Software Engineering Capstone

Task 2

App Business Proposal

Capstone Proposal Project Name: Student Planner Mobile Application

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Table of Contents

BUSINESS PROBLEM

The Customer

The customer for this app is students. Students at various levels of education including middle school, high school, and college students, will benefit from the completion of this software application. The proposed app is a digital student planner. It is intended to help students stay organized by allowing them to track their classes, class assignments, and assignment deadlines. Proficient organizational skills play a key part in a student's academic success.

Middle School Students:
Middle school is when most students are first introduced to having their school day broken up into periods. Back in elementary school, students had one teacher, one classroom, and that one teacher was the person that taught all of the different subjects. In middle school, the school day is broken up into seven periods, they have different teachers for each subject, and multiple classrooms. For many students, middle school is the first educational level where they are expected to start taking more responsibility for their academics. An abundant amount of students are usually involved in extracurriculars such as clubs and sports. Overall, the change in teaching style, increase in responsibility, and extracurriculars can make it hard for students to stay organized. Middle school students will benefit from using this software because it will help them plan out their week and manage their time. They can organize their classes and assignments, which will make it easier for them to keep track of their academic progress and stay on schedule.

High School Students:
During high school, students are expected to complete their high school work while also preparing for college. They take AP classes, SATs, and ACTs. Students are also involved in extracurriculars such as sports, clubs. Many high schools require that students volunteer a certain number of hours in order to graduate. Some high school students even begin working at their first job during this part of their life. Between preparing for college and participating in extracurriculars, it can be tough for teenagers to remain academically organized with their high school coursework. High school students will benefit from using the student planner app because it will allow them to prioritize tasks and manage their time to make sure they are able to complete their other responsibilities.

College Students:
College students are at varying stages of life. For a number of college students, they are coming straight out of high school and transitioning into adulthood. They could be moving out to a college dorm, living off-campus with roommates, or living on their own off-campus. Younger

college students have to figure out what they want to major in and what career path they want for themselves. They could also be working jobs or internships. On the other hand, other college students may already have adult responsibilities. They can have families of their own, live independently, be self-sufficient, have internships, or have a career. Regardless of where they are at in life, college students have many life and educational responsibilities. College classes are often difficult and require more effort to learn the materials. College students may find it laborious to organize their work, life, and academic schedule. College students of all ages will benefit from using this mobile student planner because it will help ensure that they fulfill all of their work, life, and school responsibilities by improving their time management, lowering their stress, and keeping them motivated.

Short Term Goals:

- Reduce Stress:
  - Each semester, students typically take 4 to 5 classes, which can mean hundreds of assignments. Between school, work, and homelife, students can feel overwhelmed and stressed. Using a student planner allows students to track and plan the numerous assignments they get each semester. By planning out their school work, they can better balance their work and school life, improve time management skills, and stay motivated to complete their goals. Altogether, this helps reduce stress throughout the semester.

- Improve Time Management Skills:
  - Students can struggle with efficiently managing their time if they are in disarray with their schoolwork. However, by inputting assignments into the planner, students are able to plan out and prioritize their homework tasks. This allows them to manage their time better because they are able to schedule that allows them to complete their goals.

- Reduce Student Procrastination:
  - Students may procrastinate their schoolwork if they don't keep track of when everything is due. The student planner app allows students to input their class start date, class end date, and assignment due date. Users are also able to set an alert to notify them on the date an assignment is due. Staying aware of deadlines is one way students are able to overcome procrastination and stay on course with their academic goals.

Long Term Goals:

- Improve Student Organizational Skills
  - Some students are not taught how to be organized, which can negatively affect their academics. Students without the ability to be organized may be more stressed, miss assignment deadlines, and fall behind in class. This app allows students to organize their academic responsibilities by keeping track of their classes and assignments. Strong organizational skills are important because they contribute to productivity, create positive learning habits, improve time management, and reduce stress.

- Improve Work-School-Life Balance:
    - Students often have to balance work, school and their personal life, which can be a demanding challenge. Using a planner can help students plan and prioritize their schoolwork and educational goals. By mapping out daily, weekly, or monthly academic tasks, they better manage their time and create a healthy schedule relationship with school.

- Increase Student Motivation:
    - Many students can feel overwhelmed by the amount of assignments for each class. By using this student planner application, they can organize their assignments based on the class. This helps break down the amount of work they have to do into smaller tasks. For instance, let's say a student is given 6 homework assignments for 4 classes. Six pieces of homework may seem like a lot of work to do, however by using the app and visually planning out their assignments for each class, the total amount of homework is broken down into smaller parts. The student can now see their overall goal (completing all 6 homework tasks) as 1 assignment for Math, 1 assignment for English, 2 assignments for Science, and 2 assignments for History. Smaller goals are often easier to complete, which can improve student's motivation and focus.

Our mission is to encourage student success through improving organizational skills. This student planner app allows students to structure and keep track of classes, assignments, and assignment deadlines. This application is not partnered with any school. We want all students to have access to using this app for their individual needs. Whether it is to help reduce procrastination, improve time management, create healthy study habits, increase motivation, improve their work-life-school balance, we want this app to help students reach their academic goals throughout all stages of their education.

Business Case

The client for this software application is students of various education levels. Throughout their educational journey, students face a number of obstacles that make it difficult to stay on top of their academic responsibilities. Middle school students are learning how to navigate their differently structured school days. Back in elementary school, school days included one teacher, one classroom, and less homework. Their middle school school days now consist of different periods, buildings, classrooms, teachers, and assignments for each class. They also have after school sports and clubs that they participate in. High school students have to focus on completing their schoolwork, taking initiative to prepare for college, logging required volunteer hours, and participating in extracurriculars. Students at this stage of education also begin working part time jobs, which they have to incorporate into their busy schedule. College students can include recent high school graduates who are just entering adulthood and those who have already been adults for some time. Younger college students are moving out for the first time, deciding their major, and working at jobs / internships. Older college students can already have families

of their own, a career, and other adult responsibilities. In addition to these challenges, many students take 4-5 classes each semester, which can mean hundreds of assignments between all of these classes. With this many assignments, it can be difficult for students to keep track of everything. The current challenge many students face is staying academically organized.

A solution to this problem is to use a mobile student planner. A mobile student planner will allow students to easily track classes, assignments, and assignment deadlines. There are many benefits to using a mobile planner instead of a paper planner. For instance, in today's world almost everyone always has their phone with them. Using a digital student planner allows students to have constant access to their educational plans right on their mobile device. In addition, a student will typically carry most, if not all, of these items in their backpack: binder, laptop, phone, charger, notebooks, pens, pencils, lunch box, snacks, and books. By having the student planner be a mobile app, a physical paper planner is one less item that they have to carry or remember to bring with them to school. Finally, digital planners allow students to easily add, edit, and delete information. With paper planners, students have to write in their class and assignment information with a pen or pencil, which can make it difficult to edit what they have planned. On the other hand, with a mobile student planner app, students are able to input, modify, and delete their academic plans with the click of a button.

The current problem is that students have difficulty staying academically organized because they have an abundant amount of schoolwork that they are responsible for. The app will solve this challenge serving as a platform that allows students to track classes, assignments, set reminders, and generate reports. Here is how each function works to help improve students' organization:

Organize Classes:

To organize their classes, one of the screens on the application displays a list of all the class names. This list serves as an overview of all the classes the student has inputted into the planner. Students are able to add, modify, and delete as many classes as they want. Upon clicking on a specific class, the user will be taken to a more detailed page that shows the class name, start date, end date, and associated assignments. The app also has a search function that allows students to easily find a certain class.

Organize Assignments:

To organize their assignments, the class details screen shows a list of all the assignments associated with that specific class. Users are able to add, modify, and delete as many assignments as they wish. Upon clicking an assignment's name within the list, the student will be taken to a detailed assignment page. This page will display that assignment's name and due date.

Set Reminders:

The app's notification system can help students stay organized by reminding them of important homework deadlines. Students have the option of setting a reminder for a specific class. When this alert is set, the user will receive a notification stating the assignment name and the date it is due. This can also improve time management skills by helping students be more aware of assignment due dates. Reminders allow students to better manage their time and prioritize homework tasks.

<u>Generate Reports:</u>
> Students are able to generate reports that will show all of their current classes and each associated assignment. This report can help students stay organized by displaying a complete list of all the assignments for each class. This information can then be used by the student to further plan and prioritize their homework assignments.

Fulfillment

> Students need a digital platform that will help them keep their academic responsibilities organized. They need a way to track their classes, class assignments, and assignments due dates all in one place. The student planner app will fulfill the needs of the client by allowing students to organize their schoolwork. This application will fulfill the customer's needs with the following functionalities:

- Compatibility:
  - It is an Android application that is specifically designed to run on an Android device. This mobile app will be compatible with Android 8.0 and higher.

- User-friendly GUI:
  - The student planner app will have a user friendly interface, which will allow users to easily use and navigate the application.

- Tracking Classes:
  - Users are able to add, modify, and delete as many classes as they desire. They are able to input their class information, including the class name, start date, and end date.

- Tracking Assignments:
  - Users are also able to add, modify, and delete as many assignments as they wish. The assignment will be associated with its specific class. Students are able to enter their assignment information, including the assignment name and due date.

- Reminders / Notifications:
  - Students are able to set reminders for upcoming assignment deadlines. When a student sets a reminder for an assignment, they will receive a notification that includes that assignment's name and due date.

- Sharing Features:
  - Users are able to share details regarding their class and assignments via a sharing feature such as email or SMS. The sharing feature also has the ability to copy the details to the user's clipboard so that they may paste the information to another application, such as their notes app.

- Search Functionality:
    - Students are easily able to search for a specific class within their class list by using the search functionality.

- Reports:
    - Users are able to generate customized reports of their classes and assignments. They can generate a personalized report that will display a table containing the student's classes and the assignments associated with each class.

- It is important to note that this app does not connect to any school to get students' class and assignment data. Students will have to manually enter class and assignment information. The app uses an in-app database, which is where the information that students provide will be stored and retrieved.

Altogether, these app components will work together to ensure students are able to stay organized by allowing them to track their classes, assignments, and assignment deadlines.

SOFTWARE DEVELOPMENT ACTIVITIES

SDLC Methodology

The Waterfall Software Development Life Cycle Methodology will be utilized in this project. A software development life cycle is a plan that outlines a series of tasks required to complete a software application. Waterfall is a SDLC Methodology that breaks down projects into linear series of tasks. The completion of a task is required before moving on to the next step. In other words, each step is dependent on the completion of the step before it. This methodology focuses on six main phases: requirements, design, implementation, verification, deployment, and maintenance. The waterfall methodology will be used for this project because this project has clear deliverables and well-defined requirements.

1. Requirements:
    - The first phase of the waterfall SDLC methodology is defining the requirements of the project. The project requirements include the necessary documents that will support the production of this app. The software application requirements include the necessary features and functionalities of the app. Altogether, these defined requirements will set the expectations for the app's functionality and deliverables for each phase of the project plan.

2. Design:
   - The second phase in this project is creating the system's design and architecture. The design phase focuses on deciding how the system will meet the project's requirements chosen in phase one. During this stage of the project plan, designers will produce wireframes, layouts, a design document, and the project schedule. They will also determine the database design, which will control how the app stores and retrieves data. These designs will be the structure of the system and help developers code the app.

3. Implementation:
   - Implementation is the third phase of the waterfall methodology. In this step, developers will begin to code the application. They will use the defined requirements from phase one and design plans from phase two in order to ensure the app meets all expectations. This phase will produce a software application that includes all listed requirements and follows the design plan.

4. Verification:
   - The verification phase is the fourth step of the project plan. Once the app development is complete, the app will be tested to ensure the application is sufficient. This phase will focus on unit tests to verify the competency of the app. The information from the test results and analyses can then be used to determine if the code needs to be updated or if the app is ready for deployment.

5. Deployment
   - In the fifth phase of the waterfall method, the application will be deployed. The app will be deployed on the chosen development environment. Once this phase has been completed, users will be able to download and use the app.

6. Maintenance:
   - The sixth step in the project plan is the maintenance phase. This means that once the app has been deployed, the app will continue to revive bug fixes, updates, and improvements. This will ensure that the application is maintaining its functions and high-level performance.

Deliverables

The following sections discuss the deliverables that will be produced from each phase of the project's plan.

Phase 1: Requirements

In phase 1, the requirements of the project are determined. The deliverable from this phase is a list of the project requirements and the software requirements. The requirements for this project include the following:

Project Requirements	Software Requirements

• Documentation
   ◦ User guide for maintaining the application
   ◦ User guide for running the application from a user perspective
• Design documents
   ◦ Class diagram
   ◦ Design diagram
• Test Plans / documents
   ◦ Test plan for a unit test
   ◦ Unit test scripts
   ◦ Test result documentation
   ◦ Test result analysis documentation
	• A user friendly graphical user interface
	• A local database that allows users to add, modify, and delete the data they input
	• A search functionality that allows students to search for specific classes
	• The ability to set notifications for assignment due dates
	• The ability to share class and assignment details
	• The ability to generate reports that include class and assignment information
	• Validation functionalities
	   ◦ Include validation that input dates are formatted correctly
	   ◦ Include validation that class start date is before class end date
	   ◦ Include validation that assignment due date is between the class start and end date
	• Code including inheritance, polymorphism, and encapsulation
	• Security features
	• Design elements that make the application scalable
	• Compatible with Android 8.0 or higher
	• Display a detailed view of the classes, including class details
	• Display a list of assignments associated with each class

Phase 2: Design

In phase 2 of the project, the architect and structure of the system is built. The deliverables from phase 2 include the following:

- Design document:
  - The design document will include a class diagram and a design diagram. A design document is a detailed plan for building the software application. The class diagram visually represents the relationship between classes of an app. The design diagram is a visual representation of the interactions between the app's components. The design document will be used as a blueprint in the implementation phase of the project.

- UX / UI designs:
  - Wireframes and mockups will be produced as part of the UX / UI designs. Wireframes are a two-dimensional representation of the app's structure. They communicate how users will interact with the app's interface and give developers an idea as to where elements should be placed. App mockups will also be provided as a deliverable. Mockups are a high-level, visual representation of the app. Mockups show a realistic preview of the app's layout and elements.

- Project schedule:
  - A project schedule will be delivered in phase 2. For each phase, the project schedule will include the phase number, milestone title, dependencies, deliverables, description, resources, and time frame. This project schedule will be used to ensure the project process is on track for reaching its goals.

Phase 3: Implementation

Phase 3 of the waterfall methodology is implementation, which is when the app is coded. The deliverable for this phase is:
- A full stack Android mobile app ready for testing:
  - At this stage, the mobile application should be fully coded and reach all of the requirements. The app should be ready to undergo a series of tests in the next phase.

Phase 4: Verification

In phase 4, the application will be tested to verify that the app is ready to move forward with deployment. The deliverables for the verification phase include:
- Test plan:

- One deliverable is the test plan. The test plan will consist of detailed plans to test the performance and the functionalities of the app. The test plan will also evaluate if the app meets all of the outlined requirements in phase 1.

- Test results document:
  - The second deliverable is the test results document. The document will include the type of test, steps taken to complete the test, and how the application passed or failed.

- Test Analyses:
  - The test analyses are the final deliverable for this phase. The test analyses will determine if the app needs to be updated to pass certain tests or if it is ready to proceed to the deployment phase. If it is documented that a test was failed, this will be interpreted that the app's code needs revisions and to go back to phase 3. If it is documented that the tests were passed and the app meets all expectations, the project will move on to step 5.

Phase 5: Deployment

In phase 5, the student planner app is deployed. At this point, it has gone through testing to ensure it meets all the requirements and now it is available to be used. The deliverable for phase 5 is:
- A full stack mobile Android app:
  - The deliverable for phase 5 is a fully released Android app. The app is deployed to a deployment environment and it is available for users to download.

Phase 6: Maintenance

Phase 6 of the project plan is app maintenance. This stage focuses on upkeeping the app's performance and functionalities after it has been released. The deliverable for phase 6 includes:
- Updates:
  - The deliverable for phase 6 is updates. Updates will include bug fixes, improvements, and any other support the app needs to be able to maintain its performance.

Deployment Plan and Outcomes

Phase 5 of the project plan involves deploying the app to a deployment environment. Phases 1 - 4 must be completed before the app is ready to be released. To recapitulate the phases of the waterfall methodology, the first phase is when requirements for the project are determined. Project and software

requirements set during this stage will be used to determine outcomes for the project. In phase 2, the architecture of the system is designed. Designers create wireframes, design documents, mockups, time frames, and decide the database structure. Phase 3 is the implementation stage. This is when developers code the app, ensuring that it meets all requirements and design expectations. In phase 4, the verification stage, the app will undergo a series of tests to guarantee that that app is reaching all the standards that have been set. The test results and analyses from this phase will be used to decide if the app is ready to be deployed or if it needs to have code modified. If it is concluded that the app meets all specifications, the project proceeds to step 5.

Once the project reaches phase 5, the app will be deployed on Firebase. Firebase is a web app development platform that helps developers build apps and games. They offer a variety of services including cloud storage, database tools, and app hosting. Deploying an application on firebase is a simple process and includes the following steps:

1. Install the firebase CLI
2. Initialize the project
3. Deploy the app

The full, in-depth set of directions for Firebase hosting can be found on their website here. After following these steps, the app will be hosted on Firebase and available to users to download.

Project Timeline

Student Planner Project Timeline					
Phase / Milestone	Dependencies	Deliverable	Description	Resources	Time Frame
Phase 1: Requirements	None	- Project Requirements - Software Requirements	- Determine project and software requirements - Use the requirements to determine the project's deliverables	- Project Manager - Laptop	03/01/2025 – 03/03/2025 2 days
Phase 2: Design	Phase 1 (Requirements) must be completed prior to beginning Phase 2 (Design).	- Design document - UX / UI designs - Project schedule	Determine the architecture and structure of the project	- Project Manager - Designers - Laptop - Canva	03/04/2025 – 03/09/2025 5 days
Phase 3: Implementation	Phase 2 (Design) must be completed prior to beginning Phase 3 (Implementation).	Full stack mobile Android application ready for testing	Use the requirements and design plans to code the app	- Project Manager - Developers - Laptop - Android Studio	03/10/2025 – 03/31/2025 21 days

					Gitlab	
Phase 4: Verification	Phase 3 (Implementation) must be completed prior to beginning Phase 4 (Verification).	• Test results • Test analysis	• Create tests plans to test the functionality of the app • Execute test cases • Use the test results and analyses to determine if the app needs to be modified or if it is ready for the next phase	• Project Manager • QA Testers • Developers • Laptop • Android Studio	04/01/2025 – 04/14/2025 13 days
Phase 5: Deployment	Phase 4 (Verification) must be completed prior to beginning Phase 5 (Deployment).	• Deployment of the Full stack mobile Android application ready for testing	• Deploy the app on the chosen deployment environment	• Project Manager • Developers • Laptop • Android Studio • Firebase	04/15/2025 – 04/18/2025 3 days
Phase 6: Maintenance	Phase 5 (Deployment) must be completed prior to beginning Phase 6 (Maintenance).	• The application meets requirements, functions correctly, and remains available for users	• Maintain the app by performing the necessary bug fixes, updates, and improvements	• Project Manager • Support Team • Developers • Laptop • Android Studio • Firebase	04/19/2025 – ongoing

ENVIRONMENTS AND COSTS

Programming Environment

Hardware:
- Development Machines:
  - Laptops / Desktops
    - To run the necessary software to build this application, a high performance laptop or desktop should be used. The machine should have at least 8GB of RAM, high definition display, internet connectivity, and at least 16GB of free disk space. The emulator on Android Studio will not run if there is not enough available disk space. 8GB of free space is recommended for Android Studio, but it would be best to have more. The recommended development machine is a mobile workstation such as a Lenovo ThinkPad P15.

<u>Software:</u>

- Server:
    - Microsoft Windows Server 2022 or higher
        - The laptops will need to run Microsoft Windows Server 2022 or higher for this project. This software is a specialized operating system designed for building and managing applications. Windows server offers high levels of security, performance, scalability, and networking.

- Integrated Development Environment (IDE):
    - Android Studio
        - An IDE is a software application that helps developers write, build, and test code. This software allows developers to create applications such as mobile apps. Android Studio is an IDE that has been specifically designed to help programmers build Android apps. Since the student planner app is intended to be for Android devices, Android Studio is the IDE that will be used to develop the application.

- Emulator:
    - Android Virtual Device (AVD)
        - To test the app on a device, an emulator will be used. Instead of using a physical phone, Android Studio has a feature called Android Virtual Device where developers can run their app on an emulator. An emulator is a virtual device replica of a physical device. This virtual device will be used to run and test the application.

- Version Control:
    - Gitlab
        - Git lab is a git platform that helps developers manage their application's software development life cycle. It allows developers to track software versions, manage repositories, and collaborate with others. Git lab will be used as the git version control system to manage aspects of this application.

- App Deployment:
    - Firebase
        - Firebase is a mobile app development platform. This software consists of various tools that help developers create, build, host, and improve their apps. The student planner app will be deployed to Firebase.

- Design Tools:
    - Canva
        - Canva is a software used to create a variety of designs. This platform will be used by UX / UI designers to produce wireframes, a class diagram, a design diagram, and mockups for the student planner mobile app.

Environment Costs

The table below shows the startup and ongoing costs. To start, the app will be hosted on Firebase with their free plan. As the app gets more popular, we will upgrade to Firebase's Blaze plan.

Startup Costs	Ongoing Costs

Windows Software Server: $109.99
Android Studio: $0.00
Emulator: $0.00
Gitlab: $0.00
Canva: $0.00
Firebase (Spark Plan): $0.00
	Firebase: Upgrade to Blaze Plan
	● App Hosting Costs:
	  ○ Uncharted Outgoing Bandwidth: $0.20/GB per month
	  ○ Cached Outgoing Bandwidth: $0.15/GB per month
	  ○ Storage: $0.10/GB per month

TOTAL ENVIRONMENT COST
Approximately: $109.99 – $114.49

Human Resource Requirements

The table below shows the estimated costs for human resources.

HUMAN RESOURCES + INDIVIDUAL COST				
Human Resource	Responsibility	Phase Time Frame	Time	Approximate Cost
Project Manager	Phase 1 - 6	03/01/2025 – 04/19/2025 7 weeks	30 - 40 hours per week Work 5 days a week during the designated time frame for phase 1 - 6.	$45 per hour Total Approximate Cost: $9,450 – $12,600

UX / UI Designer	Phase 2	03/04/2025 – 03/09/2025 5 days	6 - 8 hours per day Work during the 5 days designated for phase 2.	$40 per hour Total Approximate Cost: $1,200 – $1,600
Developer	Phase 3 - 6	03/10/2025 – 04/19/2025 6 weeks	30 - 40 hours per week Work 5 days a week during the designated time frame for phase 3 - 6.	$55 per hour Total Approximate Cost: $9,900 – $13,200
QA Tester	Phase 4	04/01/2025 – 04/14/2025 2 weeks	30 - 40 hours per week Work 5 days a week during the designated time frame for phase 4.	$42 per hour Total Approximate Cost: $2,520 – $3360
Support Team	Phase 6	04/19/2025 – ongoing	10 - 30 hours per week Work 5 days a week during the designated time frame for phase 6.	$22 per hour Total Approximate Cost Per Year: $11,440 – $34,320

TOTAL COST FOR LABOR
Approximately: $34,510 – $65,080

TESTING

Validation and Verification

Students need to be able to stay academically organized. The student planner app allows students to track and plan their classes, assignments, and assignment deadlines. To prove that the application has met the defined requirements and sufficiently meets the customer's needs, a series of software tests will be conducted. These tests will take place during the verification phase of the project plan. The software application will be tested with the following tests:

- Unit Testing:
  - Unit testing involves testing the smallest functional unit of a code. The purpose of unit testing is to test individual components of the app, making sure they produce the desired outcome. Testing isolated aspects of the app ensures that the function is working properly. Developers will perform the unit tests. It is their job to write and execute the unit test cases. Unit testing will be used to test several components including adding classes / assignments, deleting classes / assignments, and setting notifications. These functions will be tested by writing unit tests for each of the functionalities. Each unit test will then be executed to ensure each component outputs the expected result.

- Functional Testing:
  - Functional testing is used to verify that the application performs all of the defined requirements. The purpose of this test is to ensure that the app's functions are working as they were designed to do so. Quality assurance testers will perform this test. They will test a number of the app's functions. For example, they will test the ability to add a class, edit an assignment's deadline, and delete an assignment. Quality assurance testers will administer these tests by reviewing a certain requirement, testing that function in the app, and determining whether the test was a pass or fail.

- Integration Testing:
  - Integration testing focuses on the interactions between different components of the app. The purpose of integration testing is to validate that the modules are working together as they are expected. Quality assurance testers will conduct the integration tests for this software application. They will test aspects such as sharing features and notifications. These app functions will be tested by testing the necessary modules as a group. If the modules pass data as they are expected, it can be concluded that the feature tested has passed.

Analyzing Test Results

Test results will be analyzed by using a pass / fail result. Each form of testing will include a test plan. That test plan will consist of the requirement to be tested, preconditions, steps that must be executed, the expected outcome of the function, and the pass / fail result. The test will receive a "Pass" if the requirement being tested produces the expected output and a "Fail" if the test outcome does not match the requirement. For instance, if a developer was performing a unit test on adding a class, they would expect that when they test this section of code, a class is successfully added. If the output of this test matches the tested requirement, this test would receive a "Pass" as its result. On the other hand, if the output of this test failed to add a class, that would mean that the requirement is not functioning as it should. In this case, the test would receive a "Fail" as its result.

The pass / fail result will be used to determine if the mobile application is ready to proceed to phase 5 of the project plan or if the code needs to return to phase 3 to be revised. The software application must receive a "Pass" on all of the tests conducted. Any tested aspects of the app that receive a "Fail" on their test results must return to the implementation phase and have the code modified. The newly updated code must then be tested again. Once the app receives a "Pass" on all unit, functional, and integration tests, it will move forward to the deployment stage.