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My

Critical Reflection

of the

Systems Design and Development Project

Submitted by

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Introduction

Real estate sector has grown over time to become a strategic part of the economy in the world through the adoption of technology for competitive advantage (Kaur, Solomon, 2021). This secure online web application was developed by Team 5 –(SDDP Professional) for a small real estate business based in Nigeria (Dominion Akindipe Estate Agency), a company without a website that is currently struggling with its manual process of operations.

We developed the application for the company to be able to move its services online where prospective tenants, homebuyers and landlords do not have to leave the comfort of their homes to patronize and list properties with the company. This will therefore increase patronage and maximize its profitability because of the wider reach of prospective customers, 24/7 availability of the service and the fact that the company will get its commission anytime an inspection visit is booked by the tenants.

Analysis and Design of the Application

Although, this innovative business idea is not novel in the UK as there are numerous real estate companies already competing in that space such as Rightmove, Zoopla, OpenRent, etc. However, for Dominion Akindipe Estate Agency, it is a unique lifetime opportunity to reposition the fortunes of the company, especially giving the fact that none of its competitors in the area within the industry has leverage technology for its business operations, and the only cost to the company would be the hosting fee of $114 (approximate N85,410) per annum.

Waterfall methodology, a linear and logical progression project management method, was implemented for the development of the application based on its inherent benefits over Agile methodology. We agreed to use this approach because it is more suitable for the project, time saving in view of the short submission deadline and also offers greater ease of use.

We started the design of the application with a conference call to different stakeholders of Dominion Akindipe Estate Agency so as to enable us to understand the challenges facing the organization. As a team, we critically analysed all the facts gathered and produced the requirements in line with the request of the organization. We developed the use case diagrams and use case descriptions from the requirements and produced a comprehensive class diagram for the development. The project was thereafter broken down into smaller tasks which were assigned to individual members of the team, and a Gantt Chart with concrete timelines and deliverables was developed using Wrike, a project and tasks management software, to monitor the progress of our development.

The solution was designed in line with DRY, KISS and SOLID principles to segregate the entire system of consideration into fragments using an industry-recognised and tested software architectural model called n-Tier architecture. The implementation of this model was highly successful and found more suitable than its alternative i.e. Onion architecture, because of its capability to offer better scalability, flexibility, fault tolerance, reusability, and friendly maintenance. We also implemented the repository and unit of work patterns for the solution to achieve "separation of concerns" by separating the business logic of the application from the data access layer, as well as ensure the development of clean code and loosely coupled application.

Development and Technology

We utilized Google Meet platform for our team meetings and CodeCollab as a code collaborative platform where the team seamlessly created, reviewed, and shared online real-time code. The CodeCollab was used as an alternative to GitHub because some members of my team were not comfortable with its syntax, operation, and unfriendly command prompt.

We developed the web application, with deep validation of user-inputs, using the appropriate technologies such as Visual studio 2019 as the IDE, MVC architectural design approach with C# as the programming

language, SQL Server as the database and Asp.Net Core 3.1 as the framework. Although, we considered the use of Asp.Net framework for the development of the application but decided to implement Asp.Net Core framework for a number of reasons such as availability of relevant materials and up-to-date online courses, efficiency when compared to other frameworks, provision of cross-platform development of application, seamless implementation of advanced functionalities like email and chat features as well as payment platform, all of which were duly implemented in the solution that we developed.

This made the application to be highly efficient because Asp.Net Core framework is a light-weight open-source technology that utilizes the latest web standards while Microsoft has stopped technical support for Asp.Net framework. Moreover, the MVC pattern was also used to ensure that the application remain scalable and maintainable in future.

The Microsoft Identity and Access Management (IAM) was implemented to manage the authentication of the three (3) main users of the application i.e. Admin, Landlord and Tenant, and authorization of their different individual roles. The IAM was also applied to protect the application and ensure that only the right users with the right roles have access to the rights resources within the application. The three (3) users can remotely and securely use of the common functionalities of the application such as login, logout, register, change password, view category of building, view property listed by the landlord, chat with other users within the application online real-time.

Personal Reflection and Contribution

In my opinion, this project has been the best in terms of level of difficulty and exposure to a wide range of complexities in programming that is expected of a modern software developer. It strongly encapsulates all the previous modules taught (project management, C#, web development, database and study skills) and builds on experiences gained therein so far.

I played a critical role of both a team member and the team lead at the same. I handled all the critical and advanced functionalities of the project and have to be in school everyday to also teach my team members in this regard. I also coordinated the team, review their codes for errors and correct accordingly as well as merge changes on the collaborating platform.

I setup the project setup and ran the first migration (being asp.net core framework) that created the database and the required tables. I thereafter implemented Microsoft Identity and Access Management (IAM) to manage the users, logins, user registration, password change, create roles and control access to the roles, although it was a bit challenging at first.

I later implemented the live chat feature using SignalR to build a real-time dashboard which manages real-time communication between all the users. Although, WebSockets API can also be deployed to handle the same function, but I chose SignalR because of its ease of implementation and for the fact that it already included a server implementation as against building a WebSockets server implementation from the scratch.

In addition, I used MailKit, a cross-platform mail client library built on top of MimeKit in asp.Net Core to integrate the email feature into the application, and I had to open a dedicated Gmail account (sddpcoursehallam2022@gmail.com) for the purpose of this project. This allowed me to get the developer credentials for the setup which I used for the implementation. The alternative for me would have been to use FluentEmail or Postal, but MailKit standouts because of its ease of integration and lack of complexity. Since the application is an enterprise solution with payment requirement, I integrated a speedy and secure Stripe Payment Platform to handle the payment processing.

I also opened a developer account with Stripe, and this provided me with the required credentials (i.e. secretkey and publishablekey) for integration into the application. However, I considered using the PayPal platform but found its checkout implementation in asp.net Core a bit complex and cumbersome.

Lessons learnt and future career plan

Undertaking this project has really pushed me beyond my expectation. I learnt so much in a short period of time, especially how to design a project from the scratch, how to develop a loosely coupled application using dependency injection, how entity framework in asp.net core seamlessly create database, how implementing n-Tier architecture with MVC pattern in asp.net core can facilitate separation of concerns, how to implement identity for authentication and authorisation as well as some advanced functionalities in asp.net core MVC.

Although, the lectures in the class were relevant and significant, but they were not enough to complete this project work. It took me personal development, self-determination, and constant hands-on practice. I had to buy books from Amazon, download and watched related videos from YouTube, expose myself to relevant materials and up-to-date online courses on Udemy, LinkedIn learning and edX.

The skills and competencies I acquired by undertaking this project has earned me the much-needed confidence and exposure that is required in my quest to become a .Net Software Developer as well as provided a good source of evidence to demonstrate my software development expertise to my prospective employer.

Conclusion

Given more time for the project, I would have extended the functionalities of the application such as forgot password, external login with Owin integration (google, twitter, facebook, e.t.c.), google map integration to accurately display the location of the property and currency converter integration to convert the monthly rent or purchase amount from Nigerian Naira to USD and GBP.

I would have also extended the application by enabling the landlord to upload multiple pictures of the individual property in the category.

References

Kaur, T., & Solomon, P. (2021). A study on automated property management in commercial real estate: a case of India. *Property Management*.