Crowd Control

Senior Design Final Documentation

Bowtaps

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Overview Statements

0.1 Mission Statement

Our mission at Bowtaps is to develop innovative mobile software applications to provide solutions to inconveniences that trouble the everyday user. With our software, we plan on changing the mobile environment by creating applications that are easy to use with intuitive interfaces and reliable services for everyday use.

0.2 Elevator Pitch

Our company, Bowtaps, is developing an iPhone/Android app to help young adults and event-goers stay in contact with friends while in loud and crowded places using group messaging and GPS features.

Our product, Crowd Control, is designed to become an essential element for groups looking to go out together by providing both powerful group-management tools and interesting nearby outing suggestions, such as local events, concerts, and pub crawls.

We will work with local businesses and event planners to sponsor these suggestions. This will generate content for our users, visibility for our sponsors, and revenue for ourselves.

We plan to release the app for free in early-to-mid summer of 2016.

Document Preparation and Updates

Current Version [1.5.3]

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Revision History

Date	***Author***	***Version***	***Comments***
10/1/15	*Charles Bonn*	*1.0.0*	*Sprint 1 & Senior Design Contract*
11/3/15	*Charles Bonn*	*1.1.0*	*Sprint 2 Documentation*
12/11/15	*Charles Bonn*	*1.2.0*	*Sprint 3 finished, résumés added*
1/15/15	*Daniel Andrus*	*1.2.1*	*iOS documentation added*
1/18/16	*Joseph Mowry*	*1.3.0*	*Winter Sprint Report added*
2/12/16	*Charles Bonn*	*1.4.0*	*Sprint 4 Report, general content added*
2/18/16	*Joseph Mowry*	*1.5.0*	*Sprint 5 Report, various chapter revisions*
2/19/16	*Charles Bonn*	*1.5.1*	*Sprint 5 Report, organizational changes, chapter revisions*
2/24/16	*Johnathan Ackerman*	*1.5.2*	*Overview rewrite*
3/17/16	*Evan Hammer*	*1.5.3*	*Document cleanup, organizational changes*

1

Overview and concept of operations

1.1 Bowtaps and its team

Bowtaps is a start up company out of SDSM&T created by the team members of Bowtaps. Our goal is to create easy to use software applications that help ease the everyday life of the user. Bowtaps currently consists of the members Charles Bonn, Johnathan Ackerman, Daniel Andrus, Evan Hammer, and Joesph Mowry.

1.2 Crowd Control

Our flag-ship product(Crowd Control) is to create a mobile application that combines GPS tracking, group messaging and group management features into one easy to use application.

1.2.1 Purpose of the System

Crowd Control is a mobile application designed to ease the experience of going out though the implementation of integrated group messaging, GPS tracking and group management features. Along with the features to manage your group at the event Crowd Control also gives suggestions of local events, restaurants and attraction. This allows the group to continue even when the next item on the agenda is a mystery.

Even though Crowd Control is designed for the party scene, and people going out to events; it's uses can be expanded to fit more purposes. Crowd Control can be used to help manage any kind of group at an event such as church groups, tour groups, or school field trips.

1.3 Business Need

(TODO)

1.4 Deliverables

(TODO)

1.5 System Description

Behind the UI, Crowd Control is written using an MVC architecture. IOS is written natively in Swift under the IDE XCode. On the Android side, the code is written in Native Mobile Java under Android Studio.

The code for Android uses xml files for layouts which act as the view in MVC. Each activity acts as a controller. Each one of the models has an interface, which is how the controllers get access to the functions and data provided by the model. Each interface is set up in such a way that it uses OOP inheritance to generalize the models, thus abstracting our third party software.

(TODO) IOS??

1.5.1 Integrated Group Messaging

Integrated group messaging is an important feature of Crowd Control. It allows for communication between cross platform, different phone brands, and different carriers. This allows for seamless communication between users with out the issues associated with messaging such as messages not using the same format, messages not going to all recipients, and messages with users in the group that you do not want to have your personal information.

Currently this is handled by a third party called Sinch. Sinch messaging handles the encryption of messages for the security of our users. Also, Sinch uses app to app messaging. In this way, any device with Crowd Control can send a message to other group members. However, since our app is currently only implemented on Android, messages can only be passed between Android users. It only needs either an internet connection or cell service to function.

1.5.2 GPS Location services

GPS allows for tracking of members in the group on a local map of the area. With this feature you will be able to keep track of anyone in the group off of their last GPS check in. This is useful to help locate members of the group that maybe lost or unable to be located. This feature will have the option of being able to opt out when the user does not want to have their location known to the group. When the users battery is low it will allow for the check in period to be extended or turned off to save battery life.

(TODO)

1.5.3 Group Management Features

The group management features allow for information to be shared with the group. A group management menu will allow for a group agenda to be posted as well as updates when the agenda changes. With the GPS features it will allow for the group leader to set way-points for the group.

1.5.4 Suggestions

Suggestions are both a plus for the user and our way of making revenue. Suggestions are sponsored by local businesses in the form of an ad. Although these are not traditional ads, they are in the form of local points of interest such as restaurants, bars, amusement parks, or bowling allies. The possibilities are endless. With the suggestion method it will allow for our users to have helpful suggestions of places for their group to attend as well as exposure for the local businesses that are sponsoring Crowd Control.

1.6 System Overview and Diagram

The basic overview of Crowd Control can be seen in the diagram below. See Figure 1.1. Crowd Control will be using a model-view-controller design structure. With the model view controller design method we are able to abstract the user interface from the control structures that will communicate with the third party services such as Parse, Google play services, or Sinch. The model of each respective operating system (Android or iOS) will be able to communicate with the respective mapping feature (Google Play Services or Apple Map Features). While both models will be able to communicate with Parse, our back end server. Though Parse, using their features, will be able to connect user profiles to their Facebook and twitter accounts for faster log in.

1.7 Technologies Overview

Some technologies used in the creation of Crowd Control are Google Play Services, Apple Map Features, Parse, Sinch, and Android Studio.

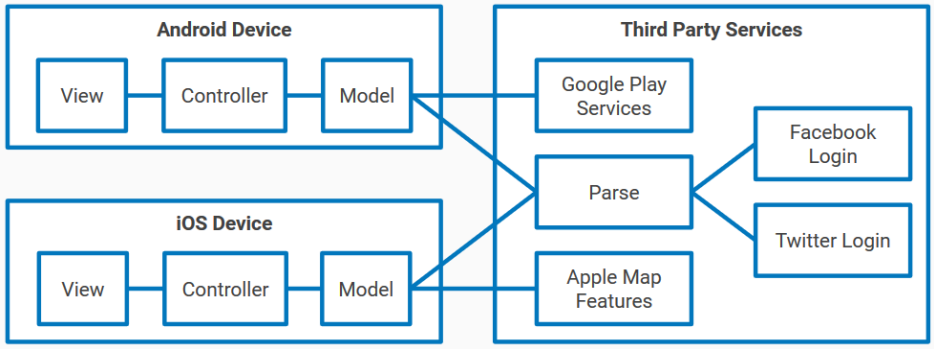


Figure 1.1: Basic System Flow Diagram

1.7.1 Google Play Services

1.7.1.a Description

Google Play Services contains the native android API for mapping features. With this it allows for communication between a map and your GPS location along with other mapping features.
REFERENCE LINK: `https://developers.google.com/android/guides/setup`

1.7.1.b Usage

Google Play Services will be used on the Android device as the default map. We chose to go with Google Play services to give android users a more native feel when it comes to using the mapping features. This allows for a less intrusive feel when it comes to using Crowd Control, will be used for displaying your location on a map, displaying other users in your group on a map, and displaying event suggestions on the map.

1.7.2 Apple Map Features

1.7.2.a Description

Apple Map Features is the native iOS API for mapping features. With this it allows for commiseration between a map and your gps location along with other mapping features.
REFERENCE LINK: `https://developer.apple.com/maps/`

1.7.2.b Usage

Apple Map Features will be used on the iOS device as default. We chose to go with Apple Map Features to give iOS users a more native, less intrusive feel. This will be used for displaying your location, displaying other users from your group, and displaying local event suggestions on the map.

1.7.3 Parse

1.7.3.a Description

Parse is abstracted behind all of our models. Our usage of it is restricted to the functions we provided ourselves though the implementations of our models, keeping all of the actual parse code out of the controllers. Parse gives us access to a web-based database that is fully protected by an experienced third party.
REFERENCE LINK: `http://parse.com/`

1.7.3.b Usage

Parse is abstracted behind all of our models. Our usage of it is restricted to the functions we provided ourselves though the implementations of our models, keeping all of the actual parse code out of the controllers. Parse is

our back-end database. It saves all the group information into a web accessible parse database, as well as storing personal log in information to another Parse database local to the phone. The globally stored information is paced among members of the group, were as the locally stored information is used for automatic log in at the convenience of our users. The web-based storage will also hold all of the location values(though encrypted), and by using a service, will keep those value up-to-date on any given device.

1.7.4 Sinch

1.7.4.a Description

Sinch is a third party, device to device, communication API. We have selected it for its encryption, and ready to use app-to-app messaging platform. This platform will work with either wi-fi connection, or cell service.
REFERENCE LINK: `https://www.sinch.com/`

1.7.4.b Usage

Sinch has its own service to handle the sending and receiving of messages. We have constructed a fragment(with the help of some Sinch code) to control a user interface to grab messages passed by the user. We have also modified the basic one-to-one message sending to send the message to the entire group.

2

User Stories, Requirements, and Product Backlog

2.1 Overview

This section contains the features, creation, and develpment of crowd control. It covers prerequsite user stories, to the design and implimentation of the application its self.

2.2 User Stories

2.2.1 User Story #1

As a user I want to join a public group.

2.2.1.a User Story #1 Breakdown

The user can request to join any public group. Their request will be sent to the group leader for approval. Depending on the group leaders action then the user will be accepted or denied access to the group.

2.2.2 User Story #2

As a user i want to be able to join a private group.

2.2.2.a User Story #2 Breakdown

For the user to join a private group they must first recieve an invitation from the group leader of the private group of interest. Then the user can either accept or reject the invitation to join the group. If the invitation is accepted then the user is placed into the group and then starts sharing information.

2.2.3 User Story #3

As a user i want to see where the other members of my group are on a map

2.2.3.a User Story #3 Breakdown

Once the user is in a group then the user will have access to a map that displays markers representing the locations of all users that are members of the group.

2.2.4 User Story #4

As a user i want to see a list of public groups nearby

2.2.4.a User Story #4 Breakdown

For a user to have quick access to groups nearby that have been listed as public, once the user has logged in a list of public groups near the users current location will be displayed.

2.2.5 User Story #5

As a user i want to have suggestions of local activities and locations.

2.2.5.a User Story #5 Breakdown

Once the user joins a group there will be a tab that lists possible locations and activities nearby the user. These suggestions will be generated by local events and businesses that advertise with Crowd Control.

2.2.6 User Story #6

As a user i want to leave a group.

2.2.6.a User Story #6

Much like joining a group the user would like to leave a group at any time and this process to be as painless as possible. Using a button on the main group page will allow a user to leave the current group for whatever their reason.

2.2.7 User Story #7

As a user I want the abilitiy to login with a custom account.

2.2.7.a User Story #7 Breakdown

For a user to be registered with our system they will have to login. This gives the option for the user to login with a custom Bowtaps login.

2.2.8 User Story #8

As a user I want to login with Facebook

2.2.8.a User Story #8 Breakdown

If the user does not want to create a custom Bowtaps login to have access to our app, then they can login with their facebook account. This gives the user easy access to the app and deals with authentication with facebook.

2.2.9 User Story #9

As a user I want to login with Twitter

2.2.9.a User Story #9 Breakdown

If the user does not want to create a custom Bowtaps login to have access to our app, then they can login with their Twitter account. This gives the user easy access to the app and authentication takes place with Twitter.

2.2.10 User Story #10

As a user I would like to message other members of the group.

2.2.10.a User Story #10

To keep users within our app rather than having to use another app to send a message to the group, the user can access the message tab once inside a group. Then the user can send a single message to each member of the group.

2.2.11 User Story #10

As a user i would like my information protected.

2.2.11.a User Story #10 Breakdown

To users data protection is a major concern. In the app all of the communication is done with user data protection in mind. All of the data being passed back and forth between users will be sent using encrypted strings.

2.2.12 User Story #11

As a group leader I want to be able to create an Itinerary for the group

2.2.12.a User Story #11 Breakdown

The group leader can create an Itinerary for all group members to be able to view. This can contain waypoints or just times when special events in the group will occur.

2.2.13 User Story #12

As a user I want to be able to look at my groups itinerary.

2.2.13.a User Story #12 Breakdown

If the group leader has created an itinerary for the group the users would like access to see upcoming group events and locations.

2.2.14 User Story #13

As a group leader I would like to invite members to a private group

2.2.14.a User Story #13 Breakdown

To join a private group the group leader must send an invitation to the members that would like to join.

2.3 Requirements and Design Constraints

This section contains the requirements and constraints of all aspects of Crowd Control. This includes requirements and constraints for both iOS and Android operating systems, server side, and network.

2.3.1 System Requirements

Crowd Control is being developed to run on two different mobile operating systems, iOS and Android. Although both applications will adhear to the same user stories, some requirements and implementation details differ. Below each operating system is outlined with its specific requirements.

2.3.1.a iOS Requirements

- Use Apple Mapping Features
- Connect with Parse API for backend data storage

2.3.1.b Android Requirements

- Use Google Maps
- Connect with Parse API for backend data storage

2.3.1.c Parse Requirements

- Add users to groups
- Remove users from groups

2.3.2 Network Requirements

Network requrements are mobile networks as this is a mobile applications. The requirement on our part is making sure that the application is able to reach the server and use at little data as possible when connected to the network. Making sure we use as little data as possible will help our users not use all of their data.

2.3.3 Development Environment Requirements

To develop Crowd Control natively for Android and iOS, two different IDEs will be used. For iOS, development must be done on an Apple device. The IDE used is XCode which has all of the necessary SDKs and emulation software to develop and test the iOS version of Crowd Control. For Android, development happens on the Android Studio IDE which like Apple's XCode, also contains the necessary development tools required to develop for Android. Android Studio can be run on either Windows and Mac.

2.3.4 Project Management Methodology

We have set restrictions on the developemnt of Crowd Control and are listed as follows:

- GitHub issues will be used to keep track of current status as well as backlogs for the product.
- There will be 3 total sprints over 2 semesters for this products.
- The sprint cycles are 3 weeks long.
- Progress reports will be summited to Dr. McGough and Brian Butterfeild at the end of each sprint.
- 4 Github repositories will be used for source control, one for each platform, one for the server code, and one for documentation.

2.4 Specifications

Crowd Control is to be built for the two largest mobile operating systems, Android and iOS. This choice was made to support the two most used smartphone operating systems because between these two, they support 94.7% of the smartphone market. Also considering the time restriction of full-time students and the length of Senior Design, the main operating system for development will be Android.

2.5 Product Backlog

- What system will be used to keep track of the backlogs and sprint status?
- Will all parties have access to the Sprint and Product Backlogs?
- How many Sprints will encompass this particular project?
- How long are the Sprint Cycles?
- Are there restrictions on source control?

2.6 Research or Proof of Concept Results

The Proof of concept is a rough design that implements basic features of Crowd Control. Basic features are currently under construction. This is currently a functional prototype with improvements in the future.

Below are screen shots of both android and iOS proof of concepts. (current formatting issues need to fix)

2.6.1 iOS Proof of Concept Screen Shots

Below are screen shots from the iOS version of Crowd Control.

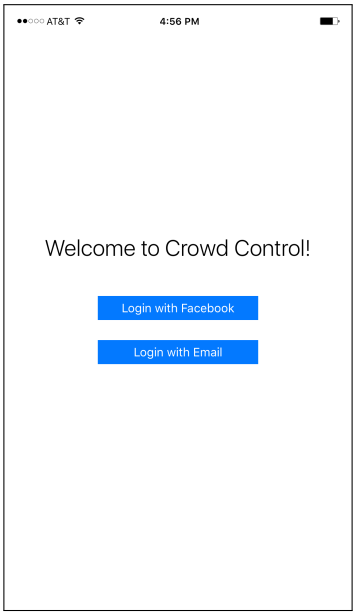


Figure 2.1: iOS login select screen

2.6.2 Android Proof of Concept Screen Shots

Below are screen shots from the Android version of CrowdControl.

2.7 Supporting Material

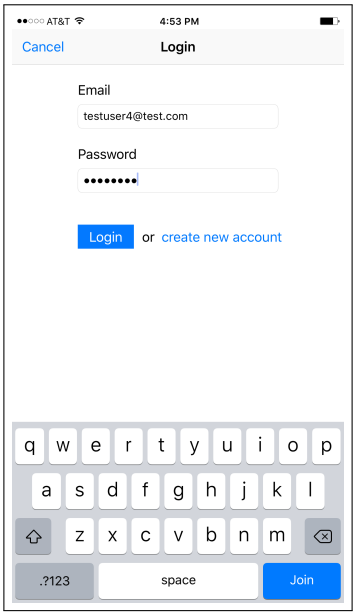


Figure 2.2: iOS email login screen

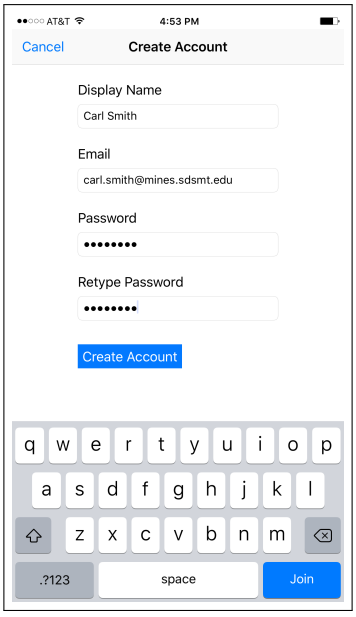


Figure 2.3: iOS create account screen

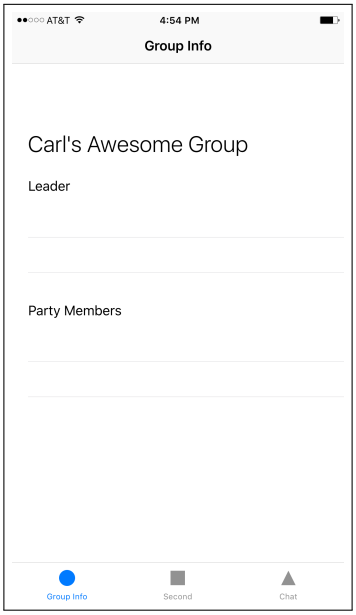


Figure 2.4: iOS group infomation screen

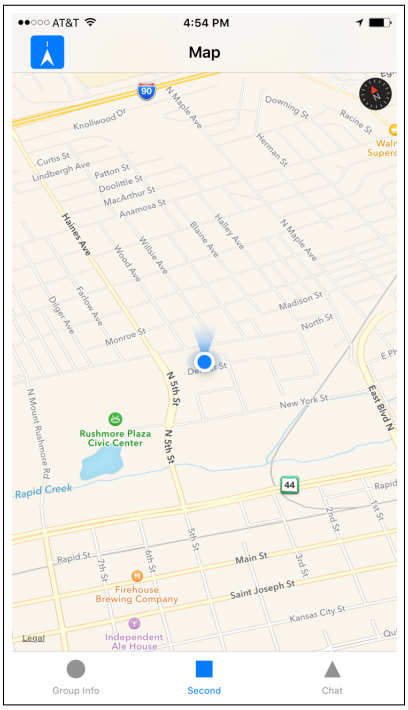


Figure 2.5: iOS map view screen

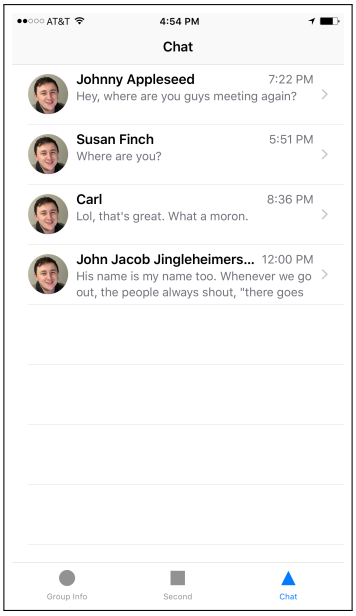


Figure 2.6: iOS messaging main screen

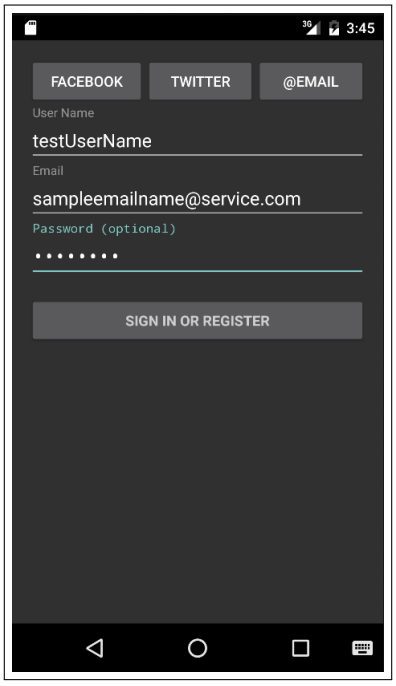


Figure 2.7: Android login screen

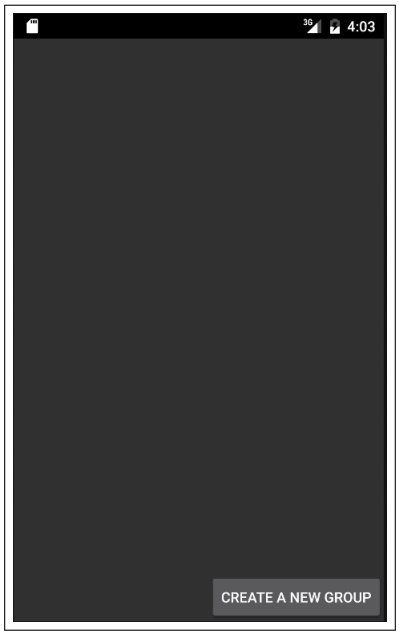


Figure 2.8: Android create group screen

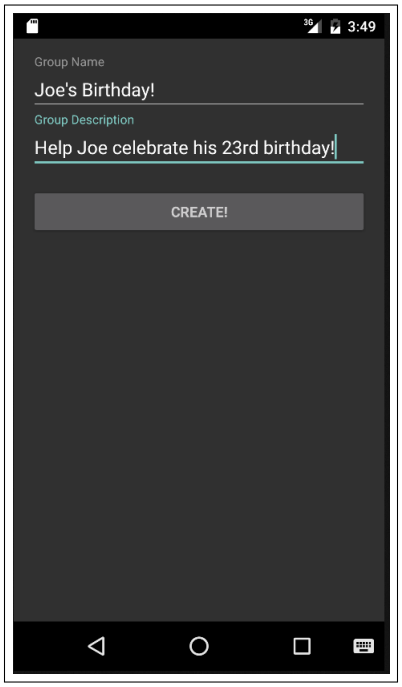


Figure 2.9: Android group information screen

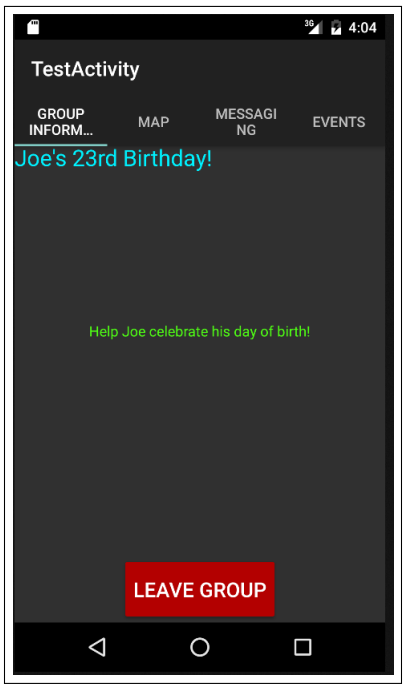


Figure 2.10: Android group join screen

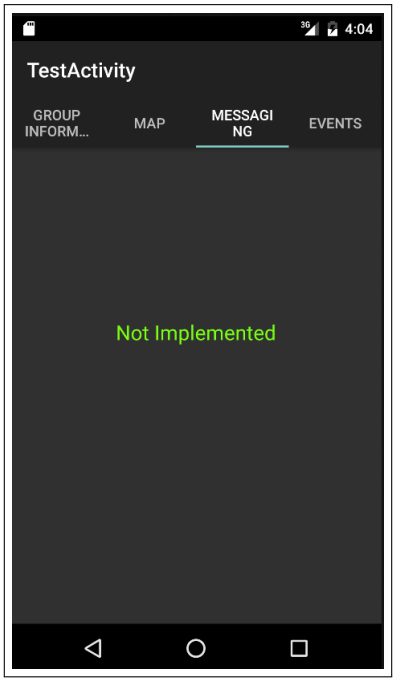


Figure 2.11: Android messaging main screen

3

Project Overview

This section provides some housekeeping type of information with regard to the team, project, environment, etc. Outlined within this section are details involving the development of Crowd Control. This chapter includes details about the team organization and structure. Further included is information outlining the financial aspects and the

3.1 Team Member's Roles

Each team member plays a pivitol role in the development of Crowd Control. Listed below are each members and their corresponding responsibilities within the production of Crowd Control. Some of the duties of each member changed half way through production as development of iOS was halted for more progress on Android. The entire projects duties are outlined below for each individual developer.

Johnathan Ackerman - Johnathan is leading the front end design and messaging implementation for the Android version of Crowd Control. This entails:

1. Creating and designing GUI elements for android
2. Designing messaging Layout
3. Implementing logic behind group join, group info, and messaging views for Android

Daniel Andrus - Daniel for the first half was leading the Gui design ad implementation for the iOS version of Crowd Control. During the second half he worked with Johnathan on Messaging as well as creating our background service. This entails:

1. Creating and designing GUI elements for iOS.
2. Implementing logic behind group join, group info, and map views for iOS
3. Implementing logic behind messaging for Android
4. Creating and implementing a background group service that checks the server for group data updates

Charles Bonn - Charles is leading the database side of Crowd Control. This database is for both iOS and Android versions. This entails:

1. Creating and managing database queries
2. Creating Cloud Code to manage database information
3. Database load testing

Charles is also working on future encryption of data going to and from the database.

Evan Hammer - Evan is leading the back end side for the iOS version of Crowd Control. This entails:

1. Creating links from the database to the mobile application

(a) Login link
(b) Group Join Link
(c) Group Member

2. Creating links to Apple maps to the mobile application

Joseph Mowry - Joseph is leading the back end side for the android version of Crowd Control. This endtails:

1. Creating links from the database to the mobile application
   (a) Login link
   (b) Group Join Link
   (c) Group Member
2. Creating links to Apple maps to the mobile application

3.2 Project Management Approach

Crowd Control was developed using the Agile software development method. The project was split up into 7 sprints each lasting 3 weeks. For the first 4 sprints, each sprint was planned out with goals for each sprint. The last 3 sprints had plans for each week, creating goals for all of the weeks inside of the sprints. To track sprint goals, meeting minutes were used to define each members goals at the beginning of each sprint. Another way to track goals and bugs along the way was to use the GitHub Issue tracker, each issue contained data about the feature or bug and any questions or extra data necessary. All of this was wrapped up in scrum meetings five days a week. Scrum meetings are stand-up meetings usually lasting five to ten minutes were each member would report on what they had accomplished, what they were working on next, and if there were any issues holding back progress.

3.3 Stakeholder Information

The stakeholders of this project were the members of Bowtaps LLC. These five members were the same five members developing Crowd Control, their names are listed above in section 3.1.

3.3.1 Customer or End User (Product Owner)

Who? What role will they play in the project? Will this person or group manage and prioritize the product backlog? Who will they interact with on the team to drive product backlog priorities if not done directly?

3.3.2 Management or Instructor (Scrum Master)

For Crowd Control, Bowtaps chose to make Daniel Andrus the scrum master. His duties included helping guide scrum meetings and helping to break up features into week long goals.

3.3.3 Investors

Currently Bowtaps has not sought out investment from external sources, instead the members developing Crowd Control have done so using funding from other sources. To fund the development of Crowd Control the team has entered into a few competitions with their intellectual property to help generate funds. The team has competed in the South Dakota Governor's Giant Vision, The Innovation Expo, and the Mines CEO Business Plan competitions to gain capitol to cover their current costs.

3.3.4 Developers –Testers

For the term of our development each member of the team was a developer and a tester. This meant that before a member of the team merged their code from their branch to a main branch that they would go through and thoroughly test.

3.4 Budget

Describe the budget for the project including gifted equipment and salaries for people on the project.

3.5 Intellectual Property and Licensing

The intellectual property Crowd Control is owned by Bowtaps LLC which is currently made up of the team currently developing Crowd Control. All source code, documentation and presentation materials are protected by copyright.

3.6 Sprint Overview

If the system will be implemented in phases, describe those phases/sub-phases (design, implementation, testing, delivery) and the various milestones in this section. This section should also contain a correlation between the phases of development and the associated versioning of the system, i.e. major version, minor version, revision.

All of the Agile decisions are listed here. For example, how do you order your backlog? Did you use planning poker?

3.7 Terminology and Acronyms

Provide a list of terms used in the document that warrant definition. Consider industry or domain specific terms and acronyms as well as system specific.

- iOS - Apple's mobile operating system for smartphones
- Android - Google's mobile operating system for smartphones

3.8 Sprint Schedule

Below is a table of dates for each sprint.

Sprint	Date
Sprint 1	9/14/2015 - 10/2/2015
Sprint 2	10/12/2015 - 10/30/2015
Sprint 3	11/9/2015 - 11/27/2015
Sprint 3.5	12/21/2015 - 1/8/2016
Sprint 4	1/18/2016 - 2/5/2016
Sprint 5	2/15/2016 - 3/4/2016
Sprint 6	3/21/2016 - 4/15/2016

3.9 Timeline

Below is an overview of the timeline of the project by sprint.

Sprint	Tasks	Date
Sprint 1	Design UX	10/2/2015
	Design Database	10/2/2015
	Design Application Layers	10/2/2015
	Set up GitHub repository	10/2/2015
Sprint 2	Code UX	10/30/2015
	Create Models	10/30/2015
	Research public/private key passing	10/30/2015
Sprint 3	iOS Login	11/27/2015
	iOS Facebook integration	11/27/2015
	Mapping	11/27/2015
	Work on Group Join	11/27/2015
Sprint 4	thing	Thing

3.10 Backlogs

Place the sprint backlogs here. The product backlog will be in the chapter with the user stories.

3.10.1 Sprint 1 Backlog

- Design UX
    1. Create groups
    2. Leave groups
    3. Group messaging
    4. Start page
- Database
    1. Design database schema
    2. Implement database on Parse
- Design application layers (MVC)
- Set up GitHub repository

3.10.2 Sprint 2 Backlog

- Code UX
    1. Mapping features
    2. Messaging UI
- Model
    1. User Model
    2. Communication Layer
    3. Link back-end and front end
- Implement Cloud code
- Business Plan

3.10.3 Sprint 3 Backlog

- Messaging API
- Join Group Implementation
- Cloud Code
    1. Group Clean Up
    2. User Information Links
- Business Plan
    1. South Dakota Giant Vision
    2. SDSM&T Business Plan Competition

3.10.4 Sprint 3.5 Backlog

- iOS
    1. Login/Logout
        (a) Improved login/sign up screens
        (b) Logout feature added
    2. Settings
        (a) Settings screen implemented
        (b) Logout functionality nested in the Settings screen
    3. Groups
        (a) Leaving/Joining a group implemented
        (b) Basic group operations
        (c) Detect if users are in a group
- Android
    1. Login
        (a) Automatic login on startup (from data store)
        (b) Login to existing account via email address
    2. Settings
        (a) Page layout created and linked from Group Join page
        (b) Logout functionality implemented
    3. Groups
        (a) Leave button implemented
        (b) Tested adding/removing users from groups
- Misc/Transitional
    1. Further documented Android code to prepare for team merge
    2. Android code review with iOS team, to prepare for team merge

3.10.5 Sprint 4 Backlog

Week 1

- Android
  - Begin implementing Sinch
  - Create location and messaging views and managers
  - Design models and manager classes for messaging and location
  -
- Cloud Code
  - Group data parsing started

Week 2

- Android
  - Broadcast/receive messages to/from all members in a group
  - Create a layout for messaging
  - Create a MapFragment to display a map
  - Created buttons overtop the MapFragment to correspond to syncing and homing locations
- Cloud code
  - Leaving and joining groups handled
  - Checking existing email upon login (validation)

Week 3

- Android
  - Retrieve locations of group members, place their locations on the map via pins
  - Update group settings and data when changed
  - Update Group members if someone leaves or joins a group
  - Group messaging unit tests
  - GPS Location unit tests
- Cloud Code
  - Returning group information upon changes
  - Functional Group update indicator complete
  - Basic group functionality implemented fully (login/logout, join/leave groups, update on change)

3.10.6 Sprint 5 Backlog

Week 1

- Senior Design Doc
  - Do a general revision of the doc
  - Business Plan
    - Finish business plan for 2016 Governor's Giant Vision Competition
- Android
  - Model Caching/ Uniformity
  - Clean up appearance

Week 2

- Android
  - Clean up the appearance of the app

  - Display Group Members on group info page
  - Safe group operations(leaving/joining group)
  - Loading animations on homing and syncing
- Cloud code
  - Safe group operations(leaving/joining group)

Week 3

- Android
  - Integration Testing
  - Start Alpha Testing
- Cloud Code
  - test join and leave functionality

3.11 Development Environment

The basic purpose for this section is to give a developer all of the necessary information to setup their development environment to run, test, and/or develop. To develop Crowd Control the team used a few different products to develop, test, and run. For development of Crowd Control for Android, the team used the Android Studio IDE which supports all aspects of Android development. Using Android Studio's Layout Editor to help create the GUI, and using its built in support for Java to code the controller and model layers. The Android Studio download online comes with all of the necessary products to build, run, and test Crowd Control. The iOS development all took place on XCode, an Apple Development IDE, much like Android Studio XCode contains a layout editor and all of the necessary build scripts to build, run, and test the iOS version of Crowd Control. For the back end of development, the team chose to use parse and created two databases on the platform. One database for development and one for deployment. Both databases are wrapped by the app so there is little trouble to switch the code when time for deployment.

3.12 Development IDE and Tools

Describe which IDE and provide links to installs and/or reference material.

Android Android Studio - http://developer.android.com/sdk/index.html

iOS XCode - Xcode can be found on the Apple App Store for free

Parse Parse Accounts can be obtained at parse.com

3.13 Source Control

To manage source control of Crowd Control, Bowtaps is currently using Git, and the server is hosted by GitHub.

3.14 Build Environment

To build Crowd Control there is little difference on the developers end between Android and iOS. On the Android side, Android Studio uses a build environment called Gradle that builds and compiles the source code and packages it into an apk. However for the developer, little has to be done besides running the Gradle scripts to receive an apk. The only thing to note on the Android build phases would be that there must be a match between the Java Version used for building and compilation and the SDK version. This correlation can be found online as new SDK release and as new Java versions are available. On the iOS side there is even less management necessary. For iOS, XCode manages all of the building and compiling of the Swift code. Only at the beginning of a project or upon the choice to update the lowest supported version of iOS are changes necessary to the build settings. However, if needed these settings can be accessed in XCode under the build settings tab.

3.15 Development Machine Setup

To develop Crowd Control for iOS or Android on an Apple device, such as a MacBook or other Apple Product, the only setup required is to download the IDEs necessary. On the windows side however it should be noted that after installing the Android Studio IDE depending on the type of physical device used for testing, there may be necessary driver downloads to interface with Android Studio's built in ADB(Android Debug Bridge). These drivers can be found online either from the manufacturer of the mobile device or some can be found on third party sites depending on the phone.

4

Design and Implementation

This section is used to describe the design details for each of the major components in the system. Note that this chapter is critical for all tracks. Research tracks would do experimental design here where other tracks would include the engineering design aspects. This section is not brief and requires the necessary detail that can be used by the reader to truly understand the architecture and implementation details without having to dig into the code. Sample algorithm: Algorithm 1. This algorithm environment is automatically placed - meaning it floats. You don't have to worry about placement or numbering.

Algorithm 1 Calculate $y = x^n$

Require: $n \geq 0 \vee x \neq 0$
Ensure: $y = x^n$
  $y \Leftarrow 1$
  if $n < 0$ **then**
    $X \Leftarrow 1/x$
    $N \Leftarrow -n$
  else
    $X \Leftarrow x$
    $N \Leftarrow n$
  end if
  while $N \neq 0$ **do**
    if N is even **then**
      $X \Leftarrow X \times X$
      $N \Leftarrow N/2$
    else $\{N$ is odd$\}$
      $y \Leftarrow y \times X$
      $N \Leftarrow N - 1$
    end if
  end while

Citations look like [**?**, **?**, **?**] and [**?**, **?**, **?**]. These are done automatically. Just fill in the database `designrefs.bib` using the same field structure as the other entries. Then pdflatex the document, bibtex the document and pdflatex twice again. The first pdflatex creates requests for bibliography entries. The bibtex extracts and formats the requested entries. The next pdflatex puts them in order and assigns labels. The final pdflatex replaces references in the text with the assigned labels. The bibliography is automatically constructed.

4.1 Architecture and System Design

This is where you will place the overall system design or the architecture. This section should be image rich. There is the old phrase *a picture is worth a thousand words*, in this class it could be worth a hundred points (well if you sum up over the entire team). One needs to enter the design and why a particular design has been done.

4.1.1 Design Selection

Failed designs, design ideas, rejected designs here.

4.1.2 Data Structures and Algorithms

Describe the special data structures and any special algorithms.

4.1.3 Data Flow

4.1.4 Communications

4.1.5 Classes

4.1.6 UML

4.1.7 GUI

4.1.8 MVVM, etc

4.2 Major Component #1

4.2.1 Technologies Used

This section provides a list of technologies used for this component. The details for the technologies have already been provided in the Overview section.

4.2.2 Component Overview

This section can take the form of a list of features.

4.2.3 Phase Overview

This is an extension of the Phase Overview above, but specific to this component. It is meant to be basically a brief list with space for marking the phase status.

4.2.4 Architecture Diagram

It is important to build and maintain an architecture diagram. However, it may be that a component is best described visually with a data flow diagram.

4.2.5 Data Flow Diagram

It is important to build and maintain a data flow diagram. However, it may be that a component is best described visually with an architecture diagram.

4.2.6 Design Details

This is where the details are presented and may contain subsections. Here is an example code listing:

```
#include <stdio.h>
#define N 10
/* Block
 * comment */

int main()
{
    int i;
```

```
    // Line comment.
    puts("Hello world!");

    for (i = 0; i < N; i++)
    {
        puts("LaTeX is also great for programmers!");
    }

    return 0;
}
```

This code listing is not floating or automatically numbered. If you want auto-numbering, but it in the algorithm environment (not algorithmic however) shown above.

4.3 Major Component #2

4.3.1 Technologies Used

This section provides a list of technologies used for this component. The details for the technologies have already been provided in the Overview section.

4.3.2 Component Overview

This section can take the form of a list of features.

4.3.3 Phase Overview

This is an extension of the Phase Overview above, but specific to this component. It is meant to be basically a brief list with space for marking the phase status.

4.3.4 Architecture Diagram

It is important to build and maintain an architecture diagram. However, it may be that a component is best described visually with a data flow diagram.

4.3.5 Data Flow Diagram

It is important to build and maintain a data flow diagram. However, it may be that a component is best described visually with an architecture diagram.

4.3.6 Design Details

This is where the details are presented and may contain subsections.

4.4 Major Component #3

4.4.1 Technologies Used

This section provides a list of technologies used for this component. The details for the technologies have already been provided in the Overview section.

4.4.2 Component Overview

This section can take the form of a list of features.

4.4.3 Phase Overview

This is an extension of the Phase Overview above, but specific to this component. It is meant to be basically a brief list with space for marking the phase status.

4.4.4 Architecture Diagram

It is important to build and maintain an architecture diagram. However, it may be that a component is best described visually with a data flow diagram.

4.4.5 Data Flow Diagram

It is important to build and maintain a data flow diagram. However, it may be that a component is best described visually with an architecture diagram.

4.4.6 Design Details

This is where the details are presented and may contain subsections.

5

System and Unit Testing

This section describes the approach taken with regard to system and unit testing.

5.1 Overview

Provides a brief overview of the testing approach, testing frameworks, and general how testing is/will be done to provide a measure of success for the system.

Each requirement (user story component) should be tested. A review of objectives and constraints might be needed here.

5.2 Dependencies

Describe the basic dependencies which should include unit testing frameworks and reference material.

5.3 Test Setup and Execution

Describe how test cases were developed, setup, and executed. This section can be extremely involved if a complete list of test cases was warranted for the system. One approach is to list each requirement, module, or component and describe the test.

The unit tests are described here.

5.4 System Testing

5.5 System Integration Analysis

5.6 Risk Analysis

5.6.1 Risk Mitigation

5.7 Successes, Issues and Problems

5.7.1 Changes to the Backlog

6

Prototypes

This chapter is for recording each prototype developed. It is a historical record of what you accomplished in 464/465. This should be organized according to Sprints. It should have the basic description of the sprint deliverable and what was accomplished. Screen shots, photos, captures from video, etc should be used.

6.1 Sprint 1 Prototype

6.1.1 Deliverable

6.1.2 Backlog

6.1.3 Success/Fail

6.2 Sprint 2 Prototype

6.2.1 Deliverable

6.2.2 Backlog

6.2.3 Success/Fail

6.3 Sprint 3 Prototype

6.3.1 Deliverable

6.3.2 Backlog

6.3.3 Success/Fail

6.4 Sprint 4 Prototype

6.4.1 Deliverable

6.4.2 Backlog

6.4.3 Success/Fail

6.5 Sprint 5 Prototype

6.5.1 Deliverable

6.5.2 Backlog

6.5.3 Success/Fail

7

Release – Setup – Deployment

This section should contain any specific subsection regarding specifics in releasing, setup, and/or deployment of the system.

7.1 Deployment Information and Dependencies

Are there dependencies that are not embedded into the system install?

7.2 Setup Information

How is a setup/install built?

7.3 System Versioning Information

How is the system versioned?

8

User Documentation

This section should contain the basis for any end user documentation for the system. End user documentation would cover the basic steps for setup and use of the system. It is likely that the majority of this section would be present in its own document to be delivered to the end user. However, it is recommended the original is contained and maintained in this document.

8.1 User Guide

The source for the user guide can go here. You have some options for how to handle the user docs. If you have some `newpage` commands around the guide then you can just print out those pages. If a different formatting is required, then have the source in a separate file `userguide.tex` and include that file here. That file can also be included into a driver (like the senior design template) which has the client specified formatting. Again, this is a single source approach.

8.2 Installation Guide

8.3 Programmer Manual

9

Class Index

9.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

10

Class Documentation

10.1 Poly Class Reference

Public Member Functions

- Poly ()
- ∼Poly ()
- int myfunction (int)

10.1.1 Constructor & Destructor Documentation

10.1.1.a Poly::Poly ( )

My constructor

10.1.1.b Poly::∼Poly ( )

My destructor

10.1.2 Member Function Documentation

10.1.2.a int Poly::myfunction (int *a*)

my own example function fancy new function
new variable
The documentation for this class was generated from the following file:

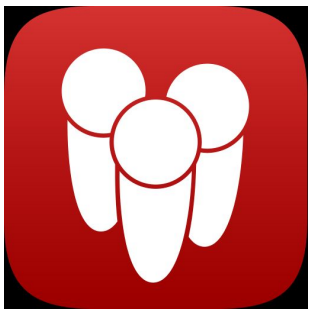
- hello.cpp

11

Business Plan

Crowd Control

Business Plan



BowTaps, LLC

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Johnathan Ackerman: johnny.ackerman@bowtaps.com
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Evan Hammer: evan.hammer@bowtaps.com
Joseph Mowry: joe.mowry@bowtaps.com

%sectionMetrics and Milestones

SDSMT SENIOR DESIGN
SOFTWARE DEVELOPMENT AGREEMENT

This Software Development Agreement (the "Agreement") is made between the SDSMT Computer Science

Senior Design Team: CrowdControl
("Student Group")

consisting of team members: Charles Bonn, Evan Hammer, Joseph Mowry, Daniel Andrus, Johnathan Ackerman,
("Student Names")

and Sponsor: Bowtaps (self)
("Company Name"),

with address: 2326 Lance Street, Rapid City , SD 57702.

1 RECITALS

1. The Bowtaps team will be designing, implimenting, and distributing CrowdControl under the SDSMT Senior Design program.

NOW, THEREFORE, in consideration of the mutual covenants and promises herein contained, Bowtaps and Brian Butterfeild agree as follows:

2 EFFECTIVE DATE

This Agreement shall be effective as of 9/30/2015.

3 DEFINITIONS

1. "Software" shall mean the computer programs in machine readable object code and any subsequent error corrections or updates created by Bowtaps for CrowdControl pursuant to this Agreement.
2. "Acceptance Criteria" means the written technical and operational performance and functional criteria and documentation standards set out in the backlog.
3. "Acceptance Date" means the date for each Milestone when all Deliverables included in that Milestone have been accepted by BowTaps under the supervison of Brian Butterfeild in accordance with the Acceptance Criteria and this Agreement.
4. "Deliverable" means the product requirements specified in the backlog under the acceptance date.
5. "Delivery Date" shall mean, with respect to a particular sprint, the date on which BowTaps will evaluate all of the Deliverables for that sprint in accordance with the backlog and this Agreement.
6. "Documentation" means the documents, manuals and written materials (including end-user manuals) referenced, indicated or described in the project plan or otherwise developed pursuant to this Agreement.
7. "Milestone" means the completion and delivery of all of the Deliverables or other events which are included or described in backlog scheduled for developement and/or completion on a given target date; a Milestone will not be considered completed until the Acceptance Date has occurred with respect to all of the Deliverables for that Milestone.

4 DEVELOPMENT OF SOFTWARE

1. The BowTaps Team will use its best efforts to develop the Software described in backlog The Software development will be under the direction of Its members with the supervision of Brian Butterfeild. BowTaps will deliver the Software to the satisfaction of the course instructor that reasonable effort has been made to design and release CrowdControl as a mobile application. The Team understands that failure to deliver the Software is grounds for failing the course.
2. Brian Butterfeild understands that the Senior Design course's mission is education and advancement of knowledge, and, consequently, the development of Software must further that mission. The Senior Design Course does not guarantee specific results or any results, and the Software will be developed only on a best efforts basis. The Software created will be intened as a beta release for future refinement before the release of CrowdControl.
3. The Senior Design instructor will act as mediator for BowTaps to help guide twords a start up software engineering company

5 COMPENSATION

NONE. This is a company start up with the goals of releasing a mobile application and starting a software developement company.

6 CONSULTATION AND REPORTS

1. Sponsor's designated representative for consultation and communications with the BowTaps team shall be

   _____ Brian Butterfeild _____ or such other person as consultant(s) may from time to time designate to the BowTaps team.
2. During the Term of the Agreement, consultant's representatives may consult informally with course instructor regarding the project, both personally and by telephone. Access to work carried on in University facilities, if any, in the course of this Agreement shall be entirely under the control of University personnel but shall be made available on a reasonable basis.
3. BowTaps will submit written progress reports. At the conclusion of this Agreement, the BowTaps team shall submit a comprehensive final report in the form of the formal course documentation at the conclusion of the Senior Design II course.

7 CONFIDENTIAL INFORMATION

1. The parties may wish, from time to time, in connection with work contemplated under this Agreement, to disclose confidential information to each other ("Confidential Information"). Each party will use reasonable efforts to prevent the disclosure of any of the other party's Confidential Information to third parties for a period of three (3) years after the termination of this Agreement, provided that the recipient party's obligation shall not apply to information that:
   (a) is not disclosed in writing or reduced to writing and so marked with an appropriate confidentiality legend within thirty (30) days of disclosure;
   (b) is already in the recipient party's possession at the time of disclosure thereof;
   (c) is or later becomes part of the public domain through no fault of the recipient party;
   (d) is received from a third party having no obligations of confidentiality to the disclosing party;

(e) is independently developed by the recipient party; or

(f) is required by law or regulation to be disclosed.

2. In the event that information is required to be disclosed pursuant to subsection (6), the party required to make disclosure shall notify the other to allow that party to assert whatever exclusions or exemptions may be available to it under such law or regulation.

8 INTELLECTUAL PROPERTY RIGHTS

Intelectual Property created durind the development, testing, deployment, and updating of CrowdControl. Intelectual Property consists of any documents drafted, products designed, and code written and implimented by BowTaps The Intelectual Property belongs to the developement team, BowTaps, under the direction and guidance of SDSM&T and consultants.

9 WARRANTIES

The BowTaps Team represents and warrants to Sponsor that:

1. the Software is the original work of the BowTaps Team in each and all aspects;
2. the Software and its use do not infringe any copyright or trade secret rights of any third party.

No agreements will be made beyond items (1) and (2).

10 INDEMNITY

1. BowTaps is responsible for claims and damages, losses or expenses held against the BowTaps team.
2. NEITHER PARTY TO THIS AGREEMENT NOR THEIR AFFILIATED COMPANIES, NOR THE OFFICERS, AGENTS, STUDENTS AND EMPLOYEES OF ANY OF THE FOREGOING, SHALL BE LIABLE TO ANY OTHER PARTY HERETO IN ANY ACTION OR CLAIM FOR CONSEQUENTIAL OR SPECIAL DAMAGES, LOSS OF PROFITS, LOSS OF OPPORTUNITY, LOSS OF PRODUCT OR LOSS OF USE, WHETHER THE ACTION IN WHICH RECOVERY OF DAMAGES IS SOUGHT IS BASED ON CONTRACT TORT (INCLUDING SOLE, CONCURRENT OR OTHER NEGLIGENCE AND STRICT LIABILITY), STATUTE OR OTHERWISE. TO THE EXTENT PERMITTED BY LAW, ANY STATUTORY REMEDIES WHICH ARE INCONSISTENT WITH THE PROVISIONS OF THESE TERMS ARE WAIVED.

11 INDEPENDENT CONTRACTOR

For the purposes of this Agreement and all services to be provided hereunder, the parties shall be, and shall be deemed to be, independent contractors and not agents or employees of the other party. Neither party shall have authority to make any statements, representations or commitments of any kind, or to take any action which shall be binding on the other party, except as may be expressly provided for herein or authorized in writing.

12 TERM AND TERMINATION

1. This Agreement shall commence on the Effective Date and extend until the end of classes of the second semester of Senior Design (CSC 467), unless sooner terminated in accordance with the provisions of this Section ("Term").
2. This Agreement may be terminated by the written agreement of both parties.
3. In the event that either party shall be in default of its materials obligations under this Agreement and shall fail to remedy such default within thirty (30) days after receipt of written notice thereof, this Agreement shall terminate upon expiration of the thirty (30) day period.
4. Any provisions of this Agreement which by their nature extend beyond termination shall survive such termination.

13 GENERAL

1. This Agreement constitutes the entire and only agreement between the parties relating to the Senior Design Course, and all prior negotiations, representations, agreements and understandings are superseded hereby. No agreements altering or supplementing the terms hereof may be made except by means of a written document signed by the duly authorized representatives of the parties.
2. This Agreement shall be governed by, construed, and enforced in accordance with the internal laws of the State of South Dakota.

14 SIGNATURES

10 / 6 / 2015

Charles Bonn — Date

10 / 6 / 2015

Evan Hammer — Date

10 / 6 / 2015

Joseph Mowry — Date

10 / 6 / 2015

Daniel Andrus — Date

10 / 6 / 2015

Johnathan Ackerman — Date

10 / 6 / 2015

Brian Butterfeild — Date

A

Product Description

CrowdControl is a group management application that will be an application that has gps features, group messaging, group management features.

1 GPS Features

1.1 Group Members

The Group member gps features will allow for users to track other users in the same group as they are. This will be under user permission to allow other user to see there location.

1.2 Suggestions

The suggestion side of the GPS will take a user or group location and give even suggestions of places to go or things to do in the area of the group.

2 Group Messaging

Integrated group messaging on a single platform uniform to iOS and android.

3 Group Manangement Features

This will allow for members to join a group, add a member to a group, and leave a group.

4 Parse Features

Parse will be used to store user data and group data.

B

Sprint Reports

1 Sprint Report #1

Sprint Report #1

Team Overview

Name

Crowd Control

Members

Johnathan Ackerman, Daniel Andrus, Charles Bonn, Evan Hammer, Joseph Mowry

Project Title

Crowd Control Group Management Mobile Application

Company

Bowtaps

Customer Overview

Customer Description

Bowtaps is a start up company based out of Rapid City, SD. Bowtaps plans on having their initial market presence with the mobile application Crowd Control.

Customer Problem

The design, creation, and marketing of the mobile application Crowd Control along with the creation of the company Bowtaps.

Customer

- GPS mapping of Members in the group
- Integrated group messaging
- Group management features (add/remove members)
- Intuitive UI
- Product testing
- Marketing plan and strategies
- Business plan
- End-user Documentation

Project Overview

The creation of Crowd Control, a mobile application on Android and iOS platforms for group management.

Phase 1

The design of the database and the basic design of the user interface.

Project Environment

Project Boundaries

- Crowd Control will be a free app available for download on the Android and iOS marketplaces.
- The product will be coded in Java (Android) , swift (iOS), and parse (back-end server).
- Source code will be kept in a private GitHub repository.
- Crowd Control will be planned on release by summer of 2016.

Project Context

- There will be 2 versions of the application (one for iOS and one for Android)
- Crowd Control will access a parse server
- Crowd Control will access GPS information

Deliverables

Phase 1

Deliverables will be UX design, database design and implementation.

Backlog

Phase 1

- Design UX
    1. Create groups
    2. Leave groups
    3. Group messaging
    4. Start page
- Database

    1. Design database schema
    2. Implement database on Parse
- Design application layers (MVC)
- Set up GitHub repository

Sprint Report

Work for this sprint included:

- Designs for Create Group page
- Design for Leave Group page
- Design for Group Messaging page
- Design for Start Page
- Design for Database Schema
- Database implementation
- Git Repository Initialization

2 Sprint Report #2

Sprint Report #2

Team Overview

Name

Crowd Control

Members

Johnathan Ackerman, Daniel Andrus, Charles Bonn, Evan Hammer, Joseph Mowry

Project Title

Crowd Control Group Management Mobile Application

Company

Bowtaps

Work Summary

- Code UX
    1. Map Screen
    2. Group info Screen
    3. Group Messaging
    4. Start page
    5. Group Info UI
- Model
    1. User Model
    2. Communication layer
- Research on public/private key passing

Backlog

- Code UX
    1. Mapping features
    2. Messaging UI
- Model

1. User Model
2. Communication Layer
3. Link back-end and front end

- Implement Cloud code
- Business Plan

Successes

Successes have been jumps in the code progress. Testing has been going well and progress has been made towards the end goal.

Issues and Changes

Some issues that have been ran into have been

- Public/Private key passing for increased security
- Differences between iOS and android coding standards not allowing for similar looks between operating systems.
- Testing of mapping features

Team Details

The team is going strong. With a busy semester, not all meeting times have worked out. But with a hard drive, we are working towards our goal of creating an app and starting our own business. We are still currently meeting with advisors to better our business plan and create marketing plans.

3 Sprint Report #3

Sprint Report #3

Team Overview

Name

Crowd Control

Members

Johnathan Ackerman, Daniel Andrus, Charles Bonn, Evan Hammer, Joseph Mowry

Project Title

Crowd Control Group Management Mobile Application

Company

Bowtaps

Work Summary

- iOS
    1. Login
        (a) Create User
        (b) Facebook integration
    2. Mapping
    3. Working on Join Group
- Android
    1. Login
        (a) Create User
        (b) Facebook integration
    2. Mapping
    3. Working on Join Group
- Server
    1. Fixed Connection Issues
    2. User Connections Created

Backlog

- Messaging API
- Join Group Implementation
- Cloud Code
    1. Group Clean Up
    2. User Information Links
- Business Plan
    1. South Dakota Giant Vision
    2. SDSM&T Business Plan Competition

Success

Successes have been group team work towards the business plan competitions on the business side. On the development side was recreating some of the database to increase efficiency with parse. Logging in has been connected to Facebook accounts.

Issues and Changes

Some issues that have been ran into have been

- Public/Private key passing for increased security
- Server connection issues from table to table with group creation
- Changes in the database schema
- GUI updates to more modern standards.

Team Details

With business plan competitions, and the end of the semester, we have all been busy. We have come together to fix issues that where not planned for in the beginning, and furthered development of features in general.

The business plan and business plan competition are coming along well, and allowing us to focus more on the primary goals of the direction of the company, as well as development of Crowd Control.

4 Sprint Report Winter Sprint

Winter Sprint Report

Team Overview

Name

Crowd Control

Members

Johnathan Ackerman, Daniel Andrus, Charles Bonn, Evan Hammer, Joseph Mowry

Project Title

CrowdControl - Group Management Mobile Application

Company

Bowtaps

Deliverables

- iOS
    1. Login/Logout
        (a) Improved login/signup screens
        (b) Logout feature added
    2. Settings
        (a) Settings screen implemented
        (b) Logout functionality nested in the Settings screen
    3. Groups
        (a) Leaving/Joining a group implemented
        (b) Basic group operations
        (c) Detect if users are in a group
- Android
    1. Login
        (a) Automatic login on startup (from datastore)
        (b) Login to existing account via email address
    2. Settings
        (a) Page layout created and linked from GroupJoin page
        (b) Logout functionality implemented
    3. Groups

(a) Leave button implemented
(b) Tested adding/removing users from groups

- Misc/Transitional

1. Further documented Android code to prepare for team merge
2. Android code review with iOS team, to prepare for team merge

Remaining Backlog

Here are the incomplete items/features for this sprint:

- Android
  - Messaging (Sinch API)
  - GPS Location (backend models)
  - Persistent groups through local datastore
- iOS
  - Messaging (Sinch API)

Successes

- Android
  - Login through email
  - Settings page (layout and implementation)
  - Local Datastore (individual automatic login)
- iOS
  - Login/Logout
  - Settings page (layout and implementation)
  - Group functionality written

Issues and Changes

Some issues that we encountered include:

- Android
  - Issues
    * Tried to manually create queries in the Parse API. We were unaware of built-in methods to accomplish the tasks. This set us back a bit.

        * Encountered NullPointerException in the UserModel model. Had to change the structure to use an application global variable.
    - Changes
        * Further development on Settings is now added to the backlog
        * Sign out functionality is now added to the backlog
        * Leave Group functionality is now added to the backlog

- iOS
    - Issues
        * Unexpected complications with database design
        * Layout complications
        * Issues with the underlying data models
        * Parallel programming complications

- Misc/Transitional
    - iOS development will be postponed, in favor of an Android prototype. This is to ensure that Android will meet expectations for the design fair.
    - Team communication and long-distance coordination was difficult.
    - Holidays and vacations imepeded our ability to be productive.

Team Details

Our team fell behind in the first semester, and in an effort to mitigate this, we allocated work towards the Winter Sprint. From here, unsatisfactory progress was still met, and we decided on another large refactor.

For the remainder of our project development, the iOS team will halt development and assist the Android team, so that Bowtaps can guarantee a satisfactory product for the design fair in Spring 2016.

Finally, to hopefully achieve better group management, we have elected Daniel Andrus to serve as acting Scrum Master.

5 Sprint Report #4

Sprint Report #4

Team Overview

Name

Crowd Control

Members

Johnathan Ackerman, Daniel Andrus, Charles Bonn, Evan Hammer, Joseph Mowry

Project Title

Crowd Control - Group Management Mobile Application

Company

Bowtaps

Backlog

The following items/features were assigned at the beginning of the sprint, and worked on throughout its duration. It is broken down by week as such:

Week 1

- Android
  - Begin implementing Sinch
  - Create location and messaging views and managers
  - Design models and manager classes for messaging and location
  -
- Cloud Code
  - Group data parsing started

Week 2

- Android
  - Broadcast/receive messages to/from all members in a group
  - Create a layout for messaging
  - Create a MapFragment to display a map
  - Created buttons overtop the MapFragment to correspond to syncing and homing locations
- Cloud code
  - Leaving and joining groups handled
  - Checking existing email upon login (validation)

Week 3

- Android
  - Retrieve locations of group members, place their locations on the map via pins
  - Update group settings and data when changed
  - Update Group members if someone leaves or joins a group
  - Group messaging unit tests
  - GPS Location unit tests
- Cloud Code
  - Returning group information upon changes
  - Functional Group update indicator complete
  - Basic group functionality implemented fully (login/logout, join/leave groups, update on change)

Documentation and Business Plan work was carried out through all weeks of the sprint, and is ongoing.

Deliverables

During this sprint, these are the items/features from the backlog that were successfully achieved:

- Android
  1. Group Messaging
     (a) Created a Layout
     (b) Used Sinch code to create a service
     (c) Implemented group messaging
     (d) Group messaging is working with no known bugs
  2. Location
     (a) Page layout created and linked from GroupJoin page
     (b) MapFragment has buttons for homing and syncing group locations
     (c) Retrieving the user's location on instantiation of the MapFragment
     (d) User and group locations implemented
  3. Group update service
     (a) Checks for updates in near real-time
     (b) Updates group settings when changed
     (c) Updates group members if someone leaves or joins
- Server (cloud code)
  1. Functional Group update indicator
  2. Returning group update information
  3. Join group function (created but not functioning)
  4. Leave group function (created but not functioning)

5. Check for Existing Email

- Misc/Transitional
  1. Business Plan filled out, also a version tailored towards the Governor's Giant Vision contest (converted to latex)
  2. Documentation done inside and outside of the source code files

Issues and Changes

Some issues that we encountered include:

- Android
  - Issues
    - Permissions to obtain contacts and locations from the device posed a challenge - still not handling the request gracefully
    - Had difficulty implementing a custom AlertDialogFragment that extends DialogFragment, inside of other fragments such as MapFragment, GroupInfoFragment, etc.
  - Changes
    - Added group update service - was not part of original backlog
    - Added user location homing on MapFragment - was not part of original backlog
- Server (cloud code)
  - Issues
    - Cloud functions improperly writing data.
  - Changes
    - Added join and leave cloud functions - was not part of original backlog

Remaining Backlog

The following items/features remain either incomplete or need improvement for this sprint, and will carry onto the next sprint:

- Android
  - Group messaging unit tests
  - GPS Location unit tests
- Cloud Code
  - Testing on Group Functions.
  - Completing Join and Leave functions

Team Details

Here are some auxiliary details about our workflow and division of responsibilities, during the sprint:

Dan and Johnny started off Sprint 4 by working on messaging-related features, while Joe and Evan worked on GPS and map features. Nick focused on the business plan, updating the existing documentation to use the updated layout, and was tasked with installing the Fabric SDK.

For week two of the sprint, Johnny focused on group messaging. Dan and Nick also worked together on cloud code, targeting the leaving/joining groups, and a group update service in Android. Evan wrote a LocationManager class and stubbed out methods, that Joe wrote an interface for and made a UI for in the MapFragment.

Week three continued with Joe and Evan working on various location features, while Dan and Johnny worked on the update service and messaging features respectively. Nick focused on cloud code and business plan/documentation writing.

Additionally, this was the first sprint in which we had Dan serve as acting Scrum Master, to aid in organization and appointment of responsibilities. Though he did officially take this role on during our Winter Sprint (Sprint 3.5), most of us were either working remotely or unavailable, thus we were unable to fully utilize this new organizational change until now.

6 Sprint Report #5

Sprint Report #5

Team Overview

Name

Crowd Control

Members

Johnathan Ackerman, Daniel Andrus, Charles Bonn, Evan Hammer, Joseph Mowry

Project Title

Crowd Control - Group Management Mobile Application

Company

Bowtaps

Backlog

The following items/features were assigned at the beginning of the sprint, and worked on throughout its duration. It is broken down by week as such:

Week 1

- Senior Design Doc
  - Do a general revision of the doc
  - Business Plan
    - Finish business plan for 2016 Governor's Giant Vision Competition
- Android
  - Model Caching/ Uniformity
  - Clean up appearance

Week 2

- Android
  - Clean up the appearance of the app
  - Display Group Members on group info page
  - Safe group operations(leaving/joining group)
  - Loading animations on homing and syncing
- Cloud code
  - Safe group operations(leaving/joining group)

Week 3

- Android
  - Integration Testing
  - Start Alpha Testing
- Cloud Code
  - test join and leave functionality

Deliverables

During this sprint, these are the items/features from the backlog that were successfully achieved:

- Android
  1. Group Messaging
     (a) Discovered and removed a bug
  2. Location
     (a) Moved remote functionality to model manager
     (b) Updated location model to reflect changes
     (c) Caching objects
  3. App Appearance
     (a) Reformatted the entire theme of the app (all pages are based of the same theme now - no more custom themes per page)
     (b) Added a tool bar to the group join page/ removed settings button (now in tool bar)
     (c) Group Information Page
        i. Added a group leader display
        ii. Added padding to appearance of display and modified text sizes
        iii. Displays all group members
        iv. Displays Dialog box if user attempts to leave the group
- Server (cloud code)
  1. Join function
  2. Leave function
- Misc/Transitional
  1. Business Plan revised and submitted to The Governor's Giant Vision Competition
  2. Finalist for The Governor's Giant Vision Competition
  3. Some of the overall Senior Design Doc has been touched up

Issues and Changes

Some issues that we encountered include:

- Android
  - Issues
    * Another bug came up in messaging which took precious time from other parts of the sprint
  - Changes
    * Many code related things were pushed to later in the sprint
- Server (cloud code)
  - Issues
    * Unable to do proper stress tests
    * Unrepeatable errors popped up (could have been a network erro r)
  - Changes
    * added more functions
    * more comments.

This is no excuse, but the team was seriously hindered by the amount of other responsibilities due during this sprint.

Remaining Backlog

The following items/features remain either incomplete or need improvement for this sprint, and will carry onto the next sprint:

- Android
  - Messaging still needs an appearance update for usability
- Cloud Code
  - Testing on Group Functions.
  - Completing Join and Leave functions

Team Details

Here are some auxiliary details about our work-flow and division of responsibilities, during the sprint:

The team focused heavily the first week on the Business Plan.

For week two of the sprint, very little was accomplished due to other responsibilities

Week three: Johnny was able to get many little things in the app to display better, such as more information on the group page. Joe put a lot of work into the theme and got custom pictures displaying in the tabs bar for groups. Evan got the map to function properly with syncing. Dan was able to finally fix the messaging bug. Nicks loud code was created to have safe group alteration functions such as joining and leaving groups.

C

Industrial Experience and Resumes

1 Resumes

Below are the resumes for the group members: Johnathon Ackerman, Daniel Andrus, Charles Bonn, Evan Hammer, and Joseph Mowry.

Johnathan Ackerman

605-877-1757
Johnathan.ackerman@mines.sdsmt.edu
GitHub profile https://github.com/Kiwii12

Education

South Dakota School of Mines and Technology
- **Computer Science Major**
- Start Date: Fall 2012
- Expected Graduation Date: **December 2016**
- Going for a Bachelor's Degree
- Enrolled Currently as a Senior

Central High School
- Graduated 2012

Programs

Team Projects

With Glut and C++, in teams of two, I have made the following:
-Pong (https://github.com/Kiwii12/CSC433_Program1_Pong)
-Solar System Model (https://github.com/Kiwii12/CSC433_Program3_SolarSystem)

In C++
-Simulated a B17 computer (https://github.com/Kiwii12/B17)

In Lisp
-Missionary Vs Cannibals (https://github.com/Kiwii12/missionaryVsCannibal)

Solo Projects

In C++
-WVX playlist creator (https://github.com/Kiwii12/WVX-Playlist-Creator)
-Basic Picture Editor (https://github.com/Kiwii12/Basic_Picture_Editor)

Skills

I have worked in the Operating Systems of Windows and Linux (Fedora and Ubunto)
I am very comfortable in **C++** and **Python.**
I am comfortable in **Android Studios**
I have also done work in SQL, HTML, Assembly, and PHP.

Goals

I wish to work with computer graphics, in virtual reality or augmented reality.

Work Experience

Pizza Ranch – 3 years, currently employed
- Rapid City, South Dakota, 57701
- 605-791-5255

DANIEL ANDRUS

Phone: (605) 269-1728
Email: danieleandrus@gmail.com
Twitter Handle: @deaboy100
Github Name: Deaboy

PROFILE

I am an undergraduate college student at the South Dakota School of Mines and Technology. I have a passion for video games and technology, and my career goal is to become a developer in the games industry, the mobile application industry, or the desktop application industry. I grew up in Los Angeles, California, then moved to South Dakota in Summer, 2010. I attended Black Hills State University for two years before transferring to South Dakota School of Mines and Technology, where I plan to graduate with a bachelors degree of computer science in May, 2016 and immediately begin working in software or game development.

EXPERIENCE

INTERN DEVELOPER, 7400 CIRCUITS — SUMMER 2015 - PRESENT

I held an internship at 7400 Circuits, a circuit board company located in Rapid City. Here I worked to improve an existing an iOS and Android game called *Trouble with Robots*. I also worked on a cross-platform desktop application that interacted via USB with a handheld game cartridge reader and writer that allows users to create and play Neo Geo Pocket and WonderSwan games on their handheld game devices.

SDSMT PROGRAMMING TEAM — 2014 - PRESENT

In fall 2014, I joined the SDSMT programming team and participated in the ACM regional Programming Competition where my team finished 14th in the region out of over 285 competing teams and 1st in the school.

SERVER ADMINISTRATOR, PROGRAMMER — 2010 - PRESENT

Since 2010, I have owned and operated a public game server for which I and another developer have written hundreds of lines of server software to help manage the community. Through this, I have become greatly acquainted with Linux, SSH, and managing small communities.

WEB DESIGNER AND DEVELOPER, BLACKHILLS.COM — 2013 - 2015

In May 2013, I started working for a local web development company as a full-time web developer. The job entailed designing and building websites of diverse sizes and varieties. Many sites were for small businesses located throughout the Black Hills, but a few were for large, high-traffic businesses such as BlackHillsNews.com and Sturgis.com.

INTERN, FTW INTERACTIVE (NOW RED SHED TECHNOLOGY) — SUMMER 2012

I held an internship at FTW Interactive, now known as Red Shed Technology where I worked with experienced developers on mobile app projects. I gained experience working with server and client communications and data processing.

SKILLS

- Programming in the **Java**, **C**, **C++**, **C#**, **PHP**, **Python**, **Objective-C**, and **Swift** programming languages.
- **OS X**, **iOS**, and **Android** development.
- Working with web technologies, including **HTML5**, **CSS**, **JavaScript**, and **PHP**.
- **Designing database systems** using **MySql**
- Working on **team projects**, **object-oriented program design**, and source control systems such as **Git** and **Subversion**

EDUCATION

Black Hills State University, Spearfish, SD — 2010-2012
South Dakota School of Mines and Technology, Rapid City, SD — 2012-2016

PERSONAL INFORMATION

I am good at math, am a fast learner, can pick up on new programming languages and standards quickly, and am a stickler for the proper usage of the word "literally". I can easily adapt to design patterns as well as programming paradigms and am perpetually learning the technologies and techniques employed in the software development, UX design, and games industries.

In my spare time, I enjoy playing and creating video games, creating YouTube videos, and learning more about the ever-changing technology industry. I love spending time with friends who enjoy similar things as I do. My career goals are to go into mobile application design and development, desktop application design and development, or game design and development. My ultimate personal goal with technology is to create applications that make people's lives better.

C. Nicholas Bonn

2326 Lance Street, Rapid City SD 57702
(651) 503-2877 charlesnicholasbonn@gmail.com

Education:

South Dakota School of Mines and Technology, Rapid City, SD — Anticipated Graduation: May 2016
Bachelor of Science in Computer Science — Cumulative GPA: 2.5

Relevant Coursework:

Database	Software Engineering
Cyber Security	Graphic User Interface

Projects:

Crowd Control App – on-going senior design project

Description: a phone app designed to manage groups in a social setting, to track the members of the groups and ease social gatherings

Technical Skills:

Languages:

Proficient in: C/C++, Python, C#
Familiar with: Java, ARM Assembly, HTML/XML, Lisp, Qt Environment, Visual Basic

Other Technical Services:

Databases: SQL Server, MySQL
Platforms: Microsoft Windows (Active Directory), Mac OSX, and Linux

Work Experience:

Discover Program - Rapid City School District, Rapid City, SD — September 2009 – Current
Program Assistant

- Co-leader for after school and summer programs for elementary aged children
- Coordinate activities for 2nd and 3rd grade program
- Tutor children with their homework
- Mentor children and provide a positive environment for learning and activities

TMI Coatings Inc., Eagan, MN — May 2012 – August 2012
Summer Intern

- Traveled to potential clients in Midwest region to collect specifications for job bids
- Drove equipment and job supplies to job sites in the Midwest
- Assisted in shop preparing equipment and supplies
- Oversaw scanning and organization of job components into electronic storage database

Awards:

Butterfield Cup — May 2015

Award from local entrepreneurs to the best mobile app business plan, product and investor pitch

References:

Available upon request

Evan Paul Hammer

402 South St
Rapid City, SD 57701
Phone: 763-257-5060
E-mail: evan.hammer@mines.sdsmt.edu

Objective

Looking for a Full-Time opportunity in a competitive and leading edge company with a focus on intrapreneurship.

Education

South Dakota School Of Mines and Technology, Rapid City, SD **Expected Graduation:** May 2016
B.S. Computer Science; **GPA**: 2.9 August 2009 - Present

Activities:

- Member in Triangle Fraternity, a fraternity of Engineers, Architects and Scientists
- Member of SDSM&T's Society of Mining, Metallurgy, and Exploration Engineers

Experience

Software Developer May 2015 – Present
Golden West Telecommunications, Rapid City, SD

- Used mostly Python and JavaScript for development
- Mobile development with the use of Sencha Touch and Apache Cordova
- Proof of Concept work with SDK's and API's

Operator January 2014 – September 2014
Deadwood Biofuels, Rapid City, SD

- General shop cleaning
- Help with maintenance of equipment and Machines

Night Chaperone/Office Assistant September 2009 - July 2013
SDSM&T Youth Programs, Rapid City, SD

- Work with students attending the SDSM&T Engineering and Science camps.
- Teach the students about Engineering and Science
- Trained all the other chaperones and TA's
- Assisted in general office work

Skills and Interests

Leadership:

- Taught leadership skills to upcoming Boy Scout Leaders at a camp called Grey Wolf
- Eagle Scout

Computer Science:

- C,C++, Python, ARM Assembly, JavaScript, Lisp
- Experience with Native Mobile Development
- Experience with Cross-Platform Development and MVC
- Experience with Open GL
- Operating Systems: Windows, Linux, Mac OS
- Experience in Database Management - MySql, PostgreSql
- Experience with Git and Subversion

Awards:

- Butterfield Cup - 2015

Joseph Mowry

Skills

Computer Languages	C/C++, C#, ARM, SQL, HTML5, JavaScript, Java, Visual Basic, Python (3.X+)
Protocols & APIs	JSON, XML, .NET, REST
Databases	Microsoft SQL
Tools/Misc.	GitHub, Mercurial(Hg), Team Foundation Server, Android Studio, Visual Studio, Xamarin, LaTeX, SQL Server Management Studio

Organizations/Misc

- Educated in over four years of Spanish
- SDSM&T ACM Chapter Member
- SDSM&T Programming Team
- Attended the Black Hills Engineering Business Accelerator
- Awarded the Butterfield Cup for "Excellence in Software Engineering"

Work Experience

Period	**May 2015 — August 2015 (Full-Time)**	
Employer	**Innovative Systems**	Rapid City, SD
Job Title	**Software Developer (Intern)**	
Languages	**C#, SQL, Xamarin.Forms, .NET Framework**	
	Cross-platform mobile development (MVVM) in Xamarin Forms, C# back-end development/stored procedures in MSSQL	

Period	**May 2014 — August 2014 (Full-Time)**	
Employer	**Emit Technologies**	Sheridan, WY
Job Title	**Software Developer (Intern)**	
Languages	**C#, JavaScript, HTML, .NET Framework, SQL**	
	Front-end (web) development in C#, stored procedures in MSSQL,followed MVC development pattern	

Education

University	**South Dakota School of Mines & Technology**	
Major	**B.S. in Computer Science**	
GPA	**2.7**	
Grad Date	**Spring 2016**	(Projected)

2326 Lance Street, Rapid City, SD, 57702 ·
✉ joe.mowry92@gmail.com ☎ (605) 209-0208 ·
https://github.com/jmowry

2 ABET: Industrial Experience Reports

As a group we have attended the SD Engineering Accelerator. We have compeated in multiple business plan competitions including:

- Butterfield Cup
- SD Innovation Expo Business Plan Competition
- 2015 SD Mines CEO Student Business Plan Competition

We also have also have and regular meetings with SDSMT EIR's to help format our buisness plan and Crowd Control.

2.1 Johnathon Ackerman

I have had no Internship experience. However, before the project Crowd Control, I worked with C++, lisp, and python. I have worked with Visual Studios on Windows side, and Vim and G edit in Linux.

2.2 Daniel Andrus

I first learned the basics of web design and development in high school. After my second year of college, I obtained an internship with FTW Interactive (now known as Red Shed Technologies). Later, I hold a position as Web Developer for 2 years before becoming an intern software developer at 7400 Circuits.

My course experience has ranged from data structures, image processing, database design, web development, group projects, computer graphics (including 3D graphics), mobile app development, and even compression.

2.3 Charles Bonn

I currently have little internship experence. What industry experence i do have is HTML. In my personal/professional life i help manage a website and a minecraft server. Though this is work i have worked with HTML and C code. I have also worked with game code that is java based.

2.4 Evan Hammer

I am working for Golden West Telecommunications(GW), a rural telecommunications provider in the state of South Dakota. Since May of 2015 I have been a Software Developer for GW working on both mobile and back-end products. For the mobile side, I have been working with a product called Cordova that is wrapped with another product called Sencha Touch. Together these two products allow a developer to use JavaScript, HTML, CSS and more to produce a mobile application for Android, iOS and many other mobile platforms. I have also written the back-end for this app, using Python and a PostgreSQL Database creating a server-side API for the mobile application. While I am not working on the mobile application I have spent my time working on other in-house products using languages like Python and JavaScript. These projects have ranged from updating existing code to ground-up projects. Also as a Software Developer for GW, I have been tasked with creating some proof of concept work. This work has ranged from testing possible new services as well as testing new platforms for development. My work continues to grow and change as I continue to work for Golden West Telecommunications.

2.5 Joseph Mowry

In his pirior industry experience, Joseph specialized in C# development and database management. His employers gave him a solid footing in AGILE and Scrum methodologies, as well as general product development. Though his experience lies primarily on the Visual Studio/C# side of things, there is a large amount of skill overlap in Android Studio and Java that he can bring to the table for this project.

D

Acknowledgment

As a special thanks we would like to thank Brian Butterfeild. His mentoring has made this project possible. Another thanks goes to Dr. Logar, With out your soft engineering class this would have never been possible.

E

Supporting Materials

This document will contain several appendices used as a way to separate out major component details, logic details, or tables of information. Use of this structure will help keep the document clean, readable, and organized.