VIETNAM NATIONAL UNIVERSITY HO CHI MINH CITY

UNIVERSITY OF INFORMATION TECHNOLOGY

FINAL REPORT

Topic:

Deploy A Web Application To Microsoft Azure

Lecturer: **Tran Thi Dung**

Group: 12

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Course: NT132.N12.ATCL

Ho Chi Minh City, 21 December 2022

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I. INTRODUCTION

I.1. Overview

I.1.1. Microsoft Azure

Microsoft Azure is a cloud computing platform operated by Microsoft for building, testing, deploying, and managing applications and services via Microsoft-managed data centers. It provides three main types of services: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

Microsoft Azure provides more than 200 products and services for three main domains: computing, networking, and storage. It also supports many different programming languages, tools, and frameworks.

I.1.2. Web Application

A Web application is an application program that is stored on a remote server and delivered over the Internet through a browser interface.

The salient features of a web application:

+ Be interactive, adaptive, and constant.

+ Be able to solve specific problems, even if just looking for information.

+ Has a content management system

A web application should adopt abilities such as usability, adaptability, agility, mobility,…

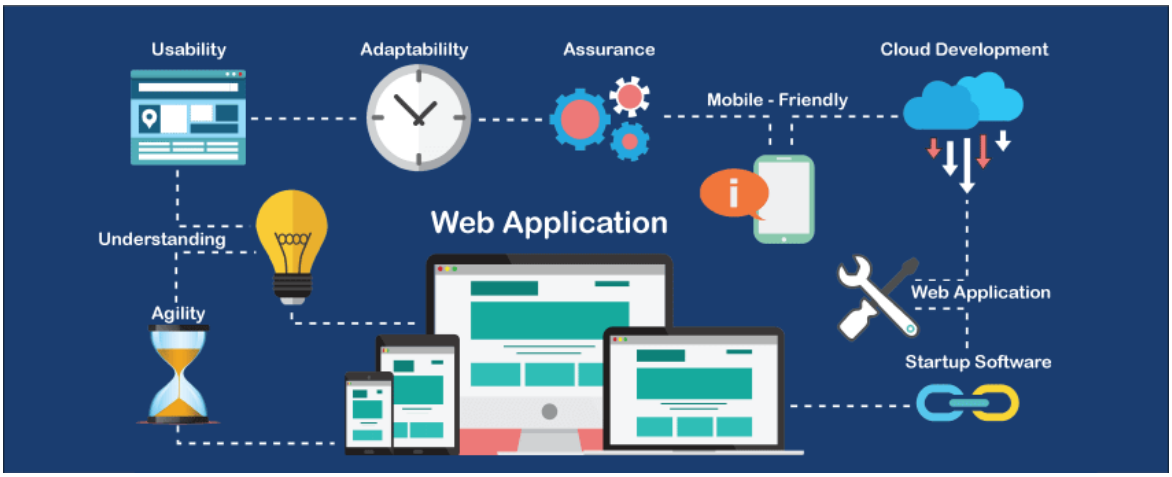

Figure 1. Features of a web application

I.2. Components

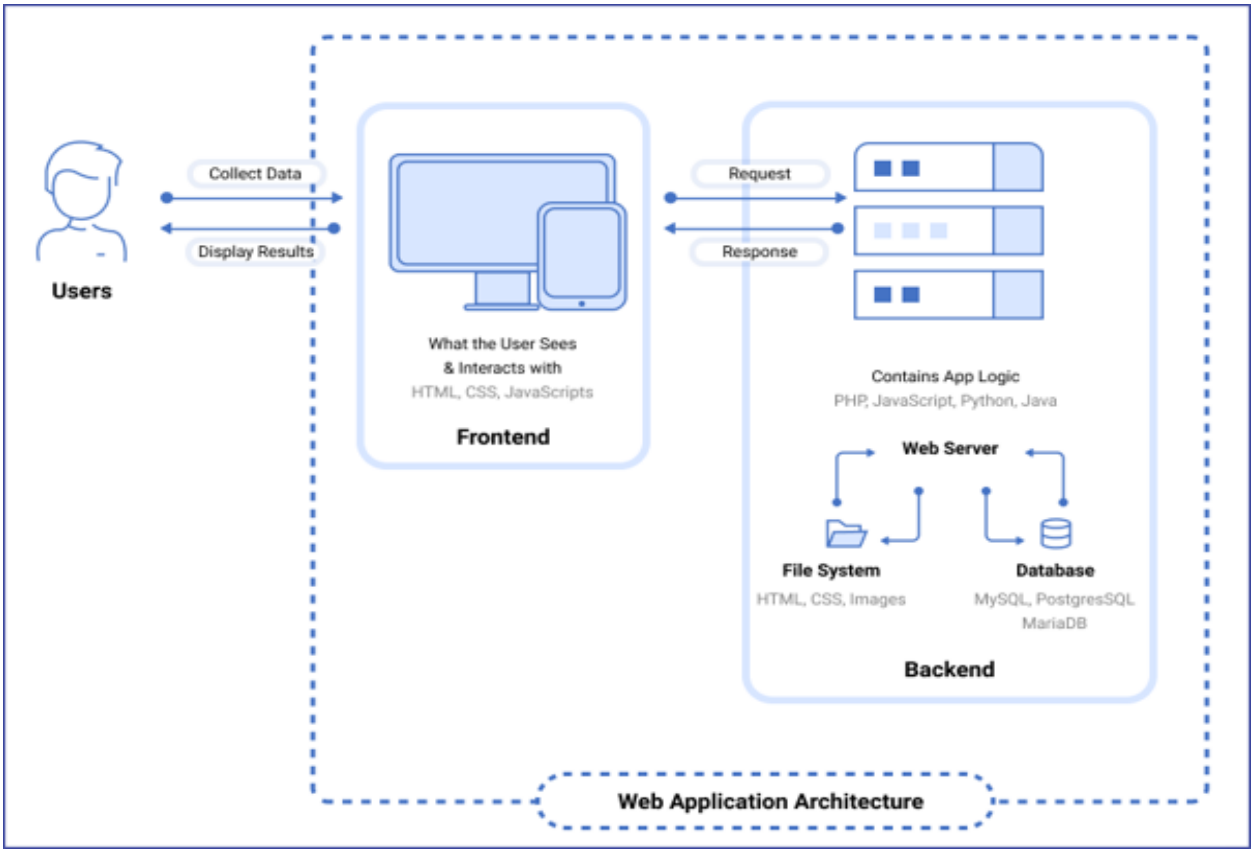

Figure 2. Components of a web application

Web application includes two sides: server and client, as it has two main components:

+ User interface components (client-side): These components link with the display, dashboards, notifications, and configuration settings of the web application that contribute to the visual interface of a web application and build the foundation for a good user's experience.

+ Structural components (server-side): mainly comprises of web application server and database server

- Web application server uses Python, Java, PHP, .NET, Node.js, and Ruby for its development. This server supports for multi-layer applications to run smoothly without any manual interference.

- Database server is used to store, retrieve, and offer information or data that is managed by the server and is required for running the web application and user's requests.

Shortly, there are three primary components of a web application, including: user interface as client-side, web application server and database server as server-side.

I.3. Operation

I.3.1. Operation of a web application

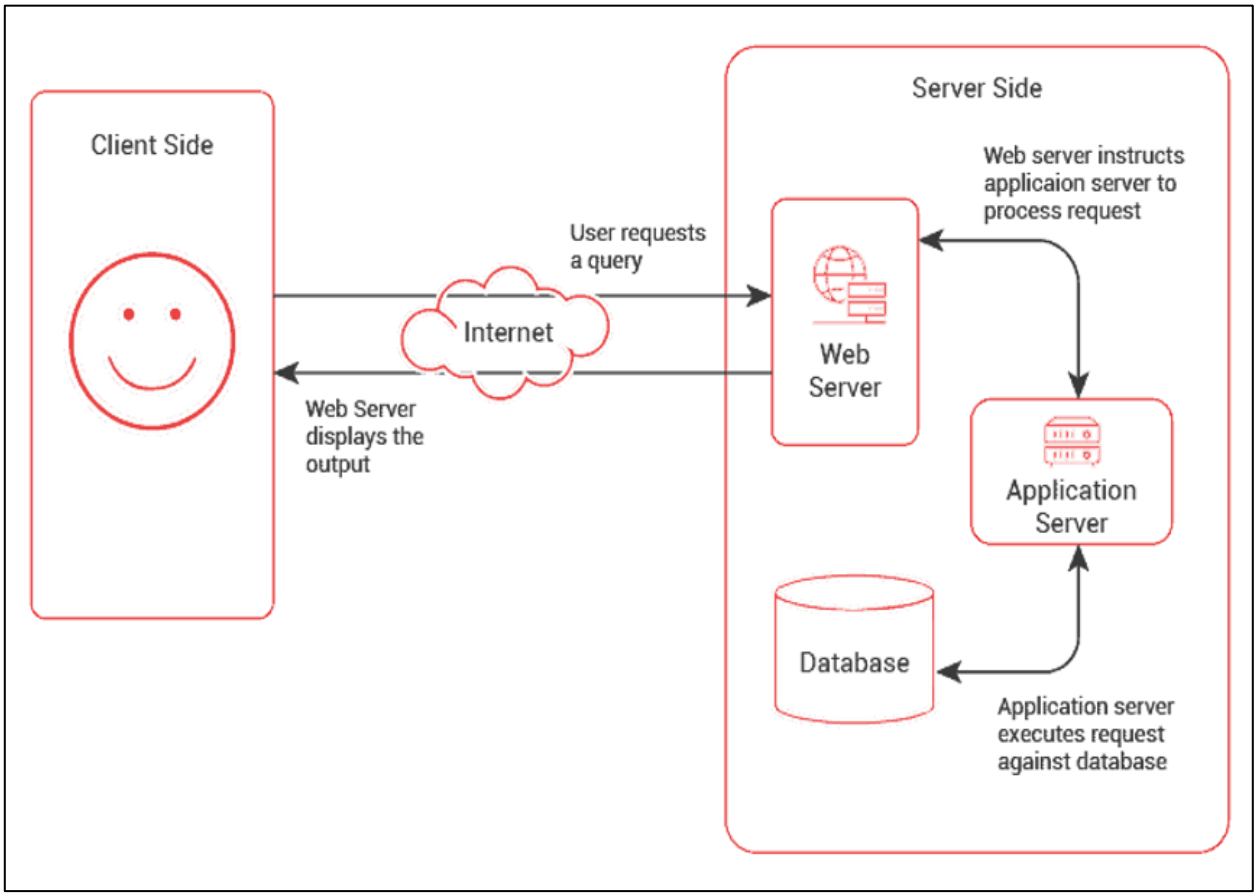

Figure 3. Operation of a normal web application

- At first, user makes a request to the Web Server by connecting the Internet through the application's user interface.
- Then, the Web Server sends this request to the Web Application Server.
- Web Application Server executes the requested tasks and acquires data from the Database Server.

- Next, the Web Application Server sends response back to the Web Server according to the processed data.
- The Web Server responds the requested tasks to the client by network-connected devices.
- Finally, the requested information appears on the user's screen.

I.3.2. Operation of a web application on Azure

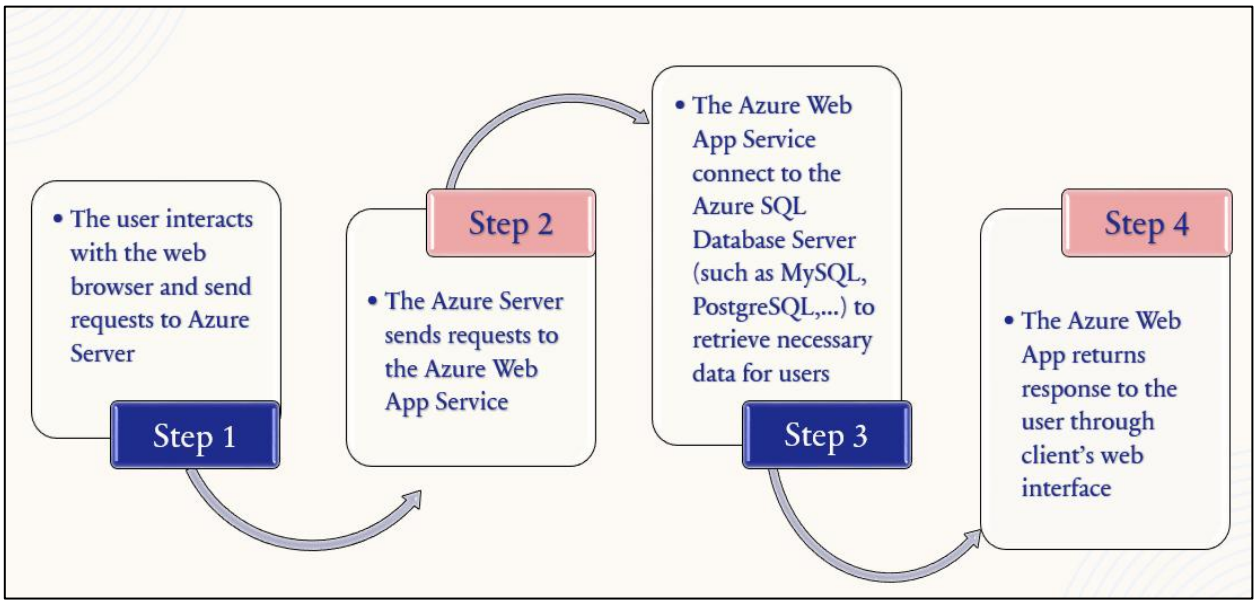

Figure 4. Operation of a web application on Azure

Most of the steps are similar to the steps involved in operating a normal web application. But the difference here is that it uses Azure's services. When users make a request to the Azure Web Application Service, it will make a connection to Azure SQL Database Server to retrieve data to response to users' requests.

- At first, user makes a request to the Azure Web Application Server by connecting the Internet through the application's user interface.
- Then, the Azure Web Application Server sends this request to the Azure Web Application Service.
- Azure Web Application Service executes the requested tasks by making a connection to the Azure SQL Database Server to retrieve necessary data.

- Next, the Web Application Service sends response back to Azure Web Application Server according to the processed data.
- The Web Application Server responds the requested tasks to the client by network-connected devices.
- Finally, the requested information appears on the user's screen.

II. IMPLEMENTATION

II.1. Topology

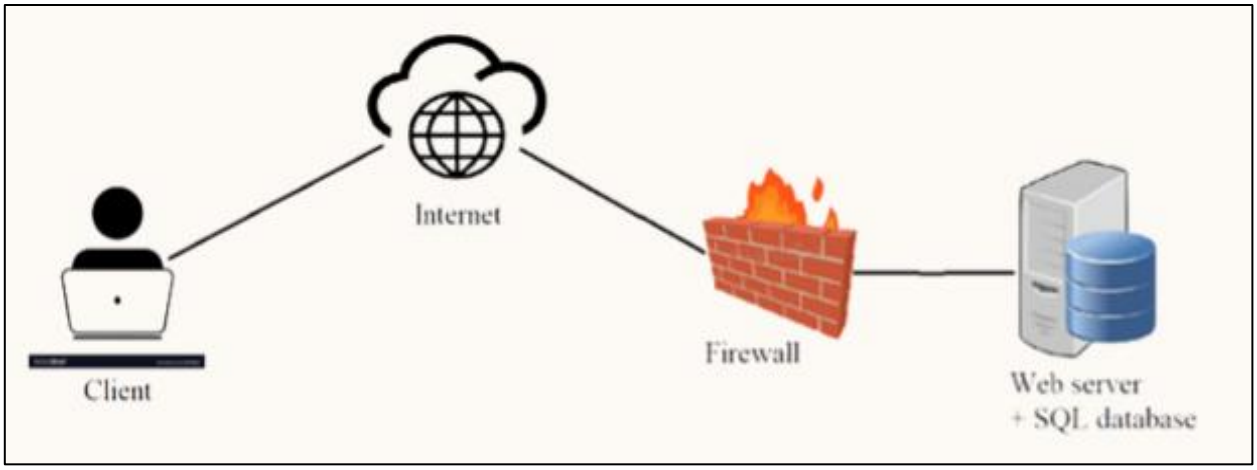

Figure 5. Topology of a web application

The topology includes four agents:

- Client server
- The Internet
- Azure web application firewall
- Web server and SQL database server

The Web server hosts the Web application by connecting to the Database server. After passing the firewall policy, the server publishes the Web application to the Internet. The client will be able to access the Web application through the browser with public IP address.

II.2. Installation

To publish a web application on the Internet, we need two main services: Visual Studio for source code and Azure Web App Service for deploying. Besides, we also use the CI/CD process via GitHub Action and connect to PostgreSQL Database Server to upload source code and database from Visual Studio to Azure Web App Service.

II.2.1. Basic part

II.2.1.1. Source code on Visual Studio – Restaurant Review

- Web application is used for:
    - View restaurant reviews and detailed feedback from customers.
    - Add personal feedback about the visited restaurants.

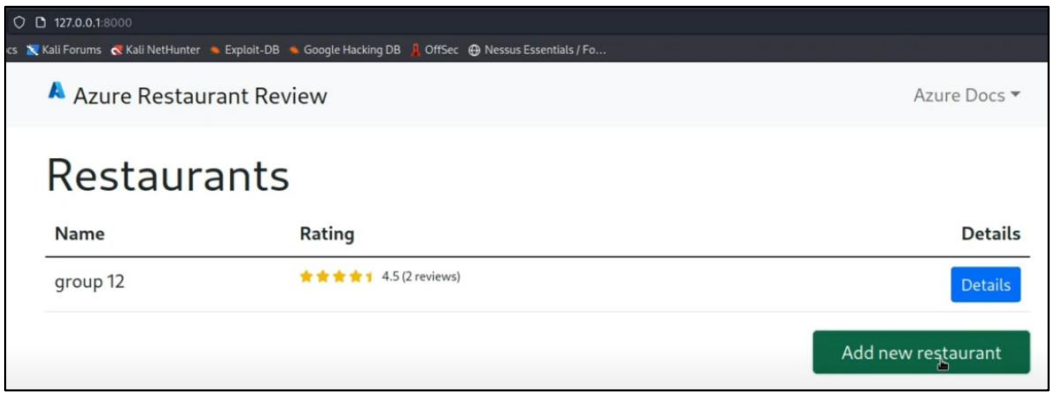

Figure 6. Main interface of Restaurant Review Application

- Programming language:
    - Django Framework 4.1.3
    - Python 3.10.8
- Function of web application:
    - Add new restaurants, new reviews, …
    - View detailed reviews of different restaurants or customers' feedback.

II.2.1.2. Connection to PostgreSQL Database Server

- Create Azure Database for PostgreSQL

Server name	: group12postgresql.postgres.database.azure.com
Admin username	: postgresqlGroup12@group12postgresql
PostgreSQL version	: 11

Figure 7. Details of Azure PostgreSQL database server

- Download PgAdmin4 v6.19
- Register database server on PgAdmin4 with details on Azure:

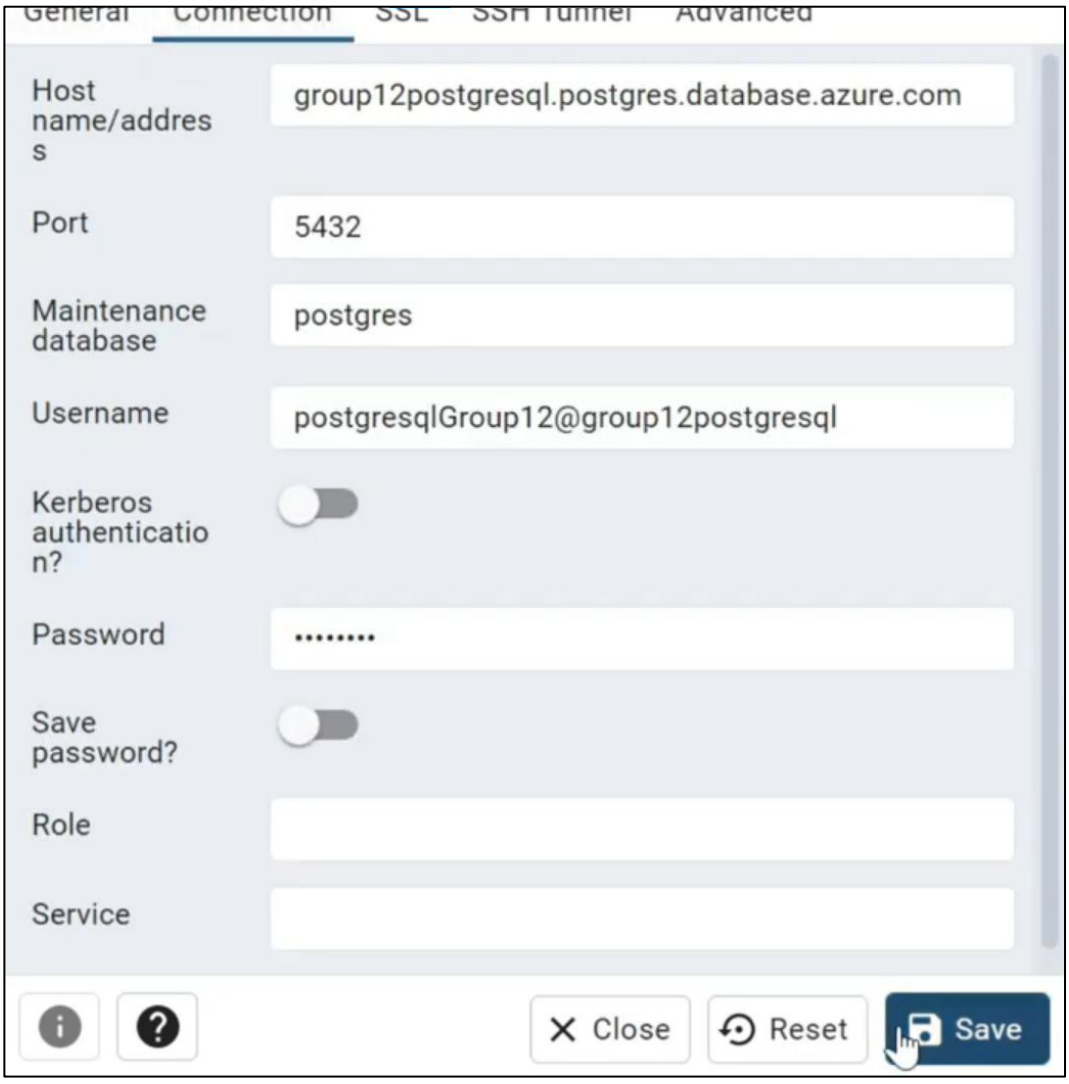

Figure 8. Registration details of database server

- Successfully connect database to PostgreSQL on PgAdmin4:

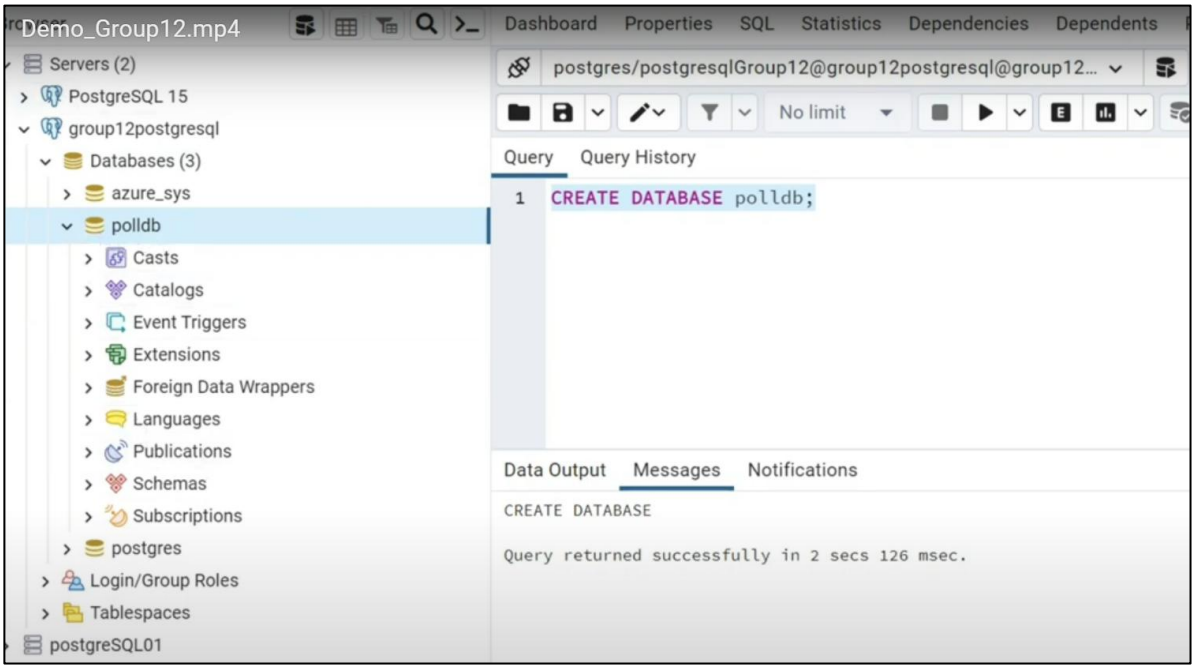

Figure 9. Successfully create database

II.2.2. Advanced part

II.2.2.1. Source code on Visual Studio – Library Management

- Web application is used to manage the library.

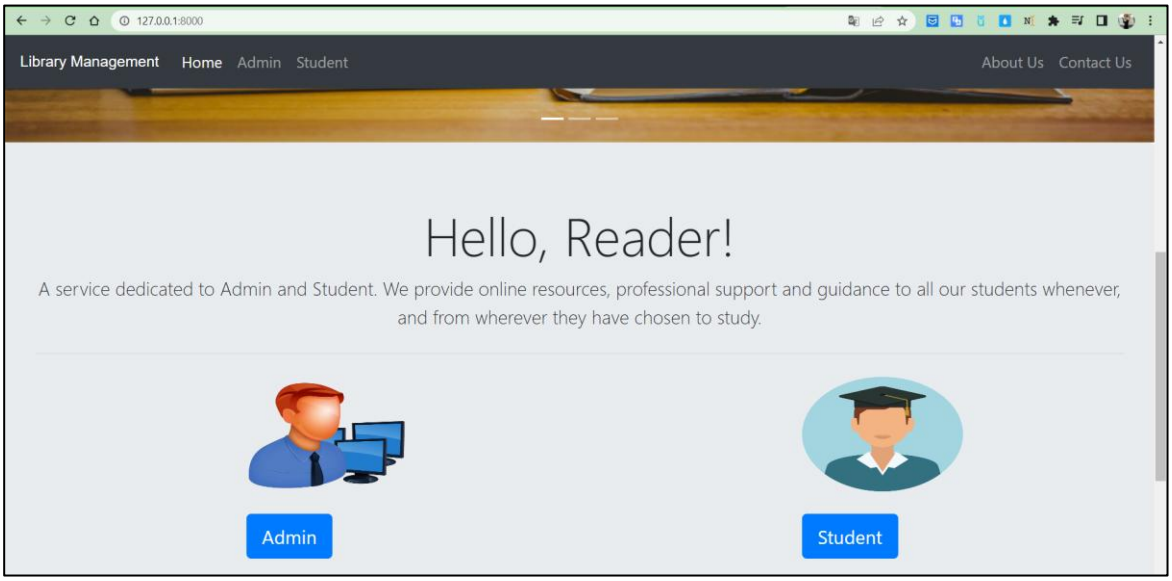

Figure 10. Main interface of Library Management Application

- Programming language:
    - Django Framework 4.1.3
    - Python 3.10.8
- Function of web application:

  + For admin:
    - SignUp and Login
    - Monitor students' borrows and returns of books.
    - Add new books.
    - View available books in library.

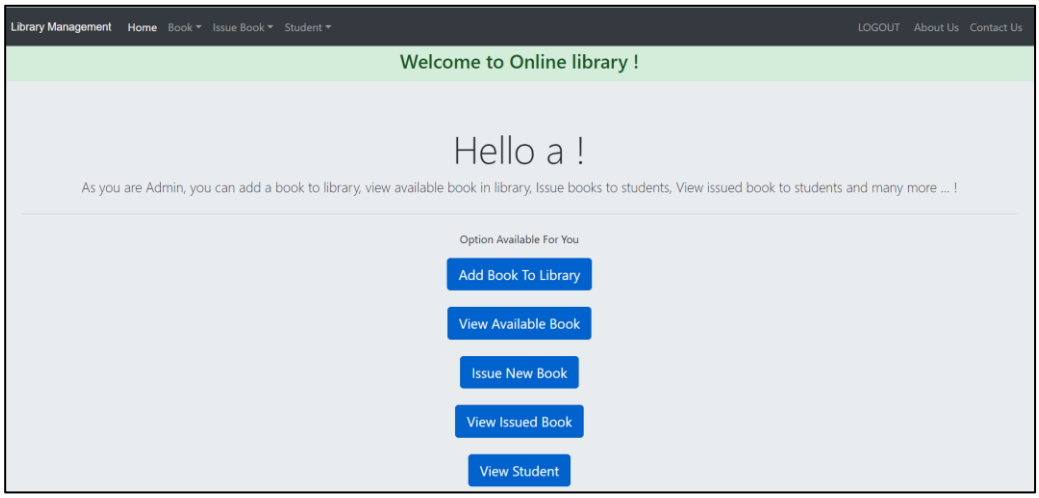

Figure 11. Admin's interface and functions

  + For student:
    - SignUp and Login
    - Check their own borrowing status.
    - Check if books are available.

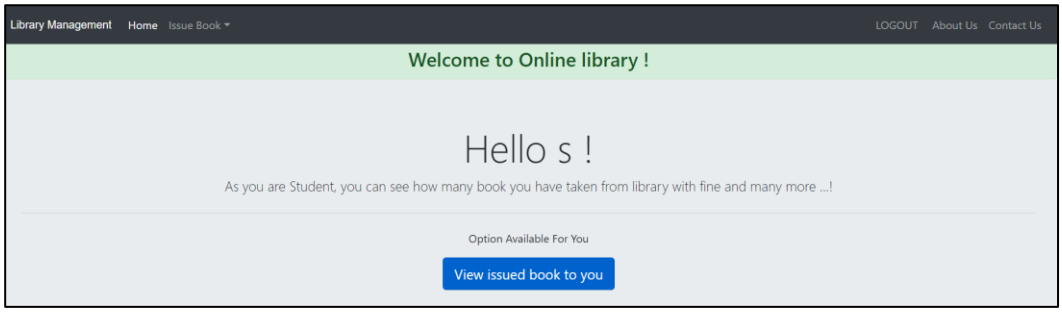

Figure 12. Student's interface and functions

II.3. Configuration

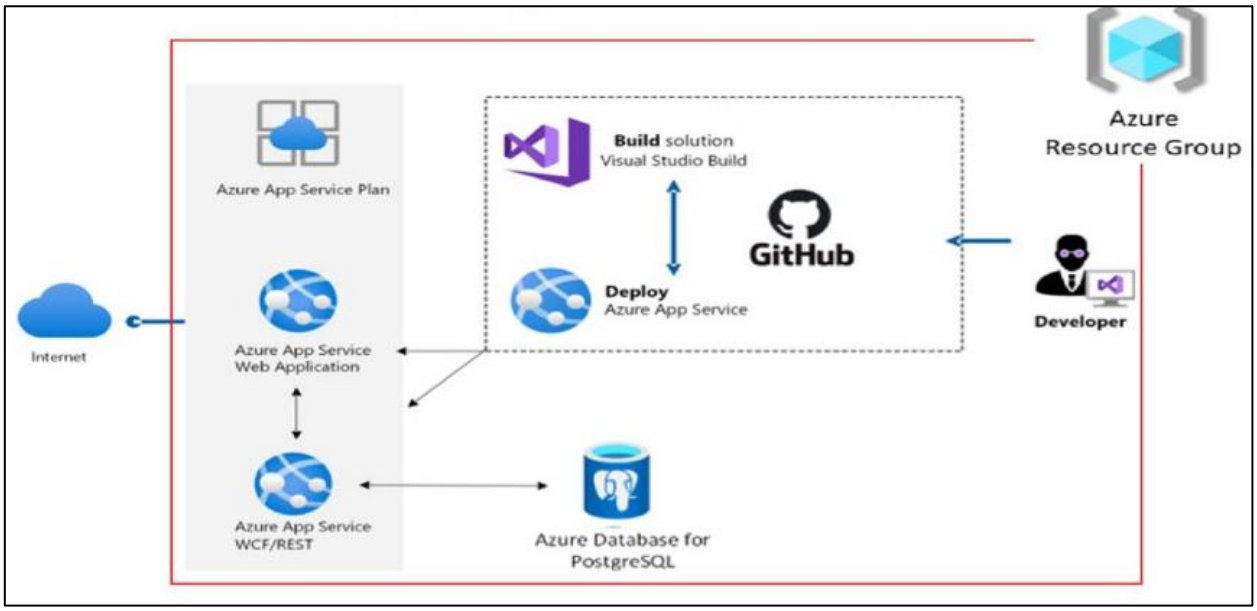

Figure 13. How to configure a web application to Azure

II.3.1. Basic configuration

The source code in Python after being coded by developers on Visual Studio will be uploaded to GitHub.

Deployment of a web application will be executed on Azure Web Application Service.

- At first, a Resource Group is created - is a container includes all the resources a web application.
- Next, Azure Web Application Service connects to the Azure PostgreSQL Database Server to store the web application's database and retrieve the data when a user requests it.
- Finally, all are published on the Internet to create a complete public web application for users.

II.3.2. Advanced configuration

The advanced part has the same settings and configurations with the basic part, however, there is a major difference between the two, which is the database.

- In the advanced part, the group's code does not use PostgreSQL Database as in the basic part, thus PgAdmin4 would not be used. Instead, we use Squlite3 Database, but the Azure Web Application Server does not support the connection of Sqlite3 Database.

- To ensure the web application could still be created on Azure, our group would commence making a Postgresql Database on Azure through Azure Cloud Shell

➢ **Step 1:** Take note of the server's name, admin server login name, password, and subscription ID for newly created server from the Overview Section of the server.

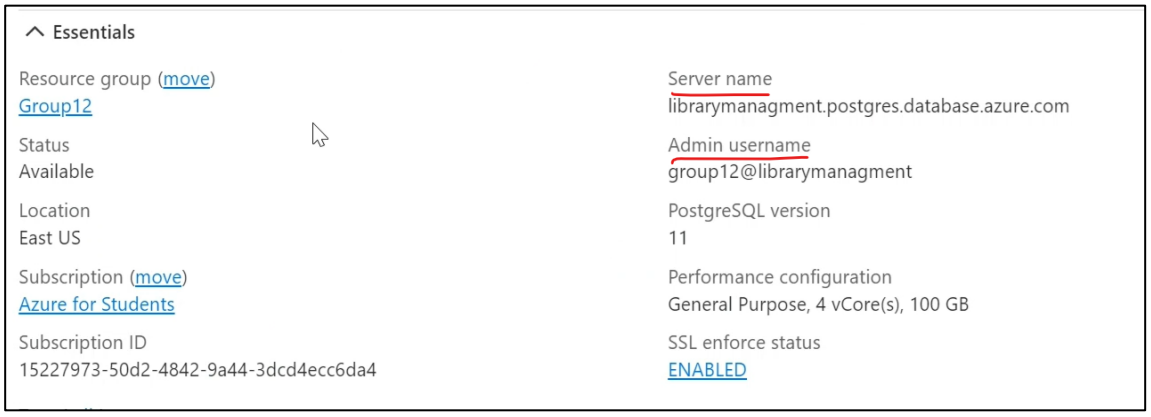

Figure 14. Details of server database

➢ **Step 2:** Run the following command in the Azure Cloud Shell terminal. (Replace values with actual server name and admin user login name)

```
psql --host=<servername> --port=5432 --username=<admin username>
--dbname=postgres
```

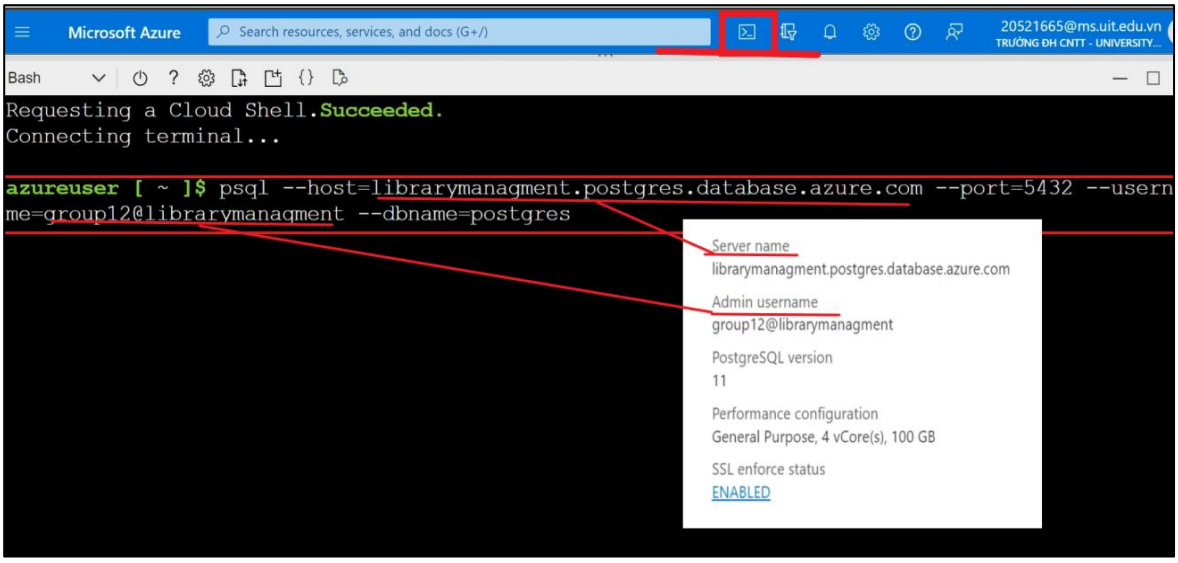

Figure 15. Declare server details for psql database

➢ **Step 3:** In the same Azure Cloud Shell terminal, create a database:

```
postgres=> CREATE DATABASE <database's name>;
```

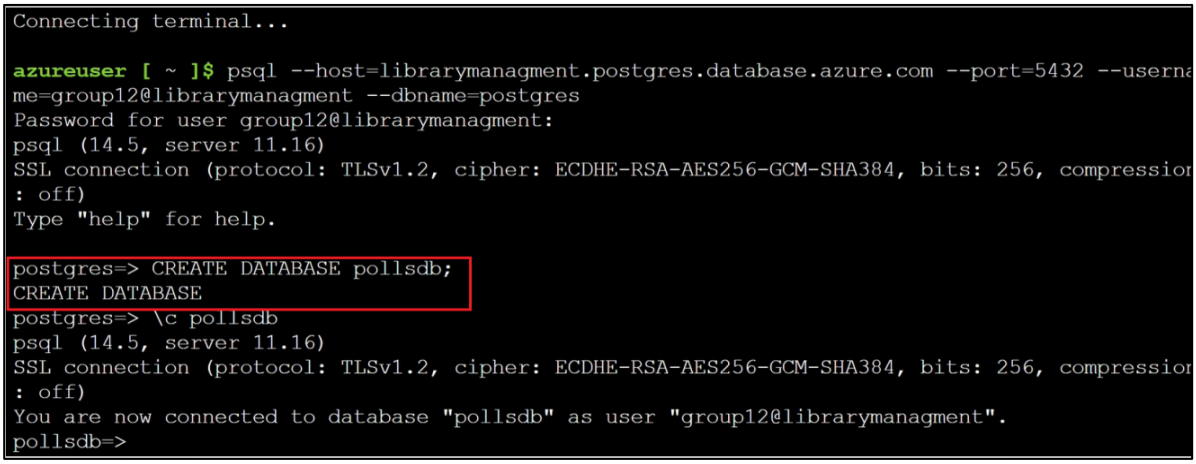

Figure 16. Create database through terminal

➢ **Step 4:**

+ Navigate to the Application Service instance in the Azure Portal.

+ Select **Service Connector** --> **Create** --> **Enter the Basics form with the following information** --> Authentication.

+ Select **Connection string** --> Enter **Username and Password** for database --> Next: Networking --> Next: Review + Create --> Create

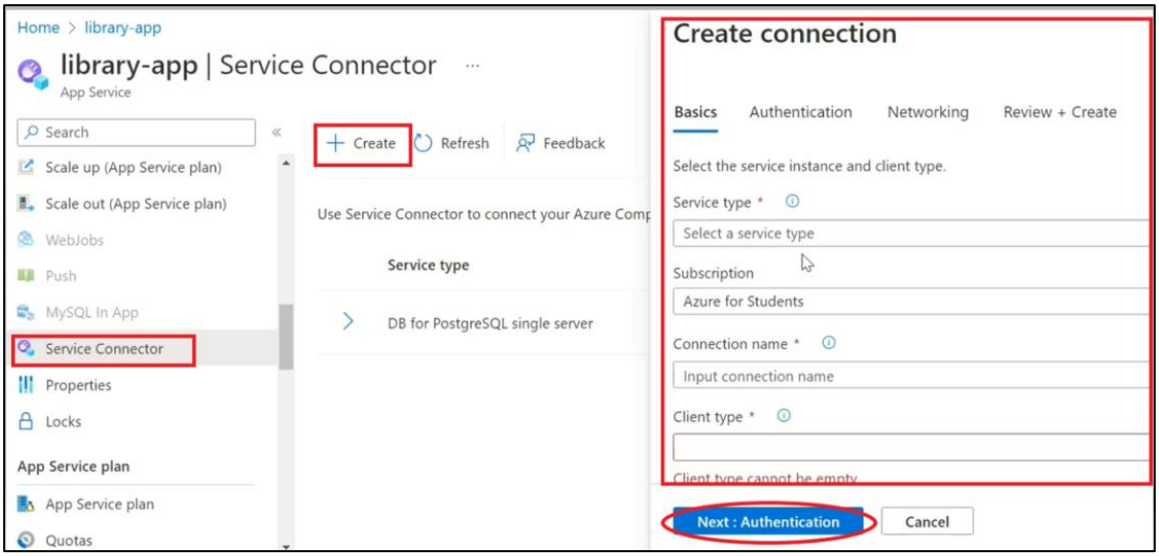

Figure 17. Successfully connect database to Azure

➢ Result:

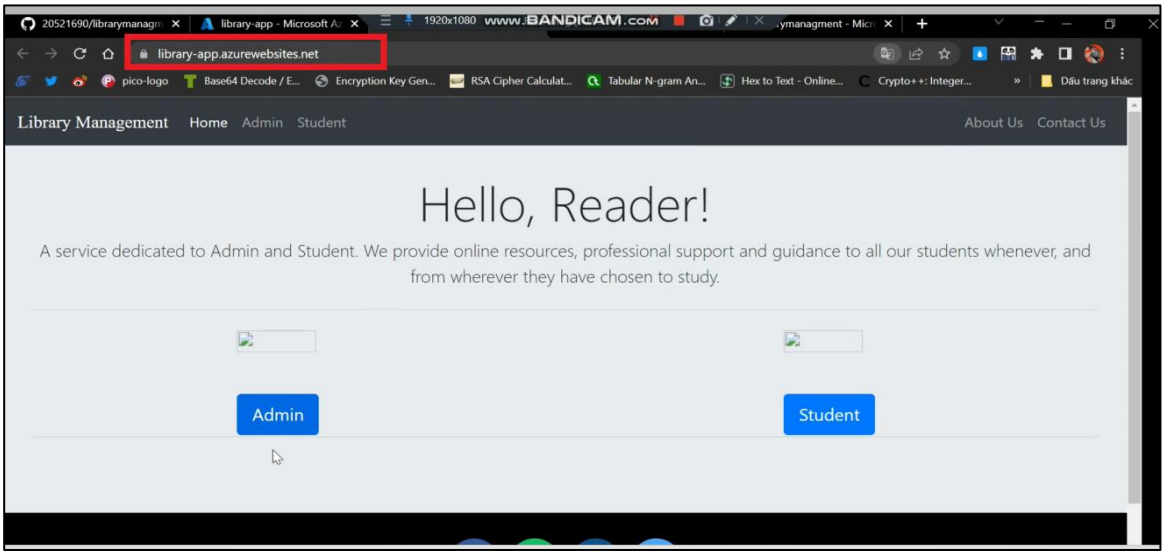

Figure 18. The web appliction running on Azure

III. APPENDIX

III.1. Task division

Lê Minh Nhã 20521690	Phan Ngọc Yến Nhi 20521717	Nguyễn Tú Ngọc 20521665
- Demo implementation - Search documents, theory	- Search paper, documents - Make PowerPoint presentation.	- Fix bugs, code on Python. - Write report

Table 1. Work division table

III.2. Self-assessment

Evaluation criteria	Attainment	Level of points	Points
Report format (1 point)	Enough content report with a uniform format	**4**	**1**
Presentation (1 point)	Good presentation from all members, easy to understand the content	**4**	**1**
Theory (2 point)	Successful presentation of the definition and operating mechanism based on the group's understanding	**4**	**2**
Demonstration (5 point)	Present basic part and a part of advanced one.	**3**	**3.75**
Quiz after presentation (1 point)			**1**

Minus point **(you/your in a report - 0.25/1 word)**			**0**
Plus point **(0.25 for the progress/first day presentation)**			**0**
		Total Score	**8.75**

Table 2. Self-assessment table

III.3. Answer the questions