C868 - Software Capstone Project Summary

Task 2 - Section A

Capstone Proposal Project Name: Retire Me Now Scheduling Software Application

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Table of Contents

Business Problem

The Customer

Retire Me Now is a startup business that works in the financial services industry. Their goal is to provide honest and professional consultation to their customers that will help them reach their financial and retirement goals. They are a coalition of ten independent consultants that utilize each other's subject matter expertise to provide the best service to their customers. Their primary revenue streams derive from billable hours of consultation; discussing the benefits and risks associated with various investment strategies.

Currently, Retire Me Now is in its early stages of business development. They are constantly experimenting and reevaluating aspects of their business such as price points of services, hours of operation, what types of services they wish to offer and many other facets of the business. They currently have a small dedicated group of about 30 returning customers but are looking to expand their volume of customers to over 500 over the course of the upcoming year.

Jason Day, Charlie Sudeikis, and Kevin Bateman will be referred to as the "stakeholders" who have been granted authorization by Retire Me Now to oversee the development of the application that will help them ease their flow of business. They will be the main point of contact between our organization and Retire Me Now.

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Business Case

Retire Me Now is in need of an appointment scheduling system that will help to ease the process of scheduling a consultant (user) with a customer for financial services. The customer needs the application to be scalable so it can handle a growing pipeline of new customers in a centralized location. They need their application to be "simple to use" so that consultants can quickly add new customers, navigate to, and change customer information. They would like appointments to be simple to set up and modify as well. They need their new system to be able to handle scheduling conflicts and would like reminders to help consultants remember when they have an upcoming appointment.

As a startup business, Retire Me Now is particularly concerned with its reputation for securely handling their customer's information. Currently, they use Google Calendar to set meetings between their consultants and customers. However, one of their consultants was recently the victim of malicious spyware and has put their customers' information at risk. In an effort to maximize the security of their data without the added cost of a security service, the customer requires a stand-alone desktop

application that can only be accessed on site at their office. They also want the application to include a credential system that can provide information about when and which users are logging into the system.

Retire Me Now is also looking to grow their business and change their business practices along the way. Their goal is to find a system that works best for their consultants and customers. The customer would like an application that is capable of generating business reports to help them decide how best to conduct their business.

Fulfillment

The Retire Me Now Scheduling Software Application will be designed to handle all of the business needs of the customer. The user interface will only consist of necessary business features. The users will be able to create, view, edit and delete customer records. The users will also be able to create, view, edit and delete appointments that will be free of any scheduling conflicts. A search bar will allow the users to quickly find customer information and appointments. An alert feature will remind the user if they have an upcoming appointment within 15 minutes of the user logging into the application.

For security measures, the application will be designed as a stand-alone desktop application to be used as an internal tool for on-site use only. The application will connect to a local database to store user, customer, and appointment data onto a local hard drive. It will require credentials to login to the system which will be tracked in a text file for future audits.

The application will also be able to generate reports and statistics. These reports will include information about the different types of meetings that are being set, view which consultants are most utilized, and view information on which days of the week appointments are most scheduled so that the customer can make business decisions based on this information. The application will also feature various calendar views so the consultants of Retire Me Now can have a high-level view of upcoming appointments set.

Existing Gaps

Currently, Retire Me Now uses Google Calendar as a way to set up appointments with some of their customers. However, there are a lot of expectations that fall short using this system. The first issue is that Google Calendar requires the customer to have a Google Account, which not every customer does. In this case, the consultants have had to either walk a customer through setting up an account over the phone or use a separate excel spreadsheet to store customer and appointment information. This makes the information they work with disjointed and causes much confusion between both the consultants and their customers.

As stated in the Business Case, there are inherent security risks that come with using a web-based application. Google Calendar being web-based means that it is prone to unauthorized access and puts their customer's information at risk if malicious cyber attackers get ahold of a consultant's login information. Although Google does provide two-factor authentication, there is no guarantee that a consultant has done their due diligence to set one up. The consultants of Retire Me Now are independent contractors and are not obligated to follow these guidelines. Security risks only increase as Retire Me Now grows its business and adds more consultants.

Google Calendar is not sufficient for handling scheduling conflicts. Currently, when a user wants to set up an appointment between another user and a customer, the invitation will still go to both parties without checking if there are any prior appointments scheduled. By the time the second user receives the invitation to the appointment, they may have scheduling conflicts. In which case, the second user would have to contact the first user and the customer to reschedule an appointment. This makes scheduling conflicts a bothersome issue that happens frequently.

Lastly, every new consultant needs to be trained to work with Google Calendar. Google Calendar offers many features that are not necessary nor relevant to the business needs of Retire Me Now.

Software Development Life Cycle Methodology

The software development life cycle of the Retire Me Now Scheduling Software Application will be guided by the Waterfall model. The nature of the waterfall model is best suited to meet the constraints of the project. Prior to approaching our organization, the stakeholders of Retire Me Now developed a detailed Requirements Document. Although these requirements still must be officially reviewed during the Requirements Analysis Phase, an informal review shows that the requirements are understandable and well-defined. Many of the features have dependencies on other features and cannot be subject to testing until the project as a whole is complete. Retire Me Now also requires the end product be a stand-alone desktop application that will need to be installed on their office computers by one of our Technical Support Specialists. Iterating, testing, and changing features after deployment will require the Technical Support Specialist to travel back and forth between our offices. This will result in prolonging the date of completion and will be financially more expensive for the customer. Therefore, the Retire Me Now Scheduling Software Application must be fully functional, tested, and finalized before deployment.

Requirements Analysis Phase

The waterfall model dictates that the first phase of development is the Requirements Analysis Phase. At this phase, our organization will assign a development team who will meet with the stakeholders to discuss the requirements and needs of the customer. The stakeholders of Retire Me Now have already outlined many of their specifications so much of the effort from our organization will be reviewing those specifications and their viability. All proposed requirements will be refined into specific and measurable outcomes. Once the Requirements Document has been approved by both the stakeholders and the Project Manager, the System Design Phase can begin.

Deliverable: Approved Requirements Document

System Design Phase

During this second phase of development, our organization will begin designing the user flow and create ways to implement outcomes. A wireframe of the user interface will be developed by the development team's User Experience Designer. The wireframe will be sent to the stakeholders for approval. It is at this time that the stakeholders can work with the User Experience Designer for modifications. Once the wireframes are approved by the stakeholders, the development team's Software Developer and User Experience Designer will work together to create an entity relationship diagram that represents the database tables necessary for the application. The development team's Software Developer will be responsible for designing data models.

Deliverable: Design Document, Wireframes, Entity Relationship Diagram

Implementation Phase

The goal of the Implementation Phase is to develop the tangible product that the customer will use. Throughout this phase, the development team's Software Developer will ensure that the end product follows the specifications that are set in the Requirements Documents, Design Document, Wireframes, Data Models and Entity Relationship Diagram. The application will be built using Visual Studio 2019 while the database tables will be created using MySQL Workbench. The User Experience Designer will guide and clarify the user flow. The Quality Assurance Engineer will begin documenting any areas during development they wish to apply further testing into a Test Plan.

Deliverable: Functional Software Application, Test Plan

Testing Phase

During this phase, the development team's Quality Assurance Engineer works through the test plan to ensure the application meets all requirements. Unit Tests will also be applied for further scrutinization of the application. Any software bugs that the Quality Assurance Engineer finds will be documented via the Bug Report to be given as feedback for the Software Developer. The Software Developer will adjust the code as needed to ensure full compliance with the specifications set for the application. The Quality Assurance Engineer will further test the application until all tests are passed. The Technical Support Specialist will also begin writing the User Guide to be available for deployment.

Deliverable: Bug Report, Unit Tests, User Guide

Deployment Phase

At this phase, the development team's Technical Support Specialist will prepare the application and database files for distribution. The Technical Support Specialist will travel to conduct an on-site installation. A live test will be run with the stakeholders to ensure that all features of the application have been properly configured. Any software bugs found during this stage of deployment will be added to the Bug Report to be handled during the Maintenance Phase. A User Guide will also be provided to the stakeholders.

If a critical software bug is found that would stop a successful deployment, the project will return to the Testing Phase for immediate remediation. Budget and completion dates would then be adjusted by the Project Manager accordingly.

Deliverable: Functional Application

Maintenance Phase

During this phase, the Retire Me Now Scheduling Software Application will be in use by the customer. The application may generate software bugs as users explore and utilize features. Software bugs will be added to the Bug Report and sent to the software development team for remediation. The Technical Support Specialist will assume the main point of contact for the customer and will periodically travel to Retire Me Now's office to issue patches and other fixes.

Deliverable: N/A

Deliverables

Throughout the Software Development Life Cycle, project deliverables are produced that aid in the process of developing the overall end outcome. Per the guidelines of the Waterfall model, certain deliverables must be constructed while other deliverables arise from the uniqueness of a project's scope and stakeholder needs. Deliverables can be categorized into two categories: Project Deliverables and Product Deliverables.

Project Deliverables

Project Deliverables are outcomes that aid in the development of the end product. The Retire Me Now Scheduling Software Application will result in these project deliverables:

- **Requirements Document**
    - The Requirements Document is a high-level overview that describes the purpose of the project, the business problem that the stakeholders are facing, the goals and objectives of the project, if there are any prerequisites before the project can be developed, the scope of the project, and the environment that the project will be built in.
- **Project Schedule**
    - The Project Schedule outlines the timeline that the project will need in order to reach milestones, complete activities, and produce project and product deliverables. The Project Schedule will also aid in ensuring that the project stays within budget and calculate proper utilization of resources.
- **Design Document**
    - The Design Document describes in detail how the software application will be developed. It outlines the assumptions, constraints, strategies, environments, and goals of the project. It describes business cases and proposes software solutions.
- **Wireframe**
    - The Wireframe is a low-fidelity document that describes how the user will interact with the application and what the user interface design should look like.
- **Entity Relationship Diagram**
    - The Entity Relationship Diagram will describe the different data models in the database, known as an "entity", and how they relate or interact with other entities in the database.
- **Test Plan**
    - The Test Plan describes the methods for testing the software application to ensure that the user experience flows through intended design. The tests will determine if the functionality of the application meets the requirements and specifications.
- **Bug Report**
    - The Bug Report is a documented list of software defects, also known as "bugs", that cause the software to have unintended behavior. This document describes the steps needed to replicate the bug, what the consequences of the bug are, when the bug was

discovered, the severity of the bug in relation to the overall program, and what the remediation was done to fix the issue.
- **Unit Tests**
  - A Unit Test is a process that tests specific parts of the application to ensure the code behaves as intended.

Product Deliverables

Product Deliverables are outcomes that are handed over to the stakeholders as a final product. The Retire Me Now Scheduling Software Application will result in these product deliverables:
- **Functional Software Application**
  - This is the end product that meets all the requirements and resolves the business problems proposed in the Requirements Documented through a software solution.
- **The Database**
  - This is the means of storing all the data related to the Functional Software Application. The Database will comply with the Entity Relationship Diagram.
- **User Guide**
  - The User Guide will be a reference document that the users of the Functional Software Application can use to explore and learn about the features of the program and how to use them.

Implementation of Software Solution

The implementation of the software solution into the production environment will occur during the Deployment Phase of the Software Development Life Cycle. The development team's Technical Support Specialist, referred to as the "Technician", will personally oversee the deployment of the application into the designated central server at the Retire Me Now office location .

The Technician will have a portable computer that contains the necessary files for installation of the application, the files for the database, and an installer package for the MySQL Workbench. The Technician will also be equipped with any necessary cables to allow a transfer of files. He/She will also take a copy of the User Guide to give to the stakeholders. Once travel arrangements have been made, the Technician will travel on-site to the Retire Me Now office in preparation for implementation.

The network architecture at Retire Me Now's office follows a client-server model where the client is a thin-client that needs to connect to a central server. This allows the application to run on all computers throughout the customer's office.

The technician will upload files for the software solution, database tables queries, and the MySQL Workbench installer into the central server. After the programs have been uploaded, the Technician will set up a shortcut to launch the application. MySQL Workbench will be installed and correctly configured to receive a connection from a local application. SQL Query statements will be run to inject test user, test appointment, and test customer data into the database

The Technician will do a live run on the production environment alongside the stakeholders to ensure a successful deployment and that the application can be distributed to the thin-clients. Any bugs found at this time will be added to the Bug Report for remediation during the Maintenance Phase. If a bug prevents successful deployment, the system logs of the computer will be added to the Bug Report and the project will be set back into the Testing Phase. In such a case, the Technician will communicate with the Project Manager tol adjust the Project Schedule and reassess the budget.

In the case of a successful deployment, the Technician will run database queries to create user accounts necessary for each user and give the stakeholders a copy of the User Guide. Implementation will be considered a success and the project will move to the Maintenance Phase.

Validation and Verification

As the project progresses through the Software Development Life Cycle, the development team will ensure that every aspect of the project directly ties to the specifications outlined in the Requirements Document. Verifying and validating the requirements and customer needs is emphasized during the Testing Phase. During this phase, the development team's Quality Assurance Engineer, also referred to as the QA Engineer, will follow the Test Plan to ensure that the application correctly behaves with intended design.

To begin, the QA Engineer will verify if all of the requirements have been considered into the design of the application. For example, if the requirements state that the user needs to be able to perform a certain action, there should be a means to perform that action. The QA Engineer will walk through the user interface and apply different scenarios from the perspective of a user.

After working with ideal scenarios, the QA Engineer will conduct a stress test and attempt to cause unintended behavior. An example of this would be applying letter inputs where number inputs are expected. The purpose of conducting these types of tests is to make the development team aware of possible vulnerabilities, logical flaws, technical mistakes and other factors that had not been taken into consideration. Any software bugs found at this time will be added to the Bug Report and referred to the Software Developer to resolve. Any logical bugs may require the User Experience Designer to change the wireframe and user flow.

The software will also be tested to ensure that it functions correctly in the production environment. This will be done by simulating the operating system through the use of a virtual machine. Stakeholders will also be encouraged to participate in the testing process so they can be observed as users. Any features that cause the user to become uncertain in what actions the application is doing will also be documented and considered for changes.

The QA Engineer will ultimately approve the project to enter the Deployment Phase.

Environments and Costs

Programming Environment

Development of the Retire Me Now Scheduling Software Application require these environments:
- Windows 10+ Operating System
- Microsoft Visual Studio 2019
- C# Programming Language
- .NET Framework 4.7+
- MySQL Workbench 8.0
- Oracle VM Virtual Box 6.1.34

Environment Costs

The Retire Me Now Scheduling Software Application does not have any additional financial costs associated with operating in the production environment. For security measures, the customer will not allow for cloud-based storage and thus all the data needs to be saved to the hard disk drive of the central server. The capacity of the database is dependent on the storage capacity of the hard disk drive. It is recommended that the stakeholders invest in a separate storage unit to backup their data but is not a requirement for continued use of the application. Any maintenance fees for bug fixes, patches, and upgrades will be discussed with the Project Manager.

Human Resource Cost

The Retire Me Now Scheduling Software Application will be developed by an assigned development team. Below is a list of the job title, a short description of general duties and responsibilities, estimated billable hours, rate and total cost for each member.

Job Title	Description	Pay Rate	Estimated Contribution	Total Cost
Project Manager	Main point of contact for stakeholders. Writes Requirements Document that ensures the project meets the needs of the customer. Ensures that the project meets deadlines and falls within budget.	$38/hour	70 hours	$2,660

	Cosigns approval for transition from one Software Development Life Cycle phase to the next.			
User Experience Designer	Develops wireframes. Develops Entity Relationship Diagram with Software Developer. Ensures a cohesive user flow. Cosigns approval for transition from Design Phase to Implementation Phase.	$58/hour	90 hours	$5,220
Software Developer	Develops data models. Writes the code necessary to run a functional program. Developers Entity Relationship Diagram with User Experience Designer. Fixes software bugs. Cosigns approval for transition from Implementation Phase to Testing Phase.	$43/hour	102 hours	$4,386
Quality Assurance Engineer	Develops the Test Plan. Creates the Bug Report. Applies unit tests to code. Finds and documents exploits, vulnerabilities, logical mistakes, and other issues with the application that impedes the user experience. Cosigns approval for transition from Testing Phase to Deployment Phase.	$44/hour	67 hours	$2,948
Technical Support Specialist	Develops User Guide. Installs the application into the production environment. Cosigns approval for transition from	$22/hour	64 hours	$1,408

	Deployment Phase to Maintenance Phase.			

Projected Timeline

The following table shows the projected timeline to completion of the project including the various phases of development, milestones, deliverables, a short description of the deliverables, and the estimated duration it will take to reach the different phases of the project.

Phase	Milestone	Deliverable	Description	Duration
Requirements Analysis	Approved Requirements Document	Requirements Document	Meet with stakeholders to discuss and scope and requirements	06/01/2022 - 06/11/2022
Requirements Analysis	Project Schedule Created	Project Schedule	A schedule that shows the timeline of progress and budget constraints.	06/08/2022 - 06/11/2022
System Design	Design Document Created	Design Document	A plan for developing the application in regards to scope, constraints, and assumptions.	06/13/2022 - 06/18/2022
System Design	Wireframe created	Low-fidelity Wireframe	A mockup that shows the user interface and how the user will interact with the application.	06/13/2022 - 06/18/2022
System Design	Entity Relationship Diagram created	Entity Relationship Diagram	A diagram that outlines the relationships between the database entities and how they may interact with each other.	06/13/2022 - 06/18/2022
Implementation	Functional Application Created (before testing)	The software application	The tangible end product that will be delivered to the customer.	06/20/2022 - 06/25/2022
Implementation	Test Plan created	Test Plan	Document that details the necessary steps to test the	06/20/2022 - 06/25/2022

			application for any errors.	
Testing	Bug Report created	Bug Report	Document that details software errors, the severity of the error, steps to replicate the error, recommendations, and fixes if possible.	06/27/2022 - 06/29/2022
Testing	Unit Tests passed	Unit Tests	Software fully passes all proposed unit tests.	06/27/2022 - 06/29/2022
Testing	Functional Application (after testing)	The software application	The tangible end product that will be delivered to the customer.	06/27/2022 - 06/29/2022
Testing	User Guide created	User Guide	The manual for a user to reference about the application's features on how to use them.	06/27/2022 - 06/29/2022
Deployment	Database configured.	The Database	Database installed onto the central server. Configured to receive data. Tables initialized.	06/30/2022
Maintenance	none	none	Ongoing maintenance and further discussion on bug fixes and upgrades.	07/01/2022+