**SOFTWARE AND DATA SCIENCE INTERNSHIP / INDUSTRY - SYNERGY MARITIME PVT. LTD.**

AN INDUSTRIAL INTERNSHIP TRAINING REPORT

*Submitted by*

**21BLC1424**

**BECM399J – INDUSTRIAL INTERNSHIP**

*in partial fulfillment for the award of the degree of*

**BACHELOR OF TECHNOLOGY**

in

**ELECTRONICS AND COMPUTER ENGINEERING**

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**School of Electronics Engineering**

**DECLARATION BY THE CANDIDATE**

I hereby declare that the Industrial Internship Report entitled “**SOFTWARE AND DATA SCIENCE INTERNSHIP / INDUSTRY - SYNERGY MARITIME PVT. LTD.**” submitted by me to VIT University, Chennai in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in **Electronics and Computer Engineering** is a record of bonafide industrial training undertaken by me under the supervision of **Mr. Rohan Rajesh Sharma, Team Leader, Synergy Maritime Pvt. Ltd. , Mettukuppam**. I further declare that the work reported in this report has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

Location: Chennai Signature of the Candidate

Date:

A letter of a doctor

Description automatically generated with medium confidence

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**School of Electronics Engineering**

**BONAFIDE CERTIFICATE**

This is to certify that the Industrial Internship Report entitled “**SOFTWARE AND DATA SCIENCE INTERNSHIP / INDUSTRY - SYNERGY MARITIME PVT. LTD.​**” submitted by **Gurshaan Singh Bhasin (21BLC1424)** to VIT, Chennai in partial fulfillment of the requirement for the award of the degree of **Bachelor of Technology** in **Electronics and Computer Engineering** is a record of bonafide industrial internship undertaken by him/her fulfills the requirements as per the regulations of this institute and in my opinion meets the necessary standards for submission. The contents of this report have not been submitted and will not be submitted either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

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**Signature of the Examiner** **Signature of the Examiner**

Date: Date:

**Head of the Department (B.Tech ECM)**

**ACKNOWLEDGEMENT**

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I would like to express my deep appreciation to them all for their trust in my abilities and belief in my potential has given me the platform to apply my theoretical knowledge in a real-world setting. I am grateful for their unwavering support and encouragement throughout this journey.

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Gurshaan Singh Bhasin

**(21BLC1424)**

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**ABSTRACT**

The software and data science industry stands as a cornerstone of technological advancement, catering to the ever-evolving needs of the modern world. This report delves into the pivotal role played by the concepts of Data Science as learnt by me in my Industrial Internship in shaping innovation, efficiency, and quality across various sectors. The document encapsulates a comprehensive overview of the multifaceted dynamics of this industry, highlighting the vital role of Software and Database Management Systems in the global marketplace.

Furthermore, this report reflects upon an enriching and insightful internship experience at Synergy Maritime Private Limited. This opportunity provided a unique window into the inner workings of a leading player in the Ship Management realm. It encompassed an array of experiences, from exploring the intricacies of Database management to understanding the importance of quality assurance and environmental impact mitigation.

The narrative within these pages captures the critical concepts and practical insights that emerged during the internship. These lessons transcend the boundaries of a single organization, offering a broader perspective on the operations and innovations that are driving this industry forward. This report sheds light on the essential role this plays in our contemporary world and reflects on the knowledge and experiences gained during an immersive internship at Synergy Maritime Private Limited.

**CHAPTER 1**

**INTRODUCTION**

* 1. **About the company**

Synergy Maritime is a leading ship management company that specializes in managing a diverse fleet of vessels for clients worldwide. Founded in 2006, Synergy Maritime has steadily grown to become a prominent player in the maritime industry.

The company offers comprehensive ship management services, including technical management, crew management, commercial management, and newbuilding supervision. They cater to various types of vessels, including container ships, bulk carriers, tankers, and offshore vessels.

Synergy Maritime is known for its commitment to safety, efficiency, and environmental sustainability. They adhere to stringent industry standards and regulations, ensuring that all managed vessels operate safely and in compliance with international maritime laws.

With a strong focus on innovation and technology, Synergy Maritime continually invests in modern systems and processes to optimize vessel performance and reduce operational costs. They also prioritize the welfare and training of their seafarers, ensuring that crew members are skilled, competent, and motivated to deliver exceptional service.

As a leading ship manager, the Synergy Group provides end-to-end maritime solutions with precisely and expertly tailored services, where great technical expertise and a diverse product portfolio create optimal efficiency, productivity and customer experience.With over 660+ vessels under technical management they handle a wide variety of vessels, including complex LNG vessels, LNG-FSU conversions, LNG-to-power solutions, LPG carriers and chemical tankers, VLCCs, Suezmax, Aframax, LR2, LR1 and MR tankers, Car Carriers, container ships from 2,000 to 20,000 TEU and Cape, Kamsarmax, Panamax, Handymax and Handysize bulk carriers.

Synergy prioritises each client’s needs, providing top quality and optimally efficient solutions, crafted to meet all requirements in management, building, converting, or recycling.

* 1. **Introduction to concepts undertaken in the Internship**

1. **Application Programming Interface (API) :**

APIs, or Application Programming Interfaces, serve as intermediaries that enable different software applications to communicate and interact with each other. They define the rules, protocols, and tools for exchanging information and accessing functionality. APIs find widespread use across various domains, facilitating integration between systems, platforms, and services.

Their versatility makes APIs invaluable in modern software development. Developers leverage APIs to incorporate functionalities from existing systems into their own applications without needing to understand the internal complexities. This accelerates development cycles, fosters innovation, and enhances the overall user experience. Additionally, APIs promote interoperability, allowing disparate systems to seamlessly exchange data and services, thereby fostering collaboration and integration in the digital ecosystem. In essence, APIs democratize access to technology and empower developers to create more sophisticated and interconnected software solutions.

1. **JavaScript Object Notation (JSON) :**

JSON (JavaScript Object Notation) is a lightweight data-interchange format widely used for transmitting data between a server and a web application. Its simplicity and human-readable structure make it a popular choice for sharing data across different programming languages and platforms. JSON consists of key-value pairs enclosed in curly braces {}, where keys are strings followed by corresponding values, which can be strings, numbers, arrays, objects, Booleans, or null. Its uses span from transmitting data over HTTP requests in web APIs to configuring settings in web applications and storing data in databases. JSON's versatility, ease of use, and compatibility with various programming languages have made it a cornerstone in modern data exchange and communication between software systems.

It allows definition of every part of the Program into parts such as “item” , “info”, “get” etc which allow for breaking down the programs parts into blocks allowing easy understanding as a user and further is platform free to understand for users irrespective of their current preferences due to its simplicity and in turn allow easy sharing and access of the same.

1. **Neo4j Graphical User Database System :**

Neo4j is a graph database management system designed to store, retrieve, and manage data represented as nodes, relationships, and properties. Unlike traditional relational databases, Neo4j's graph structure allows for flexible and efficient querying of complex, interconnected data. Nodes represent entities, relationships define connections between nodes, and properties provide additional information about nodes and relationships.

Using Neo4j's API, developers can interact with the database programmatically, integrating graph-based functionalities into their applications. This API enables developers to perform operations such as creating, updating, and querying graph data using programming languages like Java, Python, or JavaScript. By leveraging the API, developers can harness Neo4j's powerful graph capabilities within their applications, facilitating tasks such as recommendation systems, social network analysis, and real-time network visualization. Overall, Neo4j's API empowers developers to build sophisticated applications that leverage the advantages of graph databases, including flexible data modeling, efficient traversal of relationships, and powerful graph algorithms.

In this Internship as you will see ahead , I have worked extensively in Neo4j , applying the concepts of API and JSON directly to utilize the Database management system of Neo4j which is an excellent visualization tool for Databases as compared to the regular MySQL and SQL+ systems. It allows creation of database directly same as these other systems , with a much more efficient graphical node wise format. It further also allows direct CSV file uploads and creation of Database accordingly much simplified and the best of all , allows API exportation to codes which means these Databases once created can also be worked upon through codes to modify and/or even retrieve the required outputs using its native language called “Cypher” for the same.

**CHAPTER 2**

**IN DEPTH UNDERSTANDING OF INDUSTRY LEARNINGS**

* 1. **API : Incorporation of API in Regular Codes**

To understand the basic implementation of API into codes , we undertook the API of GPT v 3.5 (Only Paid v allows this) and created a basic Python code on Jupiter that asks user for a prompt or Question and then fetches the Answer from GPT , as its API has been called , here is the snippet of how the code looks [The key has been hidden due to confidentiality constraints] :

**Figure 1.**

Thus as seen here , the modules openai and time were imported , where openai is the module name that stores packages for the gpt API to function. Further the API Key was defined and a function was then defined that defines the structure of how the key is to import gpt v. 3.5 and take the users prompt as content from the prompt to then retrieve it from the actual site. The rest of the code is simply for a prompt from the User. Though relatively of a very easy standard , this was my very first concept that I learnt on my very first day and was something completely different and new to me which truly blew me away. This was further enhanced by the topics to come as you will now see.

* 1. **JSON : Importance & Utility :**

When files of code of relatively large standard or even sometimes smaller are to be shared between different users of an organization , the JSON format comes to play. This is because it has established itself as an efficient and easy way to represent code which even someone not so well – versed with regular codes can understand to an extent. Thus after understanding incorporation of API into our codes , I was introduced to this format of coding files which allowed transfer of files to users of different systems and coding preferences , which shared a common JSON format of these codes and files , simple and deliberately structured such that the various components of the functionality of these codes were blended into respective functions well defined within their “{}” for a user to understand the functions and blocks and what each of those blocks were set out to accomplish. Here is how I worked on them for the same Chatbot API implementation of python code , but now using JSON Format :

**Figure 2.**

**Figure 3.**

**Figure 4.**

So from this code , one can clearly make out that the functionalities of the code , i.e. step by step to firstly , retrieve user query and connect API of GPT v 3.5 and incorporate the Llama engine as well for this code , all of which is defined under the functional block called “info”. The next step is to define that query that is processed under “item” and finally and most importantly to “request” that item as defined in info block and then ending it off with the UI bit of the code. Thus the code was made so simple to understand and ultimately share it ahead with various users as and when the need may call for and arise.

* 1. **Neo4j**

1. **Direct Site Utility :**

Neo4j being a Graphical User Database System , allows for the Users to create their own Database via Direct on Site method , through creation using prompts of their native language Cypher , or alternatively through importing CSVs and creating nodes and relationships through graphs or lastly through the codes themselves by incorporating API.

This means that unlike how in contrast to MySQL and SQL+ one would have to manually create Relationships/Tables and manually enter the Records and Attributes while also defining Primary Keys and Foreign Keys and types of data etc. Neo4j allows a major simplification of this very project by incorporating a more visual outlook of this same process and direct uploading of CSV files into their Database after defining the keys and attributes and their data types all via a few clicks rather than a tedious line by line entering of data in the other mentioned database systems. Here is how it would look :

**Figure 5.**

From this figure we can see that I had 3 files called BankInfo and Users which are to be the Nodes in contrast to the 2 tables I would have had to conversely manually enter in the DB through the other systems , and the Relationship between is defined with the information I wish to connect them using with a CSV containing that data here called User\_bankinfo. We can see on the right hand side that the Nodes are mapped from USERs with the ID being the Name to the BANKINFO using the BID attribute as ID. This would be the equivalent of a Foreign Key constraint being defined in the other systems. Similarly we shall also set the primary keys as seen below :

**Figure 6.**

**Figure 7.**

From these two figures we can see how we defined the Primary Keys of the two Nodes as defined in the Relationship as well. After selecting the Run Import option , the Graph is then formed and we can consider this to be a successful implementation of User inputted data into the Database of the Neo4j System , allowing us to now work on it further as we please. Here is a Graph created in similar fashion of Order and Product details , where we collect Order Details of different Food Products and run it in similar fashion :

**Figure 8.**

**Figure 9.**

Thus here the Different OrderID’s were mapped to names of different Food products. Now in the same way as a user would otherwise enter SQL Queries to find out certain piece of Information , here is a demonstration on this data of the same , but using Cypher Language Queries. First let us see how a user would find the Order Details of the Product being “Chai”

**Figure 10.**

**Figure 11.**

Thus we can see that 38 Order nodes match the Product “Chai” and we can freely observe them through a graphical overview or even in the form of a table which gives a more statistical output for the same query.

We may also singly represent the Data from the nodes in this form while defining a limit as 25 here just for easier visualization :

**Figure 12.**

**Figure 13.**

1. **Application wrt API incorporation in Codes :**

As if all this was not enough for one to leave the other Systems aside , I was then taught the implementation of this Systems capability via API into regular codes to work on data between systems and fetch queries as per the Users Requirements. Here is how I was first taught to implement this feature taking this very example as the Users and Products example shown above :

**Figure 14.**

As seen above , in similar fashion to the modules being imported for openai , here modules for py2neo were imported and from them the packages of Graph and NodeMatcher were imported to work on the Graph and extract information as per the users requirements.

Here we will match the Customer ID that a user enters and then extract the relevant information we wish to receive from the Database which has been created and visualized in the Neo4j Database. This is shown below :

**Figure 15.**

Hence here the code in the Query part while matching can be modified as per the users requirement to define the node to match from and also specify the attribute to be matched as well , making it a thorough and yet simple and efficient way to retrieve data from the Database as compared to the other Systems.

1. **Real Time Shipping data and ChatBot Implementation :**

Though this was the highlight of my Internship where I finally brought out all these different learnings and applied it finally all in one , due to Confidentiality constrains , I cannot disclose outputs for the same , however here is the general overview of my work contributed for the same.   
As Synergy Maritime is a Ship-Management company primarily , it obtains data from all ships all over the world and stores it in its central database. The company was then undergoing the creation of its own In-House developed chatbot system called “Syia” which was so advanced that once the Name of the Ship was entered , it would automatically retrieve it by understanding the name as a keyword and gathering all information from the Central DB to then recommend to the user with a prompt asking “What would you like to know” with prompts for selecting between options such as Cargo stored and its types , Next Port of Arrival , Port of Departure , Crew Details etc and after choosing one of these Questions for example if I were to choose Cargo stored. After displaying the answer to this Query , it would automatically suggest the next set of questions’ answers such as Type of the Cargo , Precautions to take while loading and unloading this type of Cargo , Cost etc.   
It is in this aspect that I am proud to have contributed , however little I did and learn wonders where at the backend , using the same Neo4j database with imported Data of the ships in Question , by incorporating it into python code through API , I helped in coding the recommendation model which took a count value of Key – Value pairs of user queries and subsequent queries to train this model. So this model counted the number of times here for context the user asked for Cargo stored in a certain ship and then next asked the Type of the Cargo. Thus the next time a user were to ask for Cargo carried by the ship , the bot would automatically update the next recommendation of Question as Type of Cargo stored.

**CHAPTER 3**

**CONCLUSION**

In conclusion, my internship experience at Synergy Maritime Private Limited has been a valuable and transformative journey that has significantly contributed to my personal and professional growth. Throughout my internship, I had the opportunity to work alongside talented professionals and gain practical insights into the operations of a renowned company in the manufacturing industry.

During my time at Synergy, I was exposed to various departments and had the privilege of working with dedicated individuals who provided guidance, mentorship, and support. From the Software Dev team to the Data Science division, I learned firsthand the importance of effective teamwork, efficient processes, and strong communication within an organization.

One of the highlights of my internship was the exposure to real-world challenges and the opportunity to apply my theoretical knowledge to practical scenarios. Engaging in tasks such as API implementation , JSON formatting , Key-value pair based Recommendation System generation etc. allowed me to develop critical thinking, problem-solving, and decision-making skills. I also gained a deeper understanding of the significance of effective planning, coordination, and collaboration in achieving organizational goals.

Moreover, this internship provided me with a platform to enhance my technical skills and familiarize myself with industry-specific tools and software. The hands-on experience I gained with various systems and processes has undoubtedly strengthened my professional acumen and prepared me for future endeavors in the field.

I am immensely grateful to all the individuals who supported and guided me throughout my internship journey. I extend my heartfelt thanks to the Human Resources department for their warm welcome and continuous support, the Team Leads and Managers, for their valuable mentorship, and all the employees of Synergy for their willingness to share knowledge and expertise.

This internship report is a reflection of the knowledge, skills, and experiences I have acquired during my time at Synergy. It has been an honor to be a part of such a reputable organization and to contribute to its operations. I am confident that the insights gained from this internship will serve as a strong foundation for my future career growth.

In conclusion, my internship at Synergy has been a rewarding experience that has broadened my horizons, enhanced my skill set, and provided me with a deeper understanding of the dynamics of the manufacturing industry. I am grateful for the opportunities I have been given and look forward to applying the knowledge and experiences gained during this internship to future endeavors.

Thank you to everyone at Synergy Maritime Private Limited for making my internship journey a memorable and enriching one.

Sincerely,

Gurshaan Singh Bhasin.