

**CT071-3-3-DDAC**

**INDIVIDUAL ASSIGNMENT**

**Designing and Developing Applications on the Cloud**

**UC3F1706SE**

**HAND IN DATE: 13th April 2018**

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# Acknowledgement

First of all, I myself would like to express my gratitude to my lecturer, Dr.Kalai Anand A/L Ratnam, who has been giving me a variety of knowledge and ideas about the Microsoft Azure Cloud Computing. Thus, he was also very helpful by providing professional advice on how to deploy a web application to Azure App Service. Moreover, he also provides useful materials and tools that help me to save a lot of time on deploying the web application and complete the assignment on time.

Furthermore, I myself also want to take this opportunity thank all of my course mates, who had taught and guided me all the time in this assignment. Whereby they are willing to give help and teach me about the C# programming and some features of Microsoft Visual Studio 2017 that I have never used before. At the same time, I appreciate that my course mates who are willing to share their knowledge and help me to complete this assignment.

In conclusion, I have gained more knowledge about the Azure Cloud Computing which is very useful, because it could help me to apply it in my future works.

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# 1.0Introduction

## 1.1Project Background

Maersk Line is the global container division and the largest operating unit of the A.P. Moller – Maersk Group, a Danish business conglomerate. It is the world's largest container shipping company having customers through 374 offices in 116 countries. It employs approximately 7,000 sea farers and approximately 25,000 land-based people. Maersk Line operates over 600 vessels and has a capacity of 2.6 million TEU. The company was founded in 1928.

Operating in 100 countries and transporting goods around the globe, at first glance it would appear Danish shipping company Maersk Line is already handling all the cargo it can manage. But when Maersk determined that the volume of most of the goods it was shipping had grown to full capacity, the company decided that cloud powered solutions would be a crucial part of rectifying the situation.

“There was a ‘mind-opener’ where Maersk said, ‘How can we support the overall business strategy, and also from an IT perspective,” says Soeren Lorenzen, an account general manager with Hewlett-Packard company who is involved first-hand with Maersk’s ITO efforts. “There was a new CIO who wanted to outsource every part of IT, but without [negatively] impacting shipping.”

In an effort to support further business growth and increase organizational flexibility, Maersk decided to consolidate all of its data centers and server rooms operating worldwide onto a virtualized platform. Microsoft Azure was already hosting some of Maersk’s IT environment, and in March 2016 Maersk initially approached Microsoft about expanding the scope of the relationship. Moving forward, Lorenzen says Maersk is currently changing over its IT setup based on Microsoft Azure, starting with the desktop environment up to container management.

## 1.2 Project Objective

This project is aimed on developing a web application. It will be developed through Microsoft Azure Cloud Services, which will allow the admin to manage the Maersk cargo and shipping through the website itself. Moreover, the admin will be able to make reservation for the company who want to ship their parcel by using a container. Other than that, it will also allow the admin to register a container, ship, and shipyard. Not to mention, the admin can also view the reservation and other information that had been registered in this system.

## 1.3 Project Scope

The main project scope of this project will include the design and development of the web application based on the Maerks Line requirement. Whereby, this system will require a database to store the all of the information by using SQL database from Azure. This web application provides a login page for admin login. It is to make sure that the website is secured and prevent anonymous from stealing information. After the website has been developed, it will be deployed on the Microsoft Azure Cloud Services. Lastly, the performance testing will be done and analysed if there is any possibility of existence of bug. This is to ensure that the system will perform smoothly when deployed.

## 1.4 Project Specification

Below are list of requirements and goals that are to be implemented on the web application.

**Scalability:** The application must be scalable to meet the demand of the application.

**Maintainability:** The user must be able to upgrade the application and also perform regular maintenance or updates while multiple users are still using it.

**Availability:** Tenants want the application to be constantly available, perhaps with guarantees defined in an SLA. Again, the activities of other tenants should not affect the availability of the application.

**Provisioning:** The user must be able to provision the new application to the Microsoft Azure Platform.

**Monitoring:** The user must also be able to monitor the application at all times to identify any bugs or errors that are in the system and quickly fix or troubleshoot the issue itself.

## 1.5 Project Deliverables

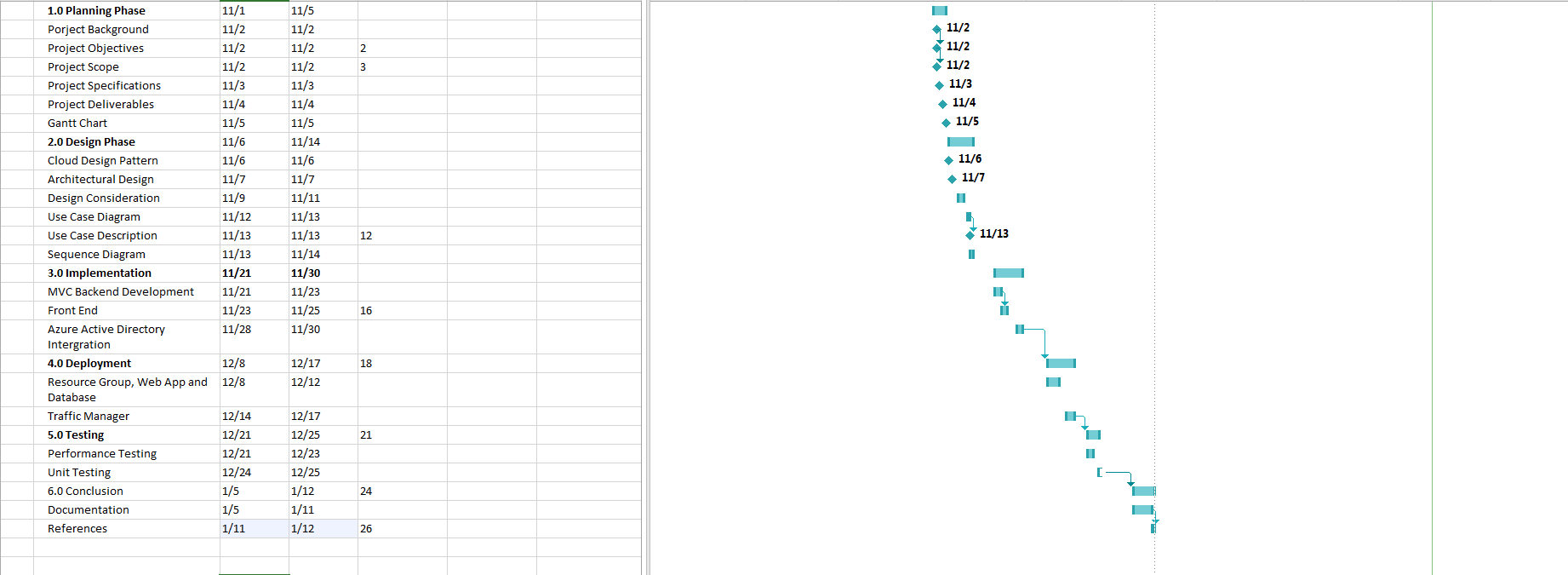
The Maerks Line web application is compatible with different types of browser, such as the Google Chrome, Mozila Firefox and others. Thus, the users will be able to perform all the functionalities as listed below.

* The user able to register ship, container, and shipyard in the web application.
* The user will also be able to perform update and delete the reservation, ship, container, and shipyard in this web application.
* User able to view the details, such as registration information.
* User able to view all of the details of shipment information, such as the arrival time, price, departure shipyard, and arrival shipyard.
* User able to make reservation for the shipment itself.

# 2.0 Project Plan

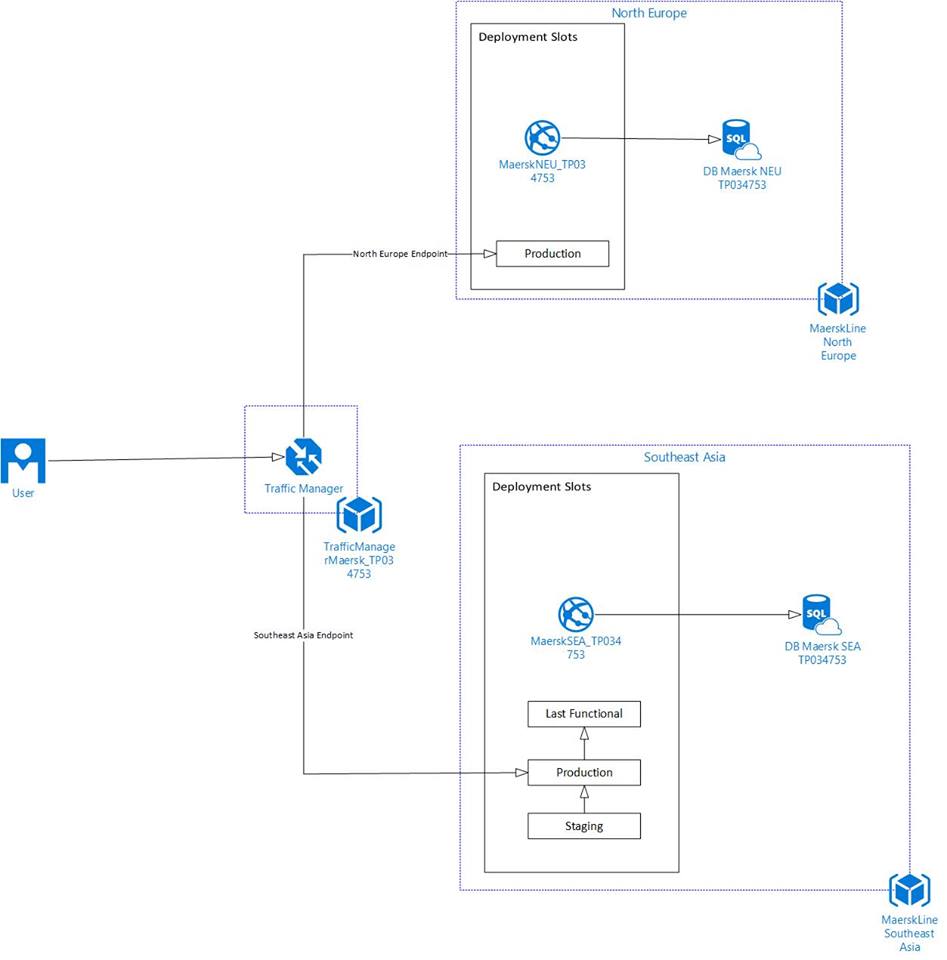
The project plan for the software developer is to follow the Gantt Chart that is stated below in developing the web application by using Visual Studio 2017 with MVC. Thus, once the web application has been developed the software developer will need to deploy the web application to the Microsoft Azure Cloud Services. Moreover, the traffic manager will be implemented to the web application. Once that is done, the performance testing will be conducted to ensure that the system is running well.

## 2.1Gantt Chart



# 3.0 Design

## 3.1 Cloud Architecture



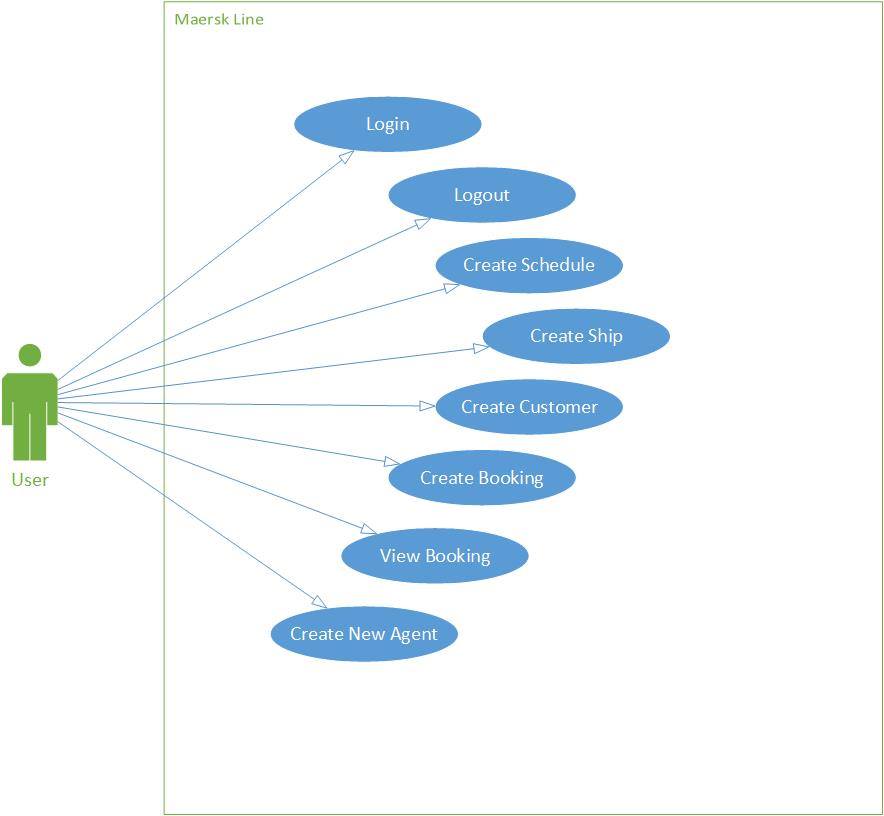
## 3.2 Design Consideration

Above all else, the software developer needs to create a new domain of the web application, which is http://maersklinelsf.azurewebsites.net. The domain name is connected with the Maerks Line site. Additionally, the domain name is made when the software developer distribute the web application frame Visual Studio 2017 to the Microsoft Azure Cloud Services. Clients easily access to the web application by utilizing this area name whenever.

The Software developer has chosen to use the Model-View-Controller (MVC) to devleop the web application itself. Besides that, it will also allow the software developer with ease to manage complexity by diving a web application into the model, the view, and also the controller itself.

Furthermore, the Maerks Line web application is available and compatible with different kinds of web browser which are Google Chrome,Mozilla Firefox, Internet Explorer and many more. Moreover, the user is recommended to use the Google Chrome Web Browser for a smoother performance of the web application.

## 3.3 Use Case Diagram



## 3.4 Use Case Specification

Table 1: Login

|  |  |
| --- | --- |
| Use Case ID: | 1 |
| Use Case Name: | Login |
| Summary: | The Users will be able to login into this website |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | The user will be required to enter the username and password in order to login to the website. |
| Description of the Main Sequence: | 1. The login page will be displayed. 2. Then, the system will prompt the user to fill in the credentials. 3. The user will then insert the username and password 4. The system will then need to verify the credentials. 5. User logged in to the web application successfully. |
| Description of Alternative Sequence: | * 1. If login details are verified, then the users will be login into the web application.   2. If login details are invalid, then the system will prompt the users to re-enters the user name password. |
| Post-condition | The user is logged in to the web application. |

Table 2: Logout

|  |  |
| --- | --- |
| Use Case ID: | 2 |
| Use Case Name: | Logout |
| Summary: | The Users will be able to logout of the website |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | User logout the website |
| Description of the Main Sequence: | 1. The Home Page is displayed. 2. Then the user will have the option to select “Logout”. 3. Once done the logout page is displayed. |
| Description of Alternative Sequence: | 1. If user does not login to the website, then the user will not be able to perform the logout. |
| Post-condition | User able to logout from the web application. |

Table 3: Create Schedule

|  |  |
| --- | --- |
| Use Case ID: | 3 |
| Use Case Name: | Create Schedule |
| Summary: | The user creates a schedule for a company in the website. |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | The user will need to be logged in and also have entered the valid schedule details. |
| Description of the Main Sequence: | 1. Once logged in to the website 2. The Home Page is displayed. 3. The user will need to select the “Schedule” option. 4. The system will then prompt the user to click the create button. 5. The user will then insert all of the Schedule details. 6. After that, the System will verify information. 7. Shipment is created and saved into the database. |
| Description of Alternative Sequence: | 1. If shipment details are invalid or entered wrongly, then the system prompts the user to re-enter the Schedule details |
| Post-condition | Schedule details are stored into the database system. |

Table 4: Create Ship

|  |  |
| --- | --- |
| Use Case ID: | 4 |
| Use Case Name: | Create Ship |
| Summary: | User registers container into this website. |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | The user will need to be logged in and the user requires to insert the valid container details. |
| Description of the Main Sequence: | 1. Once logged in to the website 2. The Home Page is displayed. 3. The user will then select the “Ship” option. 4. The system will prompt the user to click the create button. 5. The user will then insert the container details. 6. After that, the system verifies the information. 7. Once verified the container will then be created into the database itself. |
| Description of Alternative Sequence: | 1. If container details are invalid or entered incorrectly, then the system prompts the user to re-enter the container details |
| Post-condition | Container details are stored into the database system. |

Table 5: Create Shipyard

|  |  |
| --- | --- |
| Use Case ID: | 5 |
| Use Case Name: | Create Customer |
| Summary: | User registers shipyard into this website. |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | The user will need to be logged in and the user requires insert the valid customer details. |
| Description of the Main Sequence: | 1. Once logged in to the website 2. The Home Page is displayed. 3. Then the User will need to select the “Customer” option. 4. Once done the system will prompt the user to click the create button. 5. The user inserts customer details. 6. The system will then verify all of the information. 7. Once the verification is done the customer information is created into the database. |
| Description of Alternative Sequence: | 1. If customer details are invalid or entered incorrectly, the system prompts the user to re-enter the shipyard details |
| Post-condition | Customer details are stored into the database system. |

Table 6: Create Booking

|  |  |
| --- | --- |
| Use Case ID: | 6 |
| Use Case Name: | Create Booking/Orders |
| Summary: | The user will need to be logged in and The user will need to be logged in and only the user able to create the booking details. |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | All of the booking details must be created and saved in to the database. |
| Description of the Main Sequence: | 1. Once logged in to the website 2. The Home Page is displayed. 3. The user selects the “Orders” option. 4. The system will prompt the user to create the booking details by selecting the ship, customer and also the schedule. 5. Once selected the user will be prompt to create the container. 6. Once created it will be saved into the database. |
| Description of Alternative Sequence: | 1. If booking details does not exist or it has not been made, then the user unable to view the shipment information. |
| Post-condition | User able to create the booking details from the web application. |

Table 7: View Booking

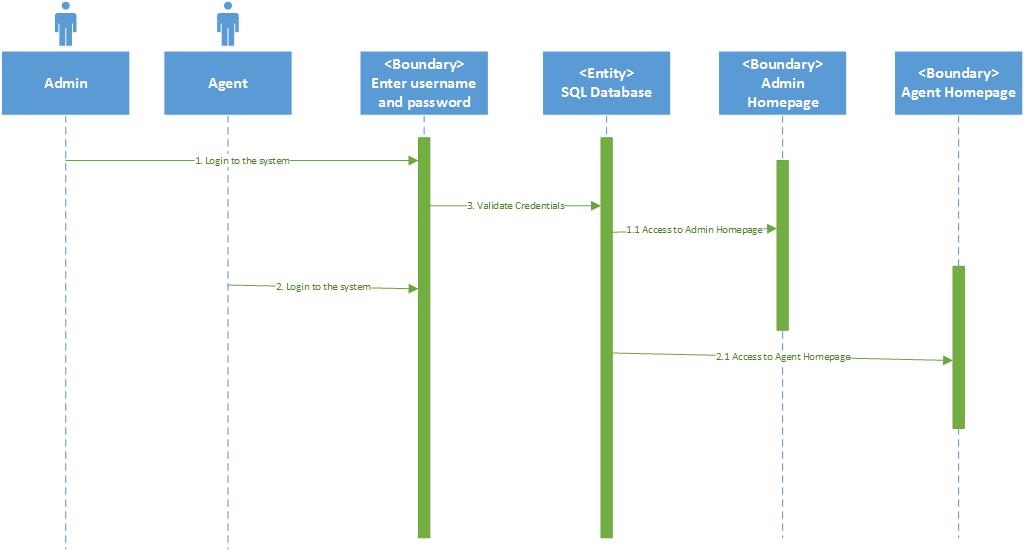
|  |  |
| --- | --- |
| Use Case ID: | 7 |
| Use Case Name: | View Booking |
| Summary: | The user will need to be logged in and The user will need to be logged in and only the user able to view the shipment details. |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | All of the Shipment details must be created and saved in to the database. |
| Description of the Main Sequence: | 1. Once logged in to the website 2. The Home Page is displayed. 3. The user selects the “View Booking” option. 4. The system will prompt the user to view the shipment details. 5. The user can update and delete the shipment from the table. |
| Description of Alternative Sequence: | 1. If booking details does not exist or it has not been made, then the user unable to view the shipment information. |
| Post-condition | User able to view the booking details from the web application. |

Table 8: Create Agent

|  |  |
| --- | --- |
| Use Case ID: | 8 |
| Use Case Name: | Create Agent |
| Summary: | The user will need to be logged in and only the user able to create a new agent |
| Dependency: | N/A |
| Actors: | User |
| Precondition: | All of the agent details must be created and saved in to the database. |
| Description of the Main Sequence: | 1. Once logged in to the website 2. The Home Page is displayed. 3. The user selects the “New Agent” option. 4. The system will prompt the user to fill in all of the agent’s details 5. Once that is done the will need to click the create button 6. The agent’s data will be saved into the database. |
| Description of Alternative Sequence: | 1. If booking details does not exist or it has not been made, then the user unable to view the shipment information. |
| Post-condition | User able to view the booking details from the web application. |

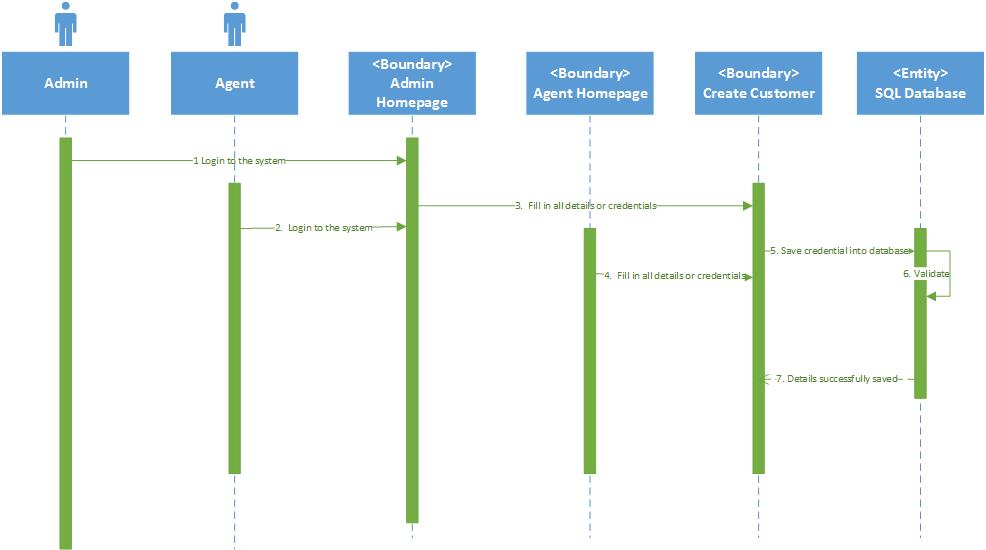
## 3.5 Sequence Diagram

## Login/Logout

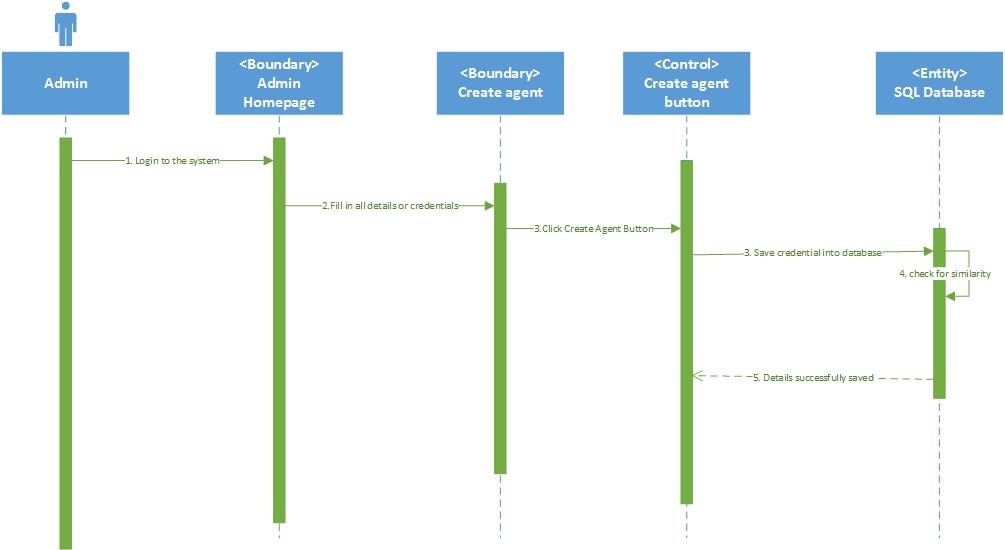


## Create Schedule

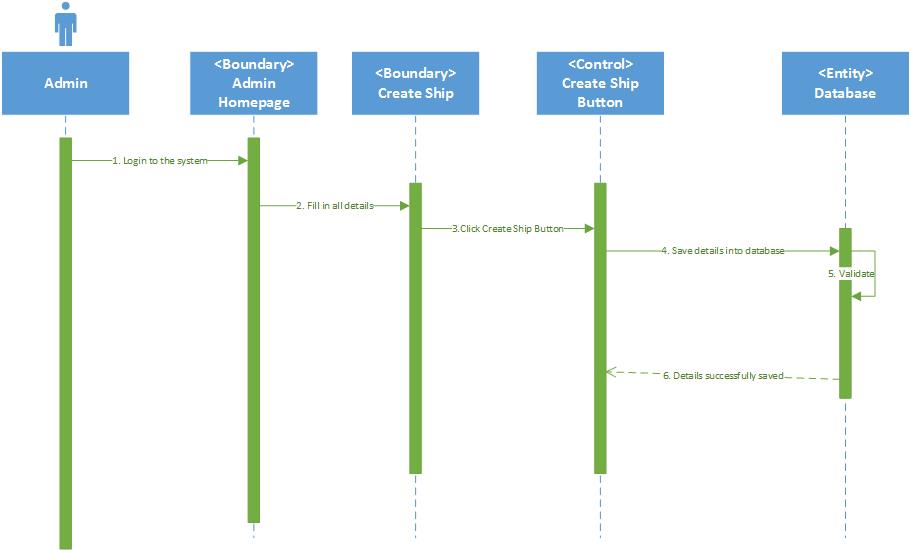
## Create Customer



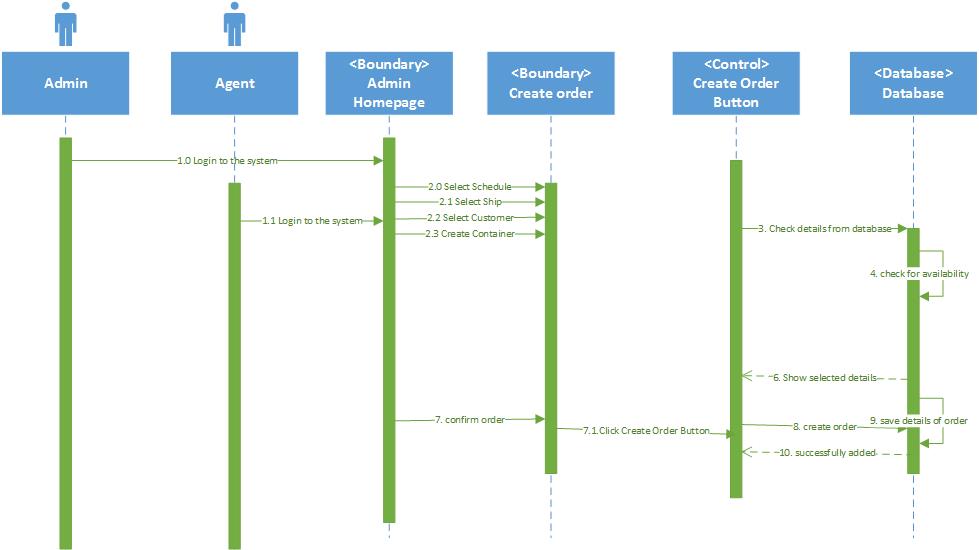
## Create Agent



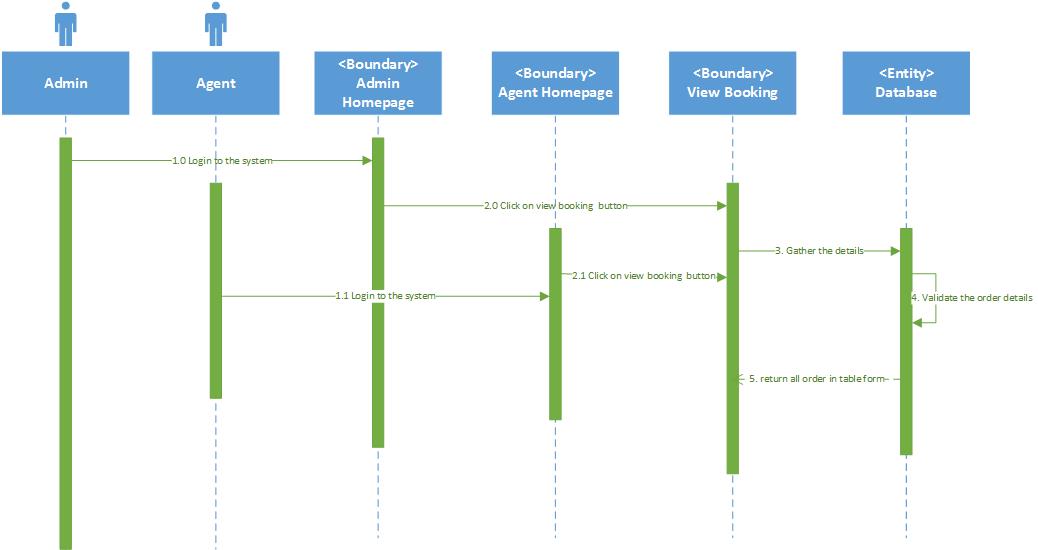
## Create Ship



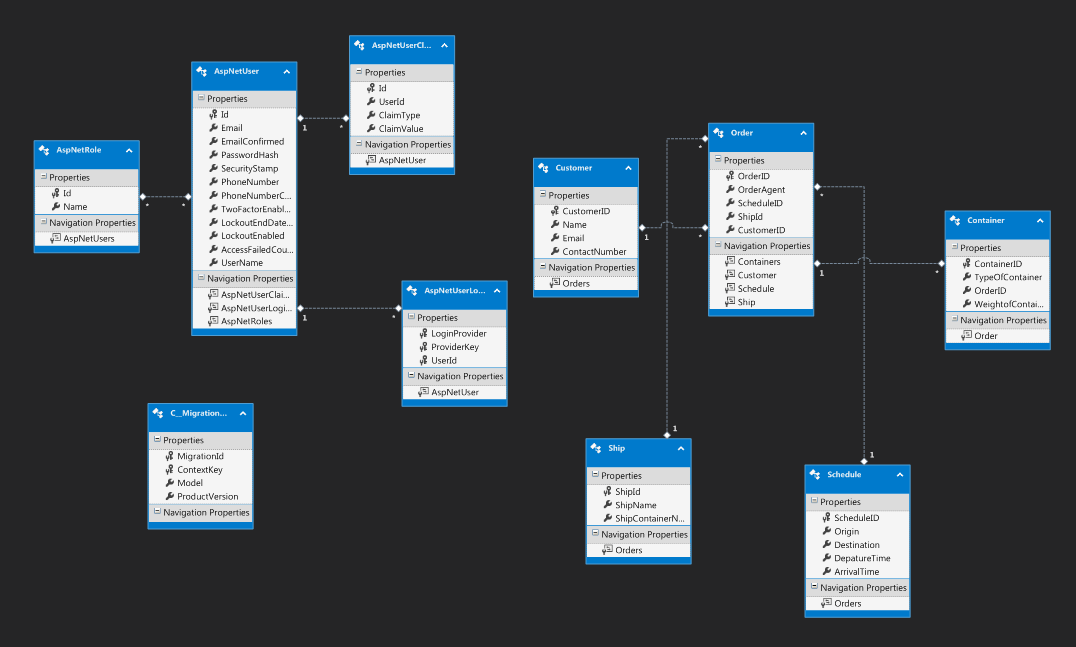
## Create Order



## View Booking

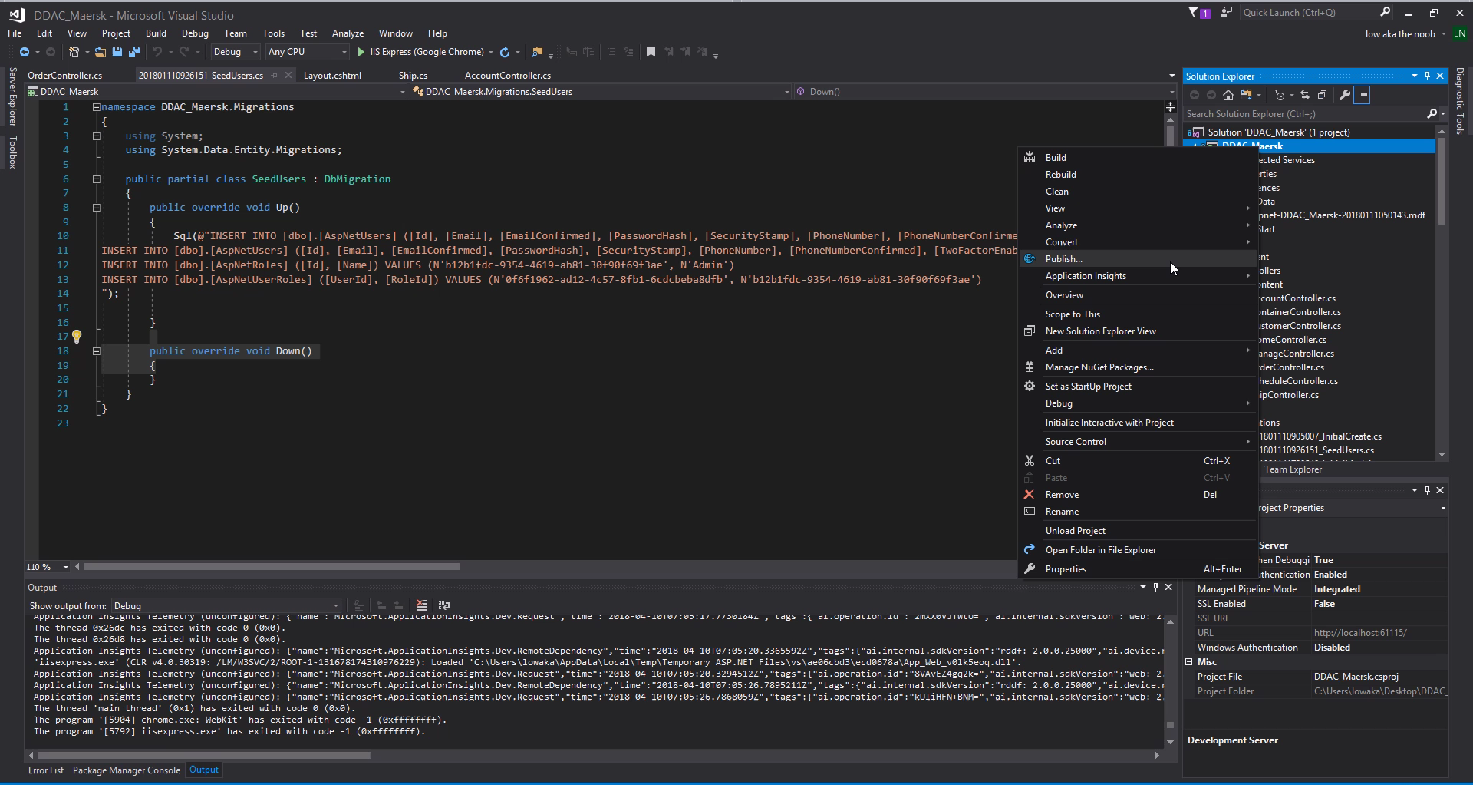


## 3.6 Class Diagram

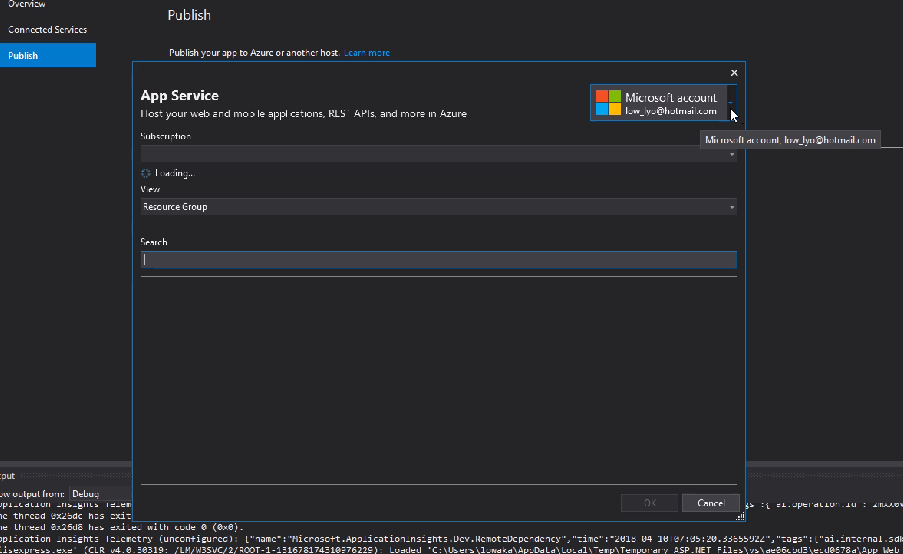


## 4.0 Implementation

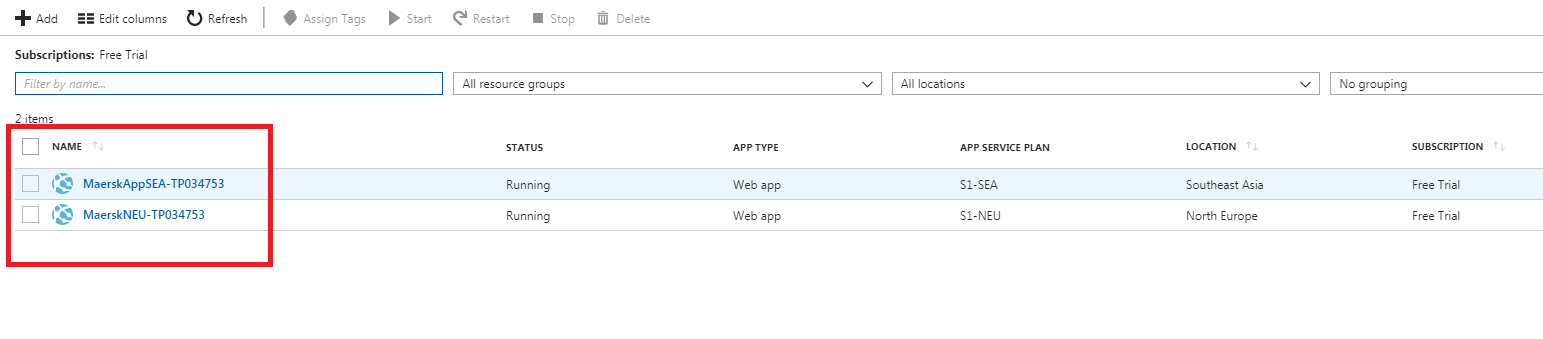
## 4.1 Create Web Application and SQL Database



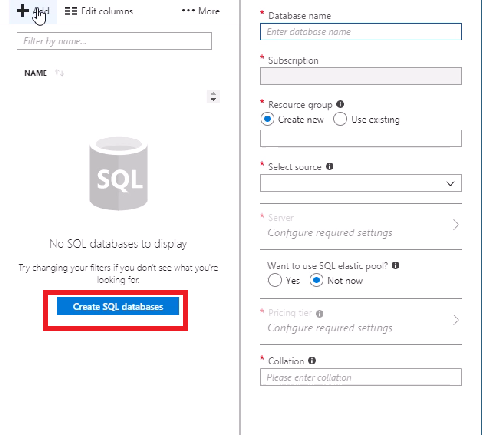
Once the software developer has completed the development of Maerks Line web application, the following step will be to publish it on to the Azure Cloud Services. To do this, the software developer will need to right click the file which is located at the top right hand side of the display screen and then select the “Publish…” option to publish it.



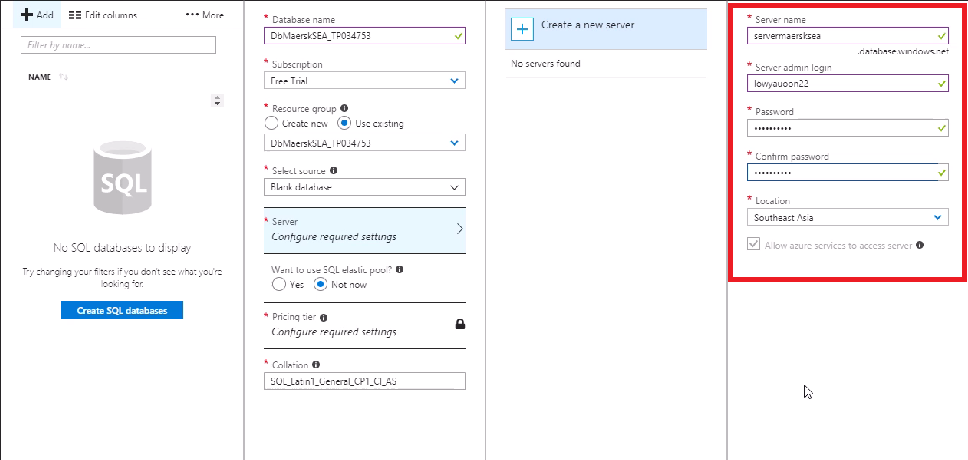
After the software developer has clicked on the publish option, the Visual Studio will then display a page where the user will need to click on “create new profile”. Then, the system will display several different options to allow the user to select on the options such as Microsoft Azure App Service, IIS, FTP, etc, Folder, and Import profile. Then, the software developer will need to select on the Microsoft Azure App Service, and then select “Create New” option as well as click “OK”. After that, the system will prompt the user to fill in all of the blanks, such as write the Web Application Name, Subscription, rename Resource Group, and select the App Service Plan. In the App Service Plan, the user will need to choose S1 standard, which is a standard service plan with 1 core, 4.75 GB RAM and 50GB storage. After all the details have been filled, the user will then need to click “Create” button. Once it has been clicked, the web application will be uploaded to the Microsoft Azure App Service.



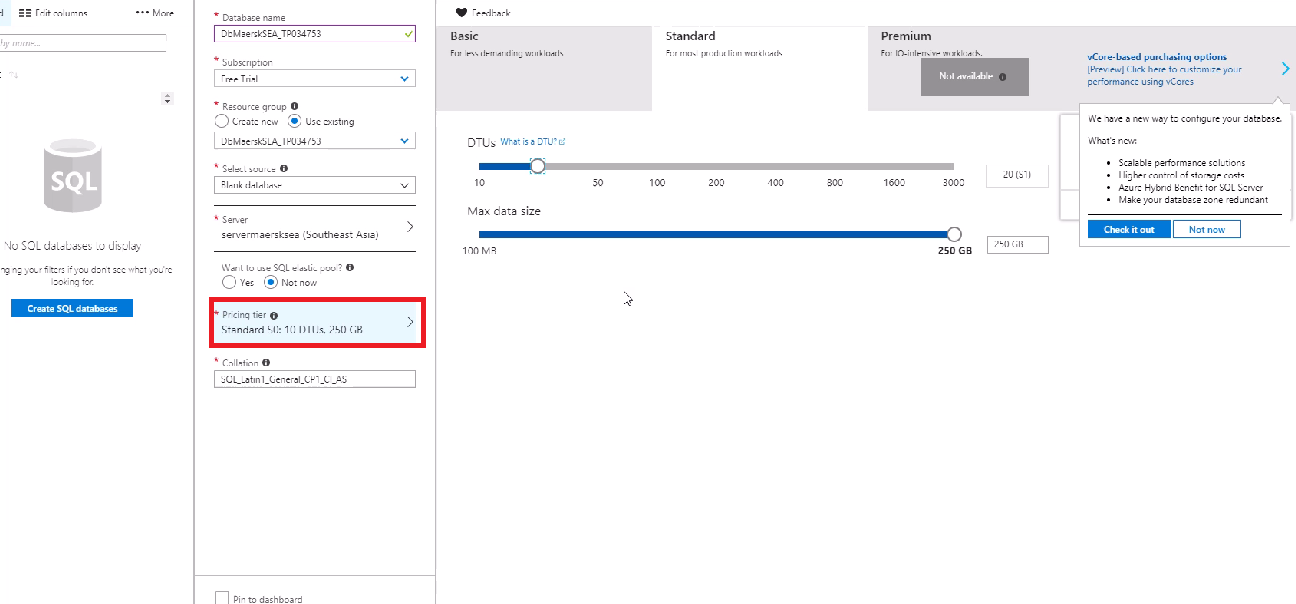
The figure above shows the created application services in Azure which is done from Microsoft Visual Studio 2017. Thus, it contains the control setting for the web application itself. Besides that, the admin of Azure can also stop all of the services of running the website as well on cloud. Not to mention, it also provides several kinds of services for the admin to manage the web application. The URL to the Maerks Line web application will be”…”. Moreover, the user will also needs to repeat the above steps again by creating another resources group with the location at North Europe.

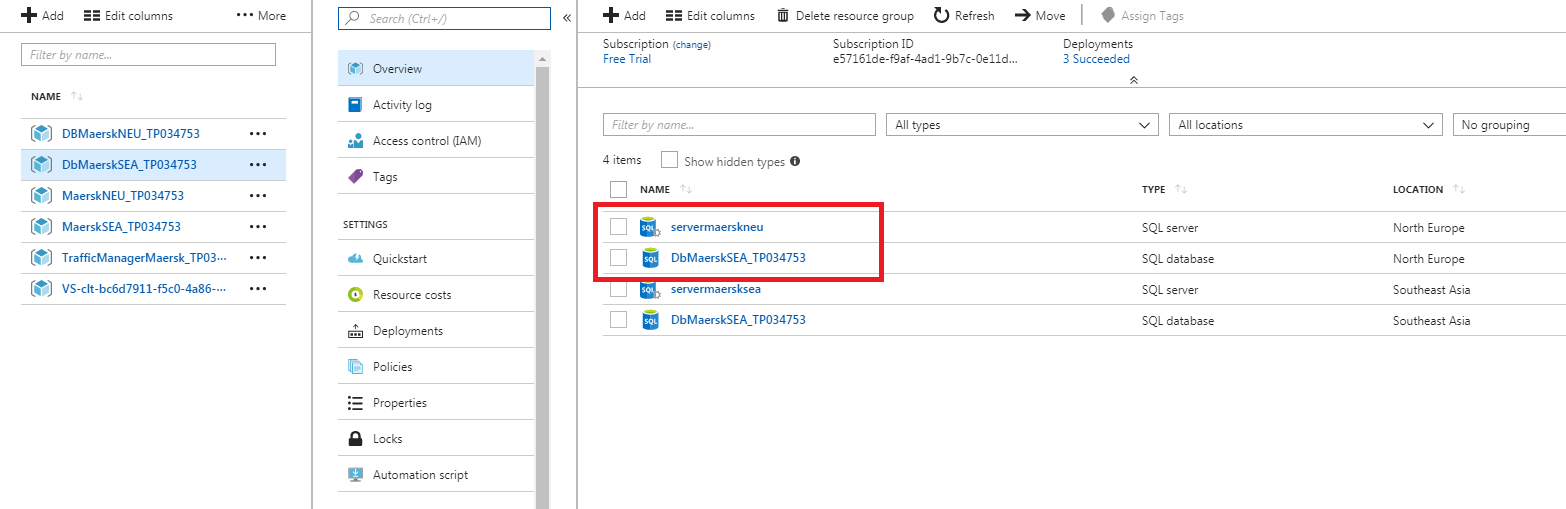


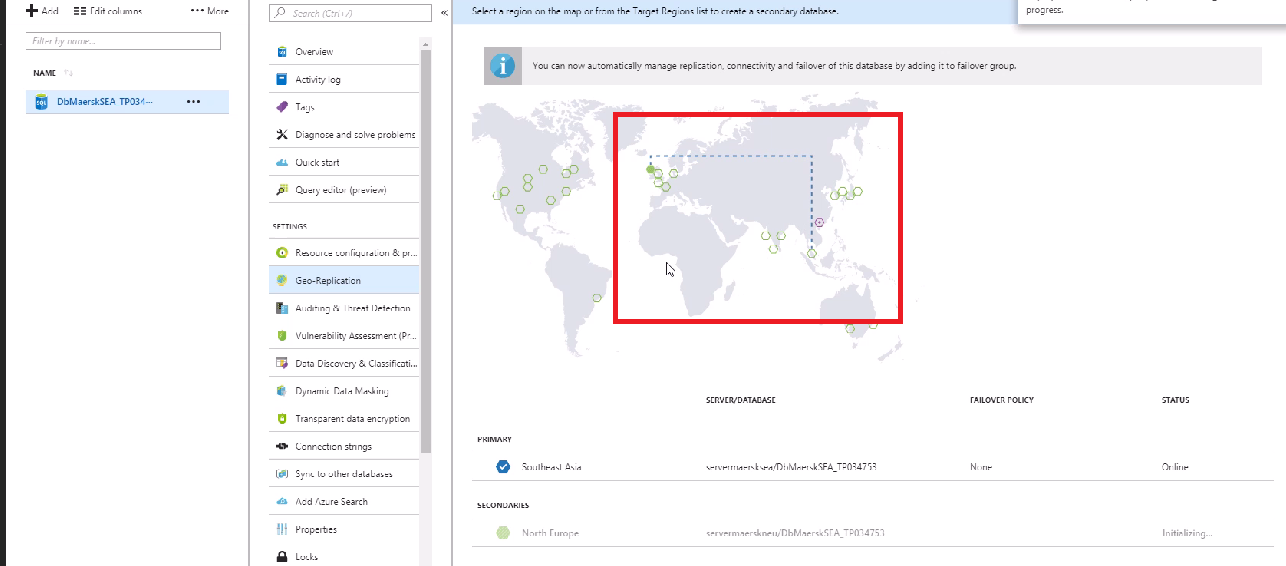
Once the developer has uploaded web application is successfully without any error or bugs, the user will be required to click the “+” button and search for the database option. Then, the system will display several kinds of options to allow the user to select from which are the SQL Database, SQL Data Warehouse, and others. After that, the user needs to select on the SQL Database option. After the selection is done, the user will be prompted to fill in all of the blanks that are provided.



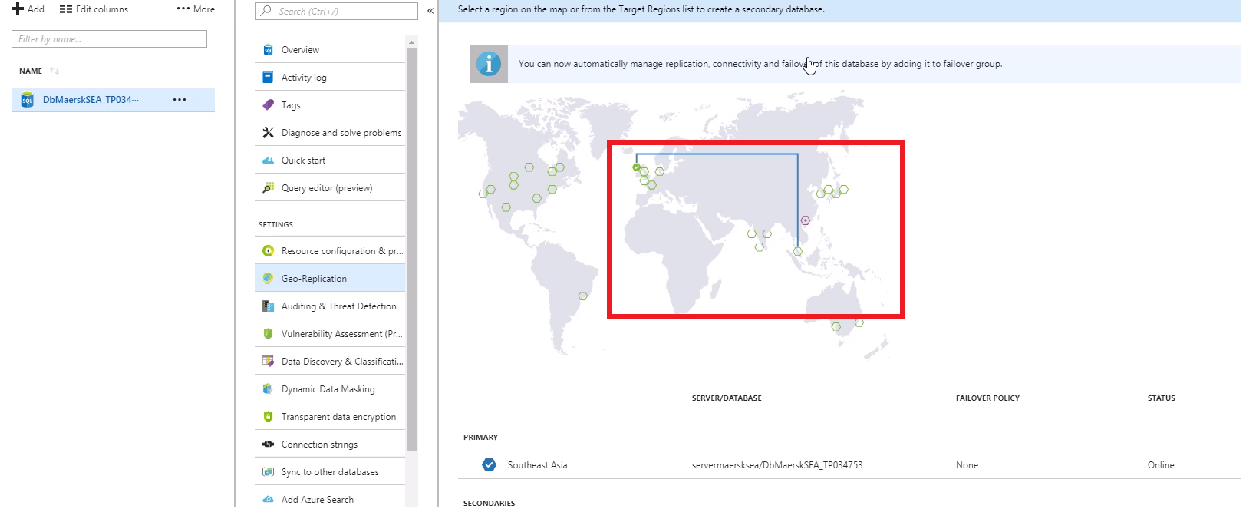
After the user has filled in all of the blanks, the user will then need to choose several options. Firstly, the user is required to click on the “Create new” for the resources group option. Then, the user will need to create a server for the database by clicking on the “Server” option. Once all of that is done the system will then prompt the user to fill in all of the blanks again for the new server.

The user will need to click on the “Pricing tier” option for the database storage. After that, the user is recommended to select the Basic package which the cost is much cheaper than the Standard package itself. Once that is done, the user will need to click the “”Apply” button to confirm the selection of the package.

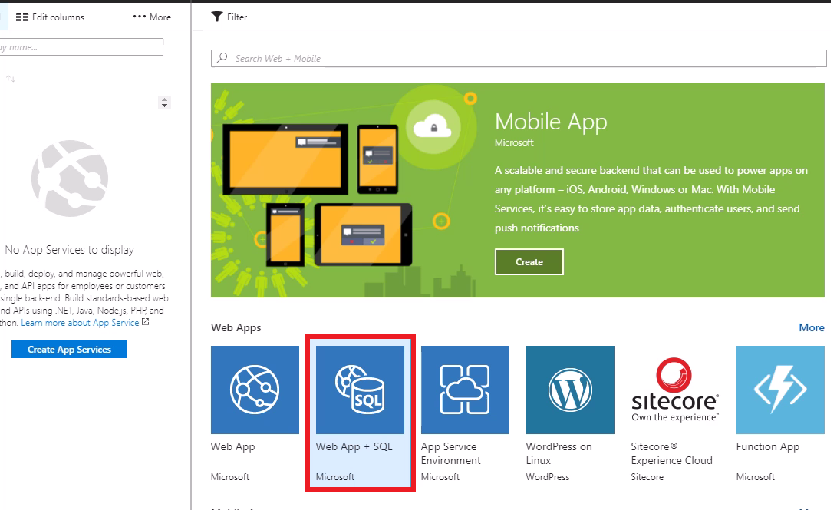
After the progress of creating the SQL database has been completed, the resources group category will then display a “ShipDatabase” resource. Inside the resource group, it contains two different files, which are the servermaersksea (SQL server) and also the DBnaerskSEA (SQL database).



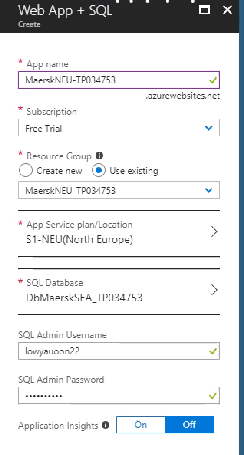
Once the server has been done the user will need has to go to the “Geo Replication” and connect the databases on both regions.



Once it has been connected it will have a clear line as stated on the top of the picture.



Once that is done the user will need to Create the Web app and also the Sql. The user will have to select from the “Web App + SQL”.

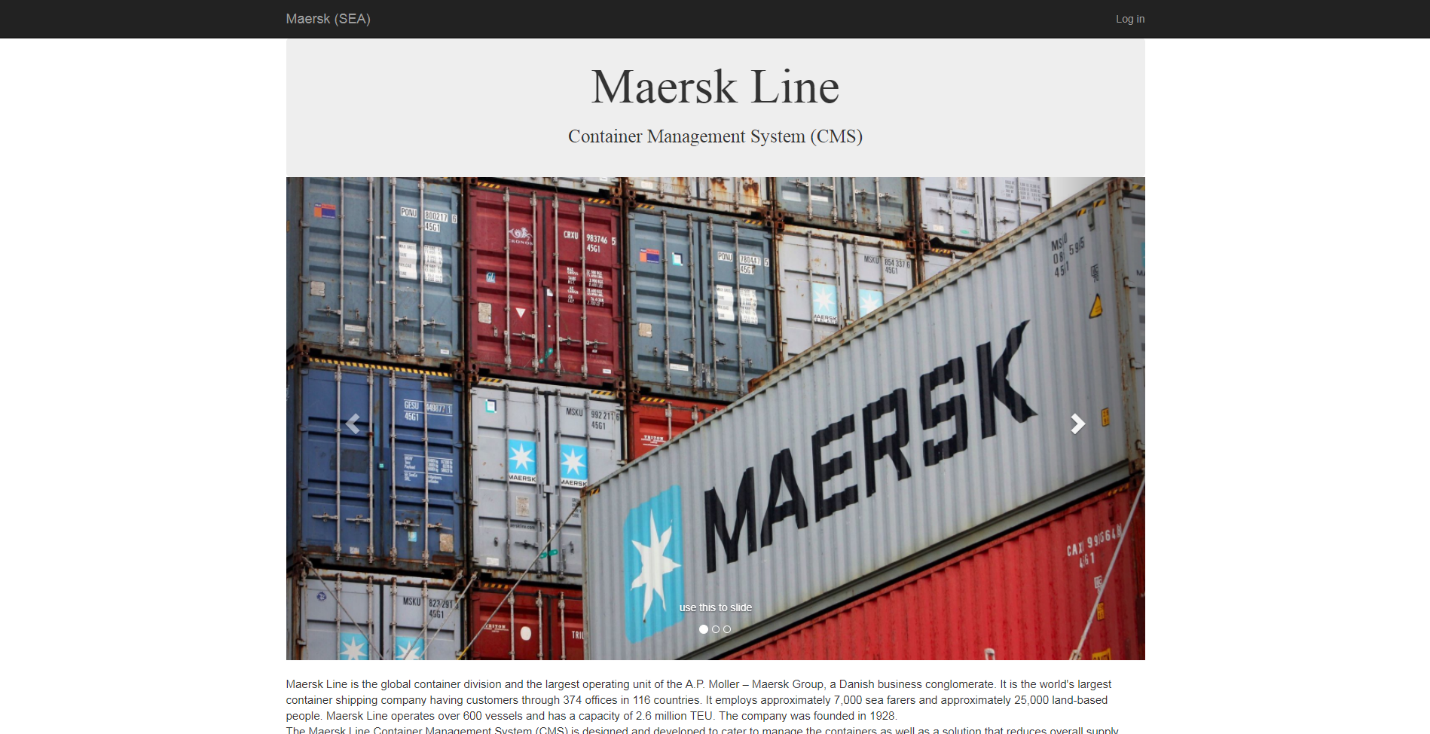


Once the user has selected the “Web App + SQL” the user will need to fill in all of the required blanks that are needed.

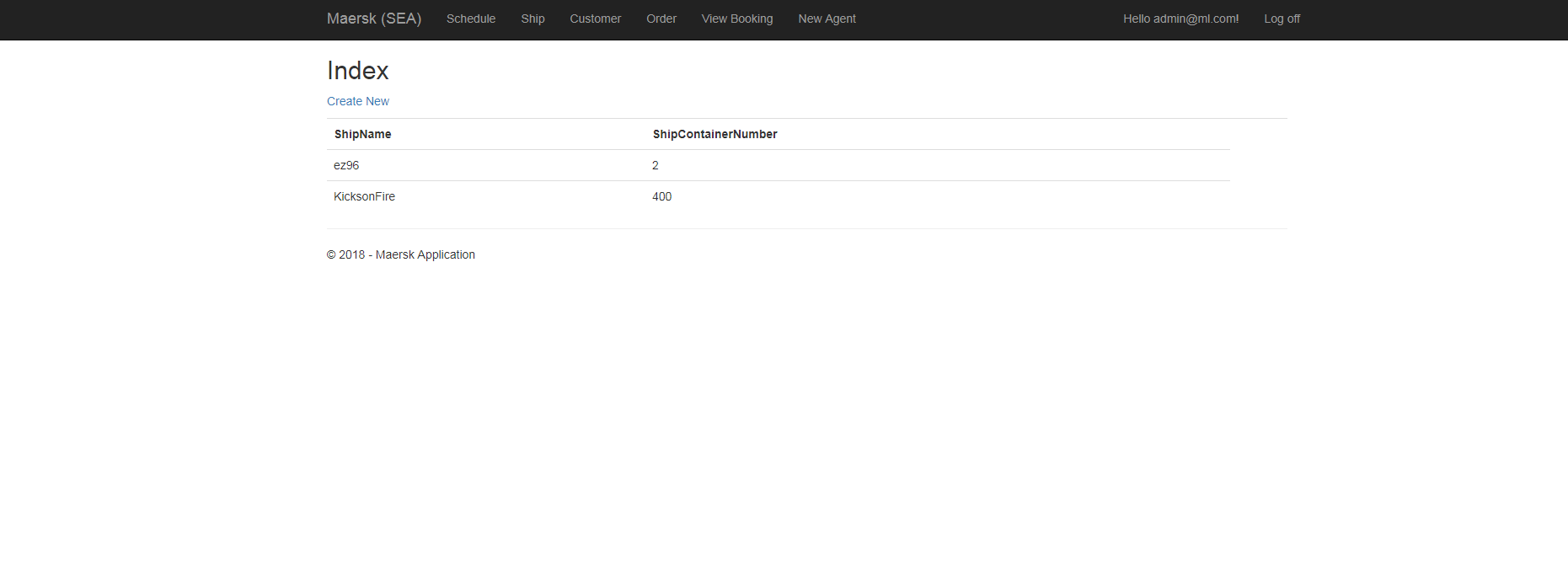


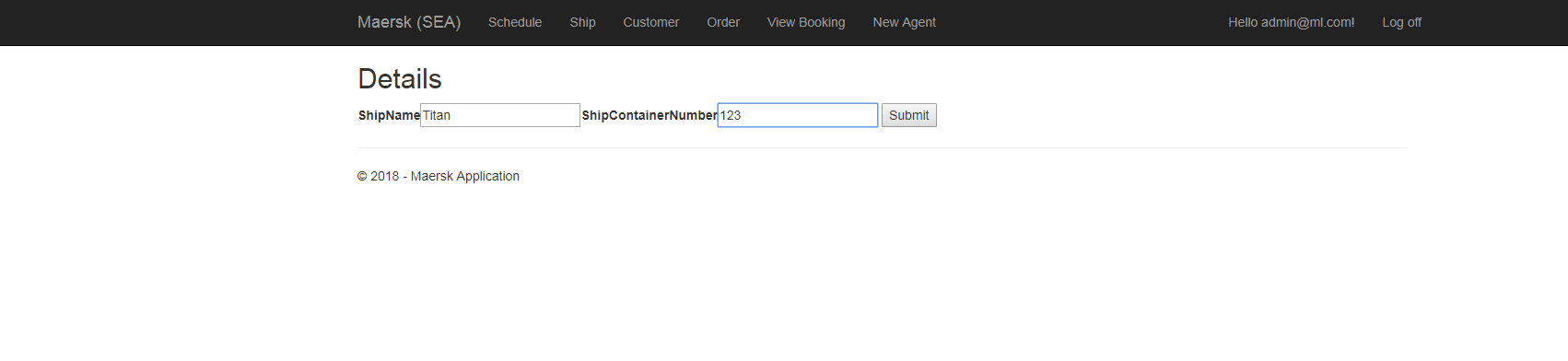
Once that is done the user will need to refresh the app services to be able to view both of the web apps

## 4.2 Web Application Screenshot (User Manual)

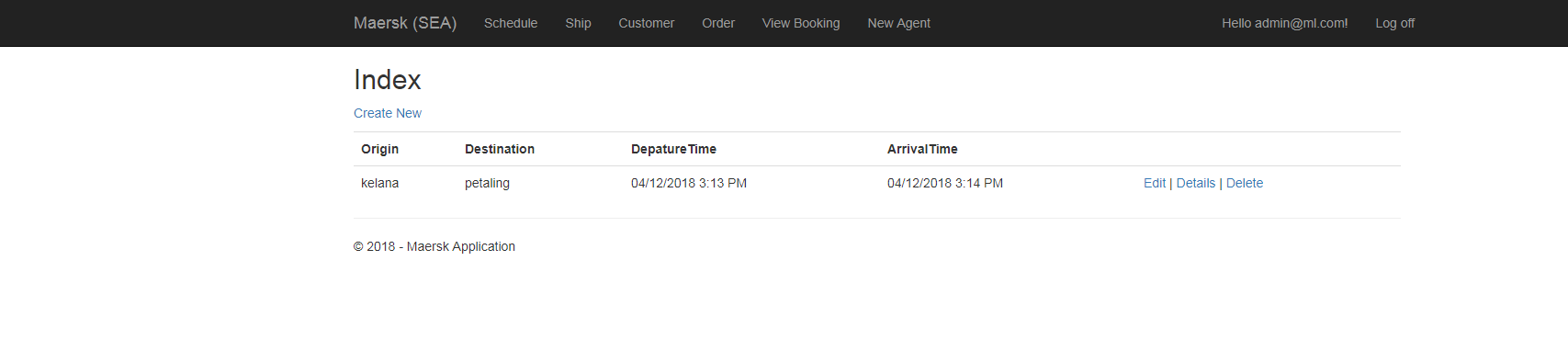


The figure above shows the home page of Maersk Line Company. This home page is showed after the admin has login successfully to the website. Moreover, it also provides several features for the admin to perform the actions, such as create reservation, container, manage ship, and shipyards.

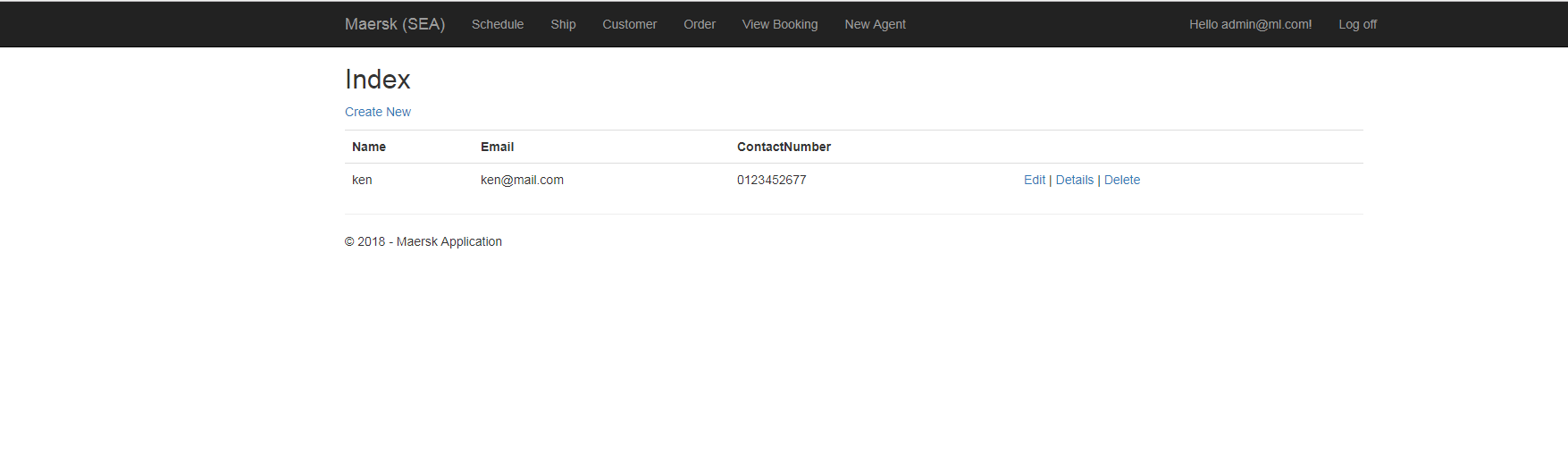
When user clicks the “Ship” tab which is located at the top of the web application, the user will be redirected to this page. Whereby, this page shows the records of registered ships. Moreover, the user is allowed to create a new ship which is located below the Ship title. Besides that, the user is also able to view and delete the records as well.



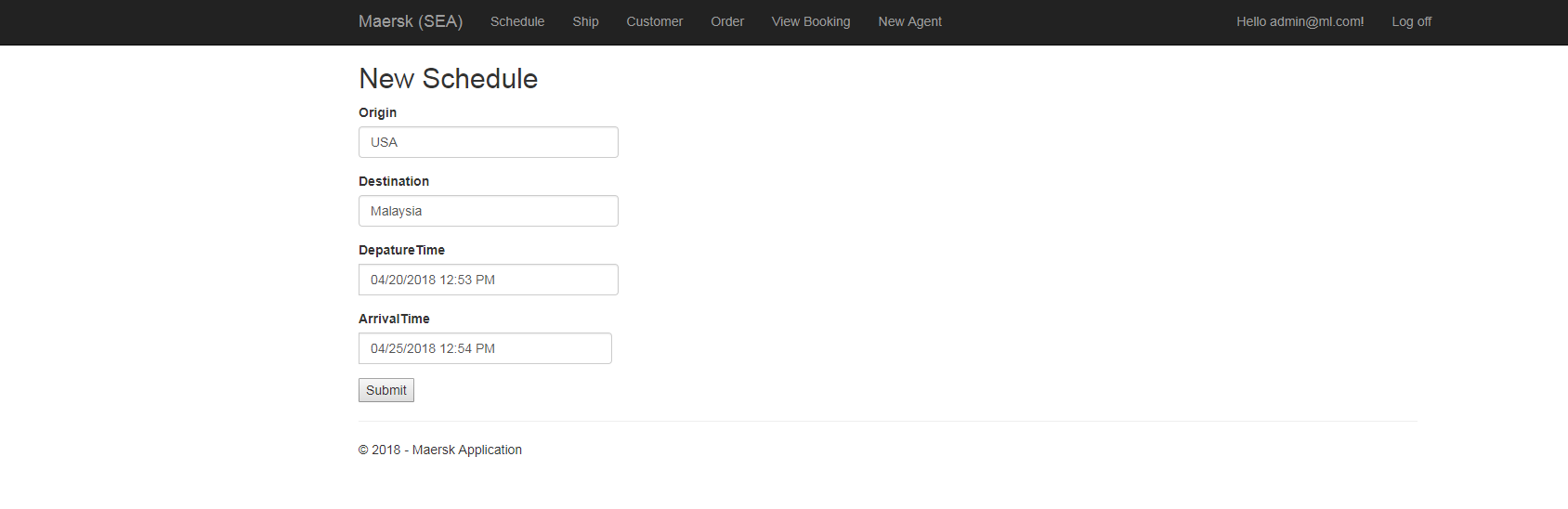
The figure above shows the page that allows user to register ship. The web application will prompt the user to fill in all of the blanks to register the ship. After that, the user will just need to click on the create button to save the record.



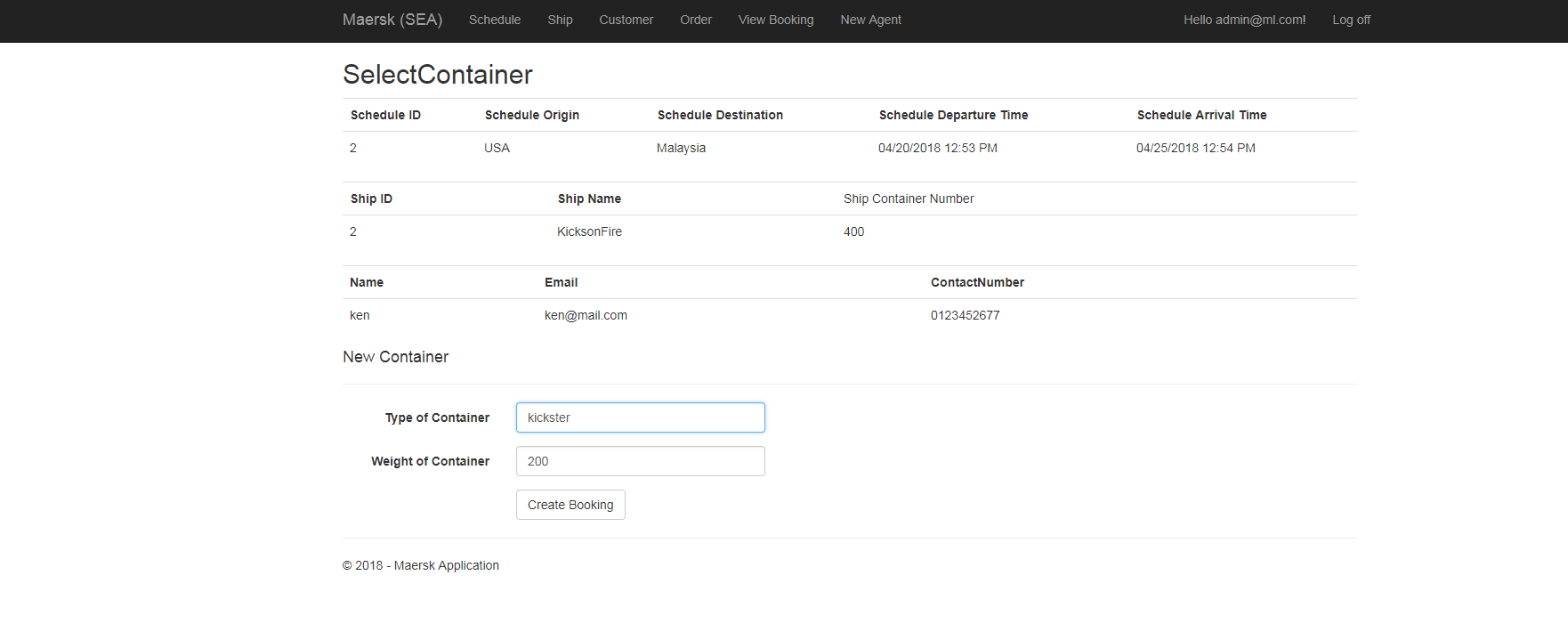
After user has clicked on the ‘Schedule’ tab, which is shown at the top of the web application, the system will display the Schedule page. Thus, this page allows user to create a new Schedule. It will also display the list of origin, destination, Departure time and Arrival time. Besides that, the user is also able to view, edit and delete the records.



After that the user will need to create a customer as well which will include their name, email, and also their contact number as well. This will be needed for the container as it will need the customers information.

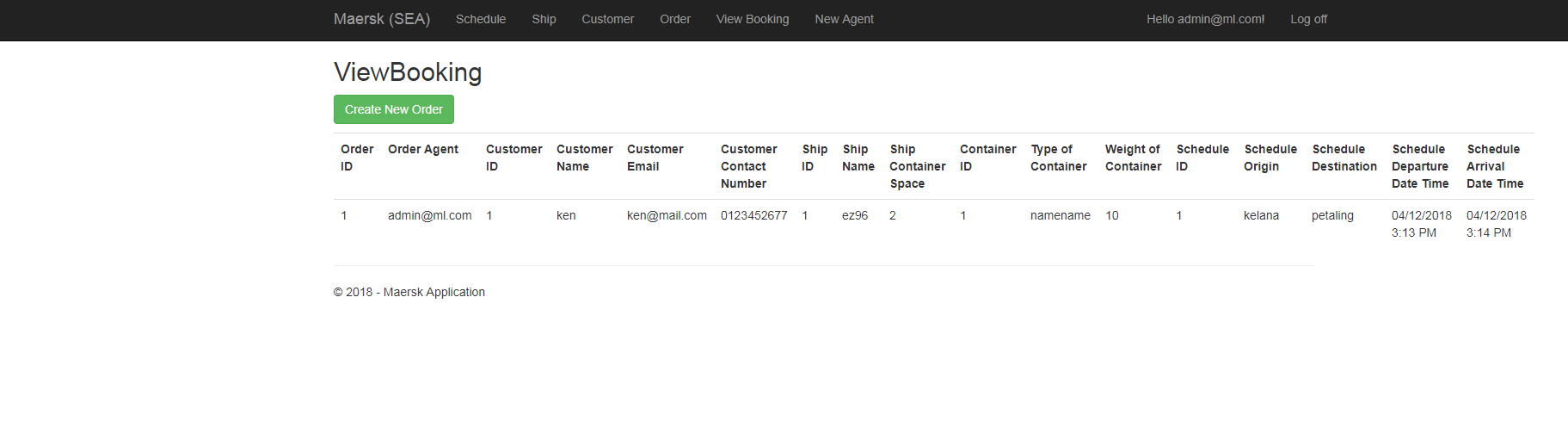


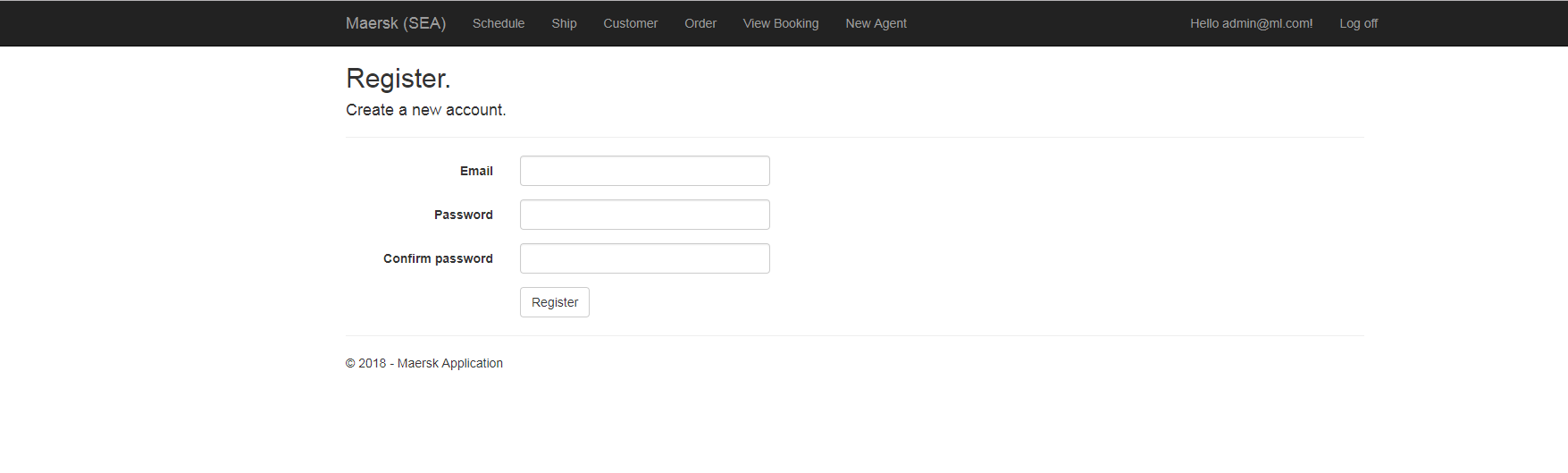
The figure above shows the page that allows user to register different schedules. Moreover, the web application will prompt the user to fill in the blanks in order to register the schedule itself. After that, the user will just have to click on the create button to save the record.



Once that is done the user will have to go to the Order tab whereby this tab will allow the user to select the Container which is through the Schedule, Ship and also the Customer. Once all of that has been selected the user must fill in the type of container and also the weight of container.

.

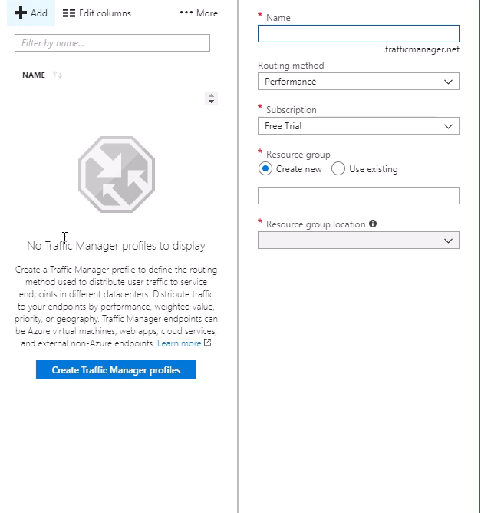
When user clicks the “View Booking” tab which is located at the top of the web application, the system will open this page. This page will show all of the records that the admin had made for the reservation for the shipments. Thus, the admin allows making a reservation which is located below the Reservation title. Besides that, the admin is also able to view and delete the records.



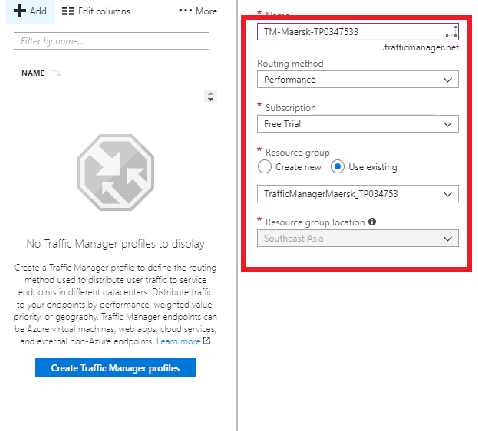
Moreover, if there the admin will also have the power or privilege to add new agents to the system as well if that is needed.

## 4.3 Traffic Manager

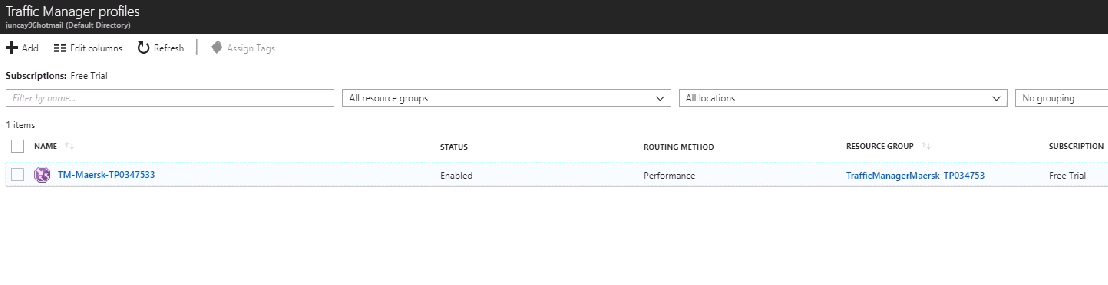
Microsoft Azure Traffic Manager allows you to control the distribution of user traffic for service endpoints in different datacenters. Service endpoints supported by Traffic Manager include Azure VMs, Web Apps, and cloud services (Microsoft, 2017).



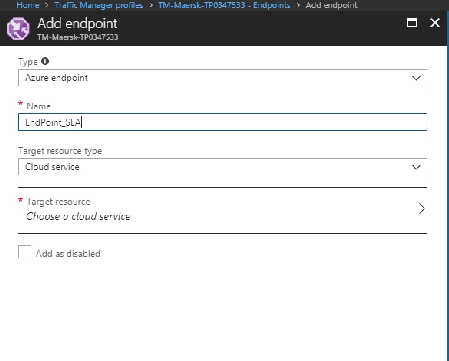
The user must click on the Traffic Manager and then fill in all of the blanks that are needed to be done.



Once all of the information has been filled in the user will then need to click the “Create” and Traffic Manager is then created.



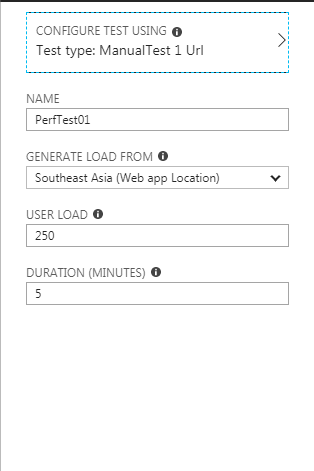
Once the user has done it correctly this will appear in the user Traffic Manager Profile.



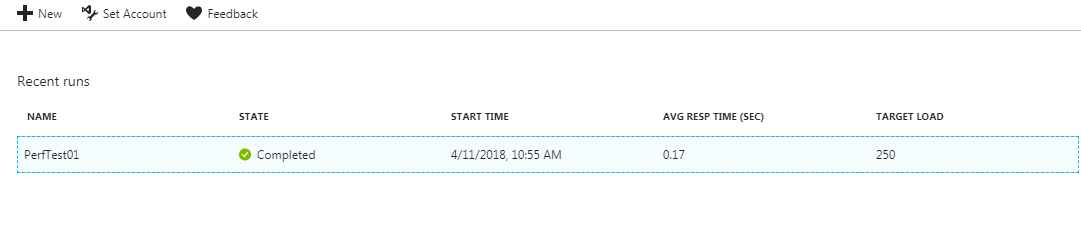
The user will then need to go into the Traffic Manager Profile and the user will then create and End Point for the Traffic Manager. Once that is done the user will be able to publish the website.

## 4.4 Performance Testing

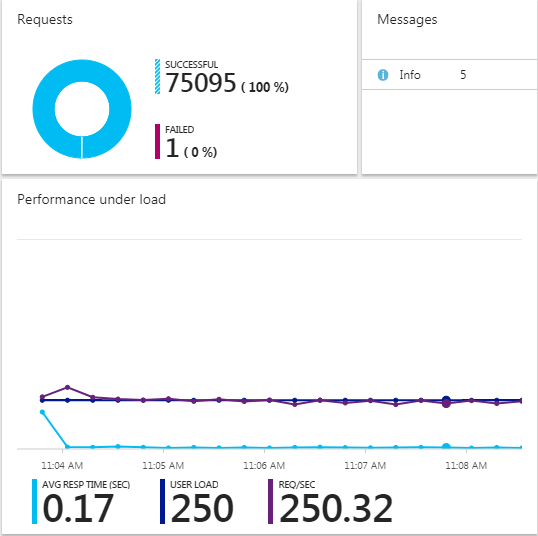
Performance testing is the process of determining the speed or effectiveness of a computer, [network](https://searchnetworking.techtarget.com/definition/network), [software](https://searchmicroservices.techtarget.com/definition/software) program or device. This process can involve quantitative tests done in a lab, such as measuring the [response time](https://searchnetworking.techtarget.com/definition/response-time) (Margaret Rouse, 2014).



In this section, the user will need to conduct a performance test to test the overall performance of the web application. At first, the user will need to give a name to the performance test. Moreover, the user will be required select the location that the load generated from and the duration of the system itself will need to load the page at the same time. Furthermore, this test will then be conducted in three different user loads, which involves on an average of 250 users, 500 users, and 100 users.



The figure above shows the list of the completed performance test on the web application itself. Moreover, the user will be able to view the test by clicking on it.



As the figure above shows, the completed test with 250 user loads. It clearly illustrates that the number of successful request are perfect and it only failed once on the overall performance.

# 5.0 Unit Testing

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test ID | Test Description | Test Data | Expected Result | Actual Result | Status |
| T1 | Login | Username: [low@john1095hotmail.com](mailto:low@john1095hotmail.com)  Password: 62598071 | Login Successful | Login Successful | Pass |
| T2 | Insert Schedule | 1, Titanic, KL-Shipyard, LGK-Shipyard, 100, 18-Jul-2018, 19-Jul-2018 | Insert Successful | Insert Successful | Pass |
| T3 | Insert Ship | Kicksonfire, 200 | Insert Successful | Insert Successful | Pass |
| T4 | Insert Customer | Ken, [Ken@mail.com](mailto:Ken@mail.com), 012345678 | Insert Successful | Insert Successful | Pass |
| T5 | Insert Order | 1, Titanic, KL-Shipyard, LGK-Shipyard, 100, 18-Jul-2018, 19-Jul-2018  Kicksonfire, 200  Ken, [Ken@mail.com](mailto:Ken@mail.com), 012345678  Choose and type container | Insert Successful | Insert Successful | Pass |
| T6 | Update Booking | 1, Titanic, KL-Shipyard, LGK-Shipyard, 100, 18-Jul-2018, 20-Jul-2018 | Update Successful | Update Successful | Pass |
| T7 | Update Ship | Kicksonfire, 2000 | Update Successful | Update Successful | Pass |
| T8 | Update Schedule | USA, Malaysia, 04/20/2018 12:53 PM,  04/25/2018 12:54 PM | Update Successful | Update Successful | Pass |
| T9 | Update Customer | Kenny, [Kenny@mail.com](mailto:Kenny@mail.com), 011337890 | Update Successful | Update Successful | Pass |

# 6.0 Conclusion

In conclusion, Maerks Line web application allows the user to make reservation for shipment, and also able to create container, shipyards, and manage ships. The web application is developed based on the requirement that stated in the assignment question paper. Besides, this web application has achieved to goal of providing a good platform for the user to manage the shipment.

Microsoft Azure is a very good platform for the web application to deploy on it. This platform also provides a good solution to the Maerks Line Company as it meets all of the requirements of Maerks Line web application. Moreover, it is very easy and convenient for the software developer to deploy their web application with few simple steps. Unlike the other platforms, it only takes few minutes to deploy the web application to the cloud itself. Not to mention, Microsoft Azure also provides SQL Database that helps a lot of software developer to solve the problem of storing the data. In order to make sure that the website can be reached frequently, Azure Traffic Manager is implemented to control the requests from web clients. Performance traffic routing is selected by deploying endpoints in few locations across the globe. This is to improve the responsiveness of the web application and send the request based on the location that is closest to the client.

The software developer has gained a variety of knowledge in this area, which is also able develop and deploy the web application on Microsoft Azure App Service, and traffic control. In this assignment, I had gained a variety of knowledge such as web application deployment, traffic control, and other functions as well. Thus, I myself believe that I could apply all that I myself had learned in to future jobs and also help improve them along the way.

# References

1. Microsoft. 2017. Overview of Traffic Manager. [ONLINE] Available at: https://docs.microsoft.com/en-us/azure/traffic-manager/traffic-manager-overview. [Accessed 11 April 2018].
2. Margaret Rouse. 2014. performance testing. [ONLINE] Available at: https://searchsoftwarequality.techtarget.com/definition/performance-testing. [Accessed 11 April 2018].

Appendices

GIT HUB LINK:

<https://github.com/lowyauoon/Maersk-Yau-Oon>

Maersk Line SEA LINK

<https://maerskappsea-tp034753.azurewebsites.net/>

Maersk Line NEU LINK

<https://maerskneu-tp034753.azurewebsites.net/>