# **Acknowledgment**

Though the entire time spent on this DDAC assignment, many individuals have lent a helping hand to the researcher in completing the DDAC assignment. First of all, the developer would like to thank his lecturer, Dr. Kalai Anand Ratnam. In the lecture and lab sessions, Dr. Kalai Anand Ratnam has guided the developer in providing guidance of his assignment. In addition, Dr. Kalai also provided valuable suggestions and recommendations that are useful to the assignment. Most importantly, Dr. Kalai has been very helpful and is willing to assist the developer when the developer faced with difficulties.

The developer would like to thank to those people who help the developer to when the developer face difficulties.

Lastly, the researcher would like to thank my family for giving support, comfort and words of encouragement when the developer faced a lot of different throughout the development, the developer would also like to thank his friends for giving a helping head so that the researcher can successfully develop and finish the assignment.

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# **Introduction**

## **Background Information**

Ukraine International Airlines (UIA) is the leading carrier and largest airline in Ukraine. Ukraine International Airlines (UIA) provides both domestic and international passenger flights. Other than transporting people, Ukraine International Airlines (UIA) also provide cargo services to multiple places such as Europe, Middle East, United States and Asia. Therefore, the website must not be lag for even a few seconds, so that the shoppers will not be notoriously fickle. As the airline become more and more popular, Ukraine International Airlines is eager to expend into new market, but there are problems with its website prevented it from an adequately serving customers beyond Ukraine. The website also experienced simple denial-of-service (DOS) attacks, which will damage the performance and reliability of the website, and it will not have the performance required to host visitors from many parts of the world.

By reducing costs, innovate, and improve customer service, Ukraine International Airlines uses technology to meets its requirements. It has gone to a paperless cockpit and uses advanced software for analyzing fuel economy. But then once again, the airline company decided to innovate its way out of its web challenges. Chief Information Officer at Ukraine International Airlines, Dmitriy Prudnikov realize that migrating the website out from the Ukraine International Airlines datacenters to a public cloud should solve all the problem above.

## **Aim**

The aim of this application is to provide minimize DOS attack and faster performance website by integrating Azure cloud computing services.

## **Objective**

* Is to develop and design an online flight booking system
* Flight booking system should implement Microsoft Azure
* Prevent denial-of-service (DOS) attack
* Prevent website lag

## **Requirement specifications**

The system is developed to allow customers to book flights that are given in by the system. It also allows customers from various country to utilize the Ukraine International Airline booking system. To allows customers to view and book flights, the customer needs to create a customer profile which can be done in the Ukraine International Airline website.

## **Major functions or contents of your solution**

Customer is able to do perform some function in the UIA website such as:

* Register account

Before proceeding to view and book flights, user must register or have an account in the UIA website. For user that do not have an account, they are able to be registered in the website with their Email address and a password which need to be eight characters and above.

* Edit customer profile

This can be done after having an account. This function allow user to change their password from the old one to the new one

* Login and Logout

After the user already registered an account with Email and a valid password, the user can login with the registered Email and password, if the Email or password is not valid in the database, the system will prompt a message to inform the user.

Logout will redirect the user to the home page.

* Able to view all the flights that provided by the company

Ukraine International Airline website will display all the flight that the company display, including flights from other continent. The flight details will be show

* Able to search flights by selecting the from destination

Ukraine International Airline website will display the all the flight status that the user searched. The user need to choose the from destination in a dropdown box.

* Book a flight

Once the user has selected a flight, user need to insert their name, gender and Email to book a flight. Once the booking is success, the system will redirect the user to the main page.

* View booked flights

User is able to check their own flight that are booked previously.

# **Project Plan**



# **Design**

## **Architectural Diagrams**

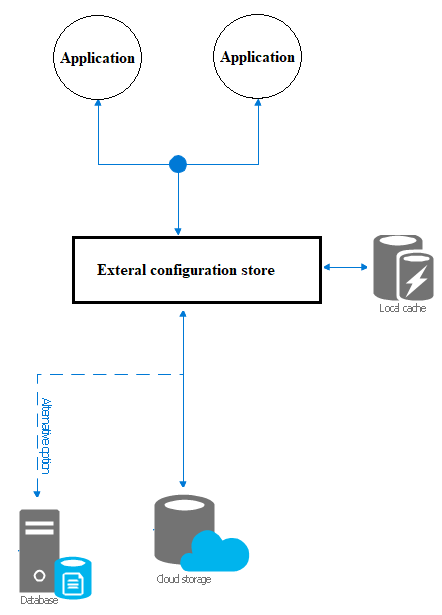


Figure 3.1.1: Cloud Architectural diagrams

Azure cloud architecture pattern diagram is created based on Figure 3.1.1. The configuration information is moves by the patterns out from the system deployment package to a centralized position. The advantage of this pattern is to provide easier management and control of configuration data, sharing of configuration of data in the whole application which is known as the Ukraine International Airline flight booking system. Runtime environments include configuration information that is detained in field deployed with the system, located inside the application folder, this applied to most of the application. The hosting and runtime environment of the application can determine the type of external store. In the diagram above is a cloud architectural, it is a cloud-based storage service, which can be a hosted database.

## **Design considerations**

Before an organization or a company want to implement cloud computing service, they need to research the result and guarantee that it will bring benefits and improve the business. Lacking good fundamental infrastructure and lack of planning a cloud model can be a disruption and turn out to have difficulties in managing. Below are some of the important infrastructure components that need to be considerate.

**Storage**

This component is one of the major component in cloud service. Cloud storage can be very expansive, therefore before choosing the cloud service, it is important to perform a research and have clear understanding of what kind and how big does the storage need for the project. To determine a good storage infrastructure, it is able to change both the needs of the IT environment.

**Handle failure as an event**

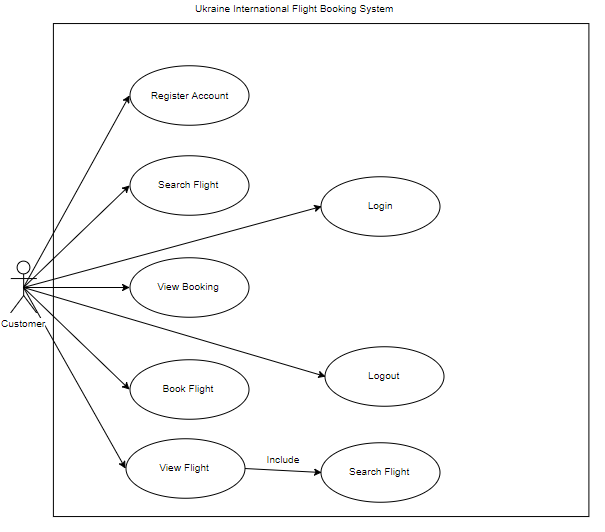
By comparing the failure of traditional system and system that uses cloud infrastructure, the traditional system overcome the failure by handle it as an exception. The traditional system will display the error message when the system failure occurs, this is because the traditional system is lack of resources. On the other hand, system that implemented cloud infrastructure can handle failure as an event. When there is a server down, the cloud will then change the server to the nearest. It is designed for not handle with exception.

**Flexibility**

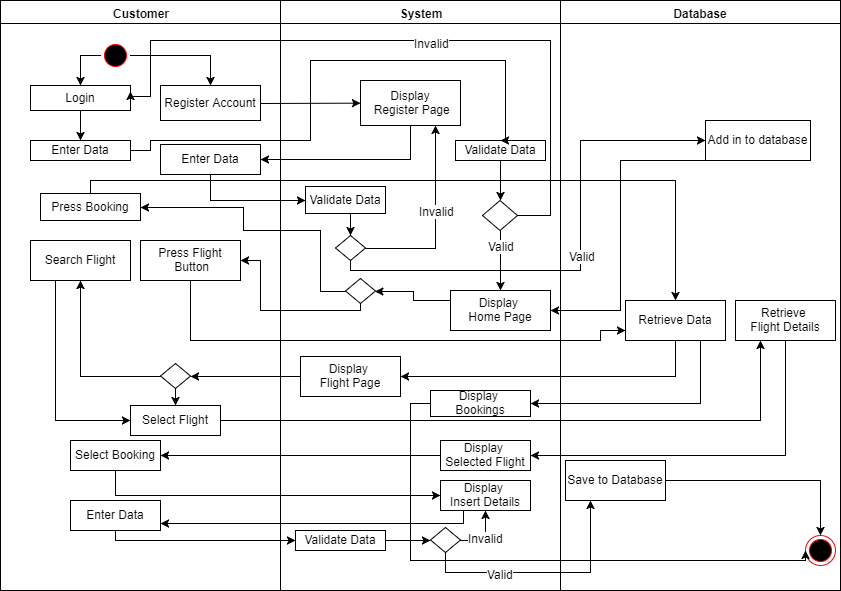
The advantage of cloud computing service is that it is very flexible with the information and workloads, which can be deployed to almost any machine that have internet connection. In an organization, the data are stored in a cloud database which allow everyone in the organization to retrieve and write data to it. But the organization administrators can restrict and control the certain types of the content to be achieve by the position in the organization. It is much more convenient and safer to save data on cloud, any disaster or low in performance will not affect the system where it implemented cloud service

## **Modelling**

### **Use Case Diagram**



### **Activity Diagram**



# **Implementation**

## **Publishing to Azure**

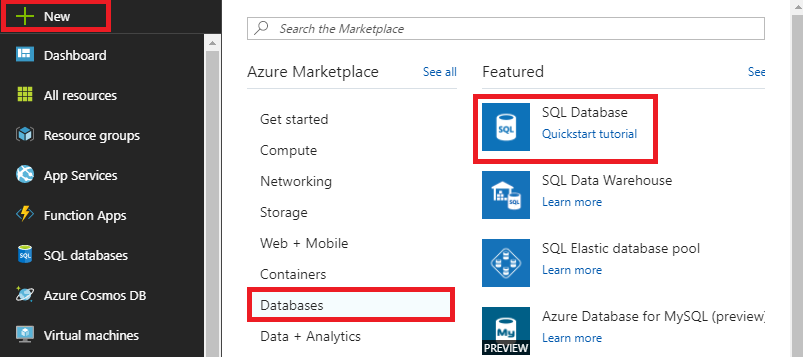


Figure 4.1.1: Create Database

First thing to do to host a web application on Azure is that to create and SQL database for the Web Application. After pressing, the developer need to enter the all the column with suitable details, the developer also need to choose the server location and the pricing of the SQL service. In this project, a basic SQL service is chosen.

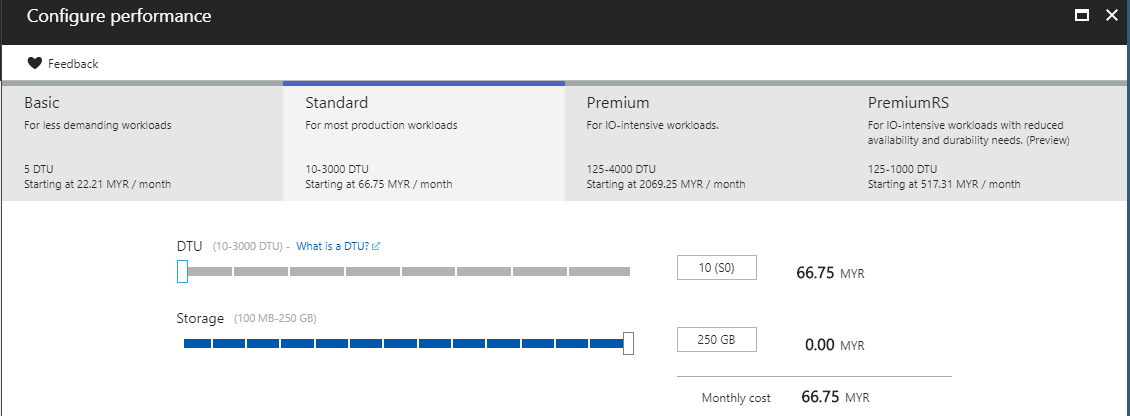


Figure 4.1.2: Select Pricing Tier

After the creation and deployment is success, it is time to create a New Azure Web Application. First, select add new, then select the Web + Mobile label, and lastly choose the Web application features.

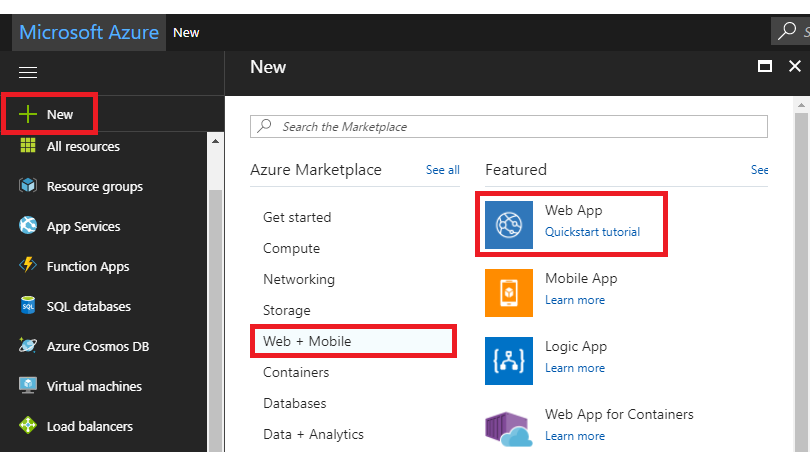


Figure 4.1.3: Create Web Application

|  |  |
| --- | --- |
| Figure 4.1.4: Insert needed data | When the Web App label is selected, it will then provide developer this page which need developer to fill all the details up. Details also include the location and the pricing tier that the developer needs. In this project, the developer chosen the basic B1 tier. |
| Figure 4.1.5: Web App Pricing tier |

## **Connection String to use SQL database**

Then now moving to the application code for hosting on Azure, but first the developer need to check the application, see whether is there any error or bugs in the application by pressing the rebuild button.

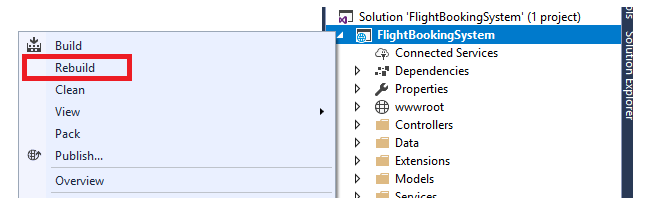


Figure 4.2.1: Rebuilding Application

|  |  |
| --- | --- |
| Figure 4.2.2: Obtaining Connection String | This is to choose the resource group created just now. Once the SQL authentication is found, just copy the code and it will need to paste in to the system, after pasting into the system, change the username and password to the one that are set in the beginning like in Figure 4.2.4. |

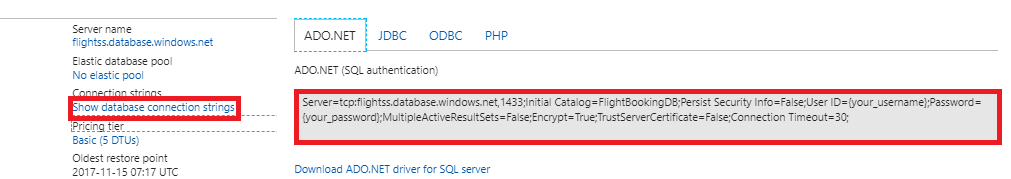


Figure 4.2.3: Copy Connection String code



Figure4.2.4: Connection String

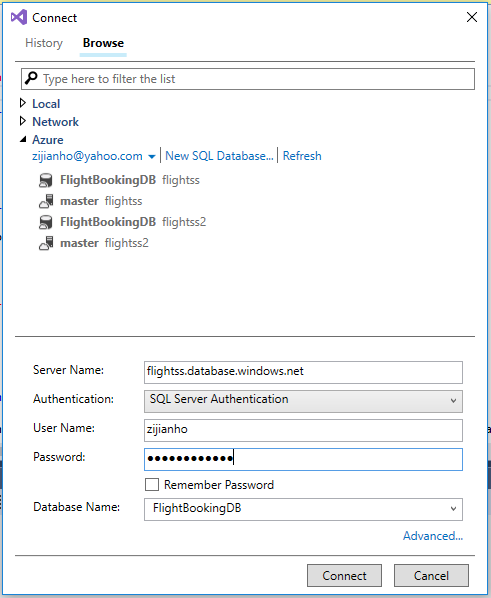


Figure 4.2.5: Add host name to SQL Database

After the completion of Figure 4.2.4, the developer will then connect the SQL database to the application. The developer also need to specify the credentials used earlier to create the database and click Connect. Once the database is connected, the green button is clicked to execute the script and populate the tables. Once the tables are populated, the developer will receive a message indicate the update was successful.

## **Traffic Manager Profile**

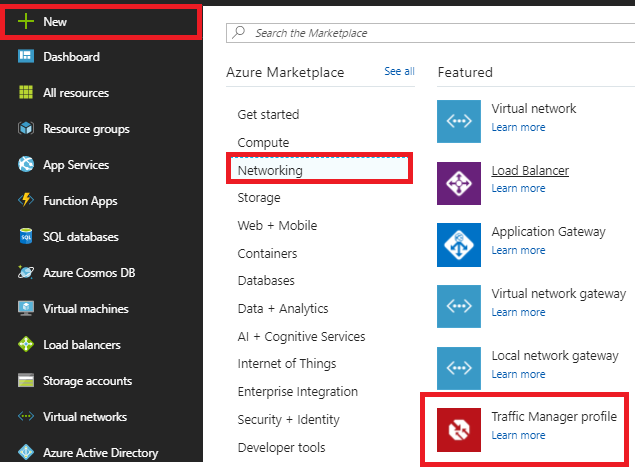


Figure 4.3.1: Creating Traffic Manager

In Figure 4.1.11 shows how traffic manager is created and implemented in the Ukraine Flight Booking System. Firstly, select add new then click on networking then choose the traffic manager profile. After the Azure portal display the form of the traffic manager, the developer will fill the information that are required, which is the name, routing method which is performance in this project, and the other necessary information needed.

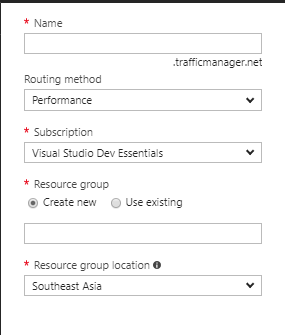


Figure 4.3.2: Inserting data in traffic manager profile

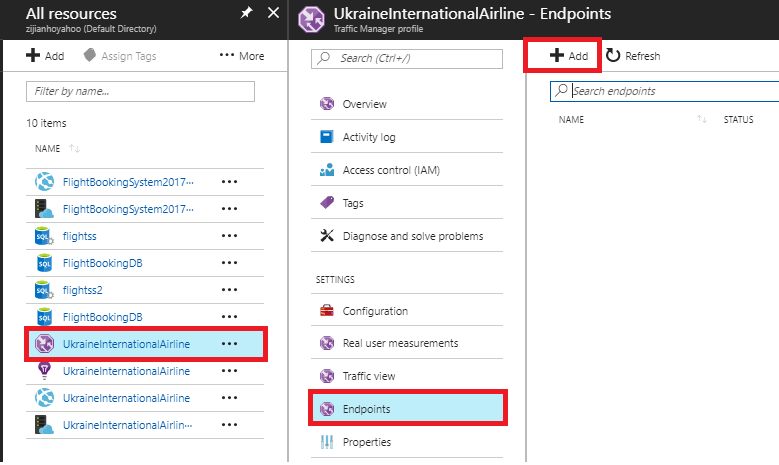


Figure 4.3.3: Adding Endpoint in traffic manager

After the completing of creating a traffic manager profile, the developer will then create endpoint in the traffic manager. In the all resources page select the created traffic manager profile will that is created earlier, select endpoints and add a new endpoint.

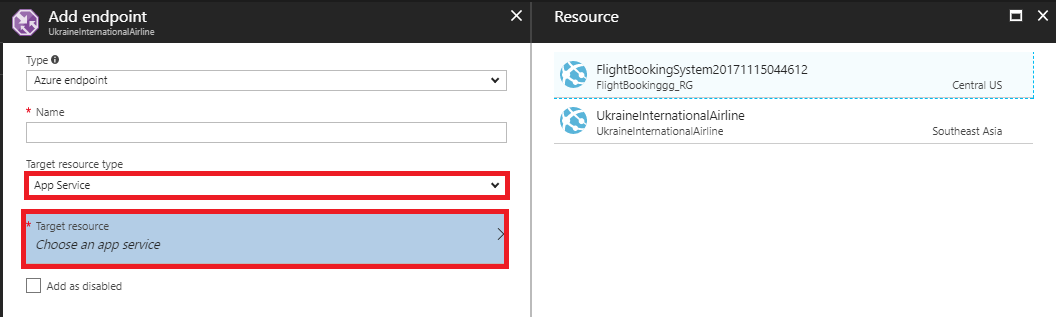


Figure 4.3.4: Adding endpoint

In this project, the target resource type is App Service and after select App service, the developer will choose their app services. Repeat this step to add both app service in to the traffic manager. The functionality of traffic manager is that when one server is down at a specific location, it will automatically redirect the user to the closest service. In this case, there are two servers, Central US and Southeast Asia. When the server in Southeast Asia is down or stop, the user that uses Southeast Asia server will then redirect to the Central US server.

## **Application Scaling**

Application scaling is when an application chosen a basic tier at the start of the development, but then there are too much requests to be handle, therefore the developer need to scale up to the right level which Azure provide such function to deliver the right level of scale in a robust, cost-effective manner. When consider the scalability requirements of an application, the resource requirements should be determined whether it should be scale up or scale out.

Scaling up the web application allow the developer to increase the resource capacity, which is RAM and CPU cores. On the other hand, scaling out is different than scale up, it maintains the tier by increasing more virtual machines to handle more user request.

For the Ukraine International Airline web application, chosen application scaling is scale out. So instead of adding more resources capacity, Ukraine International Airline web application increase more virtual machine to handle request such as booking of flights and register of account.

There are some benefits of scaling out instead of scaling up which is the data will be more consistency. Scaling out is much cheaper than scaling up because scaling up required to increase the resources capacity. The data in MySQL database will remain untouched and the MySQL proxy is hundred percent compatible. It also has great performance of cross-database quires and maintenance commands.

# **Test Plan & Testing Discussion**

## **Performance Testing**

There are many cloud computing service in the world right now that provides superlative functions and services for the society. Azure is one of the cloud computing service that is developed by Microsoft which have the ability to host and developed web application on to the Azure cloud service. The Azure portal provides performance monitoring service so that it gives the developers a very convenient and easy method when it comes to monitoring and maintaining the application’s performance.

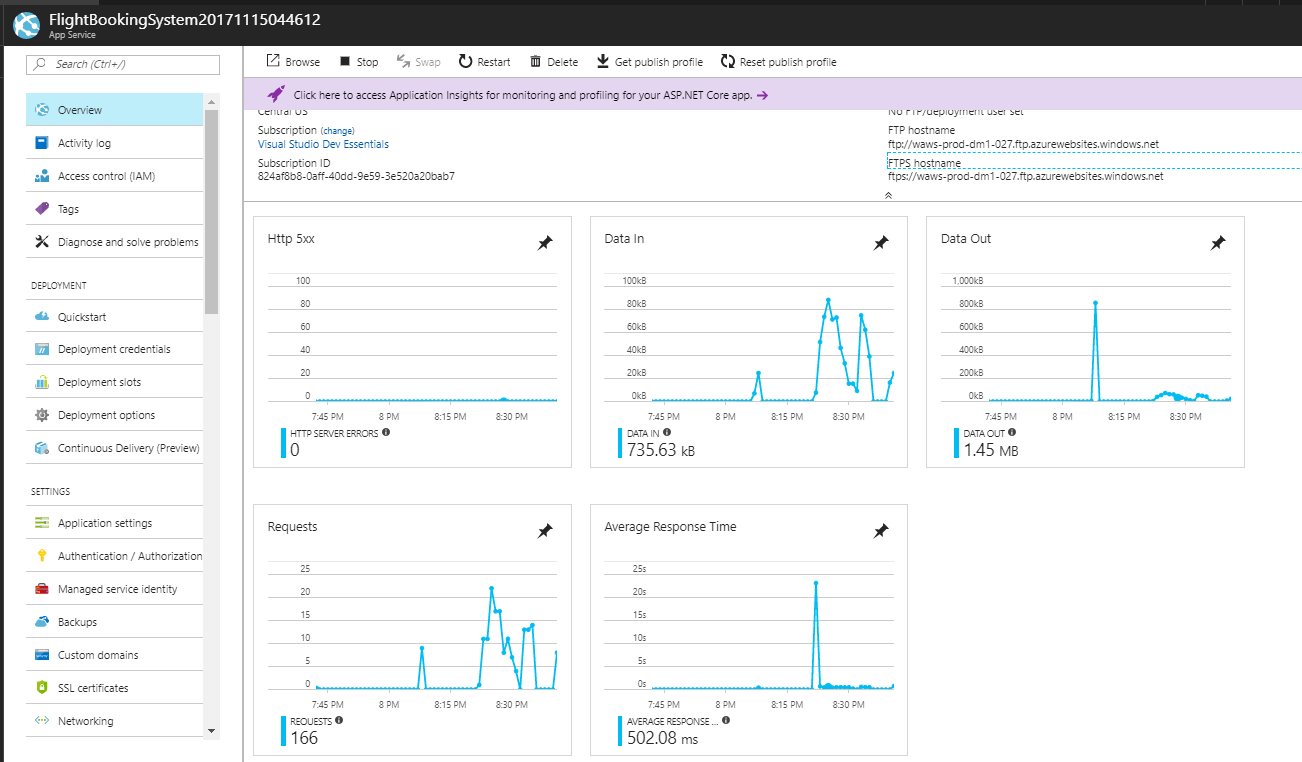


Figure 5.1.1: Ukraine International Airline System Monitor Board

In Figure 5.1.1 shows the Ukraine International Airline System monitor board. Azure provides multiples functions to monitor and determine the performance of the website that are hosted on the Azure portal. The developers are able to view the data one-by-one by selecting the one they want. For example, in Figure 5.1.2.

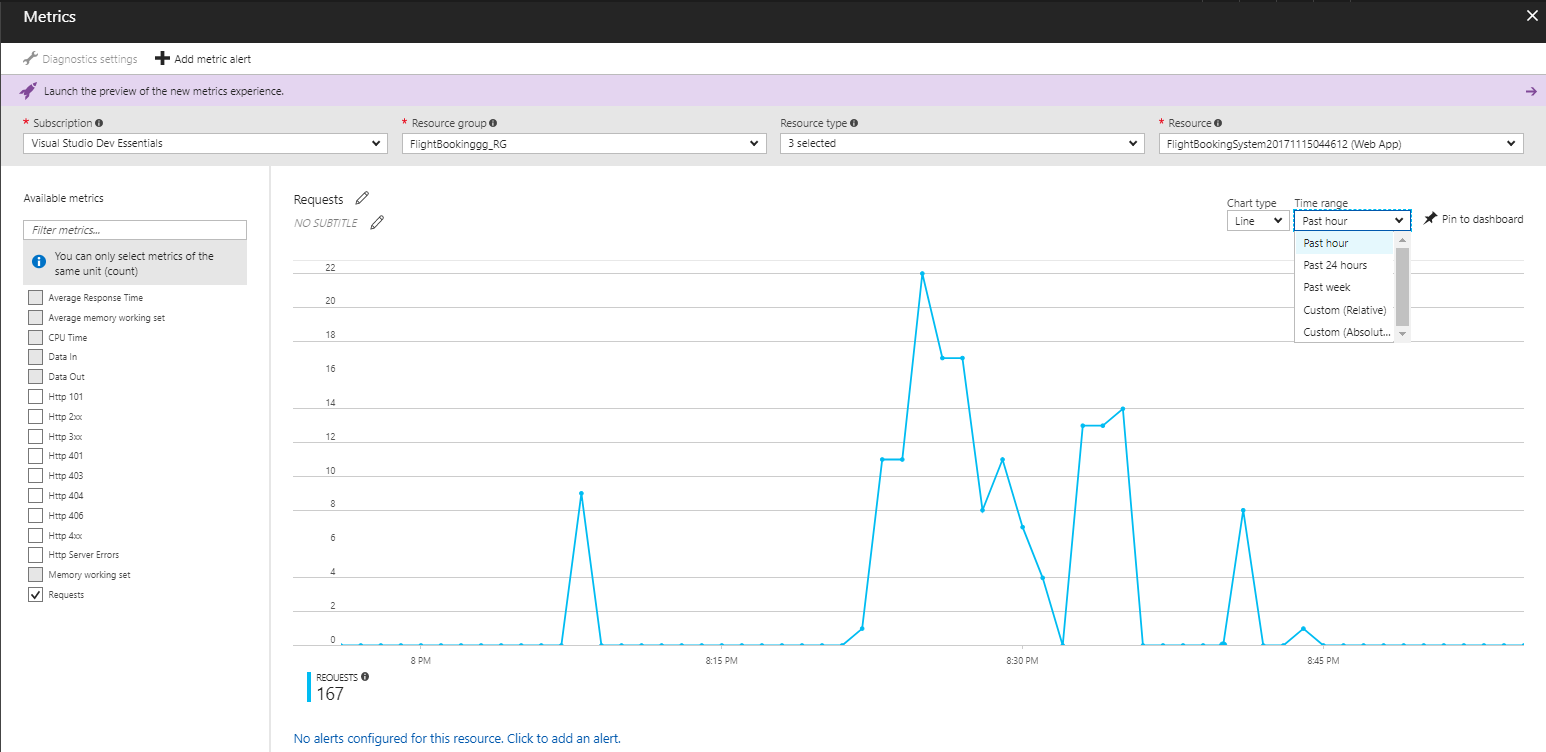


Figure 5.1.2: Single view of the selected metrics

In Figure 5.1.2 also allow the developers to change the time range to the specific time range they need. This will bring them more convenience to them so that they do not need to check one by one on the graph provided.

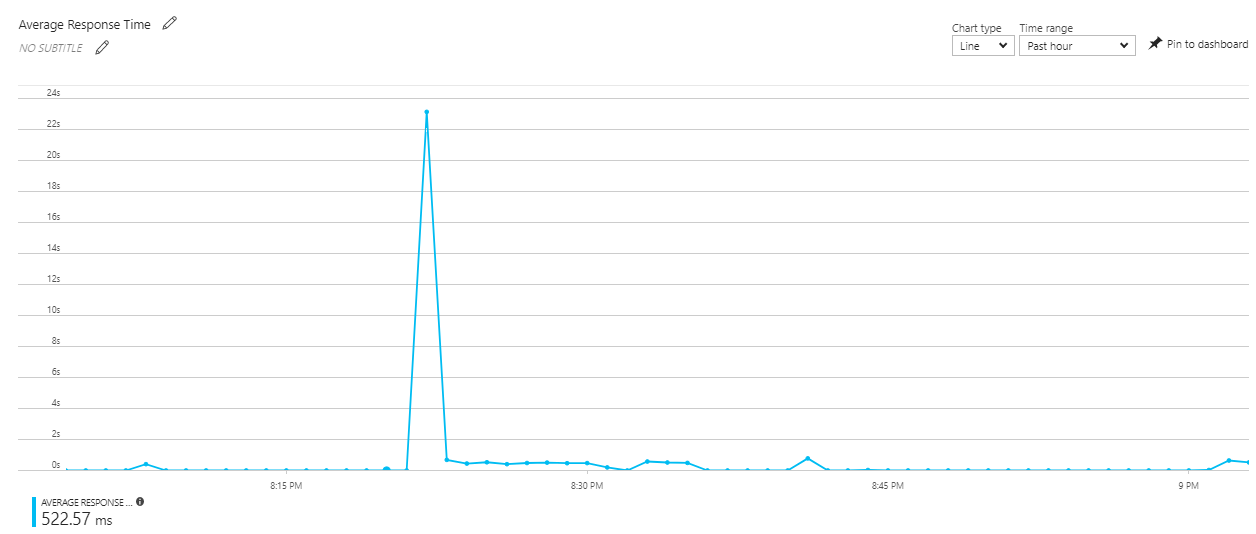


Figure 5.1.3: Average Response Time

According to Figure 5.1.3 it shows the information of the average response time of the Ukraine International Airline booking system for the past hour. Referring to Figure 5.1.3, the average response time for this web application is 522.57ms. In order to get more information about the average response time, the developer able to place the mouse pointer to the point of in the graph, the Azure portal will show the details information of the specific number of average response time on the specific time.

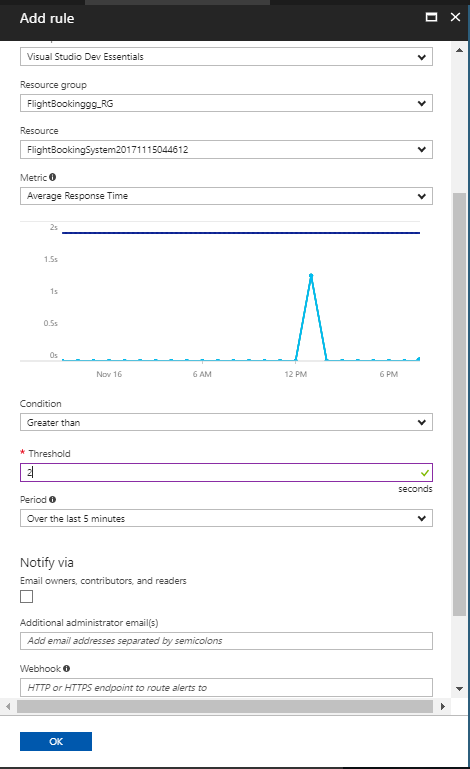


Figure 5.1.4: Set Alert

Not only that, if the developer wants to be notice when there is a decrease in performance, the developer is allowed to set an alert. With the alert they set, they will get notice once the performance of the system is decrease. In Figure 5.1.4 shows that the developer is able to set an alert for the system. the blue line indicates the average time that should not be pass, if the average time of the system passed the blue line, it will then notify the developer. This will provide a more simple and easy wat to monitor the performance which also make the developer more convenience than monitoring and watching the response time manually.

## **Unit Testing**

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Test Cases | Input Value | Expected Output |
| 1. | Login | Username: zijianho@yahoo.com  Password: ABC123456 | Login Success |
| 2. | Login | Username: Null  Password: Null | Remain at Login page |
| 3. | Register | Username: zijianho@yahoo.com  Password: ABC123456 | Save user  Display User page |
| 4. | Register | Username: Null  Password: Null | Remain at Register page |
| 5. | View Flights | N/A | Display list of flights |
| 6. | Search Flights | Origin: Seoul  Destination: Chicago | Display list of flights |
| 7. | Select Flight | N/A | Display flight details |
| 8. | Book Flight | Name: Z  Gender: Male  Email: zijianho@yahoo.com | Save Booking |
| 9. | Select View Booking | N/A | Display list of booked flights |
| 10. | Edit profile | Username: zijianho@yahoo.com  Password: ABC123456 | Save edited data |
| 11. | Edit profile | Username: Null  Password: Null | Remain at edit page |
| 12. | Logout | N/A | Display Home page |

# **Conclusion**

In conclusion, the developer has successfully developed a working web application that allows user to register account, login, view flights, and create booking. Lots of research is done to overcome the business requirements from the Ukraine International Airline company. The research also resolves and address through the proposed system. Besides that, the developer also did in-depth research to gained knowledge about different type of tier selection in Azure and also kinds of poor networking.

After this assignment, the developer programming skills for Asp.net and C# has improved significantly because have studied and practiced intensely. The developer also successfully deployed the web application on to the Azure portal. This will bring more benefits to the developer by letting the developer to monitor performance, prevent DDoS attack, prevent failures and more.

The developer also learned how to integrate and use cloud computing service. The developer also learned how to integrate the cloud storage functions into the web application.

# **Appendix**

UIA Flight Booking System source code on GitHub

<https://github.com/zijianho/DDACZijian>

Stream

<https://web.microsoftstream.com/video/a6e49e99-3846-4e57-974b-8a474ec7b7f3?list=studio>