Project Proposal Report

(Phase 4)

**APSC-100: Written submission checklist**

🗹 Assignment instructions read and all requirements met

🗹 Computer spell-check/grammar check on document

🗹 Complete document reviewed and proofread by all team members

🗹 Grading rubric attached at end of document and self-assessed

🗹 Team members reviewed the academic integrity expectations

🗹 “We do hereby verify that this report is our own individual work and contains our own original ideas, concepts, and designs. No portion of this report has been copied in whole or in part from another source, with the possible exception of properly referenced material.”

**Project Title: Clark Hall Loyalty Rewards Smartphone App**

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**Date submitted:** March 25th 2014

**Executive Summary**

The objective of this project is to design a marketing app for Clark Hall Pub. The goal is to increase Clark’s popularity and allow students easier access to the events that are available. Due to the limited time and knowledge our group has for this project, we hope to have a basic functioning app by the end of the winter term. This would include pages on the app for history, contact us, events and a main page. Also including a check-in feature that will count how many times an individual has gone to Clark which can then be redeemed for loyalty rewards. There are different solutions possible for the application including different phone platforms as well as different communication methods for the check-in system. The connection options include NFC, Bluetooth and QR codes, where their availability depends on the phone platform. The three platforms in consideration for the app are Android, iOS and Windows. Since all of these have the QR code reading capabilities, QR codes are the best solution for the check-in feature. We will design a public app for customer use and an administrative app for use by the pub’s employees. The administrative app will include a simple design and will generate a QR code every hour that can be read by the public customer app. The administrative app will also be able to generate a unique QR code that subtracts the desired amount of loyalty points whenever a prize is redeemed. The app will be designed for Android initially because Java has online tutorials and can be coded on any computer operating system. In the future if the app is successful, the app can easily be branched out to other devices. Android has an accessible way to test the apps without actually publishing the app to the Google Play Store. This allows for quick and easy testing throughout the coding process. Upon completion, the development fee for Android is also less expensive than iOS and very close to that of Windows. Android will also reach out to a larger population of smartphones than either iOS or WIndows making it a strong start for this project. Our final approach to this project will be to code the app for Android and to use QR codes for the check-in feature. To make sure all of the project conditions have been met there are a few ways to test the application. This includes initially testing the application using the built in phone emulator that comes with the Eclipse coding software. The app can then be tested on a team member’s actual device and the QR code check in feature can be tested in a number of lighting conditions. Lastly, we will grade our working model with a weighted evaluation rubric we created in this report. By satisfying all these conditions our team hopes to successfully meet the clients’ needs and provide a working application that can enhance the Clark Hall Pub experience.

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# Section 1: Problem Statement and Scope Definition

## Stated Needs of the Client

The manager of Clark Hall pub gave the teams flexibility with developing the app. There were no specific requirements for the design of the app except the hopes for a functioning marketing app for the pub. The implementation of a check-in system is desired for the finished product. The hope is that when people go to Clark they will be rewarded points which in turn can be redeemed for loyalty prizes such as hats or bottle openers that they receive from companies. Giving away free alcohol is not something that Clark Hall can legally do, so alcohol will not be a part of the rewards of the loyalty rewards. This is why merchandise companies give Clark and Clark merchandise will be the main item given away as a reward. The management mentioned how previously there was a Bluetooth check-in implemented. The range for the Bluetooth exceeded the barriers of Clark and people in the bookstore were able to check in without actually going to Clark Hall.

## Stakeholders

* Clark Hall
  + The app being created is representing Clark Hall Pub, making it a main stakeholder in the project
* Clark Hall employees
  + The employees of Clark Hall will need to know the check-in system that is being implemented. They are also the people representing Clark Hall in the venue.
* Queens students
  + They will be the people attending Clark Hall and the main target audience.
* Queens staff
  + The app will also be representing Queen’s University not just Clark Hall.
* Societies within Queens University
  + There should not be any controversial topics towards other faculties or societies within the app
* Residences of Kingston
  + Clark is a part of the Kingston community and will need to represent the community properly.
* Smartphone users
  + The app will be available to more than just the students of Queen’s University.

## Problem Statement

Our goal is to make an app for Clark Hall that will help promote Clark Hall Pub appropriately, and have a working check-in function within the app. The design of the app is aimed to represent what Clark is. The app will include some notable symbols and colour schemes that Clark is known for, such as the Clark Decagon logo and be primarily a black and yellow layout. One aspect of the design which needs to be addressed early on in the development of the app is which operating system we will be designing the app for Along with the layout of the app, a budget was given to each group. The project needs to stay within this budget that has been set. This should not be a difficult task due to the minimal costs involved with programming an app. This will be decided through the basis of the accessibility people will have in acquiring the app. This includes the number of people that will have the certain operating systems around campus. These were taken into account in Section 4, Decision Making. A breakdown of the criteria was made and a point system was used.

## Project Scope

As highlighted in the problem definition, the client has asked for a marketing app for Clark Hall Pub. The team has limited time to work on this project as the timeline only gives us until the end of the winter term. Therefore the team has made important decisions on what is believed can be accomplish throughout the project. We will initially be researching components on how app development works, what type of systems are available for loyalty rewards, how a “check in” system could work. This research can be viewed in section 4 of this project. Once research is completed the team will learn how to code an app. Due to a lack of knowledge in this field, restrictions on how detailed the final application will be have been made. We do believe we can produce a working application by the end of the project timeline. The app will be able to consist of details about different events at Clark Hall Pub, as well as a history page on the details of the pub’s past. Additionally the app will include a contact page which would also include operating hours. The largest aspect of the app that being strived for is to fulfill the check-in function. This would allow Clark Hall Pub to give royalty rewards based on how many times a customer visit the venue. Although the team is still considering multiple options for the check in system, this system is an important part of the application and will hopefully be operational by the end of the project. If all these tasks can be completed within the timeline, then additional components will be added to the app. Such components may consist of a screen that lets the customer know how long the line-up is to get into events or a screen that lets a user track how many times he or she has attended the event “Ritual”.

## Project Success

A reasonable goal that has set for the end of this project is to have a functioning prototype for the app; along with a check-in function that works. This check-in function will be limited to the reading of a QR code. Due to time limitations this is a more reasonable final project to be aiming for rather than the entire check-in function. Resources such as tutorials and open source code should make more difficult portions of the coding, like creating a QR code reader and generator, easier. The majority of the project is going to be coding, this is why we see it fit to have at least a prototype to show for our work come final presentation day. The check-in function is more lenient, having a working function is the goal. A model of what we have in mind will have to suffice if the time constraints restrict the end product. The clients main concern was for the check-in system to be accessible for all smartphones and reaching out to everyone on campus. With the QR code being the focus, this does not exclude anyone due to all smartphones having this capability, satisfying the clients’ main concern. The app itself will only be implemented to android for the sake of time given. Further development for other platforms would not be difficult if the app is successful on android first.

# 

# Section 2: Information Summary

## Relevant Resources

**Time Management [1]**

The following teaches how to successfully manage time while attending school. By designating times for things like studying and other school related topics is a good place to start. Keep the blocks short so that you do not get distracted from your main goal. Accounting for the times when you are most productive is a good idea also. Taking short breaks is a good idea to keep your mind fresh with new ideas. Prioritizing the workload helps to complete the more difficult tasks with success. This allows you to do these harder tasks while your mind is still fresh and energized. Aiming for good, not perfect is a good idea. Editing can be done along the way to make things like projects better by the deadline. Identifying tutors or other sources that understand the material will help if you may find yourself stuck at a certain point. Using little blocks of time, such as riding a bus, to go over a day’s work is a great way to keep the material fresh in your mind. This can lead to a greater understanding of the material. Keeping track of deadlines by using planners or to-do lists ensures that you are aware of the amount of time that you have to finish your work. This works better when looking at the short term, meaning daily or weekly.

**Coding Resources [2]**

This resource is a book which will help with the process of coding an app. *Android Application Development for Dummies* provides the help for making ones first application, while still having many features. The book also outlines the help Eclipse provides for developing an app. There are step-by-step instructions on which SDK’s to also use with Eclipse, designing a user interface, and other knowledge that would be helpful for this project. The book also covers how to make revenue of the app once in the Google Play store, after the twenty-five dollar fee required to be able to publish the app in the first place. Conveying this information to the client helps for them to see the benefits that the future could hold for this application. The Play store also does not have an approval process, allowing for quick and easy access to publishing upon completion. This flexibility is something that the Apple App Store does not provide. Being that Apple has an approval process before publishing an app to the store.

**GitHub [3]**

A third tool that our team was interested in researching was GitHub. GitHub is a free application for your computer that allows multiple users to access the same code. GitHub is one of the leading code sharing sites because of its great terms of service, which allow you to retain total ownership of any projects you upload. A key feature is that two members of the team can be working on the same project (in this case our Clark Hall Pub application) and save their work without losing another’s work. GitHub uses Git to complete this multiple user-coding task but creates a friendlier environment for the user, rather than just using Git separately. The website also explains the common jargon people use when communicating on GitHub as well as Git specific commands which are needed to be able to use the software. The document summarizes the process on how to get started using the software.

**Eclipse [4]**

The software that the team has decided to use for programming the app is known as Eclipse. Eclipse is a free program with an integrated development environment (IDE) for Android app development. The document found includes a tutorial on how to use Eclipse to program in Java. Eclipse walks the reader through the development process while still having access to coding aids and debugging tools. Eclipse is the type of program or similar to that of which industry would use when developing an app. The document provides a loaning library that keeps track your own library of books and let you know who is currently loaning a book. The document also has videos associated with it to further help the team. This visual aid will help when it comes to the learning of the Java language. Highlights from the lessons would be making a Java class, using the Test-First development in Eclipse, creating the different classes required and creating the main method and JAR file.

**Application of QR Codes [5]**

A QR code is a type of barcode that can be read by smartphone cameras. They were invented in 1994 by a Japanese company called Denso-Wave. QR stands for quick response because the data contained in a QR code can be decoded very quickly. QR codes can hold more information than a regular barcode because there is more surface area for data to be stored. QR codes are typically found on advertisements such as billboards, posters and storefront displays.  They allow companies to link to their websites and provide more information on the product they are advertising. Their popularity as an advertisement tool is due to the codes being very inexpensive and able to be mass-produced quite easily. QR codes are fairly easy to generate as there are many websites and free browser applications that can turn a website URL into a QR code.

**Loyalty Rewards and Alcohol [6]**

There are a very specific set of rules and laws that citizens must abide to when dealing with alcohol. These rules are especially important when it comes to loyalty reward systems. Since, the managers of Clark Hall Pub have asked us to create an application based around a loyalty rewards system to the pub, there are several alcohol laws that can be applicable to this case. In order to be a loyalty rewards system, there must be a type of reward that is given out to the public. A law that can interfere with this is that it is illegal for a licensed bar or restaurant in Ontario to give away alcohol to the public, free of charge. This means that there will definitely have to be an alternative reward in order to stay within the law. Another law that supports alcohol as a non-reward is that there is a law that states that an organization should not pressure or encourage people to drink.

**Android Platform [7]**

Android has been growing in popularity over mobile phones and tablet computers due to the versatility that Android offers. Android is available on a range of devices from different companies over a wide price range. Using an Android SDK is completely free and many tutorials have been made to help develop an Android app. The code can be customized with the OS to meet the needs that one might have. Publishing an app to the Google Play store only costs a one-time fee of $25 which is set to ensure a standard of quality from developers. Android also supports 3rd party applications if you still do not wish to pay the fee while just developing an app. This leads to a drawback of Android being considered less secure than a platform like iOS. A benefit is being able to get the app out to a wider range of devices and gain a large user base. Android also covers all the possible check-in system functions that would be applicable to this project. Android supports Java, which alone is a powerful coding language.

# Section 3: Conceptual Design Solutions

As stated in the problem definition, our team has been asked to develop a marketing application for Clark Hall Pub. To do this our team has come up with many solutions for the problem. The solutions involve two steps. The first step involves choosing the appropriate operating platform for the application. This includes three different solutions: Android, iOS, and Windows Phones. Each mobile phone platform has its own benefits and disadvantages as discussed in section 4 of the report. The second step is choosing the check-in feature respectively for each operating platform. These include Bluetooth, QR Codes and NFC. Not all platforms have all three communication options available, which is why platforms such as Android are preferred because it is compatible with all three communication options.

The available combinations of design solutions are as follows:

* Android platform using Bluetooth communication
* Android platform using NFC (Near Field Communication)
* Android platform using QR codes
* iOS using Bluetooth communication
* iOS using QR codes
* Windows platform using Bluetooth communication
* Windows platform using NFC
* Windows platform using QR codes

A flow chart visually describing these solutions can be found in Table 4 in appendix.

Most important Costs and Benefits of each design solution:

* QR code
  + A device needed to display QR codes in the pub. (monetary cost)
  + Codes would need to be renewed hourly. (non-monetary cost)
  + Available on all platforms. (benefit)
* Bluetooth
  + Would need a permanent Bluetooth enabled smartphone at the pub. (monetary cost)
  + Accidental check-ins may occur due to long range (33 feet). (non-monetary cost)
  + Customer can keep their smartphone in their pocket and still be checked in. (benefit)
* NFC
  + Only works with Windows and Android. (non-monetary cost)
  + Customer can easily check in by tapping their phone against the NFC tag. (benefit)
  + Secure connection due to close range. (benefit)

Platforms:

* Windows
  + Least expensive development fee. (benefit)
  + Small market share. (non-monetary cost)
* iOS
  + $100 development fee. (monetary cost)
  + Can only be coded using Macintosh Computers. (non-monetary cost)
  + High local market share at queens. (Benefit)
* Android
  + High market share. (benefit)
  + $25 development fee. (monetary cost)

A more detailed Cost and Benefit table can be seen in Table 2 of the appendix.

# Section 4: Decision Making

The check-in system can be implemented with the following methods. The ideal method is the one that is cross-platform, capable of being used for a check-in system as well as inexpensive, reliable and easy to maintain. If a method is cross-platform it means that it can be implemented on the three major mobile operating systems (iOS, Windows Phone, and Android). A check-in capable method means that the method can be used to implement a check-in system. An inexpensive method is one that has a small start-up fee or no start-up fee. A method is considered reliable if it is easy to maintain and if it is secure such that it cannot be abused to receive additional rewards. These criteria will be evaluated by comparison against each method. Two points are awarded for being the best method in a certain criteria, one point for being second and zero for being third. A tie is one point. If one method is not part of a tie it receives no points.

Table 1 – A score table for the potential methods.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Method | Check-in Capable | On All Main Platforms | Additional Cost | Reliability | Total Score: |
| NFC | Yes. | No. | Minimal-NFC chips. | Short range, very secure. | 3 |
| Bluetooth | Yes. | Yes. | Moderately expensive needs Bluetooth enabled device. | Large range, not very secure. | 2 |
| QR | Yes. | Yes. | Moderate. Codes free to generate but device still needed to generate them. | Short range, fairly secure. | 3 |

The results show that QR codes and NFC are tied for the best method to implement as the design solution as they tie for number of points after examining the main criteria of the final solution. To break this tie one piece of criteria (Cross-Platform capability) will be given a higher weighting. As a result, QR codes are considered the best solution because they are cross-platform and NFC is not.

# Section 5: Design Proposal

Two apps will be developed, one for the customers of the pub and one for the staff. Both applications will be developed for use on an Android smartphone. The staff's application will be a very basic application that will generate a new QR code every hour. This code will be read by the customer's application. The QR code will store the current date and time of the phone it is running on. The application will also generate a QR code that stores the number of loyalty reward points to subtract from a customer's account when they are redeeming them for a prize. This two app system is just an idea for the future, a user interface for the customer app will be developed. The available time and limited knowledge on coding java limited the final product that the team was able to create.

The customers’ application will have five main pages, a check in page, an events page, a history page, an account page and a contact us page. An example of the proposed menu is included in the appendix Figure 2. The check in page will be a QR code reader that scans the staff's application using the device's camera. Once the QR code has been scanned the current date and time on the phone will be compared to the date and time the QR code was generated. If date is the same and the time is within one hour of the time the QR code was generated then one reward point will be added to the user's account. The events page will consist of a twitter feed that shows the latest tweets from Clark Hall's twitter account. This will allow for user's to stay updated without maintaining a server that updates a page on the app. The history page will contain background information on the pub. The contact us page will contain the pub hours and all the contact information. The account page will show the user their current number of loyalty reward points and allow them to redeem them for a prize. When redeeming them, a QR code reader will open and allow the customer to scan a QR code from the staff's application. The number of points the staff has entered into their app will be subtracted from the user's account and the user's new total will be displayed.

The two app system will allow us to focus our time on learning how to code in Java. This approach avoids the use of servers, which will simplify the system's use for not only the users but for the employees of the pub. Accessibility is a main concern for the client, the pub didn't want to exclude customers based on the type of phone they had. The QR code design will be able to be expanded to any smartphone with a camera if it is a success on Android.

# Section 6: Implementation

As our final design solution, a smartphone application was created for Clark Hall Pub. At the beginning of the semester, information and research were collected in order to begin to design the application. Different solutions were determined from this information. The next step to the procedure for finishing this project was to learn how to code using the Eclipse application and Java language. Learning to code was accomplished by looking at video tutorials on the internet and by asking various people for help. There was also some knowledge that was learnt through APSC 142, Introduction to Programming. After deliberation, a design solution was chosen. The application would be coded for Android phones and the check-in system would use QR coding.

There are not many deliverables that result from this project. The smartphone application is the only deliverable outcome. The application itself is not yet ready for public use as the application is still in the process of being coded. The group will continue to work on the application so that it will meet expectations that have been set. After the application is completed, the recommendation for the future of the project would be to invest in a smartphone or device that can act as the QR code generator that is needed for the check-in system.

In creating smartphone applications, there are a variety of factors that can be incorporated throughout the process. Smartphone applications are usually a social factor in itself as people use them to network and communicate with one another. The application created within this project is a loyalty rewards system. This means that when using this application, one will be encouraged to participate in Clark Hall Pub events and their regular bar nights. Clark Hall Pub can also benefit greatly from this social application as it is a good way to publicize the pub. There are no environmental factors that can be incorporated into the outcome of this project.

# Section 7: Project Plan

It was originally planned to have a fully functioning marketing application for Clark Hall Pub by the end of this project. However due to time constraints and coding difficulties not all the features were able to be implemented in the prototype. A completed fully functioning prototype would include five different pages (Account, Check-In, About Us, Contact Us, and an Events page). An administrative application would also need to be programmed in order to allow new QR codes to be generated each hour. Unfortunately only the interface including the five pages was successfully completed in the time allotted.  Therefore the check-in feature which includes an in-app QR code scanner would still need to be coded as well as the details on the account page which records the user’s loyalty rewards. If our team were to do this again, we would allow more time for learning to code as this took a significant amount of time.

Our team has researched QR codes and know that they are able to store information such as full student name, student number, the current time and the amount of loyalty points. This would allow the client to look into creating an administrative application that creates a new QR code every hour with 1 loyalty point associated with the code. The customer application can then scan this code and redeem the loyalty point as long as they have not already redeemed that day and if the code was created within an hour. These measures should be put in place so that customers cannot redeem more than one point per event and old codes cannot be redeemed. Our team’s prototype shows that a possible design interface with most of the required features such as information about events at Clark Hall Pub. The client can use the information provided as well as the prototype to develop the check-in feature and administrative application.

An updated Gantt chart can be found in the appendix in Figure 3 showing the updated timeline used for the project.

## Work Breakdown

There were three major tasks that must be completed in order to reach success in the project. Each of these major tasks also have sub-tasks that have been completed by certain team members. None of the tasks have monetary costs associated with them. The only monetary charge would be publishing the application once the client is satisfied with the product our team has created.

These include:

* Overall application layout and all pages completed for customer application.
  + Program history page and button
  + Program home page layout and button tabs
  + Program rewards page
  + Program contact us page
  + Program opening screen

A detailed work breakdown of the tasks, including each team member responsible for the tasks to be completed in weeks 7-10 can be found in Table 3 in the appendix.

# Section 8: Economic Analysis

## Non-Monetary Costs and Benefits

The Clark Hall Pub application has the ability to provide excellent marketing opportunities for the venue. The app should be able to attract more customers while being able to reward existing customers that have been supporting Clark. Although the application could provide many benefits as seen above, the most major cost is the time that will be needed to successfully develop the application. Each team member will be required to spend up to 10 hours a week to be able to successfully complete this project in the time frame given. Time is the most substantial cost to the application but the benefits should pay back the time spent creating the app.

A detailed cost-benefit analysis of the project can be found in Table 4 of the appendix.

# Section 9: Evaluation

When comparing the final results with the projected goals laid out in phase 1, an understandable amount of goals were met. The difficulty of some aspects of the coding was not properly taken into account by the group. One part in particular is the QR code reading and generating part of both apps. A user interface was developed which was able to open separate pages for the customer app. This can be added to easily by placing words and pictures on the pages that that would be opened from the main page. The administrative app was left out for the sake of time constraints, along with the complexity of a QR code generator to be added to the application. The Customer wanted the check-in feature to reach out to all platforms of smartphones. The QR code idea presented would meet this requirement since all smartphones with a camera have this capability.

Taking into consideration the time constraints that were present, a reasonable amount of develop was able to be done on the app itself. One of the harder parts is making a user interface, which at this stage was made. The next step in the develop from this stage would be to start adding on to the pages what were needed.

The concept for a final product is in motion; perhaps if the allotted time were larger then further production of the application itself could have been done. A major factor in the hindrance of our abilities to develop a complete application for this project was the lack of experience going into this project from the group.

# Section 10: Conclusions

Our group has been hired by Clark Hall Pub to create a loyalty rewards and marketing application for their business. Three smartphone platforms, Apple’s iOS, Google’s Android and Microsoft’s Windows Phone were examined for their hardware and software capabilities for implementing a convenient check-in system. More specifically, using Bluetooth, NFC (Near-Field Communication), or QR codes was examined for reliability, cross-platform use, cost, and most importantly their ability to be used in a check-in system.  After comparisons were done for each possible option is was determined that QR codes will be the best option for the project. The team plans on coding two applications, one to generate a random QR code every hour (the administrative app for the Clark Hall employee) and another to read that QR code and give loyalty reward points the customer. A project timeline has been created in order to implement this design solution. Each team member has been assigned different aspects of the project to be in charge of. The timeline shows the non-monetary costs that will be invested into the project. Time will be used to learn more advanced coding and to create the applications.

The most important features of the application will be the check-in system, the events page, the history page, and the contacts page. The most important tests that will be done throughout the project will be to make sure the administrative app generates random QR codes at a given interval. The customer app will be able to scan the QR code and properly read it. The costs that will apply to the project will mostly be the developer fees required to publish the final product to the app store. The cost to publish to the Google play store, the Apple app store and the Microsoft Windows store are $25, $99, and $20 respectively.  All the tools required to develop the applications are available for free.

The future of the app could include expanding the app to more than just Android. Once a finished app would be developed, expanding the app to other operating systems would not be the most difficult thing to do. Someone with an understanding who knew what needed to be done could code in the other language for apple. There is also websites for converting apps that are available. Once an open source code for both the QR code generator and the reader is available, they will be added to their respective applications that are in development. This is the goal for the project, and with more time, adding the QR code functions would be achievable and a future consideration for the development of this application.

# Appendix

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## Tables & Charts

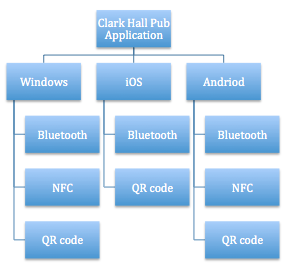


Figure - Flow chart of design solutions.

Table – Cost-Benefit table for possible design solutions.

|  |  |  |
| --- | --- | --- |
| Design Solution | Costs | Benefits |
| Android using Bluetooth | Monetary:  -$25 Development fee  -Would need a permanent phone or Bluetooth device located in Clark Hall Pub.  Non-Monetary:  -Accidental check-ins to the Pub may occur due to long Bluetooth range. | -High market share.  -Convenient for customers as they can just walk in the pub with the phone in their pocket.  -Coding is possible on all operating systems. |
| Android using NFC | Monetary:  -$25 Development fee.  -$10 NFC chip.  Non-Monetary:  -NFC only works with Windows, and Android. Due to the high percentage of iOS devices at Queens the client discussed concern that not having iOS compatibility would be excluding a considerable amount of customers. | -High market share.  -Convenient for customers as they only have to tap their phone against the NFC chip.  -Coding is possible on all operating systems.  -Secure connection due to short range. |
| Android using QR codes | Monetary:  -$25 Development fee.  -A device to display QR codes at the pub.  Non-Monetary:  -Codes would have to be renewed daily. | -High market share.  -Coding is possible on all operating systems. |
| iOS using Bluetooth | Monetary:  -$100 Development fee.  -Would need a permanent phone or Bluetooth device located in Clark Hall Pub.  Non-Monetary:  -Accidental check-ins to the Pub may occur due to long Bluetooth range.  -Can only be coded using Macintosh Computers. | -Convenient for customers as they can just walk in the pub with the phone in their pocket.  -High local market share at Queens. |
| iOS using QR codes | Monetary:  -$100 Development fee.  -A device to display QR codes at the pub.  Non-Monetary:  -Codes would have to be renewed daily.  -Can only be coded using Macintosh Computers. | -High local market share at Queens. |
| Design Solution | Costs | Benefits |
| Windows using Bluetooth | Monetary:  -$19 Development fee  - Would need a permanent phone or Bluetooth device located in Clark Hall Pub.  Non-Monetary:  -Accidental check-ins to the Pub may occur due to long Bluetooth range. | -Convenient for customers as they can just walk in the pub with the phone in their pocket.  -Least expensive Development fee out of all possible solutions. |
| Windows using NFC | Monetary:  -$10 NFC chip.  -$19 Development fee  Non-Monetary:  -NFC only works with Windows, and Android. Due to the high percentage of iOS devices at Queens the client discussed concern that not having iOS compatibility would be excluding a considerable amount of customers. | -Convenient for customers as they only have to tap their phone against the NFC chip.  -Least expensive Development fee out of all possible solutions.  -Secure connection due to short range. |
| Windows using QR codes | Monetary:  -$19 Development fee  -A device to display QR codes at the pub.  Non-Monetary:  -Codes would have to be renewed daily. | -Least expensive Development fee out of all possible solutions. |



Figure - An example home page for the Clark Hall app.

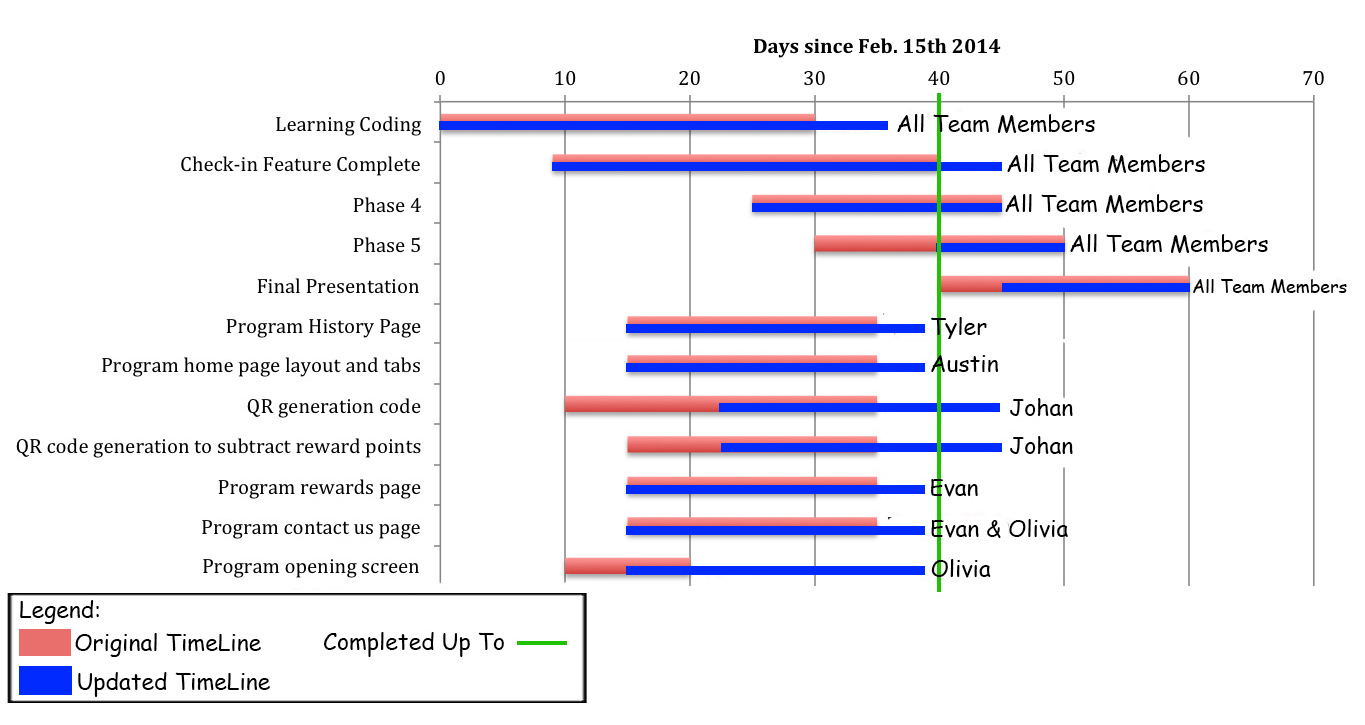


Figure – Gantt chart for project timeline.

Table – Description of tasks needed to be completed and which group member is responsible.

|  |  |  |  |
| --- | --- | --- | --- |
| Task ID Number | Description of Activity | Activity Duration (hours) | Individual responsible to see that activity is completed. |
| 1 | Program history page and button of the customer app | Weeks 7-9  (Est. 4 hours a week) | Tyler |
| 2 | Program administrative app | Weeks 7-10  (Est. 4 hours a week) | Austin and Tyler |
| 3 | Program home page layout and button tabs for the customer app | Weeks 7-9  (Est. 4 hours a week) | Austin |
| 4 | Work on QR generation for administrative app | Weeks 7-9  (Est. 4 hours a week) | Johan |
| Task ID Number | Description of Activity | Activity Duration (hours) | Individual responsible to see that activity is completed. |
| 5 | QR code to wipe rewards for administrative app | Weeks 7-9  (Est. 4 hours a week) | Johan |
| 6 | Program rewards page of the customer app | Weeks 7-9  (Est. 4 hours a week) | Evan |
| 7 | Program contact us page of the customer app | Weeks 7-9  (Est. 4 hours a week) | Olivia and Evan |
| 8 | Program opening screen of the customer app | Weeks 7-9  (Est. 4 hours a week) | Olivia |

Table – Cost-Benefit analysis of the project.

|  |  |
| --- | --- |
| Cost | Benefit |
| Time.   * This application will require a lot of time to be spent learning how to code, designing the actual application and also maintaining it once it is created. | Marketing advantages for Clark Hall Pub.   * By creating a loyalty rewards marketing app, the pub can better market their brand and hopefully get more customers. |
| Maintenance of the App.   * Once the application is developed and published, Clark Hall Pub management will be required to continually update the app to fix bugs, and provide updates on information. | Customers get rewards.   * By using the check in method and visiting Clark Hall Pub regularly it allows the customer to receive rewards, which he or she otherwise would not receive. |
| Reward distribution will have to be tracked.   * Clark Hall Pub will have to track and distribute rewards as the application identifies when a customer reaches certain milestones. | Convenience for Customers.   * Customers would be able to conveniently check the event schedule, operating hours and updates from Clark Hall Pub. |