Department of Computer Science & Engineering
The University of Texas at Arlington

Project Charter
CSE 4316: Senior Design I
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Coding Avengers
Beverage Inventory Management

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Revision History

Revision	Date	Author(s)	Description
0.1	07.01.2021	GW	Document creation
0.2	07.09.2021	TV, SL, MU, LT, GW	First draft of project charter

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1 Problem Statement

Imagine that you are a wine and liquor lover, who is passionate about collecting different types of wine grapes from different regions. As the time goes by, the amount of wine and liquor bottles in your collection surprisingly increases and it is frustrating that you can't find the perfect bottle in your own cellar because you do not remember where the exact bottle is stored, in which bottle hole or which bin. In addition, we all know that the taste of the wine and liquor gets better as it ages. However, if a bottle has been opened, it gets put away in random places and can't be found when you want it.

Accidentally, expensive wine and liquor end up going past prime, gifted wine and liquor bottles get put in random bottle holes that can not be found easily. On the other side, if you own a small winery business, wine and liquor bottle inventory management could be time consuming and requires a decent amount of manpower by manually counting how many bottles are left in stock, which one is running out or you want to check which bottles have been opened and put back in the cellars. That brings us the opportunity to work on solving your problem with managing your cellar collections. It will bring you a better experience in finding your lovely bottle, check its condition.

2 Methodology

We are going to develop and build a mobile app to perform some tasks such as scan and add the wine and liquor bottles into the inventory with a specific cellar or bin location provided by the user along with its descriptions: color, origin, winery,... its condition: opened or sealed, is it full, half or almost consumed. The app will help to mitigate the problems with locating the wine or liquor bottle, its condition, check to see if the bottle is getting expired(if the bottle is opened).

In addition, if you have a large collection of wine or liquor, then the app will perform the task to find out which one is the best pairing for the type of food that you are eating. The app will analyze which bottles are being drunk for most of the time, then add them to your favorite list. Also, it will recommend you to drink the bottles that are about to pass its prime times. If your bottles are running out, the app will find which places have the best deals. In addition, the app will show a summary of your wine business inventory by displaying the data of how many bottles are left in the stock, how many bottles are consumed each day, how many bottles are opened, and how many are running out.

3 Value Proposition

Wine Inventory app will bring some significant values to one of our stakeholders Dr. Christopher Conly who is a passionate wine lover but runs into the problem of locating his favorite wine at its prime time as well as notifying if his favorite bottles are running out of stock. In addition, the app will be capable of maintaining his favorite wine bottles list which can ideally recommend him a bottle when he is dining out or food-and-wine pairing.

On the other hand, Wine Inventory app also has huge potential for small sized restaurant owners in managing their restaurant wine and liquor bottles inventory management. First of all, the app will be capable of reducing the cost by reducing the hours of checking each bottle's condition as well as avoid going through from one cell to another to locate the bottle when a customer orders it. Secondly, the app can be used as a data tool for waiters to recommend the restaurant's best seller bottles as well as an opportunity to introduce to customers the bottles that are in low demand out of the inventory. Third, restaurant owners will be able to track the wine or liquor inventory summary such as which bottles are in high demand and the opposite as well as which bottles are running out. Our app has one functionality which can keep up with the bottle's condition such as if the bottle has been opened and not properly sealed, then it will notify the waiter before serving it to customers.

4 Development Milestones

Inventory Management Project Milestones:

- Project Charter first draft - July 9th, 2021
- System Requirements Specification - July 2021
- Architectural Design Specification - August 2021
- Demonstration of Database Implementation - August 2021
- Detailed Design Specification - September 2021
- Demonstration of UI/UX Designs and Wireframes - September 2021
- Demonstration of UI Mockups and Prototype - September 2021
- Demonstration of Back-End and Front-End Integration - October 2021
- Demonstration of User Experience and Functional Testing - November 2021
- Demonstration of Performance, Security Testing and Deployment - December 2021
- CoE Innovation Day poster presentation - November 2021
- Final Project Demonstration - December 2021

5 Background

Every single business has some type of inventory. It is essential in order to be able to sell and make a profit. The better organized a business is, the more likely it is to be successful. Taking inventory is necessary for managing costs and making sure there is no theft or loss. Just as businesses manage inventory, so do regular people with wine cellars and extensive liquor collections.

With our beverage inventory app, a user would easily be able to keep track of what's in stock, what needs to be ordered, and so much more, all in the palm of their hand. There are a multitude of reasons why manually keeping track of inventory is inferior to doing so digitally. Doing inventory manually can be immensely time consuming, financially wasteful, and even be done inaccurately. A person could take hours counting each bottle/case, they could make a mistake while counting, or their physical inventory sheet could get damaged. The biggest benefit of an inventory management app is saving time, and time is money. Any business that sells wine and liquor and any person with a collection can benefit from this app. A user would easily save money in hours by no longer needing someone to manually count and keep track of their stock. Along with saving time and money, the inventory management app would also provide convenience. Users can easily access the app on their phone, users can check the status of the inventory without even having to physically be at their place of business or home, and even be able to receive alerts when an item is running low. As with any invention, ideas arise out of need. Businesses strive to make every operation as efficient as possible to maximize their profits.

Inventory management is necessary for all businesses so creating an app to improve this process would attract many clients. Home users would benefit from this inventory management app by knowing where each of their items are being stored, which bottles are open, and if any are on the verge of going bad. To create the most efficient beverage inventory management app for any user, it needs to be compatible to a user's mobile device and be user friendly.

6 Related Work

With the modern world advancing quickly in the technology industry, there is a wide variety of beverage inventory management systems that are commercially available [1]. They can range from systems built-in hardware, a downloadable program to a company's existing hardware, or even as an app on mobile devices/tablets.

One of the most popular beverage inventory management systems is called Partender [2]. With Partender, users are able to "run a report and receive [a] XLS Purchase Order, sorted by distributor & purveyor, in seconds." Users can then forward this Excel file to their rep and finish inventory and ordering quickly. With Partender being compatible with both iOS and Android devices, inventory tasks can be easily split and delegated. Partender also analyzes the data to be able to "see how much was actually poured out (with up to 99.2% accuracy) so you can spot check variance & track your liquid cash." With these analyses, users are able to identify which labels are top movers and which are dead stock. Even with all these features, their most unique and popular feature is weightless inventory. Users are able to see the bottle on the interface and mark where the liquid line is to quickly measure the amount in the bottle. Although this is a great app with very useful features, Partender is on the expensive side. Monthly plans range from $249/month to $399/month while the annual plan costs $165/month. With this pricing, medium and smaller businesses along with home-users would not be able to afford this.

Another popular beverage inventory management system is called Barkeep [3]. It was created by a software architecture who switched to the bar industry and saw a problem that needed to be fixed. Along with the app, there is also BarkeepOnline (app + online) and BarkeepPro (app + pro) and depending on the plan, there are different features included. The app has a flat rate of $39.99 with some common features such as: multiple users, summary and usage reports, barcode scanning, excel integration, and more. Along with these features, Barkeep also offers some hardware. The Linea Pro's Laser Scanner

has a built-in laser and battery, and integrated credit card/driver's license reader. This app is good for smaller businesses as the software is not as expensive. However, the hardware has a starting price of $499, which is on the expensive side.

Orca Inventory [] is a beverage inventory management system that uses artificial intelligence (AI) and a patent-pending algorithm. Being one of the most technologically complex systems, Orca has some smart features that make it unique. Along with being able to detect deviations from previous ordering habits, Orca's One Click Intelli-Vendor Ordering is able to generate "smart orders" based on prior ordering and consumption trends with the goal of lowering overall beverage costs. A unique feature of Orca is their Recipe Costing. The feature creates menu items intelligently by knowing the cost and automatically updating recipe costs based on changes to item prices. Orca also includes some common features such as budgeting tools, invoicing and receiving, and robust financial tracking and statements. Orca initially had a one-time licensing fee of $900 and $129/month. The licensing fee has gone down to $399. Although this is a significant decrease in price, this system can still be considered expensive.

Founded in 1987, Bevinco [5] has been helping businesses manage their beverage inventory for decades. The app allows users to perform an audit and create a plan to improve their profitability, includes a Bluetooth scanner and scale for capturing accurate data, cost management (actual vs. theoretical), and smart ordering. The parent company "claims bars can expect net profit improvements of 1000—5000 per month." This is a very standard app containing all common features. However, Bevinco is only iOS compatible. Without being cross-platform compatible, this can really restrict the amount of clients wanting to use this.

While there is an extensive list of beverage inventory management systems, most are intended for larger businesses and can be very costly. Our app will be able to focus on small to medium businesses as well home-use.

7 System Overview

Collection of wines and liquors is one of the things that we see either as a business or an interest. We as a team are focusing on building an app which will be used to manage a vast quantity of beverage items. The app focuses on keeping the track of the inventory received, sold, or consumed, location and date of expiry using a dataset which contains data for different ranges of wines and liquors in terms of type and price.

To work on the app, an in-built barcode scanner will be built. The in- built barcode scanner will be used to scan the beverage item when it is received to add it in the inventory. For this, the system will require access to the phone cameras to scan the barcode of the item/s. The camera will be used to add a picture of the item scanned in the inventory too. When the system scans the item at first while adding it to the inventory, other details like name, date, location, price, type, and date of expiry will be updated. This way a user will be able to keep track of the inventory with specific details. The system will provide functionality like notifications, reminders) to the users which can be modified by the user.

For an user to use the The Beverage Inventory App, the user needs to download the app and sign up an account. In case the account pre-exists, the user can login. This leads the user to the home screen. The user can add the beverage to the inventory by scanning it. The home screen has a search bar where the name of the item can be input and searched. While the addition of the new beverage required the item to be scanned in the beginning and some information are required to be entered manually and then added to the system. While the item which already exists in the inventory is displayed with the relevant result. A diagram representing the overview of the system components is shown below:

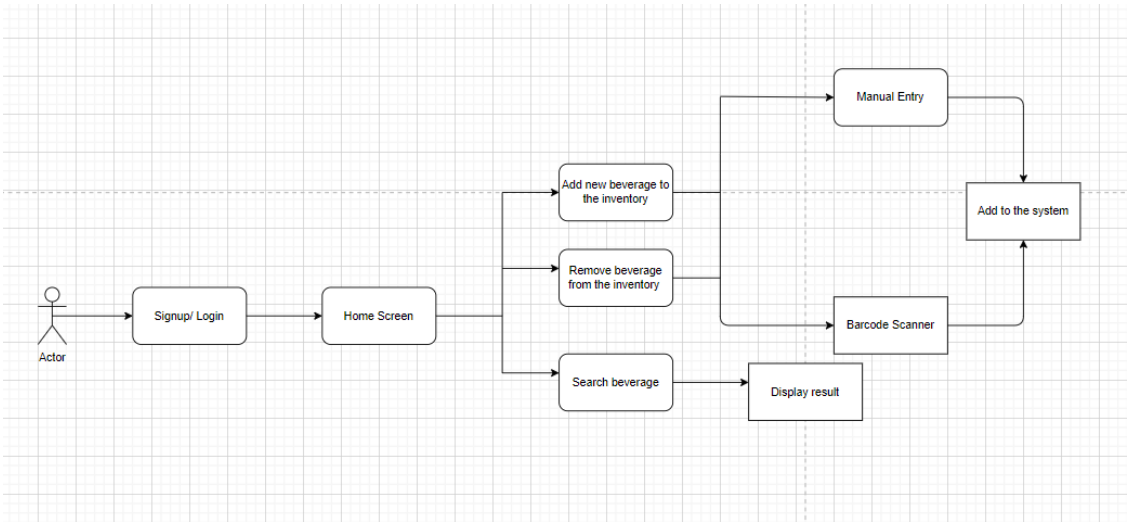

Figure 1: Project state diagram

8 Roles & Responsibilities

Our project is an idea proposal by Dr. Christopher Conly. Dr. Conly is the Scrum Master and point of contact from the sponsor side along with being a stakeholder. The other stakeholders are the team members of The Beverage Inventory Management Team.

The team members are Greg Whatley, Mokshada Upreti, Linh Thuy Tran, Sita Lama and Tuyen Van Vo. The responsibility of brainstorming ideas, documentation and formatting is assigned to all the group members. All the members of the team are either Computer Science or Software Engineering majors which makes it easier to work together.

Greg and Linh will develop ideas on each component that will be present in the project. Sita will be making sure about the deadlines and the progress as risk management lead. Tuyen and Mokshada will assist each other with domain modelling and requirements. For the project, Mokshada, Linh and Sita will be working on the Backend while Tuyen and Greg will be working in the Frontend while Tuyen will be supporting the database side of the project as well. Though the team is assigned with some tasks to work on, the team members will be helping each other in this learning process of developing an application. The team members shall help each other for the completion of the project along with the responsibility of learning the essential tools and being involved and communicative about the progress, changes required, involvement, and anything related to the project.

9 Cost Proposal

9.1 Preliminary Budget

Item	Cost
React Native library	Free
Firebase	Free, with limits

Table 1: Overview of preliminary budget

9.2 Current & Pending Support

Item	Funding
Department of Computer Science and Engineering	$800

Table 2: Overview of funding sources

10 Facilities & Equipment

The team will spend most of time in senior design labs in ERB 208 using the lab's computer building,and designing app. So, every team member gets opportunity to share ideas as well as help each other if any issue arises during this project period. The team members will work from home using personnel laptop according to their schedule. This project will use IDE/editor,and barcode scanner API as well as ReactNative framework. The firebase will use for database management.

11 Assumptions

This project will design an application to manage beverage inventory. The customer can manage cost and know when it's time to order more stocks using this app. There are list s of assumptions which are given below:

- There will be five developers to develop application in terms of human resources.
- Project cost will stay within the budget as initially budgeted.
- The project will follow scrum methodology through out execution.
- The team will write code in JavaScript.
- The data will be stored in Firebase.
- The product will delivery on assigned date.
- The user must register first before login into the system.
- The user must be more than 18 years old.
- The user must login into the system to search items

12 Constraints

- Final prototype demonstration must be completed by August 13th, 2021
- Total development costs must not exceed $800
- Alcohol is prohibited on campus
- React Native will be used to make a cross-platform app
- Firebase will be used as the backend for the app

13 Risks

The following high-level risk census contains identified project risks with the highest exposure. Mitigation strategies will be discussed in future planning sessions.

Risk description	Probability	Loss (days)	Exposure (days)
Learning to use the React Native library	0.50	5	2.5
Team member may drop the class	0.10	10	1
Team member may be restricted due to other classes or work obligations	0.3	10	3
Learning to work with new wine APIs	0.6	2	1.2
Connecting phones to IDEs for testing	0.1	1	0.1

Table 3: Overview of highest exposure project risks

14 Documentation & Reporting

14.1 Major Documentation Deliverables

14.1.1 Project Charter

The initial version of the charter will be delivered on July 9, 2021. The project charter will be updated as needed when requirements, dates, or other high-level details change.

14.1.2 System Requirements Specification

The initial version of the system requirements specification will be delivered on July 30, 2021. The SRS will be updated as needed when requirements change.

14.1.3 Architectural Design Specification

The initial version of the architectural design specification will be delivered on August 16, 2021. The ADS will be updated as needed when the system's architectural structure is revised.

14.1.4 Detailed Design Specification

The initial version of the detailed design specification will be delivered in September, 2021. The DDS will be updated as needed when low-level system design details change.

14.2 Recurring Sprint Items

14.2.1 Product Backlog

Items on the product backlog will be prioritized based on a group vote and we expect to keep track of these items using a shared document in Teams or Google Drive.

14.2.2 Sprint Planning

In Senior Design I, there are three sprints and in Senior Design II, there are four.

14.2.3 Sprint Goal

We will collaborate as a team to decide a spring goal and we will converse with the customer to ensure that the goal fits their needs.

14.2.4 Sprint Backlog

The team decided to use Scrum board/sheet to maintain the sprint backlog also to keep up with identified tasks to each team member or the whole team.

14.2.5 Task Breakdown

Individuals can volunteer for their desired tasks and most likely all tasks will be claimed. If there are any unclaimed tasks, we will as a group delegate it so every member is assigned the same amount of work. Time spent on tasks will be documented in the weekly individual status reports.

14.2.6 Sprint Burn Down Charts

Individual team member effort will be available through weekly individual status reports.

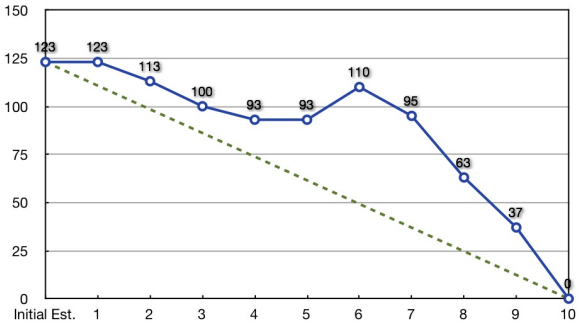

Figure 2: Example sprint burn down chart

14.2.7 Sprint Retrospective

After each sprint, we will handle sprint retrospectives by comparing our sprint goal with the outcome of the sprint.

14.2.8 Individual Status Reports

Status reports are due every Friday and will contain work and progress expectations and actual results.

14.2.9 Engineering Notebooks

Engineering notebooks will not be used for this project.

14.3 Closeout Materials

14.3.1 System Prototype

What will be included in the final system prototype? How and when will this be demonstrated? Will there be a Prototype Acceptance Test (PAT) with your customer? Will anything be demonstrated off-site? If so, will there be a Field Acceptance Test (FAT)?

14.3.2 Project Poster

Pictures of app screen shoots. Why choose Coding Avengers and Wine Inventory. Wine Inventory Powerful features. It will be delivered in December 2021.

14.3.3 Web Page

There will not be a web page.

14.3.4 Demo Video

The demo video will show how to utilize each feature, step-by-step. It will be a thorough walkthrough of the app. The video will be approximately 5-10 minutes. Examples of what will be shown are: how to add a bottle, how to delete a bottle, how to update attributes of a specific bottle, etc.

14.3.5 Source Code

After December 2021, source code will not be maintained. Source code will not be provided to any persons outside of this course. The project will not be open sourced for the general public, only available for download on Apple Store or Google Store.

14.3.6 Source Code Documentation

The team decided to use overleaf to generate and finalized the documentations in PDF format. In addition, Google Drive is utilized to stored and shared the documents within the team.

14.3.7 CAD files

This project will not involve any CAD designs.

14.3.8 Installation Scripts

Installation will be done through Apple Store or Google Store.

14.3.9 User Manual

The app will be pretty straight-forward and user friendly, however we will have documentation on how to use the app under a help section within the app itself.

REFERENCES

[1] "How to pick the best beverage inventory software (10 reviews)," Dec 2019.

[2] "Partender: Bar inventory in 15 min." 2021.

[3] T. Eicher, "The best way to keep track of your liquor inventory on iphone, ipad or ipod touch," 2004.

[4] "DOD Sample Phase I Proposal," U.S. Department of Defense, Tech. Rep., 2011.

[5] S. Hospitality, "Inventory software for hospitality: Sculpture hospitality," 1987.