**C868 – Software Capstone Project Summary**

**Task 2 – Section A**



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| **Capstone Proposal Project Name:** | StudyTrackr |
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# **Business Problem**

**The Customer**

Archimedes University is a non-profit, regionally accredited University that primarily focuses on remote learning in an online environment. They have three physical campuses in South Carolina, Texas, and California, with the home campus being in South Carolina. AU has approximately 7,000 employees comprised of 3,000 faculty and 4,000 administrative staff. AU serves approximately 80,000 students nation-wide.

## **Business Case**

AU’s mission is to provide affordable pathways to opportunity. Faculty at AU seek to help their current and prospective students as best as they can to achieve educational goals. AU already has a notification system based in its online portal and has the infrastructure in place to send email reminders and notifications regularly. However, surveys have shown that students are more successful overall when they take a more active role in their education experience.

StudyTrackr is a complete solution for students to track their term and course progress at AU. It is designed specifically to adhere to AU’s course and assessment templates. It will facilitate the student’s ability to track their education progress, take notes, and set notifications for term, course, and assessment start and end dates.

Currently, students are largely responsible for tracking much of this information through web resources offered by AU. StudyTrackr will give students the ability to keep all the information in one app on a mobile device that they typically always have on their person. StudyTrackr stores this information locally on the device and is not reliant upon a network connection to AU servers.

StudyTrackr will reduce phone calls to support for AU’s web portal, increase student independence, and give students one place to store all pertinent information for their courses.

## **Fulfillment**

StudyTrackr will be an android based student education tracking application for use by students. Students will be required to create a local password-protected account on the device to adhere to strict policies regarding student information.

Students will take their AU provided student id and email address and use that information to create an account to log in. They will then be able to add personal notes, terms, courses, course notes, assessments, and optional notifications to the application. All of this information will be stored on a SQLite local database on the student’s android mobile device.

Instructor information will be able to be entered for each course, including the instructor’s name, phone number, and email address.

The application offers the ability to search terms by name and courses by course name, instructor, and assessments. It can also generate a report for each term showing the number of “completed”, “active”, or “inactive” courses.

# **Existing Gaps**

Currently, the term and course data are largely web-based and in some cases disparate systems. The information is not all in one place and is not readily or easily accessible. The student is largely responsible for coming up with their own solution to keep track of everything.

StudyTrackr will allow students to track their AU term, course, and assessment information on their android mobile device.

# **SDLC Methodology**

The SDLC Methodology that was chosen for this project is the Waterfall methodology. The reasoning behind this is the relatively small size of the project and requested feature set. This method is predictive and linear in its approach to software development. The project’s features have been clearly defined by AU and agreed to by the software developer. Based upon this agreement, software development will follow the Waterfall pattern where each stage builds upon the one before it and each stage of development has its own set of deliverables. The relative size and agreed upon feature set make the Waterfall methodology ideal for this project.

The phases of the Waterfall methodology begin with the requirements phase. In this phase we seek to understand the client’s current situation and needs. This is the stage where requirements are defined, and a requisite list of features is created and described in detail. The deliverables from the requirements phase are a requirements document and project schedule.

The next phase is the system design phase, which is the first actual phase in software development. In this stage, while no actual coding is done, the system is designed from the ground up in terms of what is required to build the project in regard to software and hardware. This stage helps define hardware and software requirements and the system architecture the developed software will run on.

The third phase of the Waterfall model is the implementation phase. In this phase, code starts being written in preparation for the next phase - integration and testing. Each feature of the software is broken down into units and is developed and tested individually.

The fourth phase is the integration and testing phase. All the units that were developed in the previous stage are integrated into a single system after performing unit tests and then tested once more after integration.

The fifth phase is the deployment phase. After functional and non-functional testing is completed, the software will be deployed to the client.

The sixth phase is the maintenance phase. In this phase the software developer will resolve any issues that come up after deployment. This is the phase where any software patches would be released or enhancements to the software made.

# **Deliverables**

## 

The Waterfall method of software development has deliverables for each stage of the project. These deliverables fall under two types; project and product deliverables. The project deliverables are mainly the project manager’s responsibility. The product deliverables will represent the actual software being developed for AU.

## **Project Deliverables**

* Requirements Document
  + Describes features and intended functionality of the software in detail. This represents the software developer’s understanding of AU’s needs and requirements for the software
  + The document will be written in such a way that it is clearly understood by both the software developers and AU. This document must use clear and concise language as it will be referred to at every stage of the project.
  + It should contain details about look, feel, functionality, performance, class design, and database schema
* Project Schedule
  + A detailed timeline that will list all the major and minor milestones and their deliverables
  + This document should include tasks for each milestone along with a brief description of each
* Low Fidelity Wireframes
  + A low fidelity wireframe is a mockup of the application. It is designed to provide a basic representation of the basic look, feel, flow, and to show the most important features
* High-Fidelity Prototype
  + A visual prototype that focuses on the overall look, feel, and visual details of the mobile application
  + This will be an accurate representation of what AU can expect the mobile application to look like in its final stages
* Test Plans
  + An outline of the tests performed by software engineers during development to ensure that each unit of the software is functional
  + Functional test plans that involve our QA team performing end-to-end testing on the functionality of the software. Each step in the process will be clearly defined with pre-determined inputs and outputs. The QA tester’s role is to make sure that the application functions as expected

## **Product Deliverables**

* Fully functional C.R.U.D. operations performed on the SQLite database
* Developed application that fulfills all specifics of the requirements document
* Navigation pattern that matches with the low-fidelity wireframes
* GUI that matches the design of the high-fidelity prototype
* Source code and APK for distribution
* Support documentation

# **Implementation**

The implementation of this project is expected to go very smoothly. The app will be made available to AU via an apk file. It is recommended to upload the app to the Google Play store and / or the Amazon Appstore. AU will be responsible for notifying their students that the app is available to download and use. Implementation will not cause any major issues for AU as it is not reliant on any AU infrastructure.

Starting with the requirements phase the project manager will work with AU stake holders and their representatives to understand the exact requirements and make any needed changes. This process should take approximately three to four meetings running 60 to 90 minutes each.

AU stake holders will need to sign off on project requirements, low-fidelity wireframes, and high-fidelity wireframes. This process is to ensure that AU stake holders, staff, and the software developer are all on the same page with expectations as to the look, feel, and function of the software.

During the testing phase, the project manager will ensure that AU staff are trained on the usage of the software. This includes working with representatives from the IT department to provide adequate documentation and additional training if required. It is recommended to select a group of students to test this software and be a part of acceptance testing; this will put AU in a good position going forward with deployment.

# **Validation and Verification**

We will work together with AU staff to develop an elaborate and extensive testing plan to ensure that all agreed upon features of the software are implemented correctly and functioning as intended.

While writing the code for this software, our engineers will periodically test by running it and verifying basic functionality against the requirements document. It is imperative to make sure that C.R.U.D. operations can be performed on the SQLite database with no issue.

The next level of testing is referred to as functional testing. The QA team will devise a strategy to test specific requirements and scenarios for the software. Essentially, it is their job to see in what scenarios the software will stop working or be unstable. It is expected that most bugs and issues will be found in this level of testing.

The final stage of testing, acceptance testing, will be when we start working with AU staff to test the software. It is recommended to bring in a group of select students to test and be a part of the signing off process for acceptance testing. These tests should be done in coordination with the project manager so that they may be present during testing before acceptance and deployment.

# **Environments and Costs**

## **Programming Environment**

The mobile application will be developed for the android mobile operating system environment. Visual Studio using the Xamarin.Forms framework and the C# programming language will be utilized for development. SQLite, a robust, feature-rich, and lightweight database that is suited to a mobile environment will be used as the database for this application. Xamarin.Essentials and a few other reliable libraries will also be used in the development of this application in order to cut down overall programming time and costs.

The application will run and store all its data locally on the user’s android mobile device. No additional hosting costs are necessary.

At a minimum any Android device will have to meet these requirements:

* Mobile Device with Android O/S 10.0+
* 1 Gb Memory
* Snapdragon 450 or Equivalent Processor (1.8 Ghz)
* Network Connection to Download Application

## **Environment Costs**

A mobile device that can fit these specifications typically costs approximately $150.00. AU will not need to purchase these devices for students.

Since this mobile application is designed to run locally on the student’s android mobile device, there are no hosting costs associated with this project. If AU would prefer to list the mobile app on the Google Play store, there is a modest $25 fee. There is no cost associated with listing the application on the Amazon Appstore.

## **Human Resource Requirements**

The project will require a project manager, a designer, two software developers, and a QA specialist. The project manager will work closely with AU throughout all phases of the project, being involved the least in the implementation and maintenance phases. The project manager’s total estimated time is 60 hours, which will cost approximately $4,800 at a rate of $60 per hour.

The designer’s hourly rate is $55 per hour, with most of their involvement in the system design phase. Their overall involvement is estimated to be approximately 30 hours, coming to $1650.

The two software developers will be spending the most amount of time on this project, mostly in the implementation phase and will incur most of the overall development costs. Their hourly rate is $65 with an estimated two business weeks spent in the implementation phase.

The QA specialist will spend much of their time in the testing phase and their estimated involvement time is 30 hours, which would come to $1050 at a rate of $35 per hour.

The total cost for the human resources associated with this project is approximately:

|  |  |  |  |
| --- | --- | --- | --- |
| Resource | Time / hour | Rate | Total |
| Project Manager | 80 | $60 | $4,800 |
| Designer | 55 | $55 | $1,650 |
| Software Developers | 160 (80 \* 2) | $130 ($65 \* 2) | $20,800 |
| QA Specialist | 35 | $35 | $1,050 |
| Total | 330 |  | $28,300 |

# **Project Timeline**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phase | Milestone/Task | Deliverable | Description | Dates |
| Requirements gathering and Analysis | Discuss, analyze, and finalize project requirements | Requirements document and project schedule | Meetings with AU stakeholders to gather and analyze project requirements | 3/1/2021, 3/3/2021, 3/5/2021 |
| System Design | Create, review, and sign off low-fidelity wireframe and high-fidelity visual design prototype | Low fidelity wireframe and  High fidelity visual design prototype | Designer will create the low-fidelity wireframe to show navigation and main functionality  Designer will also create the high-fidelity visual design prototype to show end product look and feel | 3/8/2021 – 3/12/2021 |
| System Design | Create database schema and class list | Class diagrams | Developers will define database tables and program classes and identify relationships between them | 3/8/2021 – 3/10/2021 |
| System Design | Create Testing Plan | Testing Plan | Project Manager and Developers will create a comprehensive testing plan for unit, functional, and acceptance testing | 3/9/2021, 3/11/2021 |
| Implementation | Create unit and functional tests | Alpha version of mobile application | Developers will create and implement the feature requirements in combination with the design prototype to create a fully functional mobile application. All unit testing will be completed without errors | 3/15/2021 – 3/26/2021 |
| Testing | Create and run functional tests | Functional testing is completed without errors | QA specialist creates the functional test and runs it against the requirements document | 3/29/2021 – 3/31/2021 |
| Testing | Create and run acceptance tests | AU will complete acceptance testing to their satisfaction | AU will coordinate with the project manager. AU will complete their acceptance tests to verify that the mobile application meets requirements outlined in requirements document | 4/1/2021 -  4/5/2021 |
| Deployment | Prepare for deployment | Mobile application will be deployed to AU via apk file and source code | Mobile application will be deployed to AU via apk with the suggestion of posting the mobile application on the Google Play Appstore or Amazon Appstore | 4/6/2021 – 4/8/2021 |
| Maintenance | Maintenance plan will be set up with AU | Maintenance contract | Project manager and AU Stakeholders will discuss and finalize maintenance contract terms | 4/8/2021 |