

C868 – Software Capstone Project Summary

Task 2 – Section A



Capstone Proposal Project Name: Widget Sales Unlimited, LLC -- Appointment Organizer Plus+

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Business Problem

The Customer

Widget Sales Unlimited, LLC (aka WSU) is small to mid-size manufacturer and retailer of widgets and widget accessories, conducting business primarily within the continental United States. Founded in 1972, WSU began with just its two founders, J.C. Pennypacker and his cousin Frank Montgomery, producing widgets out of their aunt's garage in Elmira, NY and selling to local farmers and small businesses out of the back of a pickup truck. Since that time, the company has grown steadily over the past 50 years and has evolved into a national leader in the widget and widget accessories industry. Today WSU is headquartered in Rochester, NY, with J.C. Pennypacker's daughter Michelle serving as CEO, as well as several other children and family members serving on the board of directors and in various mid-level management positions throughout the firm. The company currently employs a total workforce of approximately 140 people throughout its home office, its wholly owned manufacturing arm in Corning, NY and a staff of approximately 30 traveling salespeople.

As of 2022, WSU conducts sales in all 48 of the lower contiguous states and divides those states into 6 regions conducting approximately equivalent total sales in each. The regions consist of the Northeast, Southeast, Mid-West, Texas+, California+ and Northwest. Over the past several years the company has seen consistent annual sales growth of ~8-10%, spread nearly evenly across all regions, and internal forecasts predict similar growth throughout the foreseeable future. With this growth in mind, WSU's board of directors is concerned that the firm is approaching the limits of their current corporate infrastructure and has tasked Michelle Pennypacker-Stevenson with evaluating all the company's current processes. Everything from corporate accounting controls to employee benefits plans to IT solutions is being evaluated and the company is prepared to invest wherever appropriate to ensure that scalable solutions are implemented in order to facilitate continued growth for many years into the future.

Business Case

WSU's salesforce is divided among of the 6 designated regions around the country and each salesperson spends approximately 40-45 weeks on the road each year. Broadly speaking, the customer base still primarily consists of small businesses and individual widget enthusiasts, and so the first and overwhelmingly most effective tool used by the sales team is the face to face, in-person appointment, however, appointments are also conducted in group sessions, as small seminars as well as virtually in recent years. It is this activity of conducting appointments that has been identified as most correlated with the company's overall sales, therefore monitoring these appointments and the activity of the sales team is of the upmost pertinence to management's financial forecasting.

As it currently exists, each salesperson is issued a company laptop and maintains a spreadsheet of all their scheduled and completed appointment activity. The spreadsheets are then stored in the cloud as Google documents, accessible to them and management at the home office. While regional managers do occasionally throughout the week check the activity of the individual salespeople of their region, as a practical matter the documents are most often accessed by their assistants, who at the end of the week aggregate the reports of the 3- 7 salespeople assigned to each manager into one weekly

report for the region. Also, at the end of each month an aggregate report showing the total number of completed and upcoming scheduled appointments for all salespersons, across all states and regions, is produced for upper management.

This current system is quite cumbersome and in addition to some security issues, including assistants having access to proprietary information, it's clear that it will become unsustainable soon if the expected growth rate persists. We therefore propose that WSU migrate all appointment activity to a standalone Java application to be installed on each salesperson's laptop, the workstations of the regional managers and whatever computers are used by upper management. The application will interface with a centralized database where salespeople will enter all information for upcoming and completed appointments. Management can then log into the client on their computers and check the status of any salesperson at any time or look at the total activity aggregated across a region.

Fulfillment

The fully developed application will interface with a MySQL database that is to be maintained on AWS. The application will operate for 2 distinct classes of users: primary users (salespeople) and secondary users (administrative). It will consist of several user-friendly UI's that should require minimal training for both the salespeople and the administrators to begin using immediately upon deployment. After entering accurate login credentials, salesperson users will be able to view, add to, modify and delete all their clients and upcoming appointments. Administrative users will also be able to view, add to, modify and delete all clients and upcoming appointments across the entire company, as well as sort all the data by date, region, state or view the specific activity of individual salespersons so that they can monitor the progress of the salesforce.

SDLC Methodology

The SDLC methodology used to manage this project will be a Waterfall approach. This method is the most appropriate because the requirements of the project are well known and understood, so it should lend itself naturally to a linear progression of completion without a great deal of unforeseen difficulties.

The first phase of the project will be to clearly assemble all the requirements and features that will need to be included in the application for it to prove acceptable as a scalable solution. We will examine all the information currently being maintained on spreadsheets, conduct interviews with management and users and create an exhaustive list of everything that must be included.

The second phase will be to create a list of all the deliverables for the project and produce a timeline of all the projected deadlines for each. The deliverables will be the timeline, wireframes of the UI's, a Java class diagram, a database entity relationship diagram, a fully developed and tested Java application, a user's manual and an application maintenance manual.

The third phase will be to create the mid-fidelity wireframes for each user interface screen and review these with the client for approval.

The fourth phase will be to produce the Java class diagram for the application and the entity relationship diagram for the database which will outline how the application and database will be implemented.

With all the planning completed, fifth phase will be to build the database and code the application and ensure that the two operate seamlessly together.

The sixth phase will be to conduct use case testing to ensure that all the functionality included within the application works properly and a variety of use cases and fringe inputs are tested.

Upon completion of the unit testing, the seventh and final phase of the project will be to review the working application with the client and assuming everything is satisfactory, deliver and deploy the application to the client's workstations and laptops.

Deliverables

There will be 2 types of deliverables associated with the Waterfall SDLC selected for this project, those being: project deliverables and product deliverables.

Project Deliverables

These include items that will be used by the production team to track and monitor progress of the project throughout the time it's being worked on.

- Project Schedule
 - A list of tasks that need to be accomplished and the date ranges that they are expected to be completed.
- Entity Relationship Diagram
 - A design diagram for the table structure of the database.
- Java Class Diagram
 - A design diagram of the classes that will be implemented in the Java code to make the application run.
- Test Plans
 - Unit testing will be conducted throughout development.
 - Testing the typical use cases for both salesperson and administrator users of the application.
 - Testing a variety of fringe use cases to ensure that the functionality continues to work properly for all inputs.

Product Deliverables

Product Deliverables represents what is produced to deliver to the customer.

- Mid Fidelity Wireframes
 - A stack of low fidelity wireframes for each user screen. These will be reviewed with the customer before the implementation phase to ensure they agree with the designs.
- Fully Functional Database
 - A database hosted on AWS that will contain all of the salesperson, client, appointment and user data that WSU needs to track to help their organization run efficiently.
- Stand-Alone Java Application
 - The final application that will be delivered and deployed to WSU that they may begin to use it to track and monitor the activity of their workforce.

Implementation

The implementation of this application will be fairly simple. The database will already be established and verified as operational on AWS prior to delivery to the client. Within the database usernames and passwords will be created and entered for all existing administrative and salespersons at the company.

Next, administrative users will then have Java updated/installed on their workstations and the application will be downloaded to their local hard drives. Once installed, administrators will be trained on how to login and use the application to both view the activity of their salesforce and also create new users as the company hires additional workforce.

Lastly, a similar procedure will be conducted with the salesforce. They will be instructed how to download and install Java to their laptops, after which they will be instructed how to download the application, which will be made available on a GitHub repository. Once all salespersons have everything installed on their laptops, we will conduct a training session on Zoom to instruct them on how to use the application. They will also be emailed a copy of the user manual for future reference.

Validation and Verification

Testing will be conducted in three separate phases: continuous unit testing through development, use testing upon initial completion of the application and user testing upon deployment.

- Continuous unit testing will be conducted as the code is written.
 - As the developers implement the classes and methods from the design diagrams, they will periodically stop and run the partial program to ensure that the code works as intended and attempt to identify and correct any bugs.
- Upon initial implementation and completion of all of the code for the application, several use cases will be conducted.
 - The use cases will walk through numerous permutations for what each type of user should and could attempt to do with the application.
 - Fringe inputs will be tested in an attempt to uncover any bugs that may exist.
- Upon deployment to the customer, we will follow up with several members of the sales and management teams.
 - Interviews will be conducted with the users of the application to ensure that everything is functioning properly and to obtain any feedback they may wish to offer.
 - Our company email address will be provided and we will encourage WSU to contact us with any questions or concerns pertaining to the utilization of the application.

Environments and Costs

Programming Environment

The development environment will consist of the following:

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- PC running Windows 10 Pro
- IntelliJ IDEA 2021.2.4 (Community Edition)
- Java SDK 17.0.2
- JavaFX 17.0.2
- AWS-mysql-jdbc-1.1.3
- MySQL Workbench 8.0.28
- Draw.IO 20.7.4

Environment Costs

The marginal environment costs of this application will be relatively negligible. The company issued laptops and workstation OS's are already expensed under the Windows Enterprise licensing agreement and software will not require any additional storage or hardware. The database will be hosted on AWS RDS free tier, which provides for 99% uptime and a data limit of 20gb/mo. In the event that there is extremely heavy usage of the database, the estimated costs will not exceed \$100/mo.

Human Resource Requirements

The entire project is estimated to take our company between 80 – 120 man hours. Our development team consists of junior developers, who will also be conducting the QA, that may take longer than industry standards for this type of project and therefore we are going to complete the entire project for a flat rate of \$15,000.

Project Timeline

Phase	Milestone/Task	Deliverable	Description	Dates
Pre-development	Meet with Client	None	Review current system and determine the requirements of the application.	12/14/22 – 12/21/22
Design	Design mockups	Mid-Fidelity Wireframes	Create the stack of wireframes that will demonstrate the GUI and review with customer.	1/10/23 – 1/13/23
Design	ERD	Entity Relationship Diagram	Design the database tables for the application.	1/15/23
Design	Class Diagram	Java Class Diagram	Outline the model classes that will be needed to implement the application.	1/16/23

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Development	Database Implementation	Functional Database	Write and execute the SQL that will build the database on AWS.	1/17/23
Development	Java Development	Source code for the application.	Create all the classes and implement the methods contained in the design diagrams. Create all helper classes to interface with the database. Create all the FXML documents and controller classes to create the GUI.	1/18/23 – 1/25/23
Testing	Unit Testing	None	Unit testing performed periodically during development to ensure the code functions as intended.	1/18/23 – 1/25/23
Testing	Use Case Testing	Screen shots of testing results.	Walk through several user case scenarios with a variety of permutations and ensure that that the application functions as intended.	1/26/23
Deployment	Delivery to Customer	The executable application.	Deliver the application to the customer and deploy the application their laptops and workstations	1/27/23
User Testing	Customer follow up.	None	Conduct interviews with the customer to determine if everything is running smoothly.	2/15/23