Crowd Control

Senior Design Final Documentation

BowTaps

Johnnathon Ackerman Daniel Andrus Charles Bonn Evan Hammer
Joseph Mowry

January 4, 2016

Contents

List of Figures

List of Tables

List of Algorithms

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 with easy to use and intuitive interfaces with 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 in order 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 [X.X.X]

Prepared By:
Team Member #1
Team Member #2
Team Member #3

Revision History

Date	***Author***	***Version***	***Comments***
2/2/12	*Team Member #1*	*1.0.0*	*Initial version*
3/4/12	*Team Member #3*	*1.1.0*	*Edited version*

1

Overview and concept of operations

The overview should take the form of an executive summary. Give the reader a feel for the purpose of the document, what is contained in the document, and an idea of the purpose for the system or product.

1.1 Scope

This document entails the design, implimentation and future plans for Crowd Control by BowTaps.

1.2 Purpose

Crowd Control is a mobile application designed to ease the experence of going out though the implimentation 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, restraunts and attraction. This allows the group to continue even when the next item on the agenda is a mystry.

Even though Crowd Control is designed for the party sceen and people going out to events, it 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 or school field trips.

1.2.1 Integrated Group Messaging

Integrated group messaging is an important feature of Crowd Control. Integrated group messaging allows for communication between cross platform, different phone brands, and different carriers. This allows for seamless communicaton between users with out the issues associated with messaging such as messages not using the same format, messages not going to all recipiants, and messages with users in the group that you do no want to have your personal information.

1.2.2 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 battary is low it will allow for the check in period to be extended or turned off to save battary life.

1.2.3 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.

1.2.4 Suggestions

Suggestions are both a plus for the user and our way of making a monitary developement. Suggestions are sponsored by local busnesses in the form of an ad. Altough these are not traditional ads, they are in the form of local points of intrest such as restraunts, bars, amusement parks, or bowling alllys. 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 busnesses that are sponsering Crowd Control.

1.3 Systems Goals

The goal of this application is to create a group management application with group messaging, GPS tracking, and group management freatures all under a data safe enviroment though encryption.

1.4 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 comminicate with the third party services such as Parse, Google play sercvies, or Apple Map Features. The model of each respective opperating system (Android or iOS) will be able to communicate with the respective mapping feature (Google Play Sercives or Apple Map Features). While both models will be able to communcate with Parse, our backend server. Though Parse, using their features, will be able to connect user profiles to their facebook and twitter accounts for faster loggin.

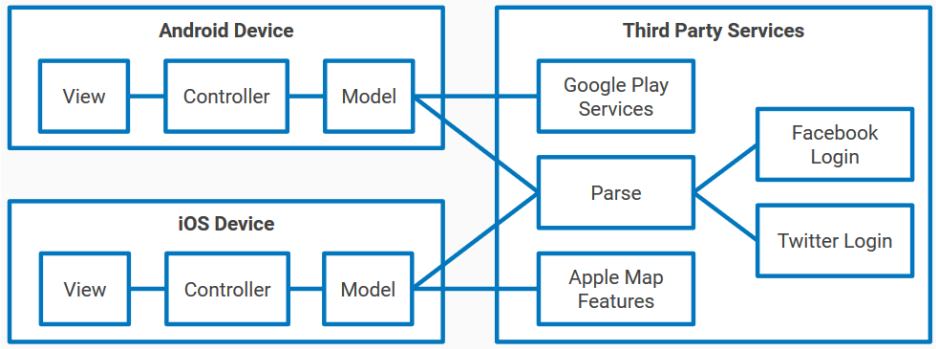

Figure 1.1: Basic System Flow Diagram

1.5 Technologies Overview

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

1.5.1 Google Play Services

1.5.1.a Description

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

1.5.1.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 maping features. This allows for a less intrusive feel when it comes to using Crowd Control. This 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.

1.5.2 Apple Map Features

1.5.2.a Description

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

1.5.2.b Usage

Apple Map Features will be used on the iOSdevice as the default map. We chose to go with Apple Map Features to give iOS users a more native feel when it comes to using the maping features. This allows for a less intrusive feel when it comes to using Crowd Control. This 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

1.5.3 Parse

1.5.3.a Description

Parse is our backend database. It allows us to save information that is needed along with giving us a way to connect to both facebook and twitter.
REFERENCE LINK: `http://parse.com/`

1.5.3.b Usage

Parse will be used to save informtion, group information, and avertisement information. It will be the main comminucation between devices and past user information

2

Project Overview

This section provides some housekeeping type of information with regard to the team, project, etc.

2.1 Team Members and Roles

Johnnathon Ackerman - Johnnathon is leading the GUI design and implimentation side for the android version of Crowd Control. This entails:

1. Graphical Design
2. Smooth Moving Interfaces
3. Easy to Use and learn layout

Daniel Andrus - Daniel is leading the Gui design ad implimentation for the IoS version of Crowd Control. This entails:

1. Graphical Design
2. Smooth Moving Interfaces
3. Easy to Use and learn layout

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

1. Creating and managing database qurries
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 backend 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 backend 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

2.2 Project Management Approach

This section will provide an explanation of the basic approach to managing the project. Typically, this would detail how the project will be managed through a given Agile methodology. The sprint length (i.e. 2 weeks) and product backlog ownership and location (ex. Trello) are examples of what will be discussed. An overview of the system used to track sprint tasks, bug or trouble tickets, and user stories would be warranted.

2.3 Phase 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.

2.4 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.

3

User Stories, Backlog and Requirements

3.1 Overview

The overview should take the form of an executive summary. Give the reader a feel for the purpose of the document, what is contained in the document, and an idea of the purpose for the system or product.

The userstories are provided by the stakeholders. You will create he backlogs and the requirements, and document here. This chapter should contain details about each of the requirements and how the requirements are or will be satisfied in the design and implementation of the system.

Below: list, describe, and define the requirements in this chapter. There could be any number of subsections to help provide the necessary level of detail.

3.1.1 Scope

What scope does this document cover? This document would contain stakeholder information, initial user stories, requirements, proof of concept results, and various research task results.

3.1.2 Purpose of the System

The purpose of Crowd Control is the ease the user expearence of going out in groups.

3.2 Stakeholder Information

This section would provide the basic description of all of the stakeholders for the project. Who has an interest in the successful and/or unsuccessful completion of this project?

3.2.1 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?

3.2.2 Management or Instructor (Scrum Master)

Who? What role will they play in the project? Will the Scrum Master drive the Sprint Meetings?

3.2.3 Investors

Are there any? Who? What role will they play?

3.2.4 Developers –Testers

Who? Is there a defined project manager, developer, tester, designer, architect, etc.?

3.3 Business Need

Use this section to define what business need exist and how this software will meet and/or exceed that business need.

3.4 Requirements and Design Constraints

Use this section to discuss what requirements exist that deal with meeting the business need. These requirements might equate to design constraints which can take the form of system, network, and/or user constraints. Examples: Windows Server only, iOS only, slow network constraints, or no offline, local storage capabilities.

3.4.1 System Requirements

Sense there we are creating Crowd Control to run on two different platforms, both iOS and Android, there are two sets of requirements that will be similar between both platforms. Even though they are both similar, implimentation between both will be differnet. With them both being different they are split into two sections as listed below.

3.4.1.a iOS Requirements

- Use Apple Mapping Features
- Access Parse as the Database

3.4.1.b Android Requirements

- Use Google Maps
- Access Parse as the Database

3.4.1.c Parse Requirements

- Delete groups when group is not in use

3.4.2 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.

3.4.3 Development Environment Requirements

The development enviroment requirement is that Crowd Control be avalabe on both iOS and Android platforms. Being cross platform allows for us to reach as many users as possible. Android development will be handled with Android Studio and iOS will be developed with xCode.

3.4.4 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 6 total sprints over 2 scimesters 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.
- Github will be used for source control.

3.5 User Stories

This section can really be seen as the guts of the document. This section should be the result of discussions with the stakeholders with regard to the actual functional requirements of the software. It is the user stories that will be used in the work breakdown structure to build tasks to fill the product backlog for implementation through the sprints.

This section should contain sub-sections to define and potentially provide a breakdown of larger user stories into smaller user stories.

3.5.1 User Story #1

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

3.5.1.a User Story #1 Breakdown

As a user i want the ability to join a group. Group joining options would be from a list or from an invite from a user.

3.5.2 User Story #2

As a user i want the abilitiy to track locations of other members in the group.

3.5.2.a User Story #2 Breakdown

3.5.3 User Story #3

As a user i want post agenda for the group.

3.5.4 User Story #4

As a user i want to i want the abilitiy to look for local groups

3.5.5 User Story #5

As a user i want the ability to have suggestions of local activities.

3.5.6 User Story #6

As a user i want the ability to leave a group.

3.5.7 User Story #7

As a user i want the ability to have a list of local groups.

3.5.8 User Story #8

As a user i want the abilitiy to login.

3.5.9 User Story #9

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

3.5.10 User Story #10

As a user i would like my information protected.

3.6 Proof of Concept Results

The Proof of conecpt is a rough design that impliments 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)

3.6.1 iOS Proof of Concept Screen Shots

3.6.2 Android Proof of Concept Screen Shots

3.7 Supporting Material

This document might contain references or supporting material which should be documented and discussed either here if appropriate or more often in the appendices at the end. This material may have been provided by the stakeholders or it may be material garnered from research tasks.

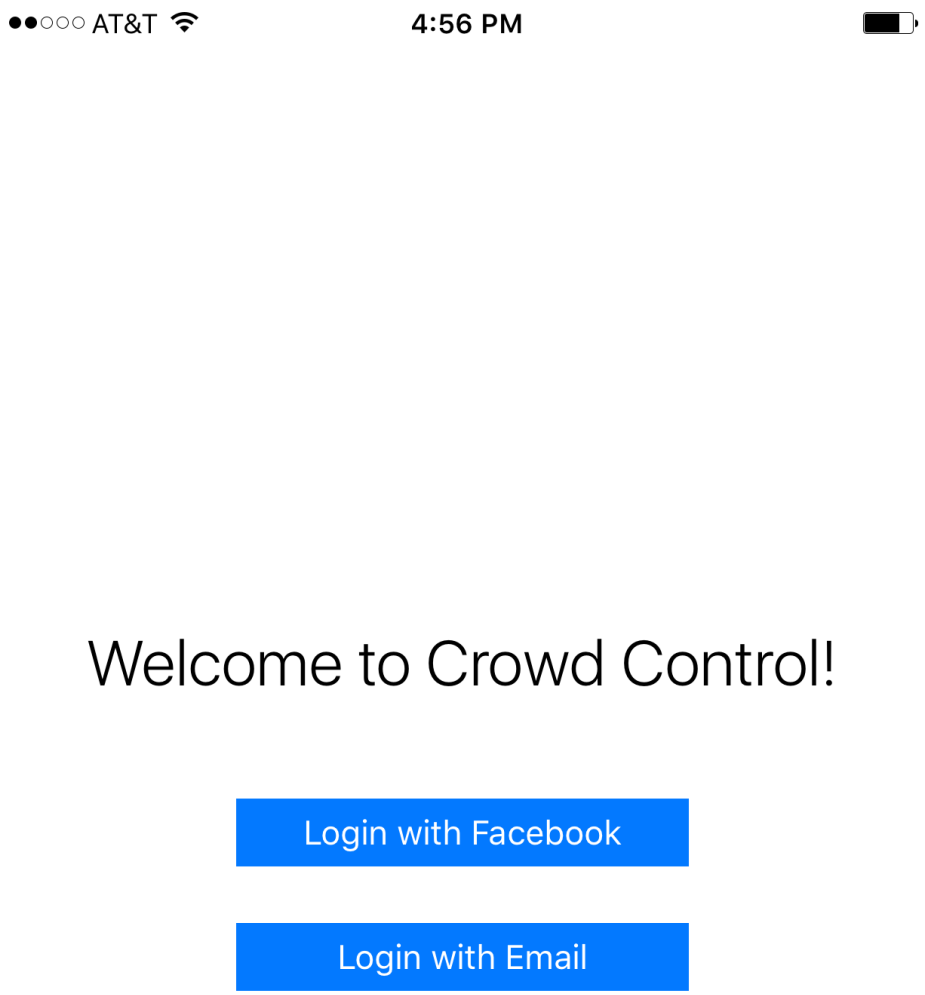

Figure 3.1: iOS login select screen

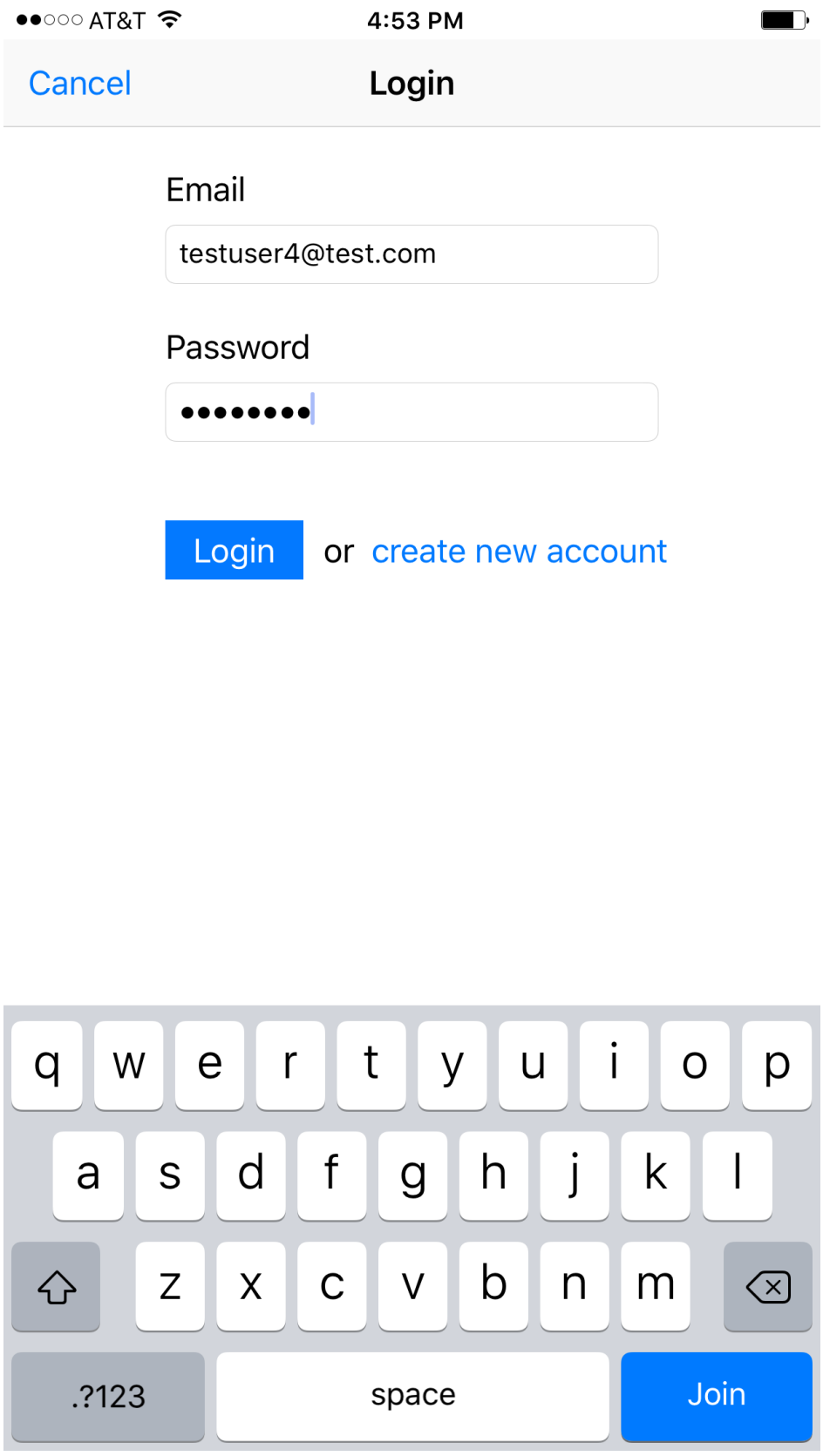

Figure 3.2: iOS email login screen

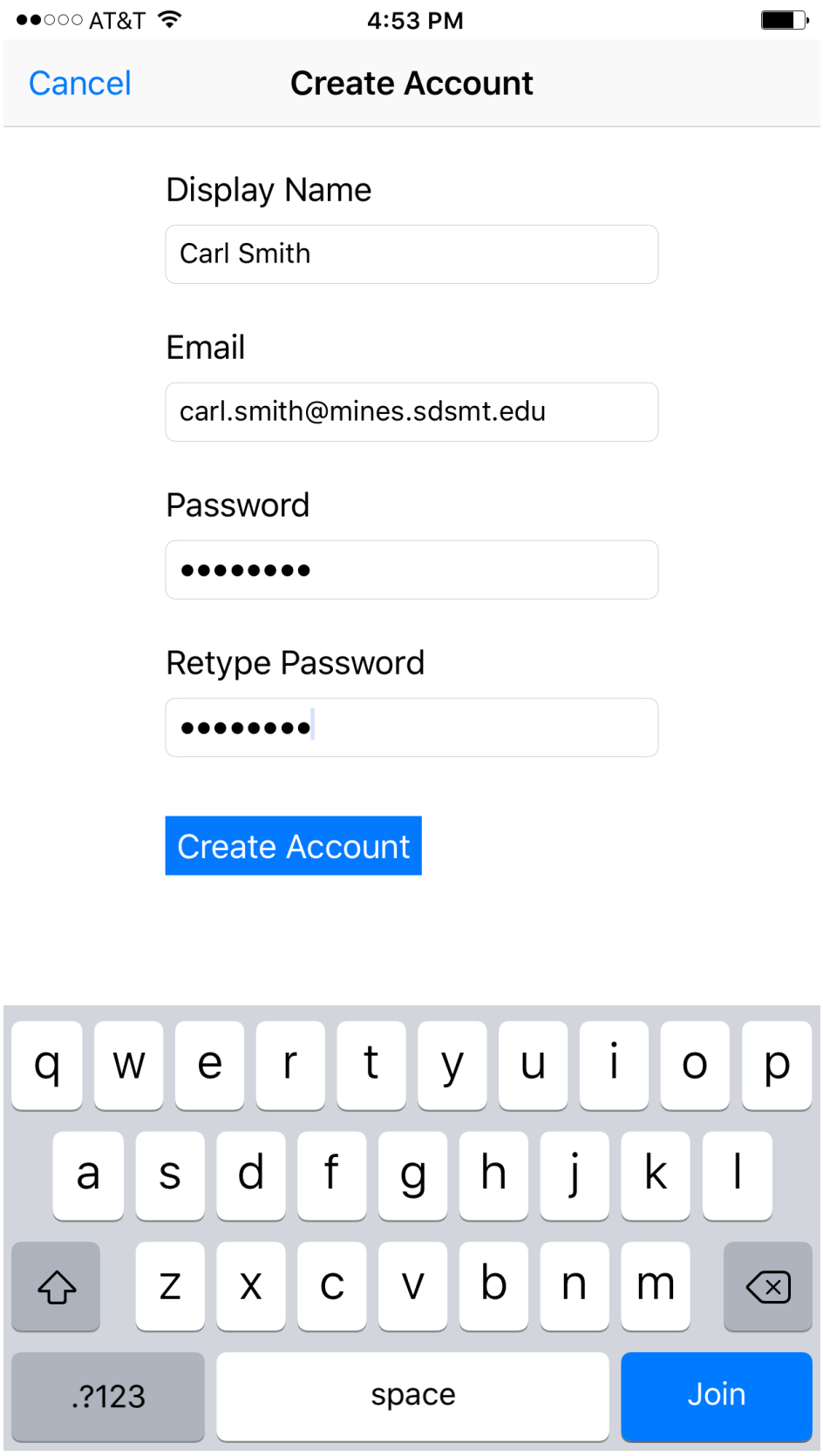

Figure 3.3: iOS create account screen

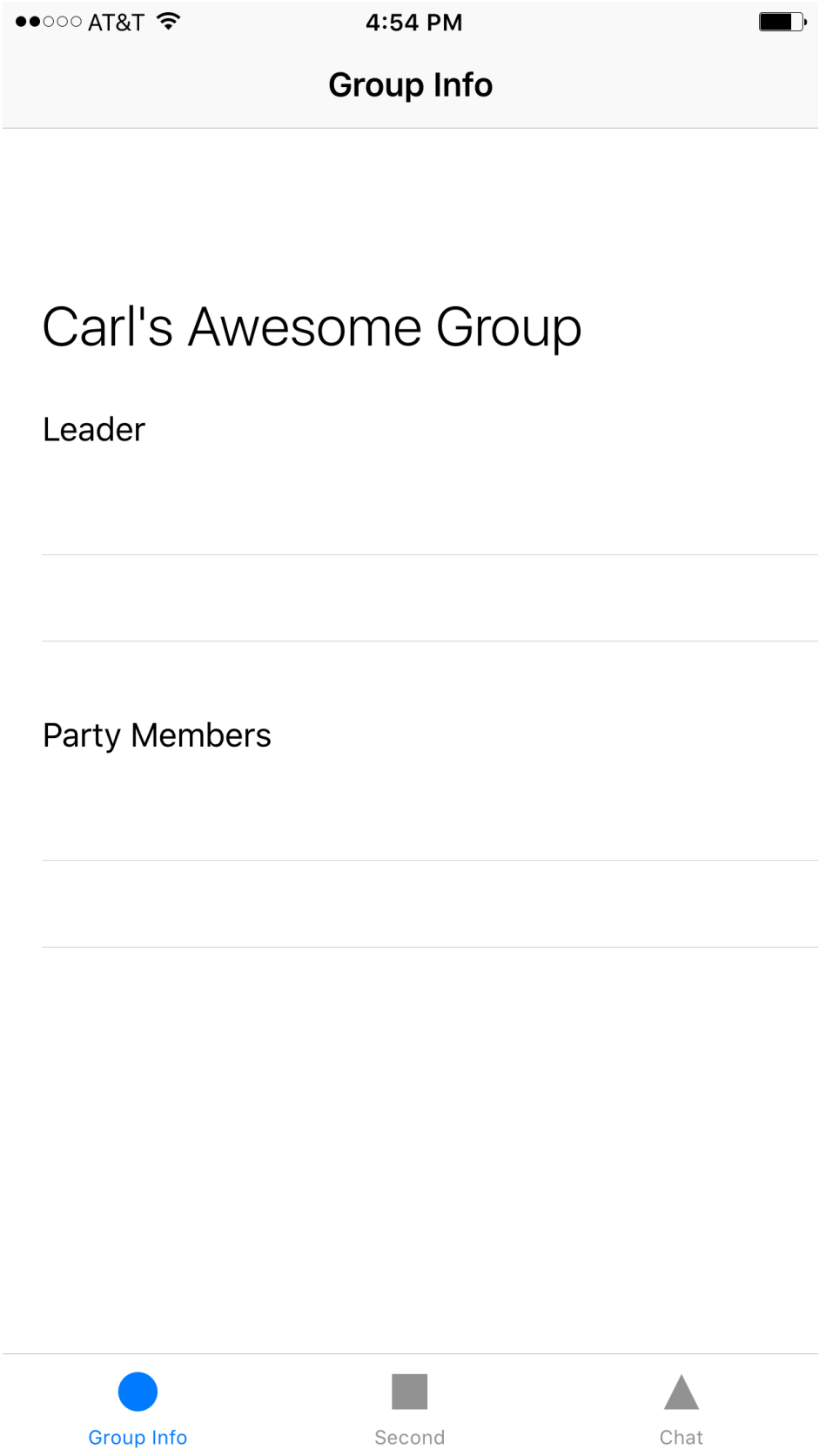

Figure 3.4: iOS group infomation screen

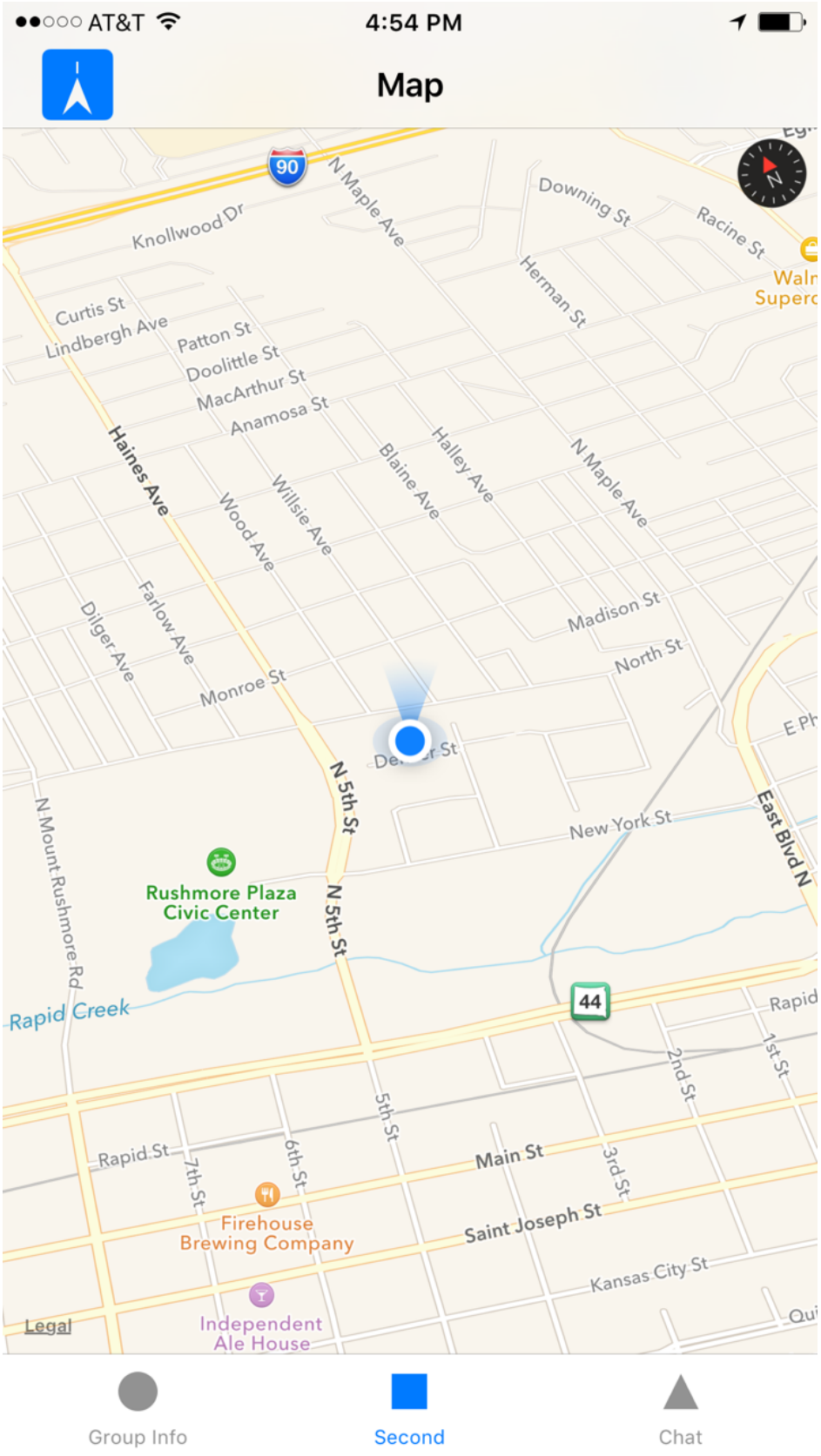

Figure 3.5: iOS map view screen

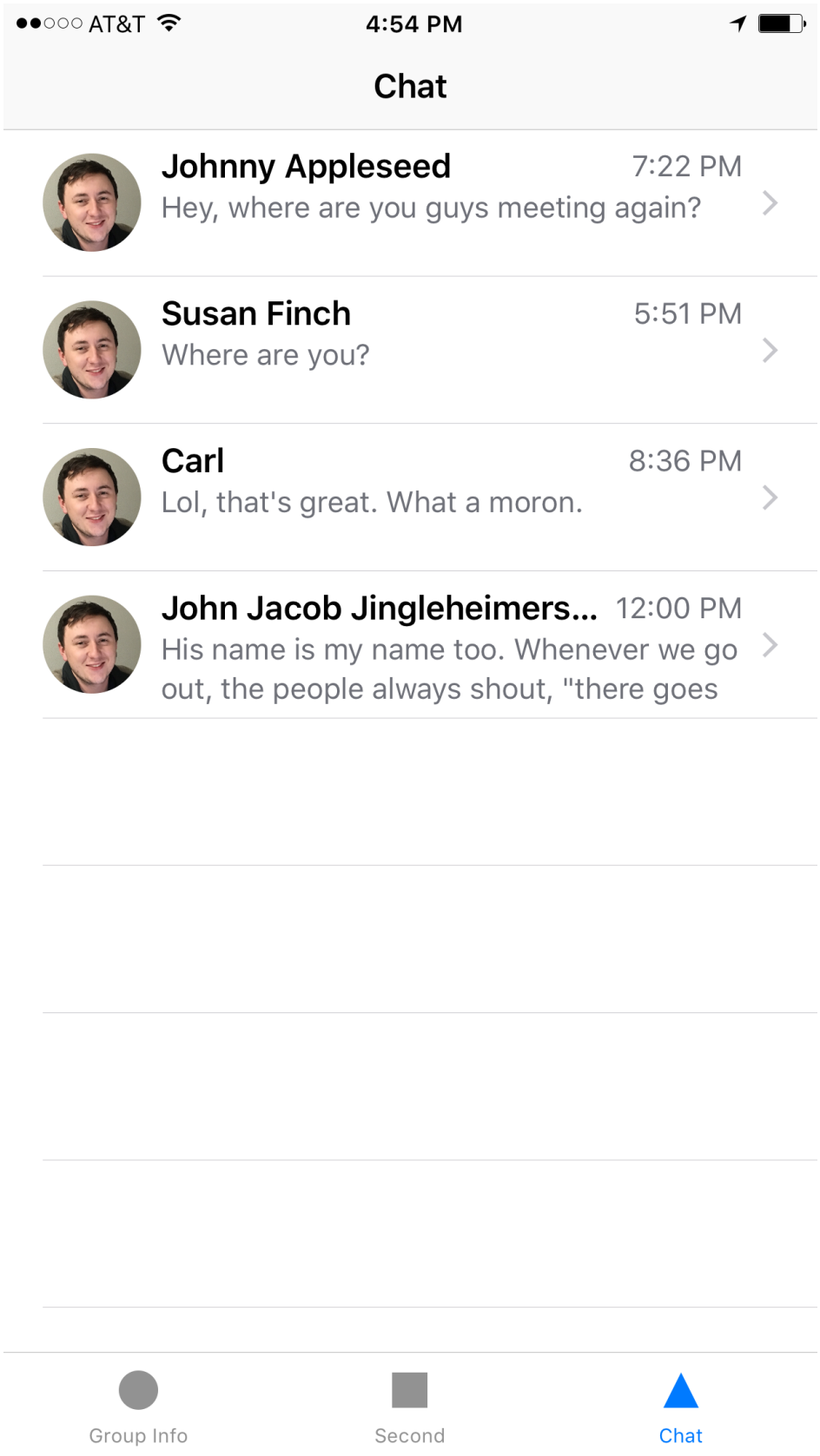

Figure 3.6: iOS messaging main screen

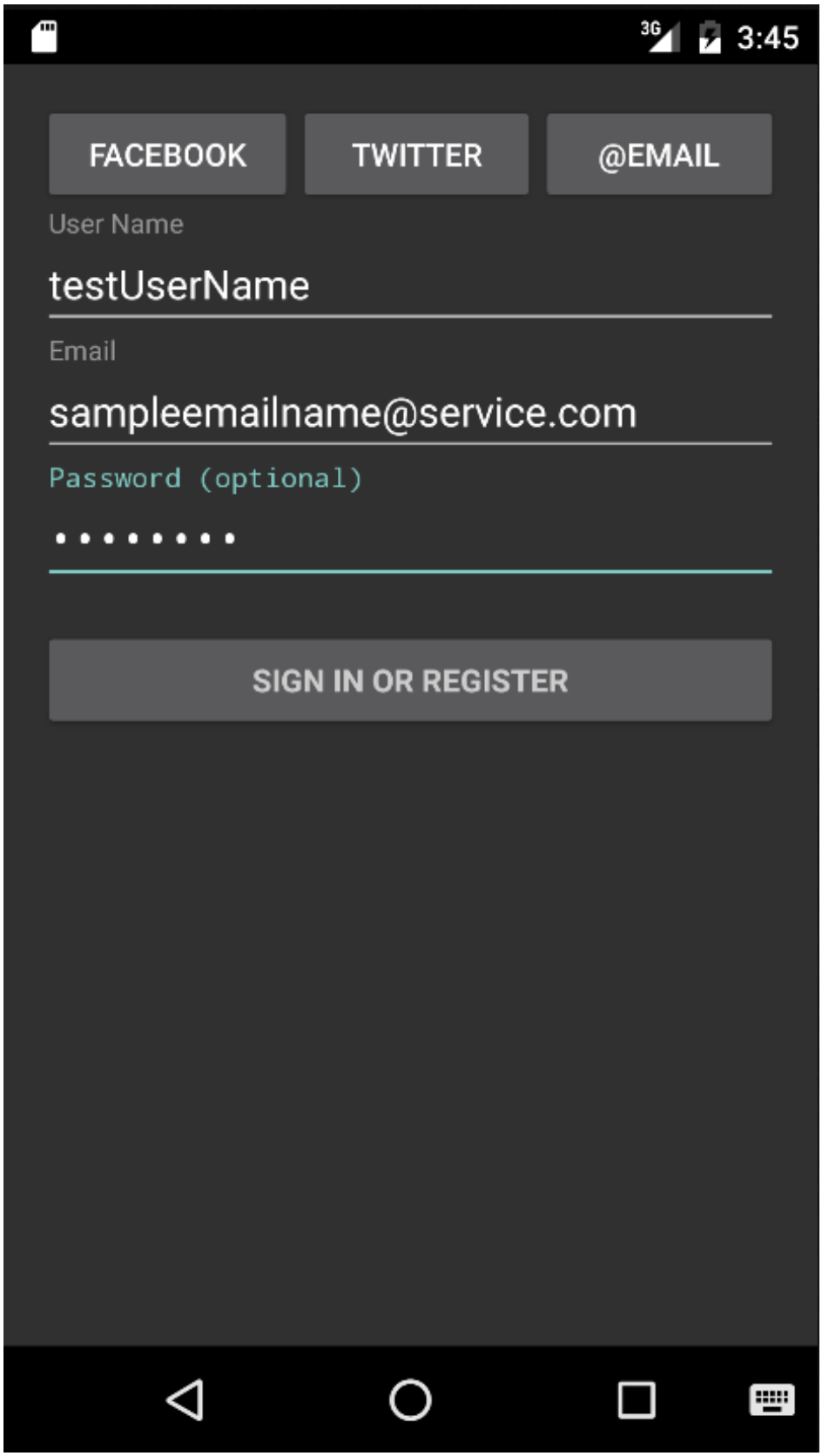

Figure 3.7: Android login screen

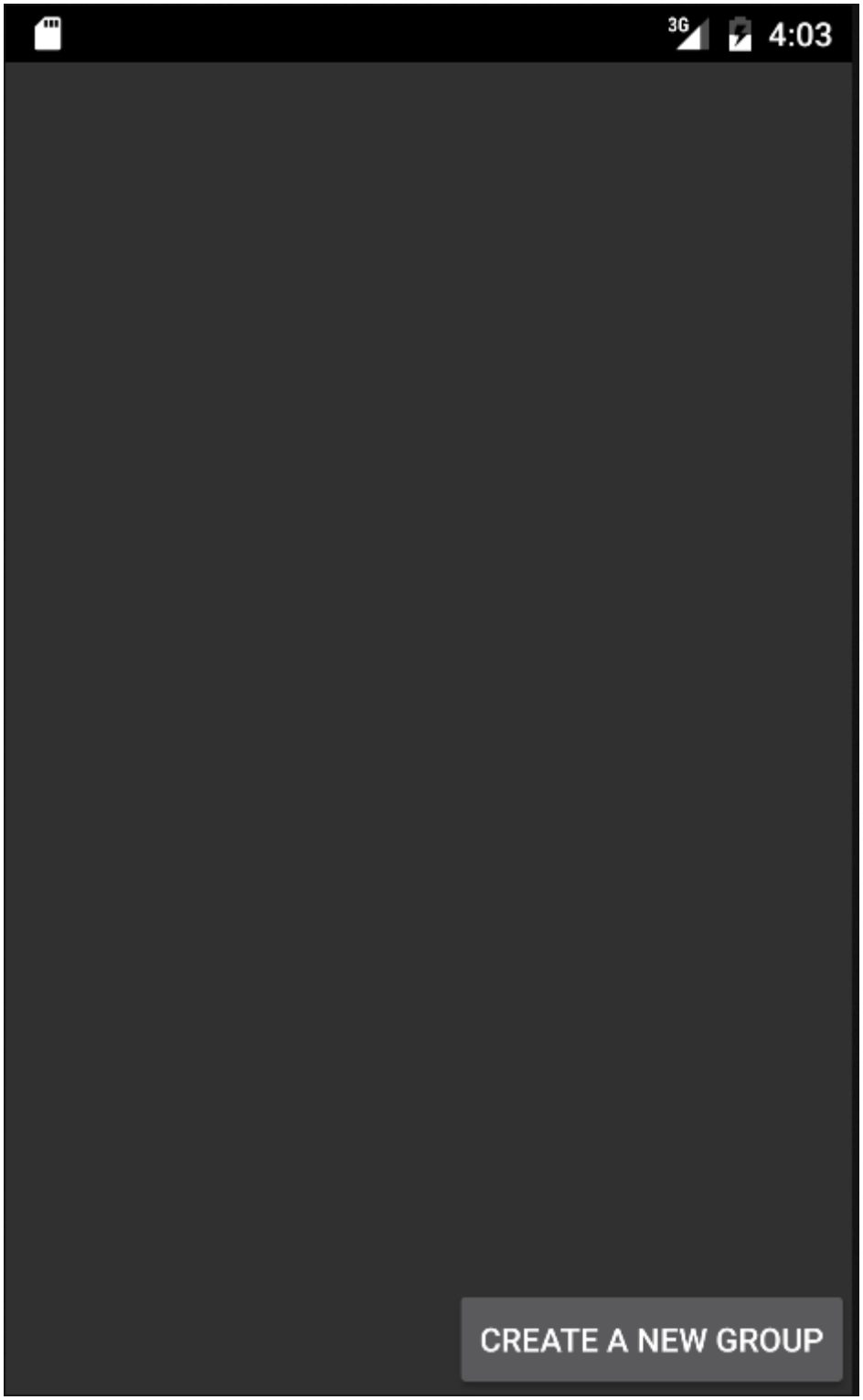

Figure 3.8: Android create group screen

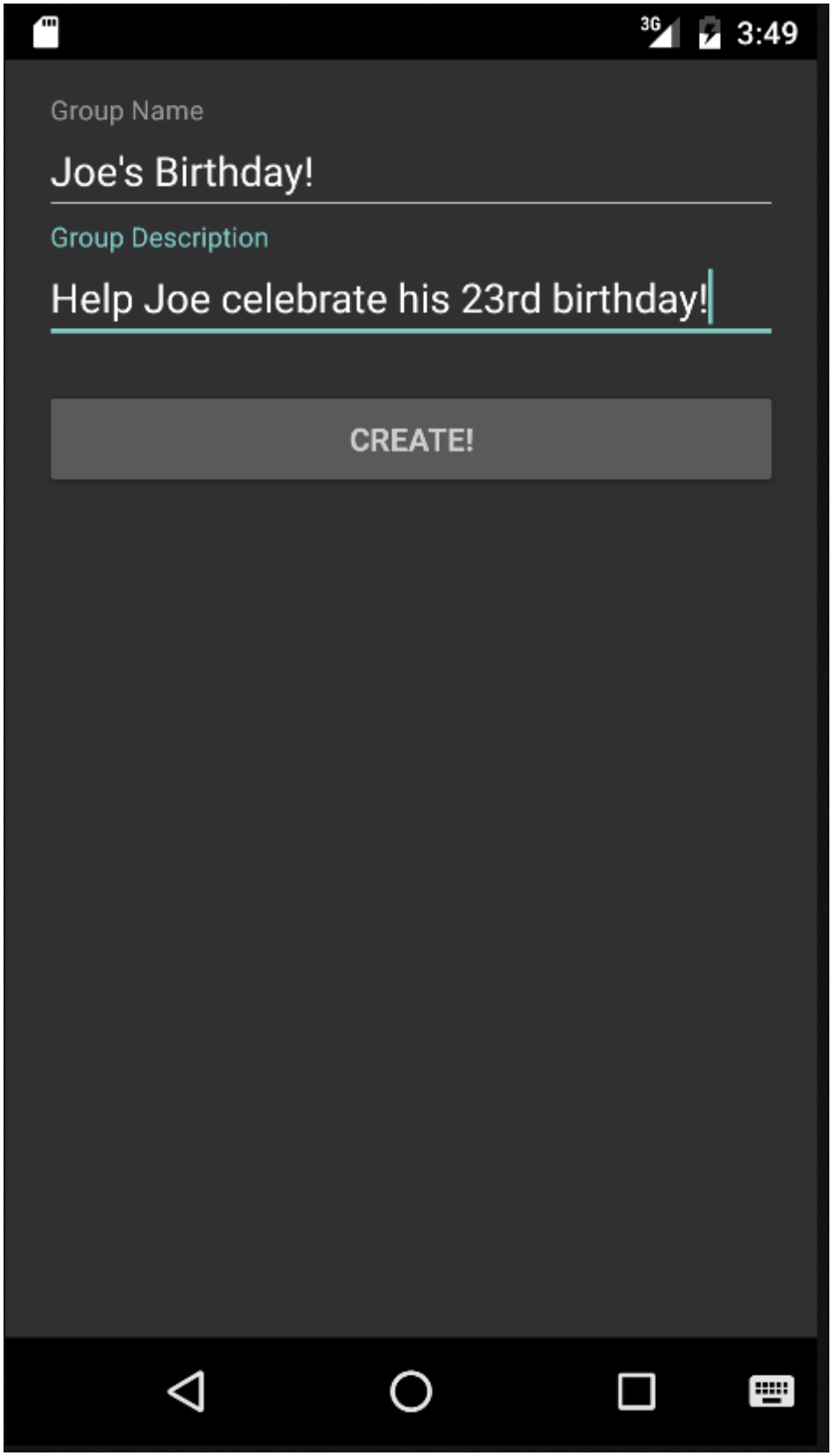

Figure 3.9: Android group information screen

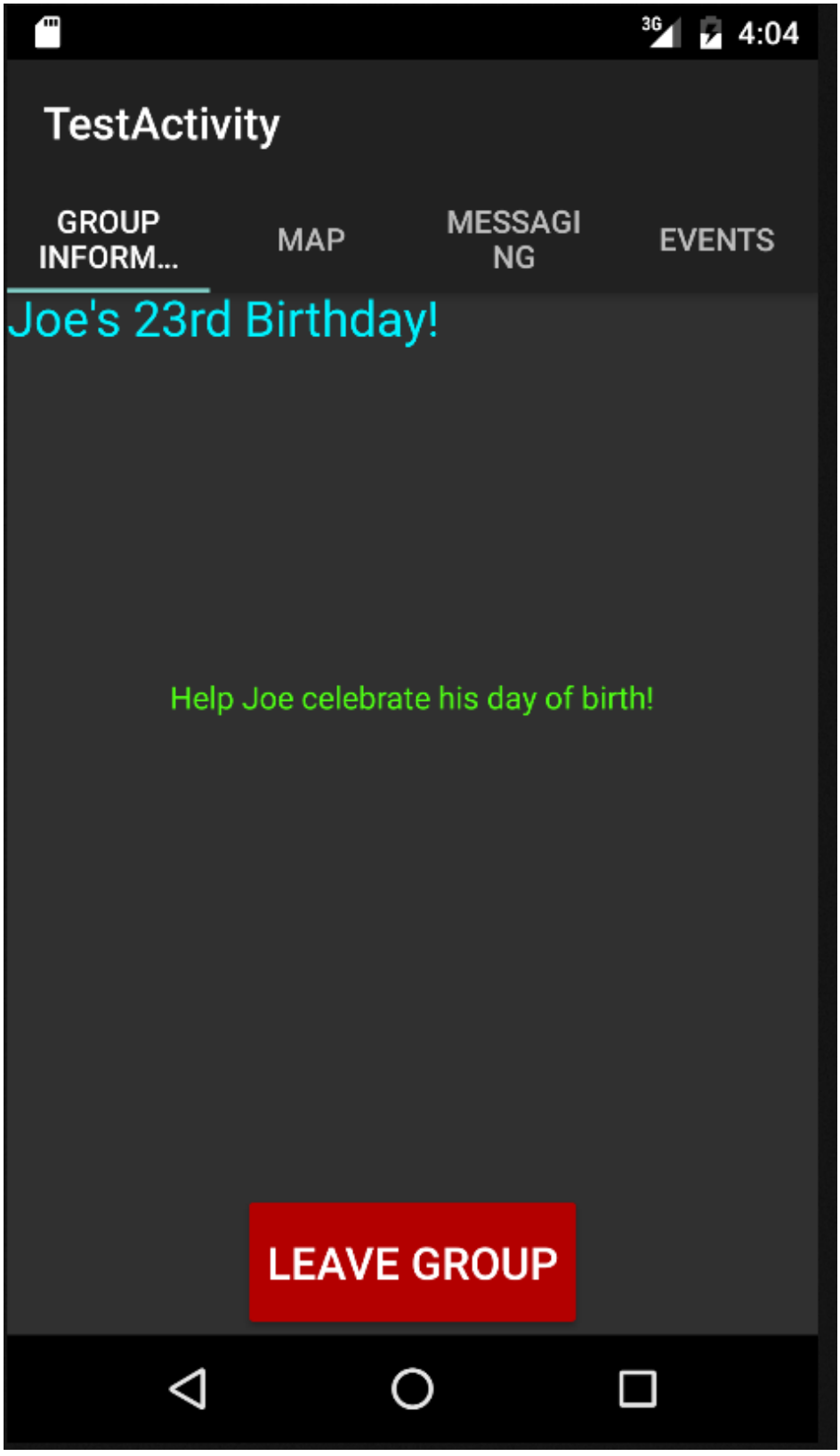

Figure 3.10: Android group join screen

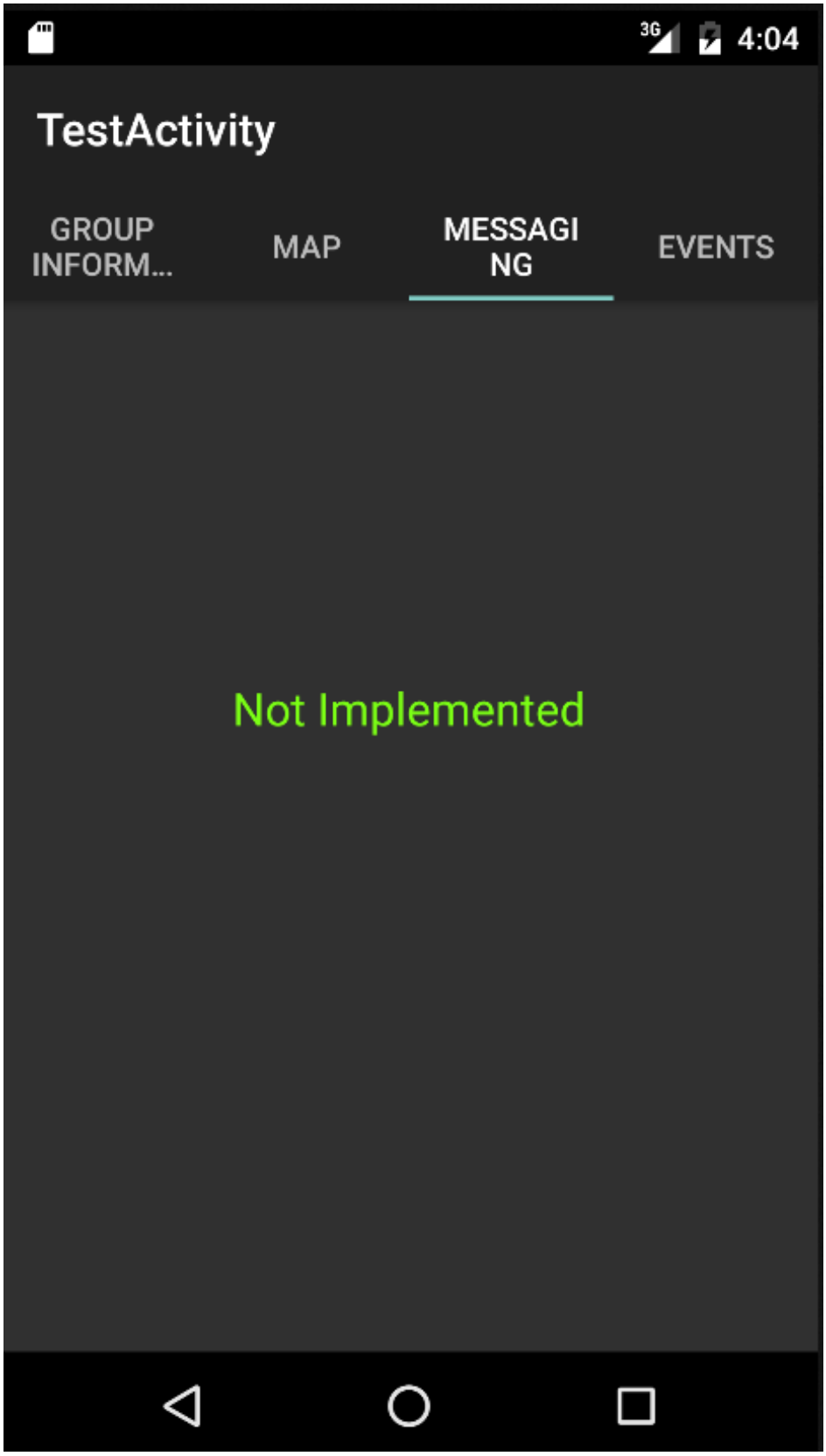

Figure 3.11: Android messaging main screen

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 [2, 1, 3] and [6, 4, 5]. 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 Integrated Group Messaging

4.1.1 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.

4.1.2 Component Overview

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

4.1.3 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.

4.1.4 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.

4.1.5 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.

4.1.6 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.

4.2 GPS Location Services

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.

4.3 Group Management Features

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.

Requirements	Test Case	Expected
Login with email	- Valid Login Credentials - Invalid email - Invalid Password	- Success - Failure - Failure
Login with Facebook	- Valid Login Credentials - Invalid Login Credentials	- Success - Failure
Login with Twitter	- Valid Login Credentials - Invalid Login Credentials	- Success - Failure
Sign up with email	- Email Already in Use - Valid Credentials - Invalid Password - Password doesn't match the re-typed password - Invalid Email (ex: doesn't have an @) - Whitespace-only username - Empty Username - Empty Email - Empty Password	- Message - Success - Failure - Failure - Failure + message - Failure + message - Failure + message - Failure + message - Failure + message
Create a Group	- No name - Whitespace-only name - No description - Whitespace-only description - Else	- Message - Message, no accept - Reminder, accept - Reminder, accept - Accept, trim whitespace, collapse whitespace in name
Add members to a Group	- Enter display name - Enter email - Enter phone number - Enter incomplete phone number or incomplete email	- Display list of matching users or "no matches" - Detect email, no change - Detect phone number, no change - Display "no matches"
Join a public Group	- Tap "join group" - Accept confirmation message - Decline confirmation message	- Displays confirmation message (y/n) - Message "request sent" - Dismiss messages
Join group via invite	- Tap "join" - Tap "delete"	- Joins group - Deletes invite
Leave a Group	- Tap "Leave Group" - Accept confirmation message - Decline confirmation message	- Display confirmation message (y/n) - Leave the current group and display nearby groups - Dismiss message
Enter display name	- Empty string - Too short (i.e. fewer than 3 characters) - All whitespace - Valid display name	- Highlight, no accept - Highlight, no accept - Highlight, no accept - Accept, trim whitespace from begin/end, collapse consecutive whitespaces
Sign out of the App	- Tap "Log out" - Accept confirmation - Decline confirmation	- Display confirmation (y/n) - Log out of the application and display login page - Dismiss confirmation message
Send a Group Message	- Empty string - Non-empty string	- Send button disabled - Message sent to all members and immediately displayed in conversation
See locations of my group members	- Tap on "map" tab	- Map is displayed, group member locations displayed on map as pins (zoomed out to display all group members)

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 how testing is/will be done to provide measure of success for the system.

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.

Table 5.1: The texting Matrix For CrowdControl.

6

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.

6.1 Development IDE and Tools

Andriod Studio
(xcode studio)
Parse

6.2 Source Control

Github was used for source control. Inside of the sourse control we currently have four different repositories. The purpose of the four different repositires is for the ability to keep iOS, Android and Cloud Code seperated. Along With code repositories there is also a repository designed to keep senior design documents.

Android Repository: `https://github.com/Deaboy/CrowdControl-Android`
iOS Repository: `https://github.com/Deaboy/CrowdControl-iOS`
Parse Repositroy : `https://github.com/Deaboy/CrowdControl-Parse`
Senior Design: `https://github.com/Deaboy/CrowdControl-SeniorDesign`

6.3 Dependencies

The dependencie for this application is that it must have the ability to connect to parse. Parse will be the database connecting all of the devices.

6.4 Build Environment

6.5 Development Machine Setup

If warranted, provide a list of steps and details associated with setting up a machine for use by a developer.

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

11.1 Business Model

11.2 Market and Competition

11.3 Regulatory environment

11.4 Intellectual Property and Freedom to Operate

11.5 Management Team and Advisors

11.6 Sources and Uses of Capital

11.7 Financial Statements

11.8 Metrics and Milestones

11.9 Exit Plan

12

Experimental Log

For research projects one needs to keep a log of all research/lab activities.

10/15/15 Ran modified filter on data sets 1 - 6. Results were ...

10/17/15 Changed tolerance on sensor and collected data. These ...

13

Research Results

This chapter describes the results and conclusions of your research. This would be the final report for a research project.

13.1 Result 1

13.2 Result 2

13.3 Conclusions

13.4 Further work

Bibliography

[1] R. Arkin. *Governing Lethal Behavior in Autonomous Robots*. Taylor & Francis, 2009.

[2] Howie Choset, Kevin M. Lynch, Seth Hutchinson, George A Kantor, Wolfram Burgard, Lydia E. Kavraki, and Sebastian Thrun. *Principles of Robot Motion: Theory, Algorithms, and Implementations*. MIT Press, Cambridge, MA, June 2005.

[3] S. M. LaValle. *Planning Algorithms*. Cambridge University Press, Cambridge, U.K., 2006. Available at http://planning.cs.uiuc.edu/.

[4] V. Lumelsky and A. Stepanov. Path planning strategies for point mobile automation moving amidst unknown obstacles of arbirary shape. *Algorithmica*, pages 403–430, 1987.

[5] S.A. NOLFI and D.A. FLOREANO. *Evolutionary Robotics: The Biology, Intelligence, and Technology of Self-Organizing Machines*. A Bradford book. A BRADFORD BOOK/THE MIT PRESS, 2000.

[6] Wikipedia. Asimo — Wikipedia, the free encyclopedia. `http://upload.wikimedia.org/wikipedia/commons/thumb/0/05/HONDA_ASIMO.jpg/450px-HONDA_ASIMO.jpg`, 2013. [Online; accessed June 23, 2013].

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

Write a description of the product to be developed. Use sectioning commands as neccessary.

NOTE: *This is part of the contract.*

B

Publications

Research Track: This chapter will include any publications generated from the research. Most likely these will be preprints and one will just include the pdf.

C

Sprint Reports

1 Sprint Report #1

Sprint Report #1

Team Overview

Name

CrowdControl

Members

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

Project Title

CrowdControl Group Mananagement Moble Application

Company

Bowtaps

Customer Overview

Customer Description

BowTaps is a start up company based out of Rapid City, SD. BowTaps plans on having their inital market presence with the mobile application CrowdControl.

Customer Problem

The design, creationand marketing of the mobile application CrowdControl 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 stragities
- Buessness plan
- End-user Documentation

Project Overview

The creation of CrowdControl, a mobile application on andriod 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

- CrowdControl will be a free app avalable for download on the andriod and ios marketplaces.
- The product will be coded in java (andriod) , swift (ios), and parse (backend server).
- Source code will be kept in a GitHub repo.
- CrowdControl 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 andriod)
- CrowdControl will access a parse server
- CrowdControl will accesss GPS information

Deliverables

Phase 1

Deliverables will be UX design, Data basedesign and implimentation.

Backlog

Phase 1

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

    1. Design Database Schema
    2. Impliment Database on Parse
- Design Application Layers (MVC)
- Set Up Git Repo

Sprint Report

Work for this sprint included:

- Designs for Create Group
- Design for Leave Group
- Design for Group Messaging
- Design for Start Page
- Design for Database Schema
- Database implimentation
- Git Repo Initilization

2 Sprint Report #2

Sprint Report #2

Team Overview

Name

CrowdControl

Members

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

Project Title

CrowdControl Group Mananagement Moble 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. Maping features
    2. Messaging UI
- Model

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

- Impliment Cloud code
- Busness Plan

Success

Sucesses have been jumps in the code progress. Testing has been going well and progress has been made twords 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 scimester not all meeting times have worked out. But with a hard drive we are working twords our goal of creating an app and starting our own bussness. We are still currently meeting with advisors to better our busness plan and create marketing plans.

3 Sprint Report #3

Sprint Report #3

Team Overview

Name

CrowdControl

Members

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

Project Title

CrowdControl Group Mananagement Moble Application

Company

Bowtaps

Work Summary

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

BackLog

- Messaging API
- Join Group Implimentationl
- Cloud Code
    1. Group Clean Up
    2. User Information Links
- Busness Plan
    1. South Dakota Gigant Vision
    2. SDSMT Busness Plan Compition

Success

Sucesses have been group team work twords busness plan compitions on the busness side. On the development side was recreating some of the database to increase effeciency 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 busness plan compitions and the end of the scimester we have all been busy. We have come together to fix issues that where unable to be seen in the beginning with Parse table creation on the mobile side verses non mobile.

The Busness plan and compition are comming along strong and allowing use to more focous on the primary goals of the direction of the company.

4 Sprint Report ...

D

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.

E

Acknowledgment

Thanks

F

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.

LaTeX Example

LaTeX sample file: Remove from submitted materials

1 Introduction

This is a sample input file. Comparing it with the output it generates can show you how to produce a simple document of your own.

2 Ordinary Text

The ends of words and sentences are marked by spaces. It doesn't matter how many spaces you type; one is as good as 100. The end of a line counts as a space.

One or more blank lines denote the end of a paragraph.

Since any number of consecutive spaces are treated like a single one, the formatting of the input file makes no difference to TeX, but it makes a difference to you. When you use LaTeX, making your input file as easy to read as possible will be a great help as you write your document and when you change it. This sample file shows how you can add comments to your own input file.

Because printing is different from typewriting, there are a number of things that you have to do differently when preparing an input file than if you were just typing the document directly. Quotation marks like "this" have to be handled specially, as do quotes within quotes: "'this' is what I just wrote, not 'that'".

Dashes come in three sizes: an intra-word dash, a medium dash for number ranges like 1–2, and a punctuation dash—like this.

A sentence-ending space should be larger than the space between words within a sentence. You sometimes have to type special commands in conjunction with punctuation characters to get this right, as in the following sentence. Gnats, gnus, etc. all begin with G. You should check the spaces after periods when reading your output to make sure you haven't forgotten any special cases. Generating an ellipsis ... with the right spacing around the periods requires a special command.

TeX interprets some common characters as commands, so you must type special commands to generate them. These characters include the following: $ & % # { and }.

In printing, text is emphasized by using an *italic* type style.

A long segment of text can also be emphasized in this way. Text within such a segment given additional emphasis with Roman *type. Italic type loses its ability to emphasize and become simply distracting when used excessively.*

It is sometimes necessary to prevent TeX from breaking a line where it might otherwise do so. This may be at a space, as between the "Mr." and "Jones" in "Mr. Jones", or within a word—especially when the word is a symbol like *itemnum* that makes little sense when hyphenated across lines.

Footnotes[1] pose no problem.

TeX is good at typesetting mathematical formulas like $x - 3y = 7$ or $a_1 > x^{2n}/y^{2n} > x'$. Remember that a letter like x is a formula when it denotes a mathematical symbol, and should be treated as one.

[1] This is an example of a footnote.

3 Displayed Text

Text is displayed by indenting it from the left margin. Quotations are commonly displayed. There are short quotations

> This is a short a quotation. It consists of a single paragraph of text. There is no paragraph indentation.

and longer ones.

> This is a longer quotation. It consists of two paragraphs of text. The beginning of each paragraph is indicated by an extra indentation.
>
> This is the second paragraph of the quotation. It is just as dull as the first paragraph.

Another frequently-displayed structure is a list. The following is an example of an *itemized* list.

- This is the first item of an itemized list. Each item in the list is marked with a "tick". The document style determines what kind of tick mark is used.
- This is the second item of the list. It contains another list nested inside it. The inner list is an *enumerated* list.
  1. This is the first item of an enumerated list that is nested within the itemized list.
  2. This is the second item of the inner list. LaTeX allows you to nest lists deeper than you really should.

  This is the rest of the second item of the outer list. It is no more interesting than any other part of the item.
- This is the third item of the list.

You can even display poetry.

> There is an environment for verse
> Whose features some poets will curse.
>
> For instead of making
> Them do *all* line breaking,
> It allows them to put too many words on a line when they'd rather be forced to be terse.

Mathematical formulas may also be displayed. A displayed formula is one-line long; multi-line formulas require special formatting instructions.

$$x' + y^2 = z_i^2$$

Don't start a paragraph with a displayed equation, nor make one a paragraph by itself.

4 Build process

To build LaTeX documents you need the latex program. It is free and available on all operating systems. Download and install. Many of us use the TexLive distribution and are very happy with it. You can use a editor and command line or use an IDE. To build this document via command line:

```
alta>  pdflatex SystemTemplate
```

If you change the bib entries, then you need to update the bib files:

```
alta>  pdflatex SystemTemplate
alta>  bibtex SystemTemplate
alta>  pdflatex SystemTemplate
alta>  pdflatex SystemTemplate
```

The template files provided also contain a Makefile, which will make things much easier.

Acknowledgment

Thanks to Leslie Lamport.