to the CTO of Orbitax Limited, Hasan Shahriar Masud for being a source of inspiration and for his constant support during the internship.

I take this opportunity to express my profound gratitude and deep regard to my Team Leader, Shamim Ahsan Shaon, Principal Software Engineer, and my mentor Plabon Kumar Biswas, Software Engineer for their exemplary guidance, monitoring, and constant encouragement throughout this internship. The blessing, help, and guidance given by them from time to time shall carry me a long way in the journey of life on which I am about to embark.

I am obliged to all my Team members, for the valuable information provided by them in their respective fields. I am grateful for their cooperation during the period of my internship.

I'm thankful to them for their continual constructive criticism and invaluable suggestions and help, which benefited me a lot during my internship. I'm thankful to them who are not mentioned but for their continual constructive criticism and invaluable suggestions and help, which benefited me a lot during my internship.

Executive Summary

The experiences, insights, contributions, and general professional development of the author during his internship at ORBITAX are covered in this document. This document's purpose is to identify and explain the intern's learning experience, work completed, difficulties overcome, project participation, team participation, and experience-gaining opportunities.

This internship program's objective is to give students the chance to connect and enhance their academic knowledge with practical industry experience while also learning more about the most recent industry best practices and technology. The ability to apply what they have learned about software engineering methods to actual projects is beneficial to the students. Without a doubt, this is a fantastic chance for the students to learn about the software business while they are still under-grad.

An internship at the well-known, international company Orbitax Bangladesh Ltd. in Bangladesh was offered to me. Right away, the ORBITAX family extended a warm welcome to me. I spent six months working as a developer after receiving the required instruction and training from my supervisor, who also oversaw my training. During that time, I also used a variety of software engineering techniques.

I gained knowledge of industry best practices and cultures, participated in real-world projects with a fantastic team, developed professionalism, teamwork, and cooperation skills, discovered new frameworks, used a variety of tools and technologies, and most importantly, discovered how the software industry actually operates. In this report, the user experience and lessons are covered.

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Chapter 1: Introduction

The B.Sc. In Software Engineering program of the Institute of Information and Communication Technology, Shahjalal University of Science and Technology, is a four-year industry-oriented degree.

IICT aims to prepare students for careers as top-tier software engineers. To help students prepare for employment in top-tier firms following three years of education, IICT provides an internship program that lasts six months before the final semester. The program's objective is to combine classroom instruction with practical work experience. To be ready to perform various technical tasks and managerial positions are meant to assist students in developing their professional abilities. It serves as a channel of communication between the academic world and business.

Students get a chance to work on real-life projects with different kinds of people in different situations. As a result, they develop strong communication skills with an outward worldly focus, positive personality, and business attitudes.

After completing my sixth semester, I received an opportunity to participate in the internship program at Orbitax Bangladesh Ltd., a multinational corporation with headquarters in Silicon Valley and one of the top providers of tax-related software worldwide. The internship program made it easier for me to apply my knowledge to practical problems. I studied industry culture and procedures and did my absolute best to make the most of it.

1.1 Origin of The Report

The students were required to produce a report on their internship program experience in order to assess their learning throughout the internship time. This report summarizes the atmosphere at ORBITAX, my professional development, and my project involvements while working there as an intern.

1.2 Objectives

The report aims to highlight my accomplishments, project involvements, and professional development during the course of the internship. The following objectives are covered in this report's content and data for readers:

1.2.1 Board Objectives

To demonstrate the worthwhile knowledge acquired throughout the internship program

1.2.2 Specific Objective

- To discuss the business best practices I have discovered
- To list the technical expertise I have gained via my internship program
- To give an account of the work I've done
- To explain the real-world projects I worked on
- To describe the difficulties I had throughout my internship
- To showcase ORBITAX's technology and software development process
- To display the services offered by ORBITAX
- To explain the surroundings of ORBITAX
- To outline the amenities offered by ORBITAX to its staff and interns

1.3 Scope of the report

I have concentrated on my contributions and my experience working on a genuine project for Orbitax in my report. This report summarizes the knowledge and experiences I gained throughout my six-month internship. This article describes how a team works together on a real-world project, how each team member plays their own function, and how the team adapts to the corporate culture and technologies. Here, we also briefly analyze ORBITAX's culture and corporate profile. The report's conclusion details my technical and professional development while participating in the internship program.

1.4 Methodology

The report is based on my personal experience working as an intern at ORBITAX and information gathered from corporate websites and papers supplied by staff. The sources of the data that were gathered are listed below:

1.4.1 Primary Data

For primary data, Orbitax Bangladesh Limited staff from various departments were interviewed on many occasions. They contributed information that was crucial to this report. Some additional primary sources were

- Personal knowledge gained through an internship
- Working together with colleagues
- Employees using it to debate contemporary technology during weekly meetings.

1.4.2 Secondary Data

- ORBITAX official website
- Articles of ORBITAX

1.5 Limitations

Information on business rules and obtaining approval from the appropriate parties are supplied in this report since sharing internal company information with third parties is strictly prohibited by company policy. I must thus briefly describe my project engagement. I'm not authorized to get into the specifics of the technology here.

Chapter 2: Company Profile

In order to supply the best worldwide tax solutions, Orbitax is dedicated to offering high-value, low-cost tax research, management, and planning solutions.

2.1 Overview

The world of international taxation is complex and ever-evolving. Although it might be difficult, keeping up with these global shifts is essential for an organization's management and compliance. The complete dashboard on Checkpoint World called Orbitax Essential International Tax Solutions allows one to integrate their tax planning requirements across all of their international operations. One will be able to easily finish their global tax needs and create business plans that are in line with the intricate and constantly-changing compliance standards thanks to its vast and potent research and analysis capabilities. Orbitax is aware that handling complex international tax matters requires the expertise of experts.

2.2 Mission and Vision

The goal of Orbitax is to make its team members' and partners' vast knowledge in international tax practice available through user-friendly software. First, they identify the elements of the foreign tax task that are complicated and require the expertise of experts.

The products of orbitax are intended to assist experienced users by minimizing the time and effort required for repetitive, normal procedures, doing in-depth research, using templates of tried-and-true tax techniques, and exploring situations, providing significant productivity increases. Through online tools available through tax content portals often used by tax experts, Orbitax introduces consumers to each product category. To assist consumers to get more out of their existing tax software and material, Orbitax also creates auxiliary tools.

2.3 Orbitax Company Classification

There are mainly 2 types of IT companies. One is Product-based and the other one is Service-based. Product-based are the companies that have their own products to sell. Ex: Google, Alphabet, Facebook, Adobe, etc. Service-based companies may or may not have their products, but their primary business is service. They work for other

organizations or we can say they are clients of Product Based companies. Examples are Infosys, Wipro, TCS, Cognizant, etc.

The business of Orbitax Bangladesh Limited is product-based. The majority of Orbitax's products are built on a web client platform. In product-based businesses, one could work on the same product for years, but in service-based businesses, one might only do so occasionally for a few months and rarely in years. Product-based businesses typically view their staff as an advantage because losing them would be a huge loss because it would take longer for a new employee to become knowledgeable about the product. Companies that focus on products will put quality first, while those that focus on services will put the customer first. As one will be faced with a fresh challenge and have to build code from start, he will have more learning possibilities there. They won't be overly particular about scheduling; all he need to do is his task.

2.4 Products of Orbitax

Orbitax is a one-stop-shop for all essential international tax research and compliance needs, including cross-border tax rates, tax treaties, daily tax news updates, country analysis, and global tax compliance forms in English. It also offers a comprehensive analysis of tax regimes with embedded tools to put one's research into action. Additionally, it offers effective real-time translation of all foreign documents along with automatic foreign exchange conversion for translating financial statements from other languages. The primary items offered by Orbitax are -

2.4.1 Orbitax Change Reports Tracker

Tracking changes to international tax legislation are made easy with Orbitax Change Reports Tracker. With a wide range of features and coverage for more than 195 countries (including global footprint analysis, multiple user access, custom reports, push notifications, and more).

2.4.2 Orbitax Drive

For safe cloud storage of tax-related documents, the Orbitax Drive is used. One may expand his company's Orbitax Drive with a variety of collaboration and data collecting options by purchasing the premium features.

2.4.3 International Tax Research & Compliance Expert (ITRCE)

International tax planning, research, and compliance workflows may be sped up with the help of Orbitax International Tax Research and Compliance Expert (ITRCE), a complete integrated online solution.

2.4.4 Due Date Tracker

Automatic due date obligation tracker linked to one's worldwide footprint for all of his filling needs.

2.4.5 Entity Tracker & Designer

Observe the worldwide presence of an MNE, including its entities and cross-border transactions. Expert in research and compliance with international taxes.

2.4.6 WHT Implementer

End-to-End Solution for determining and completing the required forms for cross-border transactions.

2.4.7 Executable Actions Tool (E.A.T.)

Create, communicate, and carry out conditional step and action-based bespoke business processes and tax workflows.

To guarantee that workflows are completed correctly and on time, the E.A.T. solution will automatically alert stakeholders, provide step-by-step instructions, and carry out the necessary actions either automatically or by bringing the assigned stakeholders to the pertinent screens to carry out the actions manually.

2.4.8 DAC6 & MDR Reporter

Cross-border agreements that affect at least one EU Member State and fit one of numerous "hallmarks" must be reported according to DAC6 regulations.

2.4.9 Audit Tracker

A thorough system for monitoring foreign tax audits and disputes. Workflow management with built-in automation that prioritizes deadlines, language translation, tax research, and interaction with several internal and external stakeholders.

2.5 Software Development Process of Orbitax

Orbitax generally follows an agile model in order to develop the software. Orbitax first provides a mockup of what to do, Some UI design, and after planning coding starts.

2.5.1 Planning

Every activity has a planning goal where we wish to find items that are related to the project. Extraction of requirements or requirements analysis is a crucial step in the

development of software. Customers often have a general concept of the outcome they desire, but they are unsure of what the program should do. At this point, knowledgeable and skilled software developers can identify vague, conflicting, or even incomplete requirements. It could be less risky to use live code demonstrations often if the requirements are accurate. Following the client's basic requirements collection, a clear analysis of the development's scope has to be made.

2.5.2 Implementation & Testing

The testing process begins as the project is being implemented, in order to ensure adequate quality. The process of developing software includes and prioritizes software testing. This step in the process makes certain that errors are found as soon as feasible.

2.5.3 Development & Maintain

Following thorough testing, release approval, and sale or other distribution of the code into a production environment, deployment begins immediately. Installation, modification (such as adjusting settings to the customer's values), testing, and sometimes a protracted assessment phase may be necessary. Software must be utilized correctly in order to be effective, thus training and assistance are crucial.

2.6 ORBITAX's Technologies and Frameworks

Orbitax has used a variety of tools and technologies over the years. These are a few of them:

- Languages:
  C #, Python, TypeScript, Javascript, NodeJs, YML, JSON, HTML, CSS/SCSS/SASS, JQUERY, PHP, Go, Java.
- Frameworks:
  ASP.NET Core, Windows Forms. Windows Presentation Foundation, LINQ, ASP.NET Entity Framework, yFiles, Angular, React, React Native, Selenium Webdriver, Golang, Laravel, Angular Universal
- Database:
  MongoDB, MSSQL Server, Postgres
- Servers:
  Nginx, IIS, Express
- Cloud:
  Amazon AWS, S3 Bucket, Windows Azure
- Microservice:
  Docker, K8s, Helm, Jenkins

2.7 Orbitax's Features

Orbitax offers a range of tax solutions. These are some of the main characteristics of orbitax.

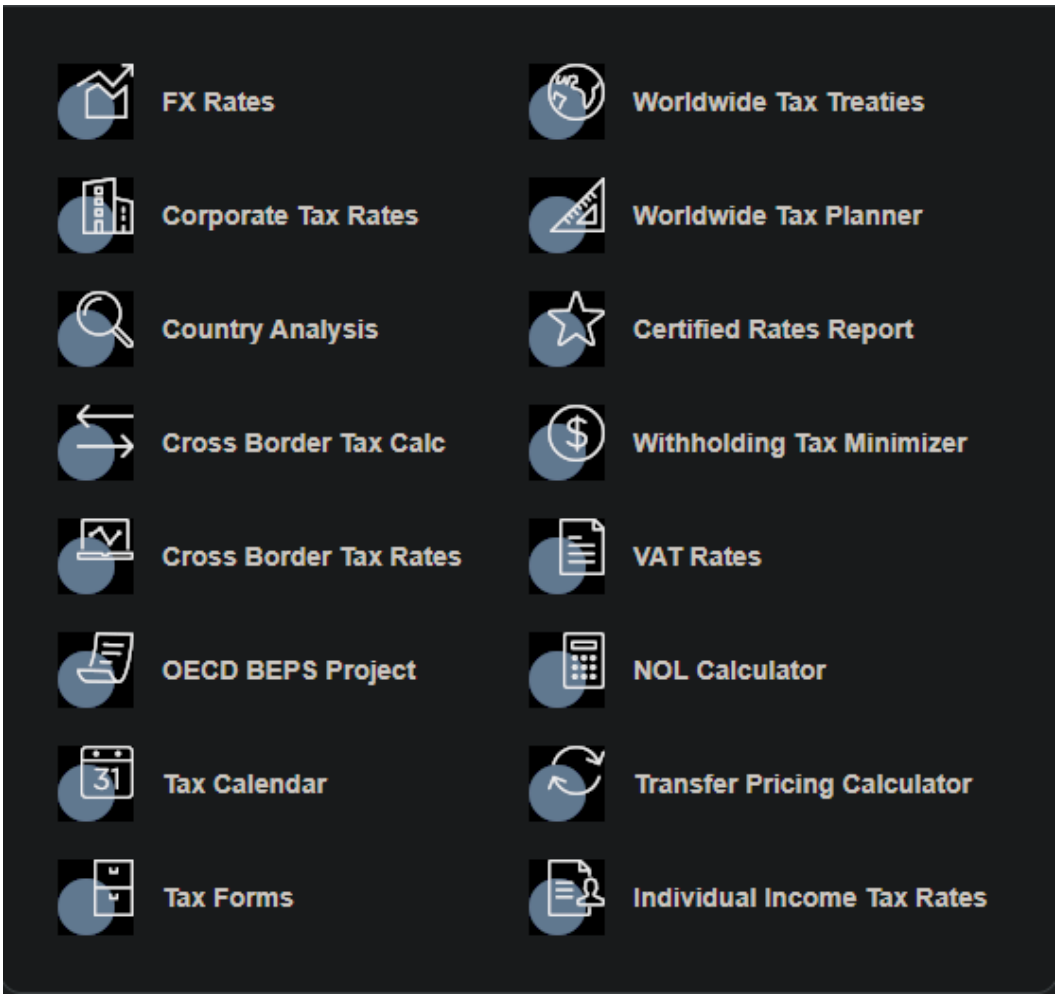


Fig: Some Main Features of Orbitax System.

2.7.1 Research & Planning

- Country Analysis

  Provides summaries of key tax legislation and tax rates, including

  - Country-specific descriptions of major provisions of international tax law, such as those governing tax attribute carry-forwards

- Country Tax Guides

- Important tax regulations for multinational corporations operating outside of their home nation include company structures, corporate and withholding tax laws for resident and non-resident enterprises, anti-avoidance regulations, and indirect tax laws. Additionally, there are tools for creating reports in Excel and PDF and for comparing laws between nations.

- A list of all international tax administration websites for every nation, allowing for direct access to the data sources themselves.

- Rates
  - Compare the tax rates of various organizations, taking into account surtaxes, effective tax rates, and corporation tax rates that take into account the current year's rate as well as rates from the preceding five years and future changes that are permitted.

- Tax Treats
  - Repository of worldwide tax treaties translated into English.

- Tax Memos
  - Automatically produce memoranda that include calculations for transfer pricing ratios, net operating loss (NOL) carry-forwards, interest and penalty rates, and deadlines for filing tax returns.

- Strategies
  - Step-by-step instructions on how to utilize the software's capabilities to put eight tried-and-true foreign tax techniques into practice and compile the findings into a thorough report. A permanent establishment is avoided, tax advantages are maximized, transfer pricing is maximized, interest deductions are maximized, withholding taxes are minimized, exemptions and foreign tax credits are maximized, and deferral is used.

- News
  - Updates notifications on approved proposed domestic rule changes, domestic rule changes, and treaty developments.

2.7.2 Planning Tools

Worldwide Tax Calculator

A modeling framework is provided to compute global taxes for a variety of tax situations, including several years, changes in company structure, and the effects of cross-border transactions such as dividend distributions, interest, and royalty payments, among others.

Transaction Calculator

Determines the overall tax advantages and disadvantages of international business.

Multiple Payment Optimizer

Enables the modeling of limits while calculating the total tax benefits and expenses of overseas transactions.

2.7.3 Compliance Solutions

Country Analysis: Compliance Checklists

Summarize important data on tax compliance by nation.

Country Analysis: Anti-Avoidance Checklists

Data on transfer pricing, LOB clauses, general domestic anti-avoidance legislation, CFC restrictions, and thin capitalization regulations.

Forms

Important tax documents, such as corporate tax return forms, treaty benefit claims forms, withholding tax reporting forms, etc., have been translated into more than 80 different languages. Additionally, the capability gives any imported PDF documents or forms an unofficial translation.

Interest & Penalty Calculator

Determines and controls the risks associated with inadequate or late compliance.

2.7.4 Charting Solution

Entity Designer and Entity Data

Create and maintain global entity structure and entity attributes, and display them in graphic and tabular format.

Entity Chart Playbook

Customized PDF report with detailed charts of global entity structure, spreadsheets with the selected entity and transaction data, document attachments, table-of-contents, and index.

Transactions

Input and display past, current, and future transactions.

Corporate Tax and Withholding Tax

Enables the tracking of corporate and withholding tax information across entities loaded into Entity Data.

2.8 Human Resource

Currently, Orbitax employs about 70 people, and they intend to increase that number. Orbitax has expanded its resources and output every year since its inception. Software developers and programmers with a love for their work are sought by Orbitax. To stay at the top, Orbitax conducts frequent training and review sessions. Additionally, Orbitax's culture of learning, sharing, and constructive criticism broadens its perspectives and keeps it composed. The precise occupations are:

- Developers
- UI Developers
- Software Testers
- Human Resource Manager
- Business Research Associate
- Product Development Manager
- Devops
- Software Quality Assurances
- Network Engineer

Chapter 3: Life at Orbitax

Orbitax constantly makes sure that everyone working there is comfortable. It makes sure that developers always have a healthy, productive environment to work in.

3.1 Overview

Since the epidemic began, Orbitax has shifted to remote working settings. But Orbitax also made the decision to go offline when things began to return to normal. Being a rapidly expanding business, orbitax wants the most productivity possible from its staff, thus it also works to provide the greatest level of facilities and physical and emotional comfort for them.

3.2 Location and Physical Layout

Orbitax has relocated to a new facility in Dhaka, Bangladesh, as part of ongoing growth. RAWAH tower in Mohakhali, Dhaka, is where they are right now.

Figure: Office Space of Orbitax

3.3 Office Schedule

The office hours at orbitax are scheduled in order to maintain a smooth flow between the various teams.
The day typically starts around 11:00 A.M. The typical lunch break is between 2:00 and 3:30 PM, however, there may be variances depending on the workload. The day ends at 7:00 PM.

3.4 Company Structure

Orbitax operates on a structured corporate framework. A predetermined official method is used for all official tasks. Employees are allowed complete latitude in managing their leaves, but they must first check-in with their team and then email HR to let them know. In addition to the official holidays, we interns received 8 holidays throughout the course of six months.

3.5 Daily Scrum

The lead team member hosts a daily scrum with all of the team members present at the beginning of each working day. Each team member must describe what they accomplished the day before, what they will do today, and whether they will require assistance from other team members. The scrum helps to resolve dependency concerns during development, and it keeps the entire team informed of the project's progress. owing to office shipping, for spending the majority of the time online. Google Meet was where the scrums were held.

3.6 Weekly Meetings

In Orbitax, a weekly team meeting is scheduled for every Tuesday. All personnel from each area are required to attend the meeting. The ongoing projects and forthcoming releases are discussed by the entire crew. Each team member benefits from being aware of other teams' efforts. Additionally, the conference also discusses a number of innovative technologies that may be used. Numerous non-technical topics are also covered so that everyone may express their opinions. Everyone will inevitably take

3.7 Dress Code

The first five months of my internship required us to work remotely online, thus there was no need for a dress code. Recently, physical offices have opened. There are no rigid dress code requirements.

3.8 Admin & Technical Support

A dedicated administrative and technical support team is present. The administrative group oversees a variety of tasks, including the organization of team gatherings, food management, yearly vacations, formal complaints, and many more.

The tech support team is available at all times to address hardware- and network-related problems and provide the necessary atmosphere during a live presentation. Additionally, they look after the entire local server and handle urgent tech issues.

3.9 Employee Facilities

The amenities available to Orbitax workers range from health care to flexible leave policies. The worthy mentions are included below.

3.9.1 Working Environment

The workplace atmosphere at Orbitax is fantastic, and it's been specially created for a software development firm by allowing workers to work from home. Orbitax has taken great effort, from color selection to furniture placement, to create a work atmosphere that actively fosters knowledge sharing and teamwork while also ensuring that staff never get bored by offering them a variety of leisure opportunities. Even though the engineers' workload might be overwhelming at times, the firm does its utmost to keep them engaged so they always feel at home. In their own designated workspaces, each team works diligently.

3.9.2 Work From Home Compensation

Orbitax made sure that the additional costs that workers had to pay in order to work remotely were paid by the office while it operated an online office until May 2022. Costs like internet usage and upkeep were covered.

3.9.3 Lunch Facilities

In the Orbitax offices, there is a lunch arrangement for all of the staff. Every day, all employees there receive a nutritious lunch. A facility for breakfast and refreshments is also available.

3.9.4 Domestic Environment

Orbitax is like a family where all the employees work together as a group. They always

guide, support, and inspire each other. They help each other not only in professional life but also in their personal life. Working here is fun and working for the company is an individual's responsibility.

3.9.5 Playing zone

There is a place designated for playing various games for enjoyment at Orbitax's new headquarters. Billiards can be played by workers to unwind. Additionally, there are PlayStations and a small gym so that the staff may exercise whenever they wish.

3.9.6 DPS program

DPS is a three-year curriculum at Orbitax. This is how it functions. Each employee will deduct a certain monthly amount from his or her account to generate a DPS. It must be a three-year DPS. The business establishes an account in this manner when an employee does, and vice versa. The employer pays the same amount as a bonus when the employee completes their DPS and provides a bank statement. Every three years, this procedure is repeated, and the third cycle is presently underway.

3.9.7 Parties

To maintain a positive work environment for all workers, Orbitax offers a fun party culture. Online get-togethers with pleasant activities for the whole staff were planned for the times when remote offices were in use. Now, conventional offline parties are also frequently hosted. There are celebrations for different occasions, releases, teams, and so on.

Figure: Orbitax Team Party

3.9.8 Recreation

For staff entertainment, Orbitax offers a variety of options. It includes things like release parties, team parties, picnics, business excursions, and outings. Every year, company employees are flown on yearly excursions abroad. Additionally, there are yearly domestic excursions that employees can take with their families.

3.9.9 Annual Trip

Orbitax plans a variety of tours for recreation. The excursions are open to all staff. These excursions range from day visits to lengthy journeys both inside and beyond the nation.

Figure: Orbitax Annual Trip to Cox Bazar

3.9.10 Sports

Games and sports are incredibly exciting to Orbitax. We participated in badminton and futsal competitions amongst software companies when I was working there. I played badminton for Orbitax and did my best to represent the company while on the squad. This event was a lot of fun, and my supervisor and I teamed up for it.

Figure: Orbitax Badminton Team

Chapter 4: Learnings and Project work

4.1 Overview

On the first day of my internship, I was assigned to the Orbitax Golang Team. The team consisted of nine people. six interns, me and my other five classmates, Hasan Masud (CTO) and Shamim Ahsan (Principal Software Engineer), Asish Pal (Principal Software Engineer). I have worked under the supervision of Shamim Ahsan, Lead of the Orbitax Golang Team. For the first 2 weeks, I was trained to understand the fundamentals of Golang. Then I was assigned the task of developing the required services in Golang. After three months of working in Golang, I worked in Angular and .NET for the Orbitax Power Team. After three weeks of training in Angular and .NET, I was assigned the task of developing production-ready features for the Orbitax EcoSystem. All the things I learned, all the tasks I accomplished, and my project involvements are described in the following sections.

4.2 Orbitax Golang Team

Orbitax holds a very vast and complex ecosystem for which a lot of computational power is necessary. Orbitax took the challenge of optimizing its system and gaining a performance boost. That is why they decided to rewrite some of the features in Golang. And so Orbitax decided to prepare a team to accomplish the goal.

We were split up into 3 smaller groups, each with 2 persons, for the pair programming exercise. Shaswata, a classmate of mine, and I were paired together.

4.2.1 Technology

We chose **Golang** for a number of reasons. It is statically typed and compiled. It is fast and simple. has memory safety, It has garbage collection and structural typing. and parallelism in the CSP manner. And it is built for concurrency

A Rest API application was first and foremost required for which GIN, a Golang framework, was used.

We used **MongoDB**, a NoSQL database for our system.

We also needed the support of Distributed Caching for which we chose **Redis**. It's a very fast and efficient in-memory data structure store, used as a distributed, in-memory key-value database, cache, and message broker, with optional durability.
As the system we planned was in a microservice architecture, we needed a message broker system for communicating between microservices. And right now **RabbitMQ** being the most popular message broker, we chose to integrate it into our system.

We utilized a tool called "**Google Wire**" since we needed support for the "**Dependency Injection**" design pattern but Golang is just a language and gin didn't have built-in support for it. It enabled us to keep up a clean code structure.

4.2.2 My Key Contribution

I have been involved with the project from the very beginning. At first, we created the basic structure & layout of the project. And the next part was code implementation. I made a number of key contributions to the project. Some of the major contributions are

1. Learn RabbitMQ.
2. Find the tools needed for integrating RabbitMQ in Golang.
3. Write a wrapper for RabbitMQ.
4. Prepare a REST API architecture.
5. Integrate authentication and authorization in the system.
6. Convert services to Golang.
7. Integrate Google wire into the system for the support of Dependency Injection.
8. Write scripts in JMeter and thoroughly run benchmark tests and compare between the new systems.

4.2.3 Challenges

In developing the system, we daily faced new dynamic challenges. Orbtiax trained us on how to approach each unique challenge. Some of the main challenges were:

OOP to FP

Orbitax current system is built using object-oriented programming (OOP). It is highly dependent on the concepts of OOP like Abstraction, Inheritance, Polymorphism, and Encapsulation. But these concepts are not available in a functional programming language. So, converting to a functional programming system was the biggest challenge of this project. We first had to decouple the business needs from the oop system and design code structure for functional programming. We spent hours planning the best option to design the system.

Integrating our system into the existing Orbitax System

One of the hardest tasks was to integrate the Golang project into the existing eco-system of Oribtax. We had to integrate our system with the backend system as well as with the front end.

Integrating Google Wire

Dependency injection is not natively supported in Golang or Gin. Therefore, we had to utilize a program called Google Wire. I was given the assignment to include this technology into the system. I was able to effectively integrate google wire into our project after spending some time investigating it.

Performance Optimization

Performance optimization was the project's aim. Therefore, each code and tool has to be carefully chosen before being included in this project. Our project was broken up into several little parts. Every module required to be tested using a variety of comparable techniques. The best tool was then selected based on the best outcome.

Code Refactoring

For maintaining a system long-term, code refactoring is a must in the software industry. So after project implementation, I was handed the task to refactor the code.

4.3 Orbitax .Net And Angular Team

After the successful completion of the Golang project, I was then moved to a new team. This team consisted of four members, Shamim Ahsan (Principal Software Engineer), Plabon Biswas (Software Engineer), me, and one of my classmates Toha. We were given the task of developing a new feature for the orbitax eco-system. Plabon Biswas was assigned as my mentor and Shamim Ahsan was assigned as my team lead. Both of them helped me to get accustomed to the orbitax eco-system. I was part of this team till the last day of my internship.

4.3.1 Technology

In this team, I worked in **.Net** and **Angular**. To prepare us for this team, we were trained for the first 3 weeks. During these three weeks, we were given the task of developing a demo project for learning the stack in the most effective way. The things I learned from this demo project are described below:

Angular:

- Making a module-based angular application.
- Planning for the system, gathering requirements from our team lead, and executing accordingly.
- Deciding the components of the system.
- Using Angular Pipe technology to transform data for display.
- Learning the use of decorators.
- Using Input and Output decorator and EventEmitter for cross-component communication.
- Learning the efficient way to communicate between the components.
- Setting up services for the application.
- Using NgRx (Redux) to set up centralized state management.
- Storing and retrieving data from browser local storage.
- Setting up an interceptor for passing JWT token as Authorization header for every request.
- Setting up AuthGuard for restricted and Authorized access to features.
- During the code setup tried to apply SOLID pattern when possible.
- Applying design patterns where ever possible.
- Setting HTTP calls for the backend.

DotNet Core:

- Making Onion-Architecture-based RESTful API.
- Using ORM frameworks to communicate with SQL databases.
- Designing Generic services and operations.
- Learning different scopes for dependency injection and their use cases.
- Service-based communication.
- Using unit-of-work to maintain database consistency.
- Unisng DTOs when communicating with the frontend.
- Using lazy loading when it is needed.
- Configuring HTTP cors.
- Applying Generic Repository with Specification Pattern.
- Following the SOLID principle as much as possible.

4.3.2 Challenges

After receiving the proper training we were then directly involved in the Orbtiax Main Code Base. Some of the challenges I faced were:

- Adjusting with a huge code base.
- Experimenting a lot to make things work fluently.
- Using HTTP interceptor for different needs.
- Converting to one structure or language by visualizing another.
- Understanding and implementing core concepts of .net and angular.
- Understanding dynamic component creation using the factory patterns.
- Refactoring the whole project, removing code smell.
- Applying different patterns where necessary.
- Doing the whole refactoring while ensuring that the project is always up to date with the requirements.

Chapter 5: Skills Acquired

I had access to a variety of expert resources throughout my internship that can assist software engineers to work more productively. I gained a variety of skills throughout my internship that helped me develop both professionally and technologically. The abilities I've acquired are covered in the sections below:

5.1 Technological Growth

5.1.1 Languages and Frameworks

Golang/Go

Go is a statically typed, compiled programming language designed at Google by Robert Griesemer, Rob Pike, and Ken Thompson. It is syntactically similar to C, but with memory safety, garbage collection, structural typing, and CSP-style concurrency. Golang has demonstrated that it is incredibly quick and effective. So, Golang was chosen by Orbitax for optimization.

```
package main
import "fmt"
func main() {
  var name string;
  fmt.Printf("Write your name : ")
  fmt.Scanf("%s", &name)
  fmt.Printf("Hello my name is %s", name)
}
```

.NET

.NET is a free, open-source, cross-platform platform for developers that may be used to create a wide range of applications.

With.NET, one can create applications for the web, mobile, desktop, gaming, IoT, and more using a variety of languages, editors, and libraries.

Angular

Angular is a TypeScript-based free and open-source single-page web client application framework led by the Angular Team at Google. We followed the official documentation of Angular. Also, Shamim Ahsan (Principal Software Engineer) took a few training sessions to get us accustomed to the best practices of Angular. After about two weeks

of training, we were given the responsibility to develop a feature in Angular that is now production-ready.

```
import { Component, OnInit } from '@angular/core';

@Component({
  selector: 'app-product-alerts',
  templateUrl: './product-alerts.component.html',
  styleUrls: ['./product-alerts.component.css']
})
export class ProductAlertsComponent implements OnInit {

  constructor() { }

  ngOnInit() {
  }

}
```

Code Snippet of an Angular Component

Typescript

Microsoft created and maintains the open-source programming language known as TypeScript. It is a rigorous superset of JavaScript in terms of syntax and gives the language optional static typing. Large application development is the focus of TypeScript, which trans-compiles to JavaScript.

HTML

The preferred markup language for texts intended to be viewed in a web browser is HTML or HyperText Markup Language.
HTML documents are downloaded from a web server or local storage by web browsers, who then turn them into multimedia web pages. HTML initially featured cues for the document's design and semantically explains the structure of a web page. It is considered the skeleton of web-client applications.

CSS/SCSS/SASS

CSS is the language we use to style an HTML document. CSS describes how HTML elements should be displayed. It is used to bring a modern and beautiful look to the UI. SCSS/SASS is a preprocessor scripting language that is interpreted or compiled into Cascading Style Sheets.

Gin

Gin is a web framework written in Go (Golang).

```
package main

import (
	"net/http"
	"github.com/gin-gonic/gin"
)

func main() {
	r := gin.Default()
	r.GET("/ping", func(c *gin.Context) {
		c.JSON(http.StatusOK, gin.H{
			"message": "pong",
		})
	})
	r.Run()
}
```

Redux

An open-source JavaScript package called Redux is used to manage and centralize the application state. It is most frequently used for creating user interfaces with frameworks like React or Angular.

Redux is a means to manage the “state” or we can say it is a cache or store that can be accessed by all components with a systematic approach. It has to be accessible by a “Reducer” and “Actions”.

5.1.2 Databases

MongoDB

MongoDB is a document-oriented NoSQL database used for high-volume data storage. Instead of using tables and rows as in the traditional relational databases, MongoDB uses collections and documents. Orbitax trained us to design database schema efficiently.

PostgreSQL

A free and open-source relational database management system called PostgreSQL sometimes referred to as Postgres.

MSSQL

Microsoft SQL Server is a relational database management system developed by Microsoft.

5.1.3 Development Tools

Postman

Postman is an API development collaboration tool that makes it easier to collaborate and streamlines each step of designing an API so that we can produce better APIs more quickly. The entire toolkit for API developers is Postman. One can create, test, and document APIs more quickly with Postman. To deal with an API that simulates the server response based on user requests, Postman offers a robust GUI.

Apache JMeter

The open-source Apache JMeter application is developed in Java and is intended to load test functional behavior and track performance. It was initially created to test web applications, but it has subsequently grown to include other test features.

Source Tree

Sourcetree is a free desktop GUI client that makes it easier to connect with Git repositories so that one may focus entirely on coding.

Bitbucket

BitBucket is a cloud-based service that aids programmers in managing, storing, and keeping track of changes to their code. A cloud-based Git repository hosting service is offered by BitBucket. Git's user-friendly interface makes it possible for even newbie programmers to utilize it. To utilize Git by itself, we often need a little more technical expertise and command-line experience. Additionally, BitBuckets offers a wide range of services, including the ability for teams to collaborate on projects, develop, test, and distribute code.

Jira

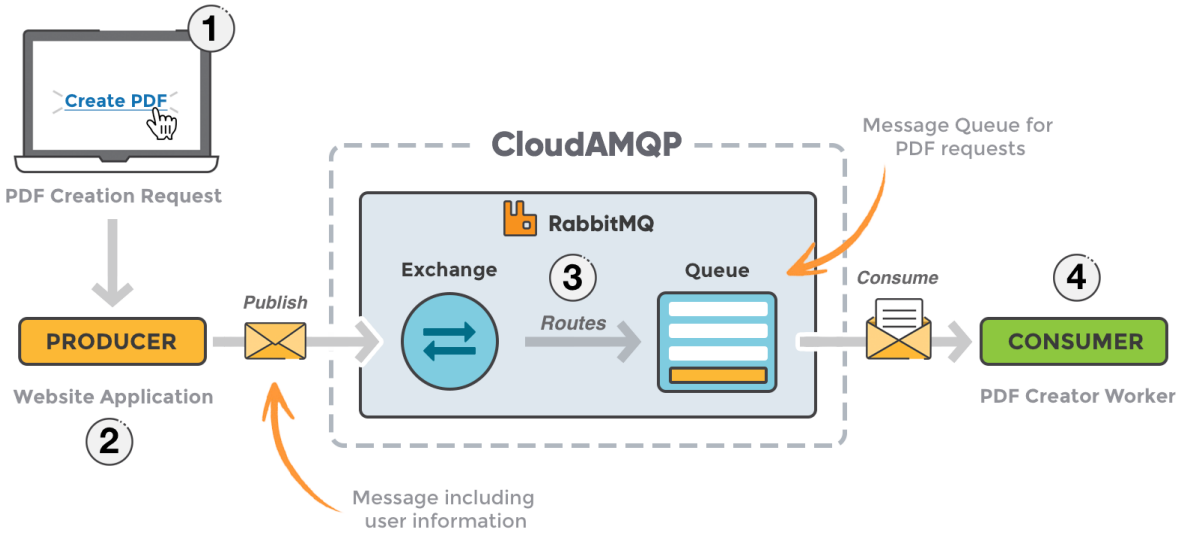
The agile technique is the foundation of the software. Jira is used for project management, bug tracking, and problem tracking. JIRA software is used by many firms in unconventional ways, such as a tool for document flow, expense efficiency, and warehouse automation. Numerous helpful tools and activities on the JIRA dashboard make resolving issues simple.

Docker

A set of platform as a service (PaaS) products that use OS-level virtualization to deliver software in packages called containers. Containers are isolated from one another and bundle their own software, libraries, and configuration files; they can communicate with each other through well-defined channels. Because all of the containers share the services of a single operating system kernel, they use fewer resources than virtual machines. Orbitax maintains its eco-system by using docker. We learned docker for using the services that were needed.

RabbitMQ

RabbitMQ is a message-queueing software also known as a message broker or queue manager. We used RabbitMQ to establish communication between microservices.



Concepts of RabbitMQ:

- Producer: Application that sends the messages.
- Consumer: Application that receives the messages.
- Queue: Buffer that stores messages.
- Message: Information that is sent from the producer to a consumer through RabbitMQ.
- Connection: A TCP connection between an application and the RabbitMQ broker.
- Channel: A virtual connection inside a connection. When publishing or consuming messages from a queue - it's all done over a channel.
- Exchange: Receives messages from producers and pushes them to queues depending on rules defined by the exchange type. To receive messages, a queue needs to be bound to at least one exchange.

- Binding: A binding is a link between a queue and an exchange.
- Routing key: A key that the exchange looks at to decide how to route the message to queues. Think of the routing key as an *address for the message.*
- AMQP: Advanced Message Queuing Protocol is the protocol used by RabbitMQ for messaging.
- Users: It is possible to connect to RabbitMQ with a given username and password. Every user can be assigned permissions such as rights to read, write and configure privileges within the instance. Users can also be assigned permissions for specific virtual hosts.
- Vhost, virtual host: Provides a way to segregate applications using the same RabbitMQ instance. Different users can have different permissions to different vhost and queues and exchanges can be created, so they only exist in one vhost.

Google Wire

Google Wire is a code generation tool that automates connecting components using dependency injection. Golang doesn't have any native support for DI which was necessary for our project requirement. For which we needed google wire to set up dependency injection in our projects.

5.1.4 System Layers and Architectures

Microservice

Microservices are an architectural and organizational approach to software development where software is composed of small independent services that communicate over well-defined APIs. As orbitax has a large tech eco-system, they use the microservice architectural pattern to maintain their services. And so we got introduced to this pattern.

Rest API

Representational state transfer is a software architectural style that describes a uniform interface between decoupled components on the Internet in a Client-Server architecture.

Caching

A cache is a high-speed data storage layer used in computing that keeps a subset of data, often of a temporary nature, in order to respond to requests for that data more quickly than it would be able to do so by accessing the data's primary storage location. One may effectively reuse previously retrieved or calculated data by using caching.

The information in a cache is often kept in quick-access hardware like RAM (Random-access memory), however, it could also be utilized in conjunction with a software component. The main goal of a cache is to improve data retrieval performance by minimizing access to the slower storage layer beneath.

A cache often stores a portion of data transiently, sacrificing capacity for speed, as opposed to databases, whose data is normally comprehensive and long-lasting.

5.1.5 Programming Techniques

OOP

A computer programming paradigm known as object-oriented programming (OOP) arranges the architecture of software around data or objects rather than functions and logic. An object is a data field with particular characteristics and behavior.

OOP places more emphasis on the objects that programmers desire to handle than on the logic necessary to do so. Large, sophisticated, and actively updated or maintained applications are a good fit for this kind of development. This encompasses mobile apps as well as design and production software. OOP, for instance, may be applied to manufacturing system simulation software.
In collaborative development, when projects are separated into groups, the technique is advantageous due to the structuring of an object-oriented program. OOP also offers the advantages of efficiency, scalability, and reused code.

Functional Programming

The term "functional programming" (FP) refers to a style of thinking about the development of software using only pure functions. It does not use the shared state or mutable data principles in Object-Oriented Programming. Expressions and declarations are valued more highly in functional languages than the execution of statements. Therefore, value output in FP depends entirely on the inputs supplied to the function, unlike other procedures that depend on a local or global state.

5.1.6 Patterns

Code Refactoring

Code Refactoring is modifying the internal organization of software to make it simpler to comprehend and more affordable to change without altering its observable behavior.

This technique is used by a development team to clean up previously written code without changing its functionality. It excludes changing the source code, fixing issues, or improving observable software aspects like the user interface.
Refactoring of the code makes this dirty code into clean code possible. Cleaner code is easier to understand, which enhances the usefulness, general structure, and maintainability of the code. It also makes the QA and debugging procedures go more quickly and efficiently. Refactoring the code makes it simpler to introduce new features and expand upon them in the future. Additionally, by eliminating any redundant code or other extraneous components, one's code will run more quickly and consume less memory.

Dependency Injection

Dependency injection is a technique in which an object receives other objects that it depends on, called dependencies. Typically, the receiving object is called a client and the passed-in ('injected') object is called a service. Our team lead took some sessions to give us a proper understanding of DI. This technique was highly used in Golang, .NET, and Angular.

5.1.7 Technologies

WebSocket

An sophisticated technology called the WebSocket API enables a user's browser and a server to start a two-way interactive communication session. Without polling the server for a response, one may use this API to send messages to a server and obtain event-driven answers.

Git

Git is a DevOps tool used for source code management. Git is used to tracking source code changes, enabling multiple developers to work together on non-linear development. After writing each block I committed my code to git. Then I had to PR (pull-request) to merge my code. My team lead merged my code to the original repo after reviewing it.

JWT

An open standard called JSON Web Token (JWT) outlines a condensed and independent method for securely transferring data between parties as a JSON object. The fact that this information is digitally signed allows for verification and confidence. JWTs can be signed using a public/private key pair using RSA or ECDSA or a secret (with the HMAC technique).

5.1.8 IDEs and Extensions

Jetbrains Goland

For GoLang developers, JetBrains offers GoLand, a cross-platform IDE created specifically for Go developers. Because it is a commercial IDE, it has a (small) price tag and a wide range of features. It offers intelligent code completion, dead code identification, on-the-fly error detection with suggestions for repairs, refactorings with one-step undo, and documentation hints. Additionally, it has robust GoLang debugging features, easy-to-use GoLand code navigation, and out-of-the-box support for Git, GitHub, and Mercurial.

Jetbrains Rider

The IntelliJ platform and ReSharper function well with Rider, a cross-platform C# IDE. It is made to work with both the.NET Framework and the.NET Core. It aids the solution's visualization of project dependencies. One may use this C Sharp IDE to deal with databases and SQL without leaving Rider.

Visual Studio

Developers may write and revise their code using the software package, the Visual Studio IDE (integrated development environment). For software development, its user interface is used to edit, debug, and build code. A code editor that supports code refactoring and IntelliSense (the code completion feature) is a feature of Visual Studio. Both a source-level debugger and a machine-level debugger may be used with the integrated debugger. A code profiler, designer for creating GUI apps, web designer, class designer, and database schema designer are further built-in tools.

Resharper

It is an extension used in Visual Studio. Its functionalities bring huge convenience to a developer.

Visual Studio Code

Microsoft created Visual Studio Code, sometimes known as VS Code, an open source code editor for Windows, Linux, and macOS. Debugging support, syntax highlighting, intelligent code completion, snippets, code refactoring, and integrated Git are among the features.
Java, JavaScript, Go, Node.js, Python, C++, and Fortran are just a few of the programming languages that may be utilized with Visual Studio Code, a source-code editor. Based on the Electron framework, which is used to create Node.js Web apps that employ the Blink layout engine, it is used to create mobile applications.

5.2 Professional Growth

5.2.1 Development Techniques

I studied the waterfall paradigm, the agile model, and a lot more in my studies. I observed the use of agile and kanban in the industry. Orbitax adopts an agile development methodology due to the constantly changing demands of its clients. Teams at ORBITAX utilize JIRA to keep an agile process running smoothly. Every morning, everyone gathers for a scrum meeting to review their current work, inform each other on prior jobs, and address any dependency concerns. Keeping everyone on the team informed on each person's work and the status of the project is beneficial.

5.2.2 Teamwork & Cooperation

The collaboration, teamwork, and information sharing of ORBITAX is one of the things that set them apart and contribute to its success. Since they are all free, seniors are always available. They frequently hold discussions on various topics and offer training to broaden our understanding. The team members are always willing to work together.

5.2.3 Planning

My supervisor taught me the value of beginning each day with a quick planning session, or scrum meeting. We are able to adhere to our spring plan thanks to this meeting and preparation.

5.2.4 Attitude & Motivation

My coworkers have taught me the importance of having a good outlook, being passionate about my work, and approaching each assignment with professionalism. Their sincerity and timeliness gave me a lot to think about. They showed me the value of being trustworthy and accountable at work. They have shown me how to take care of myself and how to face obstacles and prevail over them. They have given me a lot more to learn.

5.2.5 Experiencing Work From Home

Orbitax intended to start again and relocate to a new, larger facility despite the covid pandemic being finished in early 2022 in order to keep up with their ongoing expansion. We had to work remotely for our internship period. We utilized Google Meet to plan meetings while working remotely. Screen sharing was utilized to demonstrate our efforts. We were able to log into our work computer remotely.

Chapter 6: Conclusion

I was able to apply the knowledge I had learned in the classroom to the setting of the real world thanks to my internship experience. Applying the information I have acquired over the years to a project in the actual world felt wonderful. It assisted me in realizing my potential and, at the same time, inspired me to put in more effort in order to accomplish bigger objectives. Along with developing technically, my time at ORBITAX allowed me to create numerous lasting memories. I had a great time at all of the team functions and celebrations. One of the nicest work environments a firm can offer is the new one. The firm treated me fairly, justly, and professionally. I have gained knowledge from many groups and people. I appreciate my team lead and the CTO of Orbitax. They also gave me advice when I needed it and helped me overcome some of my flaws. Even if the internship was not long enough for me to learn everything there is to know about the labor market, the knowledge I did get will undoubtedly be useful to me in the future. Overall, Orbitax was a lot of fun, and I'm sure it will help me develop as a programmer, developer, worker, and most importantly as a person. I convey my sincere thanks to IICT for this great opportunity. I'll always be grateful to my coworkers at Orbitax, especially my teammates and team-lead.

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