**C868 – Software Capstone Project Summary**

**Task 2 – Section A**



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| **Capstone Proposal Project Name:** | Fittr - A Golf Club Fitting Tracker |
| **Student Name:** | Elliott Moos |

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# **Business Problem**

## **The Customer**

The customer is Tyson’s West Golf, a boutique golf club fitting studio and custom golf club services provider in the Northern Virginia Area providing personalized golf club assembly and repair services to golfers throughout the D.C., Maryland, Virginia area. The studio is the newest of a portfolio of 3 studios in the Northern Virginia area employing 1 Lead club fitter, 1 Expert club fitter, and 1 Apprentice club fitter. The expansion has allowed Tyson’s West to service more customers, but with the recent explosion in the popularity of golf, combined with the affluent demographic of the area, the demand is higher than it ever has been. Given higher demand, Tyson’s West is exploring ways that it can expand as efficiently and rapidly as possible. When the studio portfolio was just two studios, the current fitting tracking system was manageable and did not present very many issues. Fittings are currently tracked in a custom paper appointment book at each store making it difficult to offer services to customers across all studios since it would require communication between fitters at each studio to reconcile the paper appointment books. To expand the business to meet the heightened demand, Tyson’s West is evaluating digital solutions that can serve as a central database of fittings and their respective fitters, customers, and stores.

## **Business Case**

Fittr - the proposed software solution - is a golf club fitting management system designed to the meet the needs of boutique fitting studios like Tyson’s West. It will allow a portfolio of fitting studios to track fittings, appoint fitter roles to users of the application to separate responsibilities, and manage fitter, store, and customer records. Tyson’s Wests’ current approach is difficult to maintain across multiple stores as it is comprised of a combination of manual, paper, and vocal tracking means. To service a customer at another studio, the Lead fitter of the first studio must contact the Lead fitter of the second and reconcile the customer and fitting information each time the customer wants to schedule a fitting. This has led to missing fitting entries, incorrect customer information in multiple appointment books, and missed fittings. Fittr will be able to address these problems by centralizing the entire fitting management process into a single web-based location. The application will be able to scale faster than the studio portfolio, and the data in its relational database will serve as the single source of truth for customer, fitting, fitter, and store data.

## **Fulfillment**

Fittr will be a web-based fitting tracking application. To mirror the current hierarchy of fitter roles and responsibilities, the application will require the user to login with credentials. The role of the fitter will determine which actions he/she can perform within the application. There will be five main sections.

The first section will allow management of the fitting schedule on a weekly basis via a weekly calendar. Each fitting is rendered as a block of time within the weekly calendar and can be re-scheduled by dragging/dropping the fitting on a new time range. Clicking on the fitting block will open a detail page for the fitting, which will only be editable by Lead fitters, or fitters who are assigned to the fitting. Canceling the fitting will be accomplished by clicking the “x” in the top right corner of the fitting block and likewise is only enabled for Lead fitters or fitters who are assigned to the fitting.

The second section will be designed to manage fitter records. Fitters will be listed in a table that displays each fitter’s first and last name, its username, role, and links to view a detailed fitter profile, as well as the option to delete the fitter from the database which is only shown for Lead fitters. Lead fitters will also have the option to create a new fitter.

The third section will be designed to manage store records. Stores will be listed in a table that displays each store’s name, phone number, and links to view a detailed store profile, as well as the option to delete the store from the database, which is only shown for Lead fitters. Lead fitters will also have the option to create a new store.

The fourth section will allow management of customer records. The application will have the ability to list customers and quickly search for a particular customer by first or last name. Customers will be listed in a table that displays each customer’s first and last name, email address, phone number, and links to view a detailed customer profile, as well as the option to delete the customer from the database. All fitters will be able to create and delete customers.

The fifth section will generate useful reports so fitters can view information about fittings and fitters immediately. The first report will allow fitters to search fittings given a start and end date. The second report will enable fitters to understand the fitting load for the day with a graph that shows fittings for each time block of the day. The third report allows fitters to understand the fitting load for each fitter by displaying a graph that shows how many fittings each fitter is assigned to.

# **Existing Gaps**

Tyson’s West has been having issues with their current approach to fitting management while attempting to scale the business to meet the growing demand for specialized golf club fitting services. The fitters have been expressing concerns about the complexity of managing multiple fitting books in multiple fitting studios as well as keeping customer records up-to-date and accurate. The customers are accustomed to a much more streamlined experience in most of their daily lives as they tend to be more affluent than the average business expects. They have also been expressing concerns over missed fitting appoints, incorrect information, and over-worked fitters not being able to give them the attention that they are accustomed to.

An example of a common problem faced by both fitters and customers is incorrect customer information. When a customer is traveling or is otherwise inconvenienced by needing to travel to a single studio for their fitting needs, they want to be able to have those needs met by another location. Before the customer can be seen at a new location, the Lead fitter at each location must make sure that they both have updated and correct information for the customer. If a Lead fitter writes the incorrect information in their book, the customer can have golf clubs shipped to the wrong address, in the wrong configuration, etc.

It is obvious that the current fitting tracking strategies Tyson’s West is deploying will not scale to meet the demand of the customers or more fitting studios. A centralized web interface to manage fitting data will serve as a single source of truth that all fitters in all studios can reference when providing fitting services. This will greatly reduce the amount of time it takes for fitters to retrieve information about a customer, store, or another fitter, as well as allow customers to be serviced at multiple stores without the fitters needing to contact one another.

# **SDLC Methodology**

The Waterfall method is determined to be the correct method of developing the Fittr web application. The Waterfall method is typically best deployed for systems with clearly defined requirements at each stage of development. The requirements that Fittr will be designed to fulfill are clearly defined and the underlying problems Fittr will solve are generally well understood. Managing appointments, records, and reports are not nuanced problems in software development.

# **Deliverables**

The Waterfall method of software development has a clearly defined set of deliverables associated with each stage of the project lifecycle. They can be subdivided into project deliverables that are the responsibility of the Project Manager and product deliverables that represent the actual software product delivered to the customer. Each section below will address each deliverable category and its requirements.

## **Project Deliverables**

* Requirements document
  + Describe features and desired functionality of the application in detail to portray the software development team’s understanding of the client’s needs and the detailed constraints of the system.
  + Needs to act as the single source of truth or all technical and design discussion throughout the project
  + It should describe all aspects of the project in the context of measurements of success, reference material for user interface design, and reliability metrics.
* Project Schedule
  + Timeline that displays all stages of the project, associated deliverables and estimated start/end times.
  + Needs to include a description of each milestone and act as a single source of truth for those.
* Low-fidelity Wireframe
  + Needs to demonstrate the UI/UX of the application in an unrefined way to validate the general flow of user tasks throughout the application.
  + Does not need to have details of the exact design elements that will eventually be used but it should clearly show the main navigational components and the different ways to interact with the application
* High-fidelity Design Prototype
  + Based on the wireframe, the high-fidelity prototype will focus on the look and feel of the application and contain the full set of theme elements such as typography and color scheme
* Database Diagram
  + Will show the blueprint for the database schema including structures, data types and relations between the different database tables
  + Translates database information into the real-life entities they represent.
* Testing Plan
  + Outline of the included unit tests suite to ensure the correct functionality of the software application. Unit tests are closely based on the code they are designed to test and can take advantage of white-box testing methods. The unit test suite will run in an automated fashion and produce structured output.
  + Functional test plans that will involve a QA specialist performing a series of steps to check the end-to-end functionality of the application. The tester will validate the inputs and outputs of each test.

## **Product Deliverables**

* Running database with tables translated from the database diagram.
* Application that fulfills all requirements
* Wireframe user flows reproduced in the final application
* Matching graphical user interface and high-fidelity wireframe
* Secure admin access for Lead fitters
* Deployment to a secure and easy-to-manage cloud environment
* Support with initial data import to facilitate the process of getting started with using the application

# **Implementation**

The implementation will be designed to cause little or no interruptions to the operations of Tyson’s West golf personnel. In the requirements phase, the Project Manage will work closely with the owners of Tyson’s West to facilitate the mutual understanding of the requirements of the new fitting tracking system. Given the familiar nature of the problems Tyson’s West is having, this should only require a short 60–90-minute meeting to discuss the details specific to their business. After that, the owners will need to sign off on the project timeline as well as the low and high-fidelity wireframes. This will guarantee that the owners have a firm grasp of the application they will be using.

During the testing phase, the Project Manager will train a small group of early adopters within Tyson’s West. This will ensure that Tyson’s West will be able to provide knowledgeable feedback during acceptance testing. The software team will gather the current fitting, fitter, customer, and store data for import into the application to facilitate an easier transition for Tyson’s West.

Once the application is approved and test, it will be deployed to the production cloud environment. There will be two administrative accounts created whose credentials will be dispersed to the correct people at Tyson’s West. After that, Tyson’s West will be ready to utilize the new software in day-to-day fitting operations.

# **Validation and Verification**

An important step in the testing phase, is writing unit tests that provide coverage of critical logic within the application. Unit tests are specific tests that compare inputs and outputs of an isolated run of a method to ensure that it’s functioning correctly.

Functional tests seek to validate the software’s functionality in the context of the higher-level requirements gathered during the requirements gathering phase. Since requirements typically require a human to make decisions about whether they are met, we will have the QA team run these functional tests.

Once both lower-level test suites pass, we need to ensure that the customer can use the application to fulfill all their own requirements. The first two test suites are validated by members of the software development and QA teams who possess a lot of domain knowledge about the application. Acceptance tests serve to validate the functionality of the application in the context of the actual end users and provide the most insight into how closely the application performs in line with the original requirements. Employees of Tyson’s West will perform these in concert with the Project Manager before the application is deployed.

# **Environments and Costs**

## **Programming Environment**

The application will be developed using the FastAPI web application library. Most of the code is written in the Python programming language but several sections of the site will also utilize Javascript, a lightweight interpreted scripting language for the browser. The database backend will be PostgreSQL, an open source object-relational database management solution. We will also use several libraries from the FastAPI ecosystem to facilitate certain common tasks and save programming time and money.

The application will be hosted in shared a cloud environment called Digital Ocean. Deployment to Digital Ocean is simple and secure and will reduce the complexity of managing the application server. Digital Ocean manages a virtual machine called a Droplet the application will be deployed on. Digital Ocean has a dashboard with helpful hints on everything from logging onto the Droplet to managing a fully automated deployment process with continuous integration and delivery.

## **Environment Costs**

Deploying the application to a cloud provider like Digital Ocean will greatly reduce the costs of running the application. Rather than buying a custom-built server and deploying it in a datacenter, Digital Ocean charges a small amount of money per running hour of the Droplet. Since there will be a predictable number of users using the application at any one time, we don’t need to optimize for real-time scalability. There are also not very many stores/fitters, so we can use a relatively modest Droplet with 1 virtual CPU and 2GB of ram. This will cost $12 a month. The Droplet can be resized if the business grows, or the traffic seems to be more than the current Droplet can handle. The total yearly cost of running the application will be $144.

## **Human Resource Requirements**

The project requires a project manager (PM), a designer, two software engineers and one QA specialist. The PM will work on an as-needed basis with the most activity being expected to take place during the beginning and end of the project. His total activity is estimated to amount to 80h, which will cost $4000 at his hourly rate of $50/hour. The designer’s hourly rate is $60/h, but her activity will be limited and concentrated toward the beginning of the project. She is expected to contribute about 40h, which will cost $2,400. Each software engineer will be working consistently throughout the project and their hourly rate is currently $70/h. The total amount of their time working is estimated to be 3 business weeks. The QA specialist will be most active during the testing stage and should not work more than 40h, which would come to $1600 given an hourly rate of $40/h. A visualization tool is utilized below to help with understanding the totals:

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| --- | --- | --- |
| **Resource** | **Rate \* Time** | **Total** |
| Project Manager | $50/h \* 80h | $4000 |
| Designer | $60/h \* 40h | $2400 |
| Software Developers | $70/h \* 120h \* 2 | $16,800 |
| QA Specialist | $40/h \* 40h | $1600 |
| **TOTAL Human Resource Cost** |  | **$26,000** |

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# **Project Timeline**

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| --- | --- | --- | --- | --- |
| Phase | Milestone/Task | Deliverable | Description | Dates |
| Requirements gathering | Review and wrap up requirements | Requirements document and project schedule | Discussions with Tyson’s West owners to produce and formulate application requirements | 1/1/23, 1/4/23 |
| System Design | Design and review low fidelity wireframe and high-fidelity design prototype | Low and high-fidelity wireframes | Designer will produce a low-fidelity wireframe to showcase fundamental ui/ux of the application and create a high-fidelity prototype to portray the aesthetics of the application which will be matched by the software developers | 1/5/23-1/12/23 |
| System Design | Generate entity relationship diagram for the application | ERD | Developers will define and model entities to be represented as database tables and identify relationships between them | 1/5/23-1/7/23 |
| System Design | Create overall testing plan | Testing Plan | Project manager and software developers will create testing plan for unit, functional and acceptance testing | 1/8/23, 1/11/23 |
| Implementation | Create working application and write unit tests | Application ready for testing | Developers will implement feature requirements and match prototype design to create a fully functional application according to specs. All unit tests will run without errors. | 1/12/23-2/2/23 |
| Testing Phase | Create functional tests and execute them | All functional tests are executed successfully | QA specialist will create and execute functional tests to verify all requirements. | 2/3/23-2-9/23 |
| Testing Phase | Create acceptance tests and execute them | Customer executes acceptance tests to satisfaction | In coordination with project manager, customer will run acceptance tests to verify that the application meets their requirements. | 2/10/23-2/12/23 |
| Deployment | Procure and prepare deployment environment | Application deployed and ready to be used | Configure Droplet and run application. | 2/15/23-2/16/23 |
| Maintenance | Generate maintenance plan | Maintenance service contract | Discuss and finalize terms of service for ongoing maintenance with the customer. | 2/17/23 |
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