**Division of Responsibilities**

**Description**

Brown Greer is an industry leader in providing settlement administration and litigation management service to law firms, corporations, and government agencies. The project named BG Suite has a distributed system that not only work as the internal office automation application used by internal employees, but also BG Suite has a public API to provide data to third party client. BG Suite is a brand new application that start from scratch and will serve as one of the basic and underlying component of whole Brown Greer architecture.

**Detailed Responsibilities**

**Job Duties:**

Creating RESTful services to expose the data using HTTP and HTTPS protocol, expose data in JSON format, reference and call Entity Framework repository to retrieve data or stored data. (20%)

**Explanation:**

There are many internal services running inside the whole company system.As planned, BG Suite WEBAPI will play as a data providing service in the future for either internal application or various third-party clients using HTTP protocol. Therefore, the beneficiary needs to create restful service to expose and consume data so that service can communicate with each other. Since the dataset between Brown Greer’s services are so big (millions level per day) that smartly and correctly choosing data format is the key to the application’s efficiency and stability. The beneficiary made a lot of research and finally determine to use JSON data format as the standard data exchange format among whole architecture, which is proved to be the best practice among all possible options.

**Beneficiary’s Corresponding Education and Experiential Qualifications:**

Beneficiary gained the knowledge of Object-Oriented Programming in his bachelor’s degree and gained the proficiency level of C# from coursers and projects in his degree in Computer Science. He learnt how to use advanced data structures and to utilize different algorithms from a course called Advanced Data Structures in his degree of Computer Science. He gained the knowledge of client-server model from a course called Client-Server Software in his courses. This helped him to deeply understand the core of C# and .Net technology.

**Related Courses:** Introduction to Program Design, Abstraction and Problem Solving,

Software Engineering Techniques, Web programming.

These coursework covers introductory object-oriented problem solving, design and programming engineering. Implementation of large programming projects using object-oriented design techniques and software tools in a modern development environment

**Job Duties:**

Security is an important topic in this project and the beneficiary needs build a reliable and feasible method for security. In this project, the beneficiary design and developer Json Web Token based security technology to implement the user identity verification. (15%)

**Explanation:**

As BrownGreer PLC is dealing with a lot of sensitive information, security is always a top concerned topic through all developing life cycle. To prevent possible unsafe behavior and hacking activities the beneficiary utilized Json Web Token to build the application authentication module. The theory is that after the client verified their identity, WEBAPI will generate a token using HS-256 algorithm and issue the token to client. Each token will expire after 5 mins which effectively prevent the occur of token-stolen and CSRF attack. Also the beneficiary re-route WebAPI route and wrap all data in JSON object which make the service more secure.

**Beneficiary’s Corresponding Education and Experiential Qualifications:**

Beneficiary gained the knowledge from many courses and projects in his Computer Science degree. By learning and understanding cryptology and web security, beneficiary is able to extract and store sensitive through JWT, which will secure the web application a lot. For example, the web application used to save credential in configure file on web servers, which means a malicious can hack all credentials once he gets into Brown Greer web servers. By authentication all incoming request through JWT token, the hacker wont be able to get data from BrownGreer database since the token expire after 1 minutes.

**Related coursework:** Software Engineering Techniques, Senior design project, cryptology, web programming.

These courses emphasize the importance of web secure and how to build safe and reliable software.

**Job Duties:**

Designing and developing the user interface of the application using ASP.Net MVC, Razor View Engine, HTML5, CSS, Bootstrap, JavaScript and jQuery. This ASP.NET MVC application would work as internal UI layer which can navigate to other application or check employee profile and grant access.

(20%)

**Explanation:**

One purpose of BG Suite is to build an internal Office Automation application for Human Resources, Attorney and other employees to use, which would also work as a base service and entry point to future application.

Building the user interfaces so that clients can choose products they prefer and have a better understanding of company products.

Company also need internal UI so that internal DevOps team can organize and authorize user account and grant permission to users.

**Beneficiary’s Corresponding Education and Experiential Qualifications:**

Beneficiary gained the knowledge of frontend and User Interface from couple of his project in his computer science degree. In the projects, User Interface are used to present the data efficiently and provide interaction functionality between user and web pages. Beneficiary also learn how to build website frontend part and concept of Http protocols. Web framework like jQuery is a popular framework and it helps beneficiary to learn and master another framework called Angular.

**Related course:** Introduction to Computer Programming, Web Programming, User Interface design, Software engineering techniques, Senior Design Project.

Using concepts from these courses as well as his experience working in .Net framework the beneficiary is able to create smooth and user-friendly UI.

**Job Duties:**

Implementing Dependency Injection pattern by leveraging framework called NINJECT to implement Inversion of Control (IOC). The purpose is to make application loosely coupled to increase the extensibility and maintainability. Also, dependency injection make it easier to mock the repository so it’s easier to implement unit test.

(10%)

**Explanation:**

Leveraging the concept of Dependency Injection design pattern to build loosely coupled class, model and programming component. By using framework like Unity, MOQ, the project is more maintainable and testable.

**Beneficiary’s Corresponding Education and Experiential Qualifications:**

Beneficiary gained the knowledge of Objected Oriented Programming from his degree of Computer Science. He implemented Dependency Injection during his projects and figure the pros and cons of such a programming design pattern.

**Related course:** Software Engineering Techniques, Fundamentals of Programming Languages,

Senior Design Project.

The beneficiary has accumulated an in-depth knowledge about Object-Oriented Programming from his courses. During these courses the beneficiary worked with various programming languages in various environment including C++, Java, C#, JavaScript.

**Job Duties:**

Involved in Database table designing and writing Stored Procedure based on various requirement. Used Entity framework as data access layer using repository pattern. Developed Store procedures where complexity is high and executed using Entity framework database first methodology. (20%)

**Explanation:**

Writing stored procedure of SQL Script so the application can generate SQL query script based on template and given variables. The first time of execution of Stored Procedure will generate the best execution path and save it in memory, which will make it much faster. Also, using Stored Procedure can extensively increate the safety of SqlServer. For example, Stored Procedure can prevent SQL Injection attack and validate the data type of incoming parameter.

By using Repository Pattern can make the DAL (Data Access Layer) more useable and flexible. Developer can their own logic if needed and reuse common feature and logic in most repository.

**Beneficiary’s Corresponding Education and Experiential Qualifications:**

The technologies required for this task include knowledge of writing SQL scripts, cloud-based service and SaaS(Service as a service). The beneficiary gets these knowledges from his courses of computer science department. He learned the knowledge of how Database is organized and how to write fast, correct script to access data in database. He gained a lot of knowledge about T-SQL, which build him the foundation of learning SQL after he get into this project.

**Related course:** Introduction of Database System, Fundamentals of Programming Languages,

Concept of computer programming, Fundamentals of programming languages.

Beneficiary get his knowledge of Database from these courses.

**Job Duties:**

Writing Unit Test function and test cases using NUnit and using framework like MOCK to mock the repository and remote connections to make sure the developing process follows TDD developing rules. So every time when a new feature or module is finished, the testing application will make sure the newly checked in code would not break the existing code. Also, the fully considered and developed testing function and testing cases are decent proof of good quality of new code. (10%)

**Explanation:**

For each module, developers need to write unit test to make sure a specific method, or class has correct functionality. Unit tests can be used to individually test the proper operation of the smallest parts of an application. It is required that developer’s commit meet code quality standards. Beneficiary is responsible for implementing unit tests by using NUnit, Mock and different design patterns. In some part of SDLC, developers have to follow TDD methodology, which is to write detailed and comprehensive testing cases which can be another way to test the code quality and documentation of new features.

**Beneficiary’s Corresponding Education and Experiential Qualifications:**

Beneficiary learned the testing concept from one curriculum called Software Engineering in her Computer Science Degree. He gained knowledge of the different design patterns from one curriculum called Software Design and Patterns. Designing test cases for some functionalities of an enterprise-level application is complicated, which requires a deep understanding of the design patterns embedded in the code.

**Related course:** Fundamentals of programming languages, Introduction of Software Engineering techniques.

The beneficiary’s courses during his Computer Science degree introduced the knowledge about how to design and write maintainable and testable project.

**Job Duties:**

Using Jira as a project Management tool to track issues, assign ticket, writer user story and report sprint meetings. (5%)

**Explanation:**

BrownGreer PLC use Agile Scrum methodology to manage project and software development. Jira is the most popular issue tracking product. It provides tracking for bug, issues and other management functions.

**Beneficiary’s Corresponding Education and Experiential Qualifications:**

Beneficiary learned the standard developing methodologies like Water Fall and Agile. He learned that Agile Scrum is a typical branch of Agile methodology which usually reported and grooming and planning bi-weekly. A scrum master/project owner play an important role that create the requirement based on business requirement from stakeholder and assign the tasks to different people.

**Related course:** Software Engineer techniques, Senior Design Project.

The beneficiary has lot of experiences working with a team using Agile methodology. Beneficiary leverage Agile Methodology on senior design project and Jira to manage the whole software developing lifecycle. The beneficiary has gains skills and knowledge required for becoming a team leader.