

VIETNAM NATIONAL UNIVERSITY OF HCMC

INTERNAL UNIVERSITY

INTERNSHIP REPORT



by

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Submitted to: School of Computer Science and Engineering

International University, VNU-HCM

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Organization/Company:

MWG - Information Technology One Member Limited Company The
Gioi Di Dong Suite T2-1.2 , D1 Street, Saigon Hi-tech Park, Tan Phu Ward, Thu
Duc City, HCMC

Duration of the Internship:

11 weeks (01/07/2021 – 25/09/2021)

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Certified by

Supervisor's Signature



ACKNOWLEDGMENTS

First of all, to complete this report, I would like to express my sincere thanks to the mentors and teachers in the department of information technology who supported me step by step to complete this internship successfully.

I would also like to express my deep gratitude to the advisors of MWG for taking the time to guide and teach me wholeheartedly during the past 3 months of internship. Thank you for your enthusiasm and dedication. Company colleagues and advisors have helped me learn a lot of new knowledge so that I can have a solid foundation to graduate and work in the future, I can also integrate faster into the professional work environment.

Although I have done my best to complete this report, I believe that there are still some mistakes because the knowledge during the internship in the company is too new to me. I hope you understand that and I also hope that everyone will give me feedback so that I can improve it better.

Ho Chi Minh September 9, 2021

Internship Student

A handwritten signature in black ink, consisting of stylized cursive letters, likely 'Lê Thanh', written above a horizontal line.

Lê Thanh

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I. DESCRIPTION OF COMPANY/ ORGANIZATION

1. Name of Company: Mobile World Investment Corporation (MWG)

Business logo :

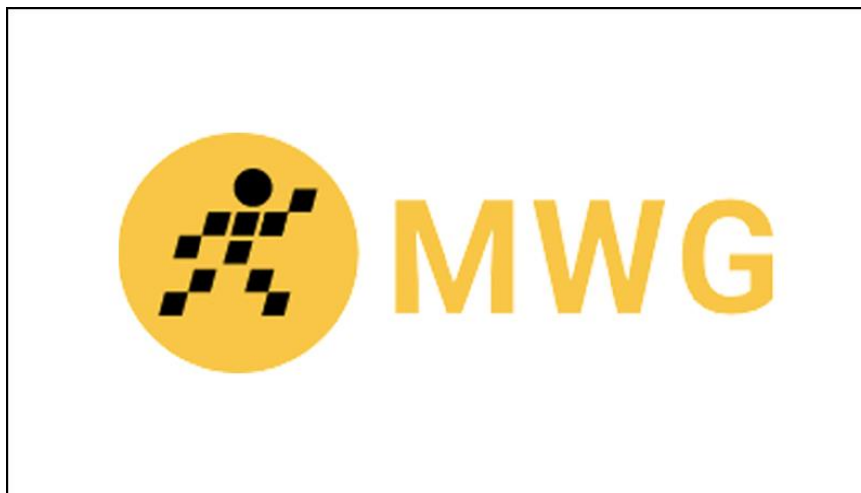


Figure I-1. MWG Logo

2. Contact:

+ Email: investor@thegioididong.com

+ Phone: 02838125960

+ Address: Information Technology One Member Limited Company The Gioi Di Dong Suite T2-1.2 , D1 Street, Saigon Hi-tech Park, Tan Phu Ward, Thu Duc City, HCMC

3. Description

Mobile World Investment Corporation (MWG) is the No.1 Retailer in Vietnam by revenue and net profit after tax with more than 4,500 stores nationwide. MWG operates the following concepts: “thegioididong” mobile

phone retail chain, “Dien May Xanh” consumer electronics retail chains, “Bach Hoa Xanh” grocery retail chain. In addition, MWG has expanded to regional markets with the phones and consumer electronics retail chain in Cambodia as well as invested in An Khang pharmacy chain. The company has recently developed a new high-tech agricultural project named “4KFarm” to offer consumers with safely-grown fresh produce of “4 No” policies (zero pesticide, non-GMO seeds, zero preservatives and zero growth substances).

MWG concentrates on developing excellent customer services that are in line with the corporate culture of putting customers as the first priority in all actions.

MWG was proudly named in TOP 50 best big public companies in Asia (voted by Forbes) and the only Vietnamese representative in Top 100 Asia-Pacific Retailers voted by Retail Asia Magazine and Euromonitor.

MWG has been the Champion in TOP 50 best performing companies in Vietnam (The Business Review – Nhip Cau Dau Tu). MWG’s success story was considered as an interesting case study for researches at Harvard University, UC Berkeley, Tuck Business School (US).

Not only be acknowledged as top performing company by investors and professional organizations, MWG also gains trust from employees given the fact that the Company has been 4 times consecutively in the TOP 50 Best Places To Work in Vietnam and won the “Best Winner” in HR Award for Effective HR Policies.

4. Our services and products

+ Thegioididong.com was established in 2004, is a retail chain of mobile devices (mobile phones, tablets, laptops and accessories) with the No. 1 market share in Vietnam with more than 2,500 selling points of mobile devices (including nearly 1,000 Gioi Di Dong stores and more than 1,500 Dien May Xanh stores) present in 63 provinces and cities across Vietnam.

+ Dien May Xanh, formerly known as Dienmay.com, is a retail chain of consumer electronic products (electronics, refrigeration and home appliances) with the No. 1 market share in Vietnam with more than 1,500 stores. in 63 provinces and cities across Vietnam.

+ Bach Hoa Xanh was put into trial at the end of 2015, is a chain of stores specializing in retailing fresh food (meat, fish, vegetables, fruits...) and necessities with nearly 2,000 supermarkets in the southern provinces and South Central. Bach Hoa Xanh provides daily essential products that are fresh, of clear origin, and diverse in types; reasonable prices compared to traditional markets and small shops; in a clean, friendly space and in locations accessible to housewives.

+ Bluetronics, formerly known as Bigphone, was born in 2017, is the first retail chain of consumer electronics in foreign markets of MWG. Bluetronics currently has more than 20 stores specializing in retailing genuine mobile devices

and electronic products in Cambodia, with quality after-sales service and cooperation with consumer financial institutions for installment sales, things that consumers in this market have never experienced when buying at a retail store.

+ 4KFarm – High-tech Agriculture Development Branch of Bach Hoa Xanh – is a new member of Mobile World group. 4KFarm's team of agricultural experts transfer technology and support farmers to grow safe vegetables. 4 NO (no pesticides, no growth agents, no preservatives and no genetically modified varieties). 4KFarm is committed to purchasing 100% of this safe vegetable from farmers and exclusively supplying it to Bach Hoa Xanh chain. 4KFarm's mission is to provide customers with safe, healthy food and bring a more prosperous life to farmers. Customers can scan the QR code on the vegetable bag and know all information about the origin of the vegetables such as which greenhouse to grow, the name of the farmer, the type of seed, the date of sowing, the date of harvest, and can view the live camera of the farmers. membrane to grow 4K safe vegetables.

+ An Khang pharmacy is a chain of pharmacies specializing in selling pharmaceuticals, functional foods, medical equipment, etc., belonging to Mobile World Group.

5. Organization chart of the company

- + IT Developer: Website, Mobile app, ERP, CRM, Backend/Frontend/

Fullstack.

- +Business Analyst BA (IT Business Analyst).

- +IT System Network/ IT Database/ BI.

- +IT Security.

- +IT Tester, IT QA/QC.

- +IT R&D.

- +Diverse programming languages: Java, Javascript, C/C++, C#, SQL,

Node JS,...

- Top 3 Skills at MWG:

- + OOP, C#, .NET 4+, ASP.NET MVC 4+, Java

- + Webservice, WCF Service, Web API

- + HTML, CSS, Javascript

6. Function of my internship department

My department is a programmer for the BHXH system: researching and developing new technologies to reduce congestion on the server, researching and applying new algorithms to solve the problem of dividing jobs for employees. , design UI/UX patterns to apply the interface to the app on the system, build a complete basic microservice

II. SUMMARY OF THE INTERNSHIP

- During my nearly 3 months of internship, I learned how to use google's OR-tool algorithm (MIPS solver CP-SAT solver) to optimize the division of work for employees. In addition, the access to the employment system of employees of a large sales system like BHXanh has made me learn more practical experiences of businesses.
- I also learned about UI / UX design ways by doing the work of designing the display frames of the system app and designing the customer's purchase bill.
- Finally, I learned how to build a basic microservice system consisting of the following parts:
 - + How to write APIs to call the store from the database
 - + How to use JWT
 - + How to use gitlab CI/CD to run code on the server
 - + How to monitor the project using prometheus and grafana to measure metrics
 - + how to use API gateway
- In order to successfully complete this internship, I would like to thank the mentors of MWG who have supported and taught me a lot in the assigned tasks, I also thank the teachers of International University. helped and facilitated my internship even while the covid disease caused everything to communicate online.

III.PLANNING

WEEK	DATE	JOB
1	1/7	<ul style="list-style-type: none">- Setup the following<ol style="list-style-type: none">1. GIT SCM2. Visual studio(>=2017)3. Dbeaver(query database)4. OpenVPN(to connect while working from home)- Use the link above to read and understand this algorithm as an example
	2/7	<ul style="list-style-type: none">- Do google assignment
	3/7	<ul style="list-style-type: none">- Recode the example of assignment- Understanding MIPS solver and CP-SAT solver <p>Learn what MPSolver, MPVariable, MPCConstraint, and MPObjective objects are for.</p>
	4/7	<ul style="list-style-type: none">- Make a real example with little input data
	5/7	<ul style="list-style-type: none">- Submit the task

Table III-1. Week 1

WEEK	DATE	JOB
2	8/7	<ul style="list-style-type: none"> - Give the data excel file to make a lot of database to do - Assign the requirements of the division of work to employees
	9/7	Meeting and talking more about the details of this
	10-14/7	<ul style="list-style-type: none"> - Continue to talk about the data and conditions of the algorithm to complete the job - Help each other with ideas and apply it to a real database
	15/7	<ul style="list-style-type: none"> - Completed phase 1 of the work division algorithm - Submit it - Notice what has been accomplished for the mentor

Table III-2. Week2

3	17/7	- Submit work results
	17-21/7	- Continue to work on the sequel to phase1 because it's quite complicated and takes a lot of time
	22/7	<ul style="list-style-type: none"> - After completing, we compared the results of the algorithm of each person in the team - Selected the code with the most optimal algorithm in those code

Table III-3. Week 3

4	24/7	<ul style="list-style-type: none"> - Split into two teams and each team has a different job: - A team in the direction of researching and developing new technologies to improve the system (hazelcast, lmax disruptor) - A team will be working with the API
	25/7	<ul style="list-style-type: none"> - Company VPN granted - Connect to corporate VPN, - Add company host and access company git
	26/7	- Set environment variables and complete the setup steps to run the project according to the mentor's instructions

		<ul style="list-style-type: none"> - Add project to running Tomcat - Finally run postman to test the available API commands - Read and understand example hazecast and lmax, solution to monitor project
	28/7	<ul style="list-style-type: none"> - Explained about the system related to Product and Price of supermarket chains BHX - Get access to the database system of these two - Understand how to operate and how to declare new
	29/9	<ul style="list-style-type: none"> - complete the setup steps to run the call store command to test on postman - Read and fully understand the sample project

Table III-4. Week 4

5	1/8	- Assigned to design the UI of the bill
	3/8	<ul style="list-style-type: none"> - Submit the article about the bill and UI of the product in the cart popup of the app - Assign a new job to design a popup to display product information
	5/8	- Submit a new task

Table III-5. Week 5

6	10/8	- Search or self-code tool to read postgresql and create your own class in java based on attributes
	12/8	- Found the tool
	13-15/8	<ul style="list-style-type: none"> - Continue reading project code - Research and understand the purposes of API code files - Learn about docker
	16/8	- Research causes and solutions, UI Components when using the NimbusLookAndFeel theme sometimes fail

Table III-6. Week 6

7	17/8	- Found a fix for the bug
	18-22/8	- Continue to study the code and how it works
	23/8	<ul style="list-style-type: none"> - Assigned a brand new project to write APIs to call the store from the database - Assigned to the study of jwt - Assigned to learn CI/CD and apply it

Table III-7. Week 7

8	24-26/8	- Learn and do the assigned tasks
	27/8	- Submitted API and JWT store articles
	30/8	<ul style="list-style-type: none"> - Submitted gitlab CI/CD - Merge branch into main branch to test auto deploy - Being taught about the company's promotion model and sales system - Dig deep into the database of those two things - Understand how to operate and its working principle - New assignment is monitor project using prometheus and grafana

Table III-8. Week 8

9 + 10	6/9	<ul style="list-style-type: none"> - Preliminary completion of that task with demo projects - Assign work on api gateway
	9/9	<ul style="list-style-type: none"> - Held a seminar to talk about how to write APIs to call the store from the database, - Organize a seminar about JWT
	10/9	<ul style="list-style-type: none"> - Held a seminar about gitlab CI/CD and how to apply it on the project
	11/9	<ul style="list-style-type: none"> - Submit task promethues and grafana

Table III-9. Week 9+10

IV. INTERNSHIP ACTIVITIES & ACHIEVEMENTS

1. Internship activities

Since I have been practicing for almost 3 months so far, I will divide this into 3 parts: July, August and September.

+ July:

- I started my internship on July 1st, the same day I met my freshers and was introduced to the mentor who will guide us through this internship. It all started with the mentor organizing an online meeting or a way of messaging through the app to help people get to know each other better. After gathering enough human resources to join the group chat, the mentor began by first guiding us on how to set up the most basic software so that we could begin working.
- We were instructed to install GIT SCM, Visual Studio, Dbeaver, and OpenVPN. We updated and downloaded all of the necessary software that morning, but the company didn't provide the VPN in time, so we had to do a few things without VPN access.



Figure III-1. GIT SCM



Figure III-2. Visual Studio



Figure III-3. Dbeaver



Figure III-4. Open VPN

- We were able to participate in this internship with the department as a BHXanh programmer immediately after our mentor introduced us to what we needed to do next. Mentor informed us of the path of a new optimization algorithm, which is Google's OR-tool.



Figure III-5. OR-Tools logo

About OR-Tools

Google Optimization Tools (a.k.a., OR-Tools) is an open-source, fast and portable software suite for solving combinatorial optimization problems.

The suite contains:

- A constraint programming solver;
- A linear programming solvers;
- Wrappers around commercial and other open source solvers, including mixed integer solvers;
- Bin packing and knapsack algorithms;
- Algorithms for the Traveling Salesman Problem and Vehicule Routing Problem;
- Graph algorithms (shortest paths, min cost flow, max flow, linear sum assignment).

We wrote OR-Tools in C++, but also provide wrappers in Python, C# and Java.

Figure III-6. About OR-Tools

- Following that, we were assigned the task of familiarizing ourselves with the Google optimization algorithm by reviewing the sample assignment several times and then re-coding it. As a result, we became acquainted with the fundamental concepts of the two main algorithms we intend to employ, namely the MIPS solver and the CP-SAT solver. And I began to learn about the components that comprise it by learning what MPSolver, MPVariable, MPCConstraint, and MPObjective are and how they function in this algorithm.
- After we understood that, we were given a reduced fact data set and asked to code a new problem based on it, which was a little difficult for me at first, but thanks to everyone's enthusiasm and guidance, I finished it on time and submitted it.
- After we mastered the algorithm, our mentor decided to give us a database of actual employee work in excel files. At first, we were overwhelmed by the large number of files, but our mentor continued to give us algorithmic conditions that would benefit our work, and now we know what it's like to work on a real project.
- In the days that followed, we held continuous online meetings and discussed more about the project's details. We also asked and answered questions from members on a regular basis so that we could achieve mutual awareness. In general, we spent almost a week thinking about it, and then everything was done, we finished phase 1 of the algorithm and ran it successfully, and we didn't forget to write

down things that needed attention or questions for the mentor after submitting the task.

- We spent another week working on this project together because it was quite complicated because the input data and division conditions were so many that our progress was too slow, but in the end, everything was successful, as soon as the team completed their own algorithm, we were asked by the mentor to compare each other's code and find the most optimal algorithm and use it to continue.
- Following that, there was a significant change in the way my team worked; the mentor held an online meeting and announced that, starting now, we could join the company's business, which he decided to divide. I am divided into two groups: one will research and develop new technologies for company projects to help relieve server congestion and many other things, and the other will be involved in professional activities. I was a member of the API working group and knew a lot about working with APIs. The research team will be tasked with investigating hazecast and the lmax disruptor. Although divided into 2 groups, the mentor said that the two groups can also help each other if possible and if anyone wants to switch groups, they can also do it.
- The company provided us with our own VPN the last week of the month, after which we were able to connect to the company's VPN and access the company's git to get up and running. put some effort into it

We received a project from the mentor, and he asked us to clone the code and begin setting up the necessary things to be able to run it, forcing us to use Java 8 and run on the Tomcat server at first. After that, we are asked to install Docker. After that, we will run the command lines on git bash to be able to set the environment variable we cloned about. Post man software is also a must-download tool.



Figure III-7. Java 8



Figure III-8. Tomcat apache

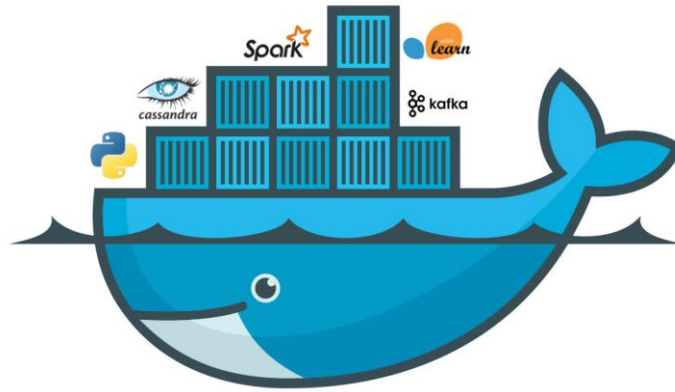


Figure III-9. Docker



Figure III-10. Postman

- Following that, the research team was also assigned the hazelcast and lmax research tasks. We had our first experiences running API tests on the postman software to call API functions and then call the store from the database to execute commands after receiving a sample project and setting up the necessary things to run it. In the days that followed, we went to seminars to learn about BHXh's data system and operating principle. We learned about its Product and Price, its operating

principle, how it is stored, and how it works. Searching and viewing the complete database of the above two systems made us very excited because it was the first time we had access to a large enterprise sales data system, and understanding all those data deeply and thoroughly was also a big challenge for us, but we succeeded because the instructors are very dedicated and enthusiastic to answer each person's questions.

+ August:

- Starting in August, I was assigned to complete the UX / UI code, specifically the interface of BHXanh's bill as well as the popups and interfaces on the cash register app of employees working in the store. This new task was not difficult for me because it was quite similar to what I did when I was learning web, the only difficulty I faced when making the interface of the bill was the barcode and having to convert from web to pdf made me quite confused, fortunately, everyone supported me so it was quite smooth, because perhaps this is quite light so we do it relatively faster than other tasks,

Mã sản phẩm	Tên sản phẩm	Giá bán cũ	Giá bán mới	
2701122048100	SẢ CÂY KG	20,000	22,000	Đã in lại
2701122047800	RAU THƠM CÁC LOẠI KG	50,000	49,000	Đã in lại

Figure III-11. Popup

- Then I was given a main task to find or code myself a tool that can convert from a table in postgresql to a class in java from the attributes in the database, I searched and tried to think of a way to get it. I was able to complete it, but not waiting for me to successfully search, the mentor informed me that I had found the corresponding tool, so I will not list the things I have done in the summary, the next few days of my task. We are quite comfortable, it is reading and understanding the sample project that the mentors have and as well as learning new knowledge about docker to be able to understand more deeply about the project, followed by a small task assigned to us. I'm just perfecting every bug where running NimbusLookAndFeel sometimes it throws an error on the UI component, and we've found a solution to it, but it's probably not the best solution yet. that mentors wait for, after a few small things, we continue to bury our heads in reading the code of the sample project to ready for the process of building our own code later.
- And what has come has come, we were assigned to complete a brand new project and the initial tasks were assigned as follows, coding API classes to be able to call the store from the database, applying jwt to the project, setup gitlab CI/CD to be ready to deploy the project to the server to auto deploy

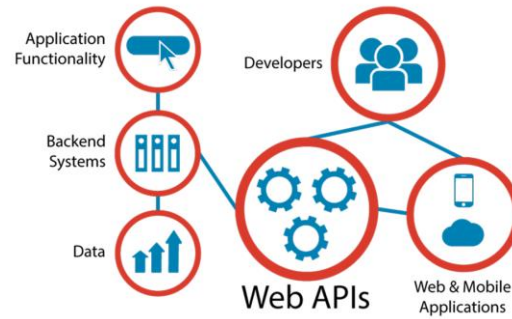


Figure III-12. APIs

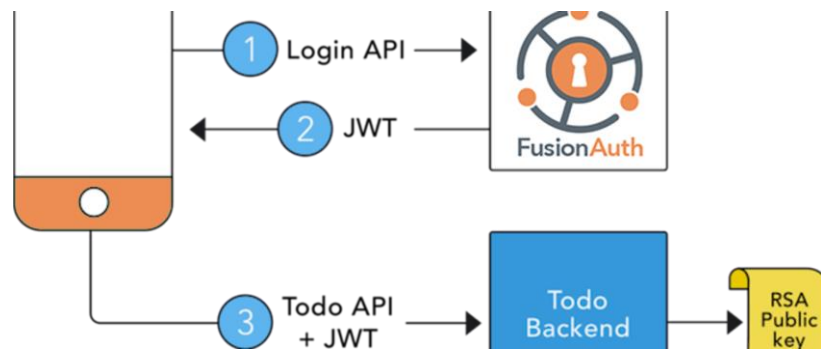


Figure III-13. JWT

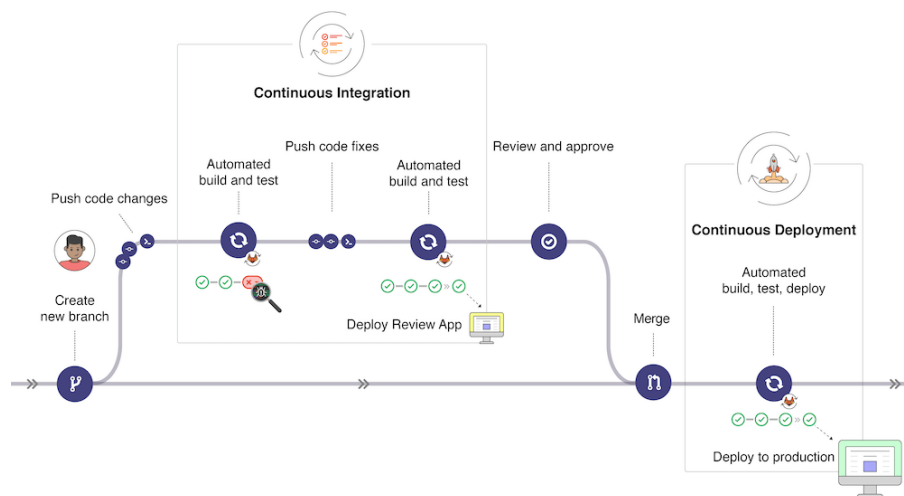
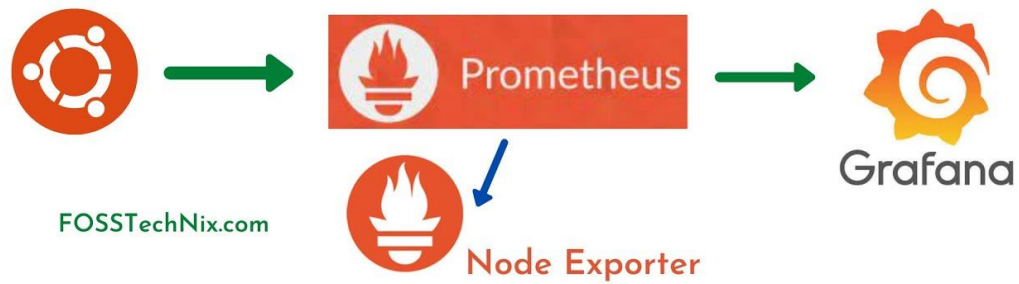


Figure III-14. Gitlab CI

- After completing the tasks and submitting them, we had the opportunity to attend another seminar on the topic of Promotion and the sale system of BHXanh, this time the seminar also talked about how it works, principles and thoroughly explained how to search, how to set up and show the database of the two above, we had great results after that.

+ September(until 11/9):

- - Because it's only two weeks into September at the time of writing, I'll just talk about my schedule until 9/11. We completed the previous three tasks, and now two new tasks have been assigned, which will be the final two tasks required to build a microservices, which are: monitor project using prometheus and grafana, and api gateway. My task is primarily to monitor the project, which I have tested and run with my friends using sample projects from the internet. Setting up the necessary software was a bit difficult for us because this project runs on linux, so we were quite confused at first because we are all using windows. After setting everything up, we tested it on projects from the internet and it was successful, but when we did it on the ma, it failed.



Linux Server Monitoring using Prometheus and Grafana with Node Exporter

Figure III-15. Monitor Project

V. INTERNSHIP ASSESSMENT

- During my internship at the company, I gained a wealth of knowledge and skills. The first point I'd like to make is the importance of collaboration. Unlike my college project, where one person did all of the work and the grades were distributed among the others, my internship experience was collaborative. It is more professional here, and everyone in a team must work together to complete the task.
- In an internship, I learn to work as part of a team rather than focusing solely on myself. Not everyone is adaptable right away. Being easily adaptable to my surroundings is one of the most valuable soft skills, not only desirable to employers but also important to my personal development. Before beginning a project, my task is to become acquainted with the company's working environment, each department, and the applications that the company uses to complete projects and communicate with one another. The following skill I am learning is problem-solving ability. Whenever I have a question or a bug, I will have to search on Google or YouTube Channels to find out about it, and the process takes about 5 to 15 minutes. If you have a long search but no results, you must contact the mentor to quickly solve the problem. If I have any questions or don't understand something, I'll have to contact them for the best explanation.
- Responsible skill is something I learned while working at the company; if there is a bug in the project, I have to be responsible for

editing it right away, as well as finishing the project on time and completing the demo to give to the mentor before the deadline.

- The final skill I learned was time management, which required me to arrive at work on time and to always rest properly in order to maintain good health and work effectively. It is necessary to divide the work in order for it to be completed reasonably, so prioritize tasks that are related to everyone on the team so that the project can be completed quickly without losing everyone's waiting time. I believe my internship at the company has had a significant impact on my future career. Through projects in the company, I also learned about some of my weaknesses and how to overcome them. I also thank the company for providing me with numerous opportunities to work directly, be able to complete a project, and save a lot of money suitable for the job.
- I can tell the difference between school and business projects. To be a complete product that can be used with the customer's requirements, you must go through a more thorough, detailed process rather than simply running the main features. And I believe that my internship activities are related to my university coursework. I quickly adapted to the job and correctly understood the working process due to the useful knowledge that was carefully trained during a long learning process.

VI. REFERENCES

- [1] OpenVPN, link: <https://openvpn.net/>
- [2] Visual Studio, link: <https://code.visualstudio.com/download>
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<https://www.youtube.com/watch?v=7gW5pSM6dlU>
https://grafana.com/docs/grafana-cloud/quickstart/noagent_linuxnode/

The end.