



Your Pickup Game Partner

Mobile and IoT Computing Services: 08781/45887

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Acknowledgment

We would like to thank Professor Norman Sadeh for his invaluable guidance and insights throughout our journey. We would also like to appreciate Linda Moreci's support on coordinating our meeting requests with Professor Sadeh.

We would also like to thank all people who have participated in our survey and user testing for their dedication and support!

Executive Summary

Our group developed WeBall, an android app which can help users find players and schedule time for a pickup game. When users want to organize a pickup game, they can create posts in our app by adding information such as type of ball game, location, date, time and count of players needed. Other users can view created posts and accept them. The primary function of this app is to bypass multiple channels of communication between pickup game enthusiasts and offer them a time-efficient way to organize matches.

Introduction

WeBall is an application that assists users in scheduling pickup matches for ball games. To set a context for the use of the application, below is a description of what pickup matches are and which sports qualify as ball games -

- a. Pickup games are sports matches which are spontaneously started by a group of players. Players are invited beforehand, but they are not obligated or committed to appear for the match. Also, referees/umpires are typically not present in these matches which leaves it up to the players to decide the rules of the match for themselves.
- b. Ball games, as the name indicates, includes physical sports such as basketball, football, frisbee, soccer, tennis, badminton, table-tennis, softball, volleyball, squash, ice hockey, baseball, bowling and others (and not online games).

Product Overview

a. What is WeBall?

WeBall is an Android based native application for players of pickup games. Its primary task is scheduling of pickup matches by connecting organizers and participants. However, this app has an associated social platform aspect to it also. This is because it enables any user of the app to add contacts who the user believes will be participants of pickup games in the future.

- It allows organizers to perform the below mentioned activities:
 - Inviting users to use the app by importing phone contacts*
 - Creating a invitation for a pickup game to be scheduled
 - Add information related to date, time, location, required count of players for the pickup game in the post
 - Post the invitation to all users or groups of select users
 - Add comments (optional) to increase decision making effectiveness for users who can view the post**

*This feature addresses the issues described in Exhibit 1

**To be implemented in next version of the prototype

- For participants, the following functionalities are available:
 - Search for pickup games posted by organizer using filters for location and time (the day the search is made)
 - View information added in the post as well as comments from users who have accepted the post*
 - Accept or reject invite at anytime before the post is closed**
 - Create a personal profile and add information that can optionally be made public***

- View profile of other users (if profile of the user has been made public)

*Currently only users accepting the invite can add comments; but this feature will be made available to users rejecting posts in the next version of the prototype

**Post can be viewed till the end time of the game given count of accepted players remains less than or equal to total available spots

**Optional profile sharing to be included in future developments

b. What problems do players of pickup games face?

Exhibit 1: Pickup matches are unpredictable across multiple factors:

ARRIVAL TIME	DURATION
<p><i>'Issue of coordination'</i></p> <p>-Coordinating start time of pickup games is time consuming - lot of time is spent in coordinating arrival time by both organizer and participants</p> <p>-Coordination is not only time consuming but it involves multiple channels of coordination.</p>	<p><i>'Players can join/drop out at any time'</i></p> <p>-Players who agree to participate in the pickup game not only have different arrival times, but also differ in:</p> <ol style="list-style-type: none"> How long they play; since there is no obligation to play, players may drop out early leaving fewer players on court/field than the minimum required A participant may not want to play over the entire duration of the game
FACILITIES (GROUND + EQUIPMENT)	PARTICIPATION

<p><i>'Will the court be free at this hour?'</i></p> <p>-Participants hesitate from joining for a pickup game if they do not own required equipment or if are not certain that playing ground/court will be available for the duration of the pickup game</p>	<p><i>'Will the player's skill level match mine?'</i></p> <p>-Participants have their own criteria regarding who they want to play a pickup game with. Some of these include:</p> <ul style="list-style-type: none"> a. Identity of other players - some participants have security concerns if the identity of other players is unknown b. Skill level of other players - an experienced player looking to play competitively may not want to schedule a pickup game with amateurs
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c. What are the currently existing solutions for scheduling pickup games?

Currently, participants of pickup games use a number of channels, often used simultaneously, to communicate with one another. These channels include:

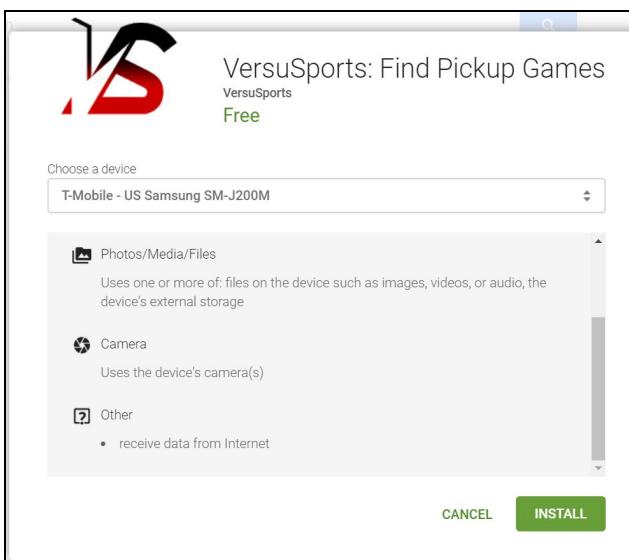
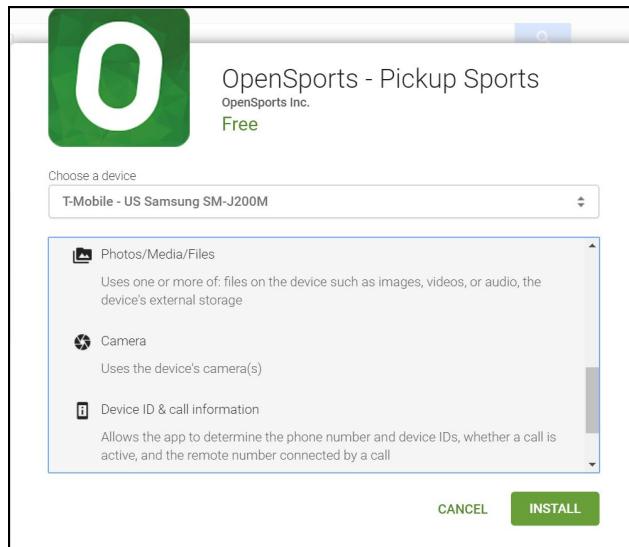
- a. Face to face scheduling
- b. Mobile calls
- c. Mobile texts
- d. Apps: Whatsapp, WeChat, GroupMe, FB Messenger, etc.
- e. Pickup game scheduling apps: OpenSports, RecCheck, Huddlers, etc.

There are multiple pickup game scheduling apps available on both Android and IoS. In terms of competition, WeBall competes directly with these apps for acquiring participants of pickup games.

d. How does WeBall fill the gap in user requirement?

Our analysis of the current landscape of pickup games scheduling methods on a high level has indicated some of the findings below listed below. These have been addressed in greater detail in the ‘user survey’ section -

1. Despite the availability of a large number of applications for scheduling pickup games, these have not yet substituted traditional channels used by players (face to face communication, mobile calls) and the more prevalent over-the-top mobile messaging services.
2. Some scheduling apps such as RecCheck are available for scheduling only a single sport, such as basketball, which limits the utility of the app.
WeBall's solution: Users can select from a set of 4 popular ball games
3. Users do not find the interface of some of these apps friendly. Ex - to create a profile in OpenSports, a user is compulsorily required to upload a photograph and specify a gender. Users who did not wish to share photo and/or gender information found this step arbitrary and unnecessary to the login process and were therefore, not motivated to use the app.
WeBall's solution: Users required to only submit their email ID at the time of login
4. Currently available apps have raised privacy concerns among some of the users. Ex - some apps require access to photos/media/files and device ID information. The permissions page for two such apps at the time of download are added below.



Motivation

This section describes the requirement gathering process for developing a UI prototype. In particular the following activities were performed to identify UI requirements and workflow -

- I. Developing initial hypothesis of target users
- II. Conducting pre-survey interviews
- III. Survey (v1) creation and response collection
- IV. Interpreting survey results and identifying key features for prototype
- V. Survey modification (v2) and interpretation of updated survey results

a. Developing a hypothesis - '*who are the target users?*'

In the context of developing an app for pickup game scheduling, we concluded that there were 2 categories of users likely to use this app -

Target groups	People who participate in pickup games and are comfortable scheduling pickup games using existing methods	Do not participate in pickup games because they have not yet identified a convenient way to schedule pickup games)
What WeBall can offer	Offer an improved usability experience over existing apps	Offer a convenient way to schedule pickup games using the app

For the 1st version of this app, the target users are students across different educational levels in the following institutions -

1. Grades 9 to 12 (public schools)
2. Additional private elementary and secondary schools

3. Colleges and universities

For the first rollout, this target population made sense because students typically have access to facilities to play, equipment and most importantly a student community to find pickup game participants from.

To assess the viability of this application, a market sizing exercise was performed to understand the size of the target population within Pittsburgh (details in Appendix, item 3). 8,200+ target users are present in Pittsburgh itself. This exercise will be repeated for other college cities to obtain a national count of potential users.

b. Conducting pre-survey interviews

12 Tepper students including Presidents of BB club and Indoor Soccer club were interviewed to identify relevant questions for the first version of the survey. Feedback received from some of the participants on the concept of WeBall and our own viewpoint on the feedback is added in the table below -

Comment/feedback	Team's viewpoint
App allowing a user to connect with strangers for a pickup match - can a social media platform be associated with it? That is, allowing users to chat with one another individually?	The purpose of the app is to serve as a scheduler of pickup games. User has the ability to add users and view profile of other users (if profile public), however, WeBall is a scheduling platform and not a social connectivity platform for pickup game enthusiasts.

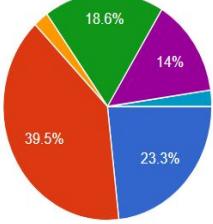
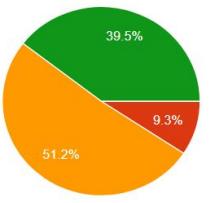
<p>Some games such as basketball need a degree of coordination and familiarity with team mates. Not all participants may want to play with unknown players.</p>	<p>Users should have the flexibility to schedule matches with players whom they are familiar with through the option of creating 'groups'</p>
<p>If I have arrived for a scheduled match and some participants have not turned up, I would rather still go ahead with the available players than defer the match or penalize the players who did not turn up by not inviting them for the next matches; they are not obligated to appear for a pickup match anyways.</p>	<p>This gave us 2 insights into the design of the prototype:</p> <ol style="list-style-type: none"> 1. A player-penalty system does not make sense in pickup game schedulers 2. Invitations for a pickup game should be available for all invitees till the end of the game giving participants greater flexibility in determining their availability for a match
<p>Some players have concerns that they would like to have addressed by the organizer before making a decision to accept the invitation for the pickup game. This includes information regarding:</p> <ol style="list-style-type: none"> 1. Am I required to get my own equipment? 2. What is the skill level of participants? I do not want to 	<p>The comments mentioned on the left led us to conclude that users should have enough information available to make an informed decision regarding the proposed pickup game.</p> <p>For this we have provided both organizers (who create invitations) and other users (who view and accept/reject invitations), the ability to optionally add comments that contains</p>

<p>be paired with amateurs.</p> <p>3. Which court has been selected for the Tennis match? I have been meaning to play in a clay court.</p>	<p>information to address any queries that participants may have.</p>
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c. Survey (v1) creation, response collection and interpreting survey results to inform design

Sample used for the survey: 43 graduate students of ECE at CMU. This sample is representative of the target population identified for WeBall (biases exist because of limited demographic variations across the sample).

Question/response	Guidance to prototyping																																										
<p>1. Which of the following games do you play? Select all that apply. 41 responses</p> <table border="1"> <thead> <tr> <th>Game</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr><td>Basketball</td><td>12</td><td>29.3%</td></tr> <tr><td>Football</td><td>2</td><td>4.9%</td></tr> <tr><td>Soccer</td><td>6</td><td>14.6%</td></tr> <tr><td>Tennis</td><td>9</td><td>22%</td></tr> <tr><td>Badminton</td><td>30</td><td>73.2%</td></tr> <tr><td>Table-tennis</td><td>17</td><td>41.5%</td></tr> <tr><td>Cricket</td><td>4</td><td>9.8%</td></tr> <tr><td>Softball</td><td>2</td><td>4.9%</td></tr> <tr><td>Volleyball</td><td>3</td><td>7.3%</td></tr> <tr><td>Ultimate frisbee</td><td>0</td><td>0%</td></tr> <tr><td>Racket</td><td>1</td><td>2.4%</td></tr> <tr><td>Field hockey</td><td>1</td><td>2.4%</td></tr> <tr><td>Squash</td><td>1</td><td>2.4%</td></tr> </tbody> </table>	Game	Count	Percentage	Basketball	12	29.3%	Football	2	4.9%	Soccer	6	14.6%	Tennis	9	22%	Badminton	30	73.2%	Table-tennis	17	41.5%	Cricket	4	9.8%	Softball	2	4.9%	Volleyball	3	7.3%	Ultimate frisbee	0	0%	Racket	1	2.4%	Field hockey	1	2.4%	Squash	1	2.4%	<p>To identify the top 4 ball games to be included in the UI - badminton, table-tennis, basketball and tennis emerged as the most popular games.</p>
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<p>2. How comfortable are you participating in pickup games? If confused about what a pickup game is, please take a minute to read the description at the top. 43 responses</p> <table border="1"> <thead> <tr> <th>Comfort Level</th> <th>Percentage</th> </tr> </thead> <tbody> <tr><td>Very comfortable</td><td>20.9%</td></tr> <tr><td>Somewhat comfortable</td><td>65.1%</td></tr> <tr><td>I avoid participating in pickup games</td><td>14%</td></tr> </tbody> </table>	Comfort Level	Percentage	Very comfortable	20.9%	Somewhat comfortable	65.1%	I avoid participating in pickup games	14%	<p>To understand the proportion of students who participate in pickup games (~20%).</p> <p>The response 'somewhat comfortable' may include</p>																																		
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	<p>participants who participate occasionally in pickup games, however, pre-survey results indicated that this group may also include respondents who are not sure of what pickup games are in the first place and choose to answer 'somewhat comfortable' anyways.</p>												
<p>4. How do you find players for a pickup match?</p> <p>43 responses</p>  <table border="1"> <thead> <tr> <th>Method</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>WhatsApp/WeChat/GroupMe/Messenger to individuals</td> <td>39.5%</td> </tr> <tr> <td>WhatsApp/WeChat/GroupMe/Messenger to group(s)</td> <td>23.3%</td> </tr> <tr> <td>Face to face</td> <td>18.6%</td> </tr> <tr> <td>N/A</td> <td>14%</td> </tr> <tr> <td>Phone call</td> <td>1%</td> </tr> </tbody> </table>	Method	Percentage	WhatsApp/WeChat/GroupMe/Messenger to individuals	39.5%	WhatsApp/WeChat/GroupMe/Messenger to group(s)	23.3%	Face to face	18.6%	N/A	14%	Phone call	1%	<p>To identify the breakup of competing methods for scheduling pickup games.</p> <p>Over-the-top messaging applications emerge as the most important channels currently used for coordination between players (~40%).</p>
Method	Percentage												
WhatsApp/WeChat/GroupMe/Messenger to individuals	39.5%												
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<p>6. How often do you schedule pickup matches in a week? Please remember, we are talking about impromptu matches for which you need at least 1 more player.</p> <p>43 responses</p>  <table border="1"> <thead> <tr> <th>Frequency</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>More than 5 times</td> <td>9.3%</td> </tr> <tr> <td>Occasionally, maybe 1 or 2 times a week</td> <td>51.2%</td> </tr> <tr> <td>Varies from week to week depending on my schedule</td> <td>39.5%</td> </tr> <tr> <td>N/A</td> <td></td> </tr> </tbody> </table>	Frequency	Percentage	More than 5 times	9.3%	Occasionally, maybe 1 or 2 times a week	51.2%	Varies from week to week depending on my schedule	39.5%	N/A		<p>To understand if 'date' filter needs to be added for players to discover games. We concluded that this filter needs to be included since playing schedules of 50% of respondents fluctuates from week to week, implying that same day invitations will not</p>		
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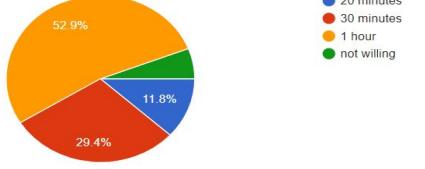
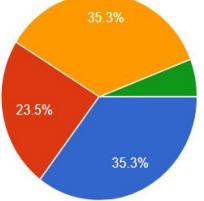
	work.																					
<p>7. Up to what distance would you be willing to travel for a pickup game? Here, assume that you do not have a car to travel around in.</p> <p>43 responses</p> <table border="1"> <thead> <tr> <th>Distance</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>More than 5 miles</td> <td>1.3%</td> </tr> <tr> <td>2 to 5 miles</td> <td>20.9%</td> </tr> <tr> <td>Less than 2 miles</td> <td>58.1%</td> </tr> <tr> <td>N/A</td> <td>18.6%</td> </tr> </tbody> </table>	Distance	Percentage	More than 5 miles	1.3%	2 to 5 miles	20.9%	Less than 2 miles	58.1%	N/A	18.6%	<p>#We concluded this question did not add value because:</p> <ul style="list-style-type: none"> a. Mode of travel of players varies b. Location information will allow a player to make an informed decision about participation 											
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More than 5 miles	1.3%																					
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<p>8. What networks do you share with groups of people you play pickup games with? Select all that apply.</p> <p>43 responses</p> <table border="1"> <thead> <tr> <th>Network</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Same school</td> <td>23</td> <td>53.5%</td> </tr> <tr> <td>Proximity to ga...</td> <td>14</td> <td>32.6%</td> </tr> <tr> <td>Friends</td> <td>35</td> <td>81.4%</td> </tr> <tr> <td>Friend's friends</td> <td>23</td> <td>53.5%</td> </tr> <tr> <td>N/A</td> <td>5</td> <td>11.6%</td> </tr> <tr> <td>Proximity to ga...</td> <td>1</td> <td>2.3%</td> </tr> </tbody> </table>	Network	Count	Percentage	Same school	23	53.5%	Proximity to ga...	14	32.6%	Friends	35	81.4%	Friend's friends	23	53.5%	N/A	5	11.6%	Proximity to ga...	1	2.3%	WeBall should offer users the ability to import contacts from phone as 35% respondents organize pickup matches with their friends and another 23% with mutual friends.
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Option-2: Proximity to game facility that I use																						
<p>9. Please select factors below which may dissuade you from playing a pickup game with someone you do not know. Select all that apply.</p> <p>43 responses</p> <table border="1"> <thead> <tr> <th>Factor</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>I have security c...</td> <td>11</td> <td>25.6%</td> </tr> <tr> <td>I am not aware...</td> <td>12</td> <td>27.9%</td> </tr> <tr> <td>I prefer playing...</td> <td>26</td> <td>60.5%</td> </tr> <tr> <td>N/A</td> <td>4</td> <td>9.3%</td> </tr> </tbody> </table>	Factor	Count	Percentage	I have security c...	11	25.6%	I am not aware...	12	27.9%	I prefer playing...	26	60.5%	N/A	4	9.3%	<p>#This question did not add value because interviews indicated that if a player has arrived for a pickup match, it is likely that he/she will continue participating in it, even if other players are unknown.</p>						
Factor	Count	Percentage																				
I have security c...	11	25.6%																				
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Option-1: I have security concerns																						
Option-2: I am not aware of his/her skill level	However, the fact that 26%																					

<p>Option-3: I prefer playing with people I know</p>	<p>replied that they prefer playing with friends reiterates that a user is likely to opt for groups of friends to organize pickup games with.</p>																					
<p>10. Please select factors which will make you more confident of playing a pickup game with someone you do not know. Select all that apply. 42 responses</p> <table border="1"> <thead> <tr> <th>Factor</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Name only</td> <td>8</td> <td>19%</td> </tr> <tr> <td>Occupation (student/full-time job/retired)</td> <td>25</td> <td>59.5%</td> </tr> <tr> <td>Neighborhood</td> <td>14</td> <td>33.3%</td> </tr> <tr> <td>Organizer of the match can vouch for the stranger</td> <td>16</td> <td>38.1%</td> </tr> <tr> <td>Skill level (amateur/competitive/amateur)</td> <td>14</td> <td>33.3%</td> </tr> <tr> <td>N/A</td> <td>4</td> <td>9.5%</td> </tr> </tbody> </table> <p>Option-2: Occupation (student/full-time job/retired) Option-4: Organizer of the match can vouch for the stranger Option-5: Skill level (amateur/competitive/amateur)</p>	Factor	Count	Percentage	Name only	8	19%	Occupation (student/full-time job/retired)	25	59.5%	Neighborhood	14	33.3%	Organizer of the match can vouch for the stranger	16	38.1%	Skill level (amateur/competitive/amateur)	14	33.3%	N/A	4	9.5%	<p>To identify fields that WeBall should request users to share and maintain as a part of his/her profile.</p> <p>Occupation emerges as the most important criteria followed with whether the organizer can vouch for an unknown player.</p>
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<p>11. At least how much time in advance should the organizer notify you about the pickup game? 43 responses</p> <table border="1"> <thead> <tr> <th>Time in Advance</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>More than 1 day</td> <td>48.8%</td> </tr> <tr> <td>12 to 24 hours</td> <td>20.9%</td> </tr> <tr> <td>6 to 12 hours</td> <td>7%</td> </tr> <tr> <td>3 to 6 hours</td> <td>7%</td> </tr> <tr> <td>I am good with a 30 minutes heads-up</td> <td>14%</td> </tr> <tr> <td>N/A</td> <td>0%</td> </tr> </tbody> </table>	Time in Advance	Percentage	More than 1 day	48.8%	12 to 24 hours	20.9%	6 to 12 hours	7%	3 to 6 hours	7%	I am good with a 30 minutes heads-up	14%	N/A	0%	<p>To determine the period up to which an invitation posted by the organizer should be available for viewing by participants.</p> <p>Here, while survey results indicate that respondents prefer at least a day's notice in advance, the results of the second survey indicate that users actually want the post to</p>							
Time in Advance	Percentage																					
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	be visible till the end time of the pickup game.
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d. Survey modification (v2) and interpretation of updated survey results

Sample used for the survey: 17 graduate students of Tepper at CMU

Question/response	Guidance to prototyping										
<p>10. Would you like the time period of a game be split into time slots? If yes, at least how long is each slot?(e.g. An one-hour game is split into two time slots each of which is half an hour. Some people only play in the 1st time slot, some only in second and other play in both.)</p> <p>17 responses</p>  <table border="1"> <thead> <tr> <th>Time Slot Length</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>1 hour</td> <td>52.9%</td> </tr> <tr> <td>30 minutes</td> <td>29.4%</td> </tr> <tr> <td>20 minutes</td> <td>11.8%</td> </tr> <tr> <td>not willing</td> <td>6.7%</td> </tr> </tbody> </table>	Time Slot Length	Percentage	1 hour	52.9%	30 minutes	29.4%	20 minutes	11.8%	not willing	6.7%	<p>WeBall offers participants the ability to join an ongoing pickup game after it has started, and allows them to select a time slot in which they will join the match.</p> <p>This question allowed us to identify the minimum period of time that the entire duration of the pickup match should be split into (1 hour).</p>
Time Slot Length	Percentage										
1 hour	52.9%										
30 minutes	29.4%										
20 minutes	11.8%										
not willing	6.7%										
<p>11. At least how much time in advance do you want a post to be closed so that no one else can join in the game?</p> <p>17 responses</p>  <table border="1"> <thead> <tr> <th>Time Advance</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Not closed until the game ends</td> <td>35.3%</td> </tr> <tr> <td>Not closed until the game starts</td> <td>35.3%</td> </tr> <tr> <td>30 minutes</td> <td>23.5%</td> </tr> <tr> <td>1 hour</td> <td>6.7%</td> </tr> </tbody> </table>	Time Advance	Percentage	Not closed until the game ends	35.3%	Not closed until the game starts	35.3%	30 minutes	23.5%	1 hour	6.7%	<p>Question 11 in the first survey was restated to identify the longest duration over which users would like to be notified of a pickup game (rather than how much in advance they should be informed).</p>
Time Advance	Percentage										
Not closed until the game ends	35.3%										
Not closed until the game starts	35.3%										
30 minutes	23.5%										
1 hour	6.7%										

	<p>35% indicated that the post should remain open till the game ends - this makes sense since it offers users greater flexibility in time.</p>															
<p>6. How comfortable are you organizing pickup games? If confused about what a pickup game is, please take a minute to read the description at the top. Mark 'N/A' if you don't play pickup games.</p> <p>17 responses</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Very comfortable</td> <td>23.5%</td> </tr> <tr> <td>Somewhat comfortable</td> <td>41.2%</td> </tr> <tr> <td>I avoid organizing pickup games</td> <td>23.5%</td> </tr> <tr> <td>N/A</td> <td>11.8%</td> </tr> </tbody> </table>	Category	Percentage	Very comfortable	23.5%	Somewhat comfortable	41.2%	I avoid organizing pickup games	23.5%	N/A	11.8%	<p>The results of the first survey and the interview indicate that organizers may behave differently from participants.</p> <p>Therefore, the objective of this question was to identify the relative proportion of people who prefer organizing pickup games (~23%) versus those who prefer playing (~20% - from first survey).</p>					
Category	Percentage															
Very comfortable	23.5%															
Somewhat comfortable	41.2%															
I avoid organizing pickup games	23.5%															
N/A	11.8%															
<p>If you are not comfortable with organizing pickup games, what are the reasons?</p> <p>17 responses</p> <table border="1"> <thead> <tr> <th>Reason</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>It takes much time...</td> <td>8</td> <td>47.1%</td> </tr> <tr> <td>care about facilities...</td> <td>4</td> <td>23.5%</td> </tr> <tr> <td>worry about people...</td> <td>6</td> <td>35.3%</td> </tr> <tr> <td>N/A</td> <td>2</td> <td>11.8%</td> </tr> </tbody> </table> <p>Option-1: Contacting people is time consuming Option-2: No sure about facilities</p>	Reason	Count	Percentage	It takes much time...	8	47.1%	care about facilities...	4	23.5%	worry about people...	6	35.3%	N/A	2	11.8%	<p>Given that an equal % of people responded that they avoid organizing pickup games, this question identified some of the reasons for the same.</p> <p>Coordinating people across multiple platforms is time consuming and emerges as</p>
Reason	Count	Percentage														
It takes much time...	8	47.1%														
care about facilities...	4	23.5%														
worry about people...	6	35.3%														
N/A	2	11.8%														

Option-3: Worry about people quitting after accepting invitation	the single most important factor which inhibits organizing pickup games.
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Revenue Model

Given the host of competing applications and channels currently available for users of pickup games, team WeBall rejected the option of charging users upfront at the time of download. The chosen business model is a ‘freemium’ one in which users will perform the download for free but will be charged for the below mentioned premium features -

1. Ability to invite >10 users per game (users are not a part of groups)
2. Form groups with >20 users
3. Time slot function for users who have accepted an invite (provides time slot based invitation acceptance feature)

User Interface: Paper Prototyping

Based on our discussion and the first survey result, we build our initial paper prototyping to illustrate main functions of WeBall. There are 5 major parts in the application: Sign in, Me, Create Post, Discover Games and My Games.

Sign In

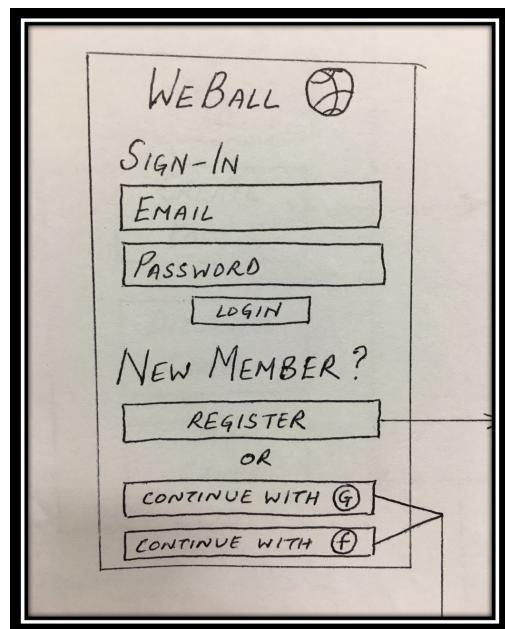


Figure 1

Figure 1 above is the first page of WeBall. Users can sign in with their WeBall account or through the third party like Google and Facebook. If someone is the new member, he/she can create a WeBall account using their email . After verifying his/her email (like Figure 2), he/she has created a WeBall account successfully.

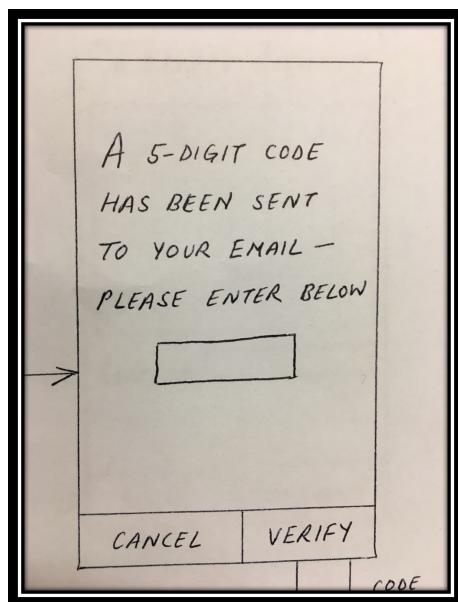
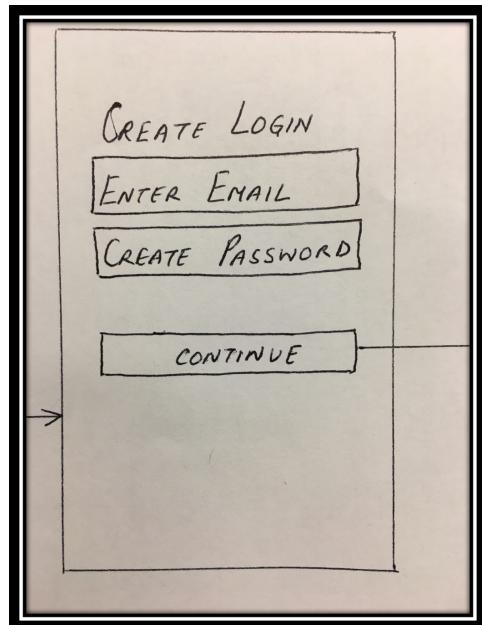


Figure 2

Home page

Figure 3 is home page of WeBall, which has 4 buttons. These 4 buttons actually indicate the main functions of WeBall. We come up with the main functions according to our survey results and interviews. Users will have their own profile. They can create posts and discover games, and they also can view their upcoming games.

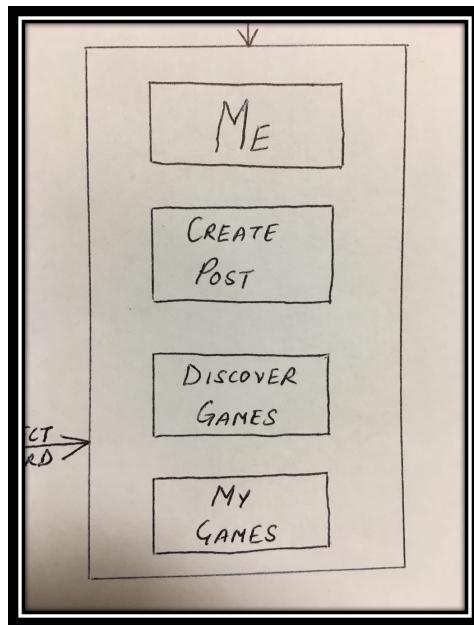


Figure 3

ME

ME is actually a profile for every user. As it shows in Figure 4, once users click “ME” button, they can see their profiles. In the profile, there are informations about Account ID, name, email and phone number. The Account ID is unique to every user, which is convenient for users to add friends. Name and email is necessary and they are provided by users. Phone number is optional in case that someone feel uncomfortable to provide their phone numbers. Most importantly, users can add friends or make groups in ME. According to the feedback, users may always play one kind of sports with certain

people. At this situation, users can create a group named as “basketball team”, and if they want to play basketball, they can make posts to this certain group.

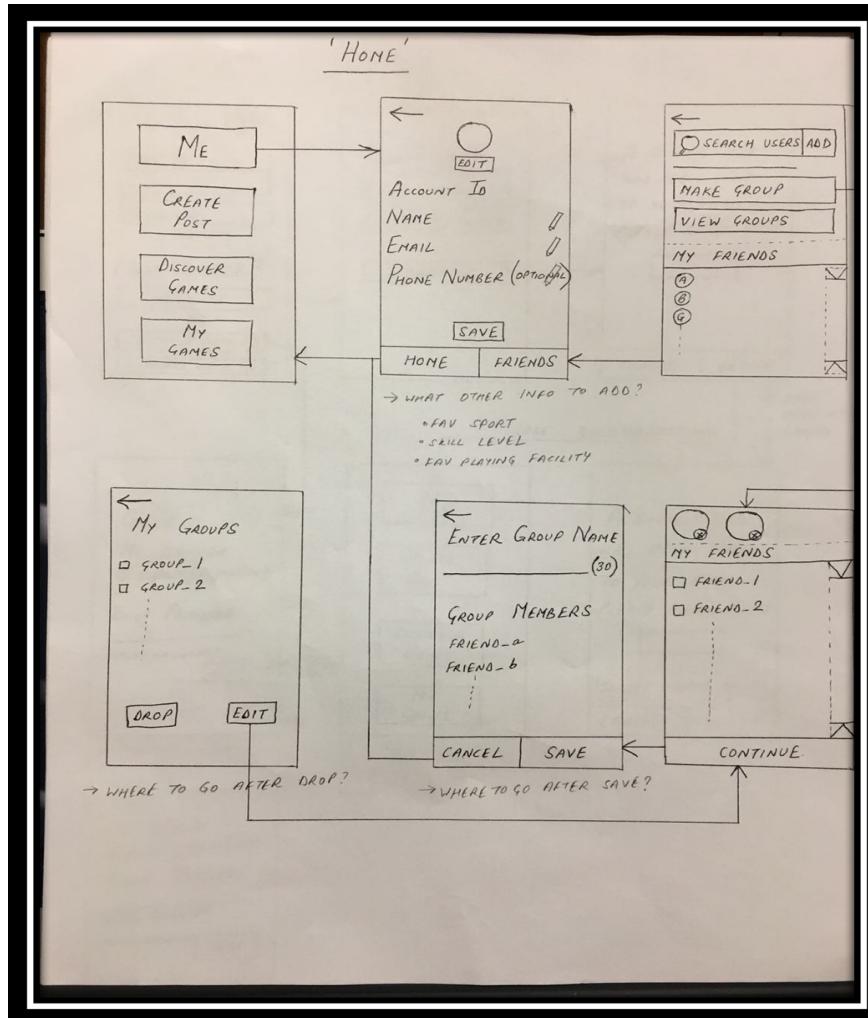


Figure 4

Create Post

This part is mainly for organizers who want to make posts to invite other(Figure 5). First of all, organizers can select games.

Initially, WeBall provide 5 games, which are most popular games from our first survey result. Then, organizers can select time and location. After that, organizers choose number of players that want. At last, organizers can choose to post to public or private.

Once they choose public, everyone can see their posts. Or they can choose private which certain people can see their posts. Organizer also can type in comments for more detailed information. For example whether facilities are offered.

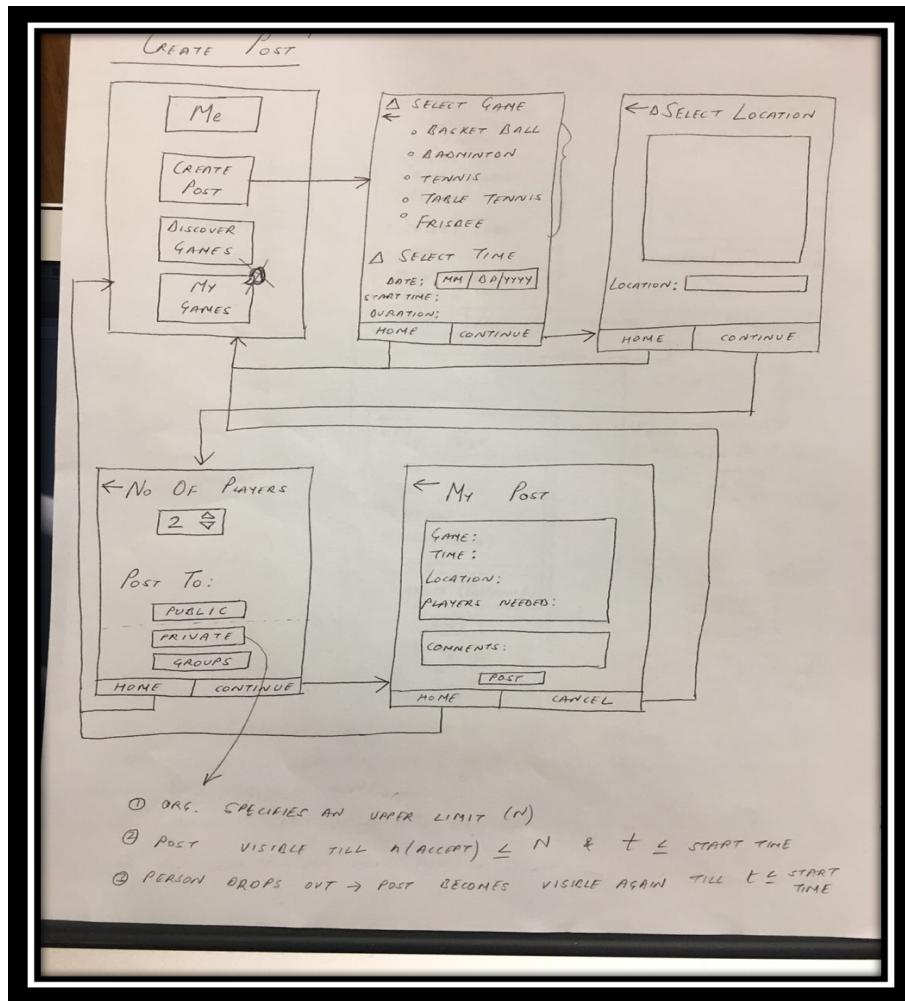


Figure 5

Discover Games

Users can discover certain games with certain time once they click “Discover Games”. Just like “Create Post”, users can discover certain games with certain time they want.

And as long as the number of players is not full, and the post is not closed, users can join in.

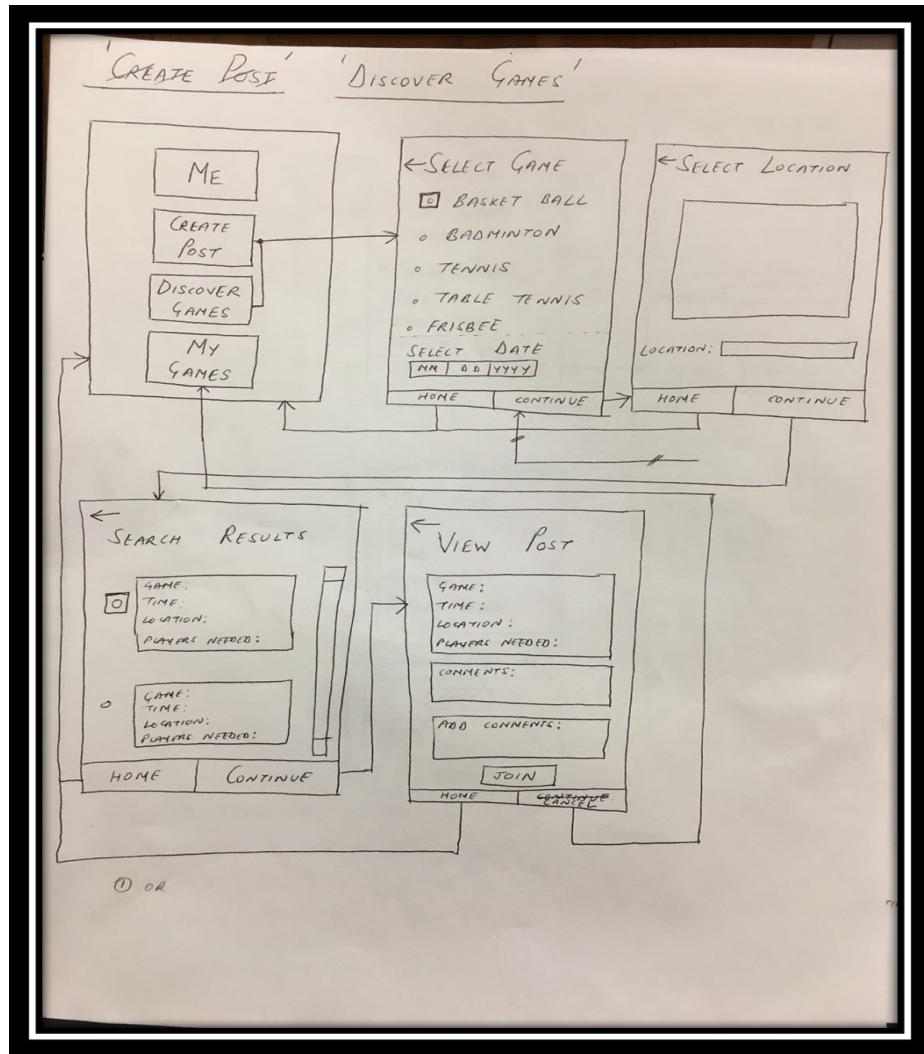


Figure 6

My Games

Users can view their upcoming games in My Games. Users can view whole informations about the games they want to join, including the type of games, time, locations and number of players.

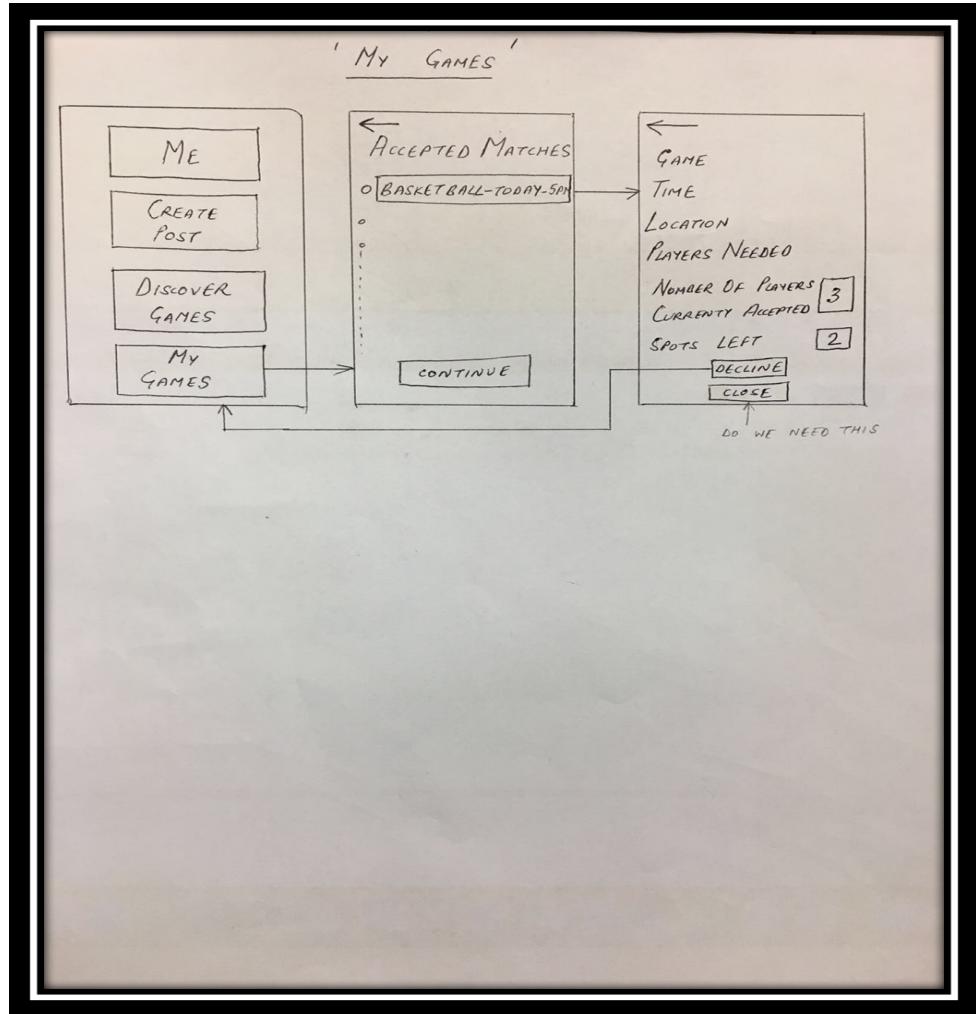


Figure 7

User Interface: Refined

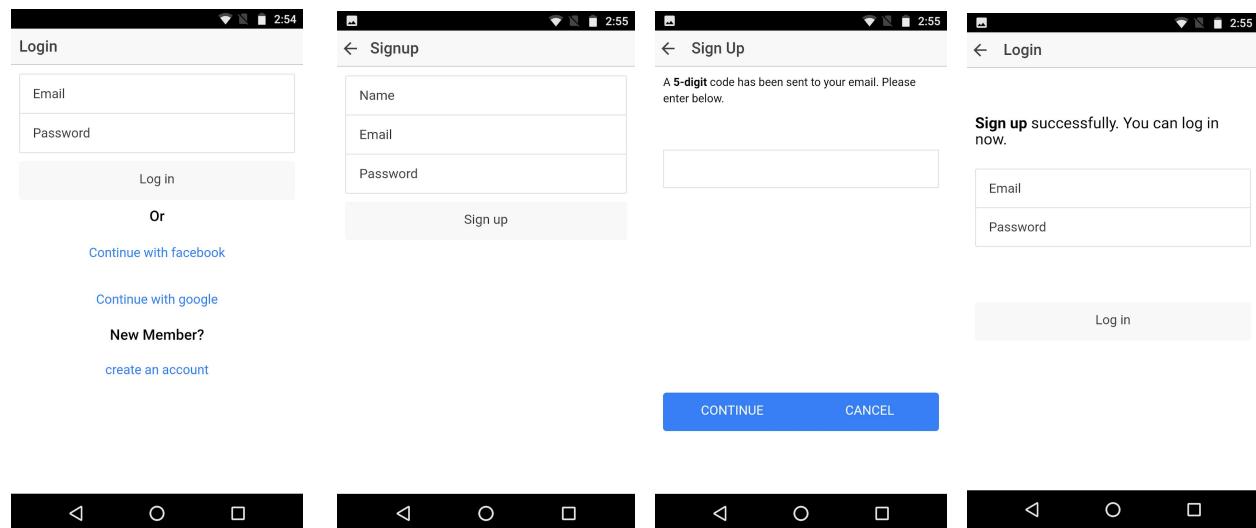
After paper prototype is done, we handout survey2 and refine our UI design and transform it from paper prototype to UI by using ionic creator . Then we invite some people to do user test.

We make some changes according to the result of survey2 and user test. We also include those abstract from survey1 but we forgot to do in paper prototype.

To make our UI style uniform, for each button bar, we always put “cancel” button as its right part while “continue”, “save”, “post” buttons as its left. In paper prototype, not all pages have cancel or home button. Since several users felt them lost in process and can not go back to initial step on each scenario, we add cancel button on every page so that user can cancel their process at any step and go back to the main page of each scenarios. We also add home button on every final step of one scenario if it not jump to home page automatically.

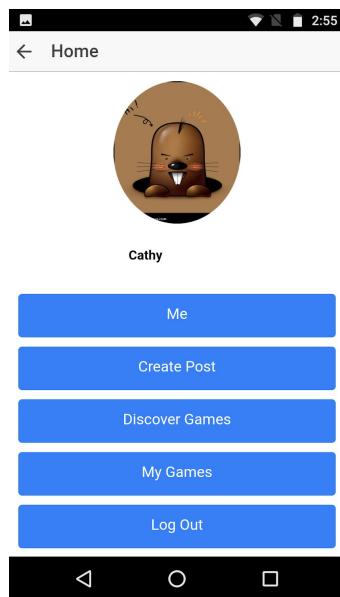
Sign Up

This part is as same as what we have in paper prototype.



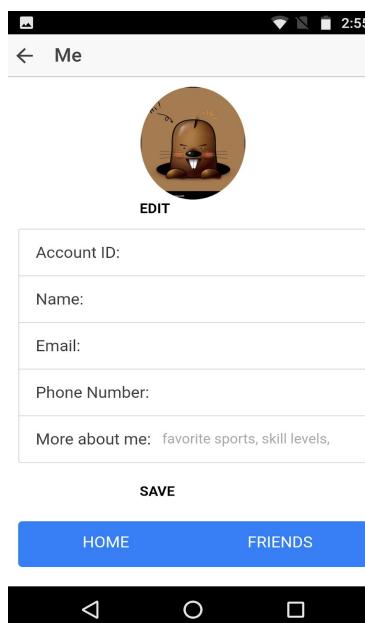
Home Page

There are five buttons in home page. We add “Log Out” button this time .



Me

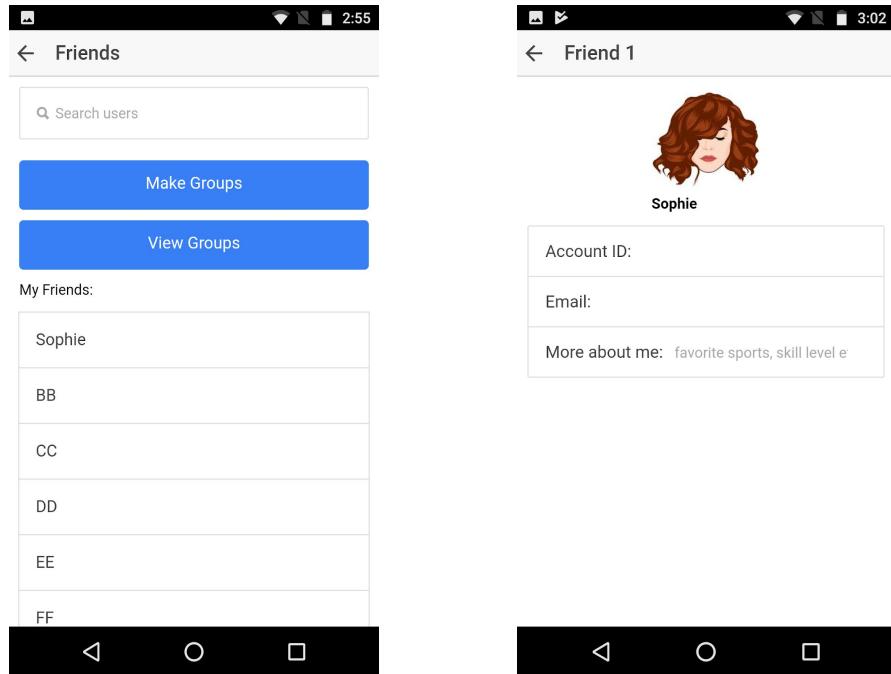
We add “more about me” for the user to show their favorite sports, skill levels or such thing so that other users can know this user better. We add this function because in survey1 27.9% people select the factor of dissuade them from playing a pick up game to be not aware of people’s skill level, and 33.3% people feel that skill level will make them more confident of playing a pick up game with someone they do not know.



(1) Friends

Here is a search engine on the top of the page. The user can search for other user by user id or name and then invite him or her to be friends.

Here is a list of my friends. If clicking on one friend's name, the friend's profile is shown.

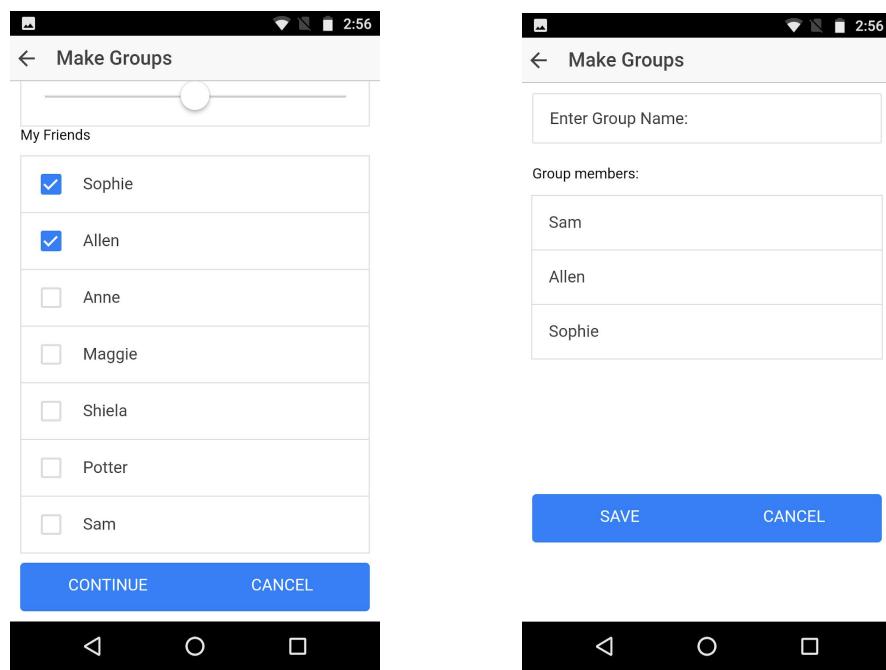
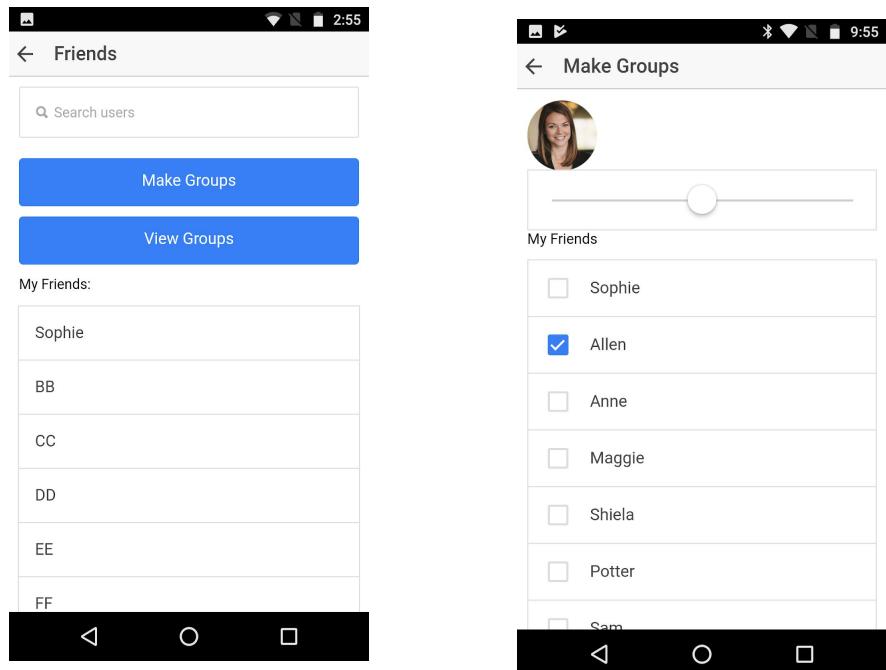


(2) Groups

(2.1) Make Groups

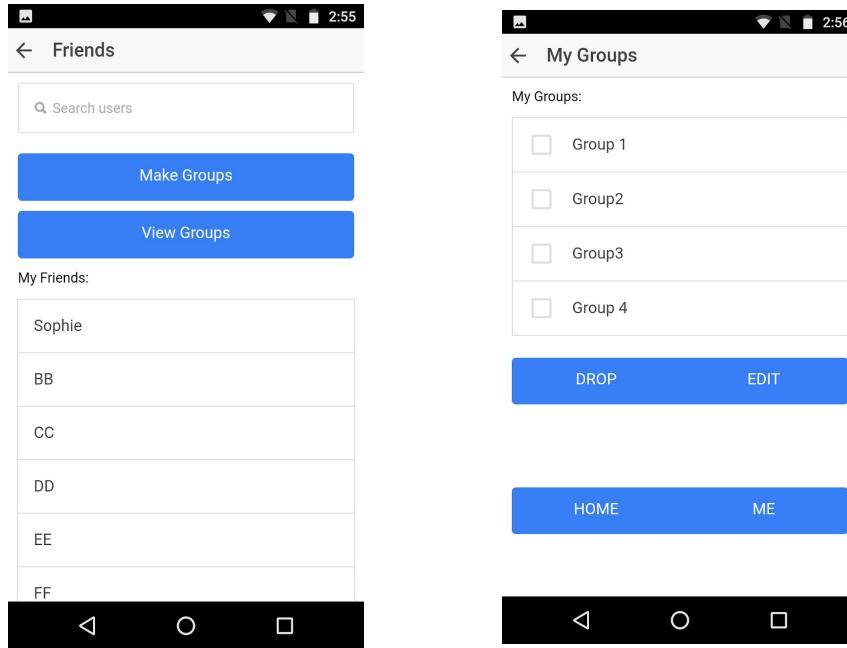
On the main page of "Make Groups", the user can select people to be group members.

Once saved, this group is created and the page will go back to "Friends" main page.



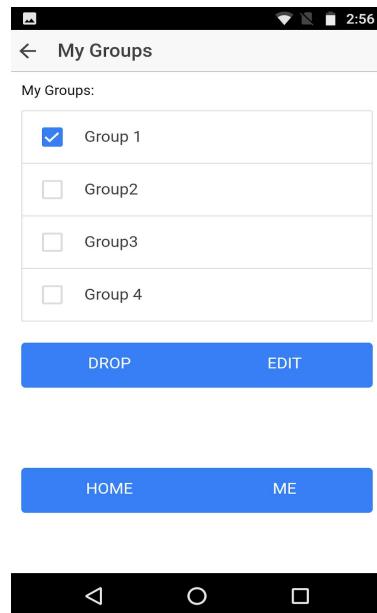
(2.1) View Groups

On the main page of “View Groups”, the user can select one group and then drop or edit this group.



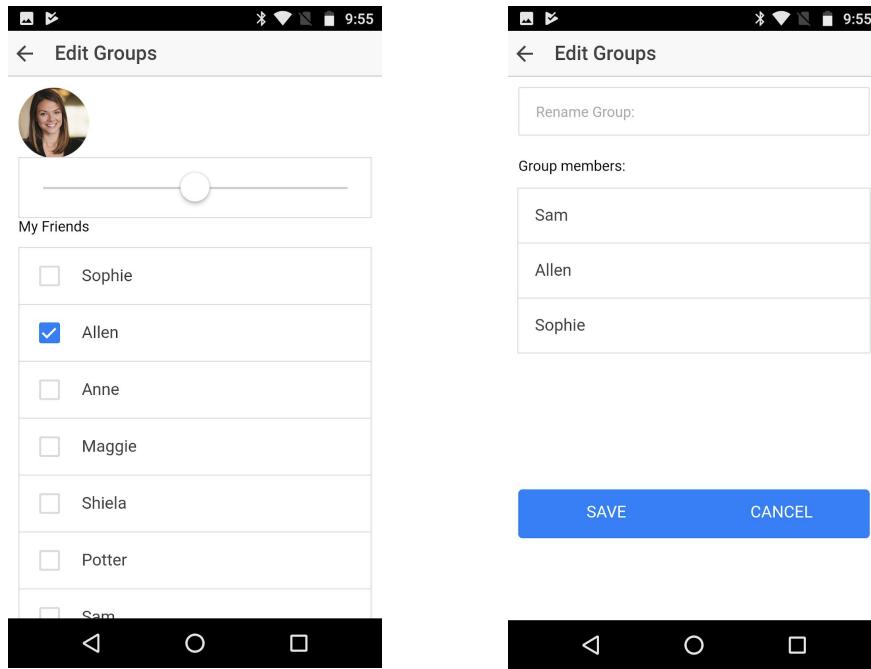
(2.1.1) Drop Groups

Just click on drop button, a group will be removed from the group list on this page.



(2.1.2) Edit Groups

Clicking on edit button, a page similar to “make groups” will appear. Use can delete member or add member, and then can change group name.



Create Post

Compared with survey1, in survey2 we provide more options in the question: What is your favorite sports, especially those popular in America. We also ask people how many types of game they want the list to show them. According to the result, the list of games for creating post and discovering game now only include 4 different games.

← Create Post

SELECT LOCATION

Map showing locations in New York City, including Brooklyn and Manhattan. Red dots indicate specific locations.

CONTINUE CANCEL

← Create Post

Select Game

Basketball	✓
Table Tennis	
Badminton	
Tennis	

Select Time

Date: _____

Start Time: _____

CONTINUE CANCEL

← Create Post

Number of Players

Post To

Public
Private

← Create Post

My Post

Game:	Basketball
Time:	13:20 12/12/2018
Location:	University Center 5302 Forbes Ave Pittsburgh, PA 15213
Players needed:	5

Comment

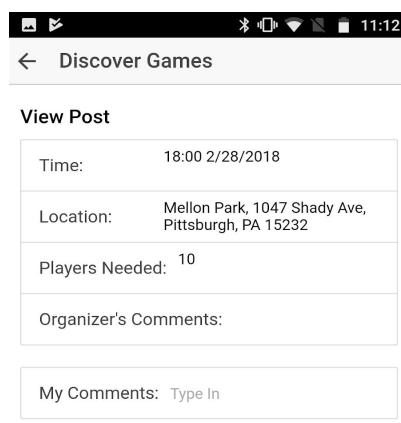
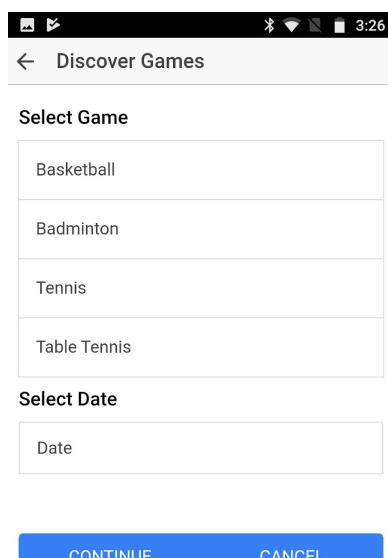
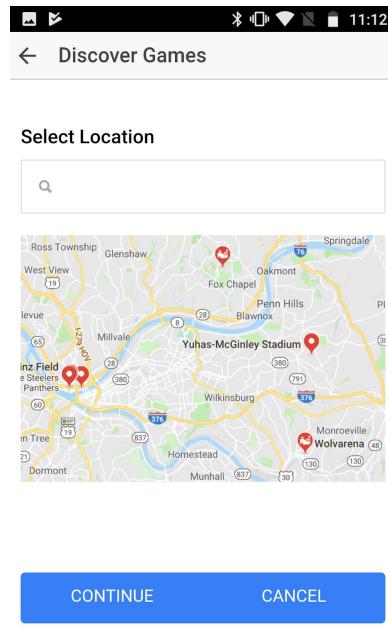
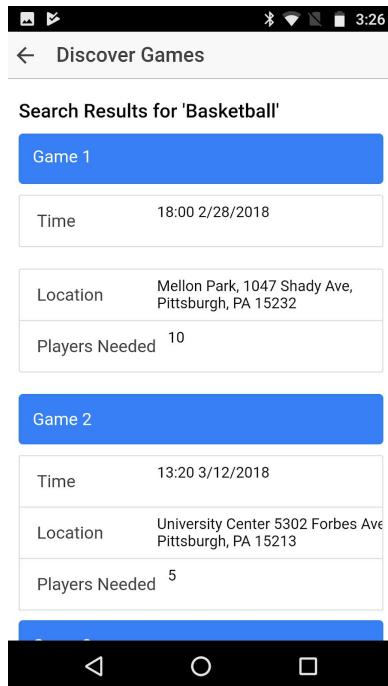
(optional)

CONTINUE CANCEL

POST CANCEL

Discover Games

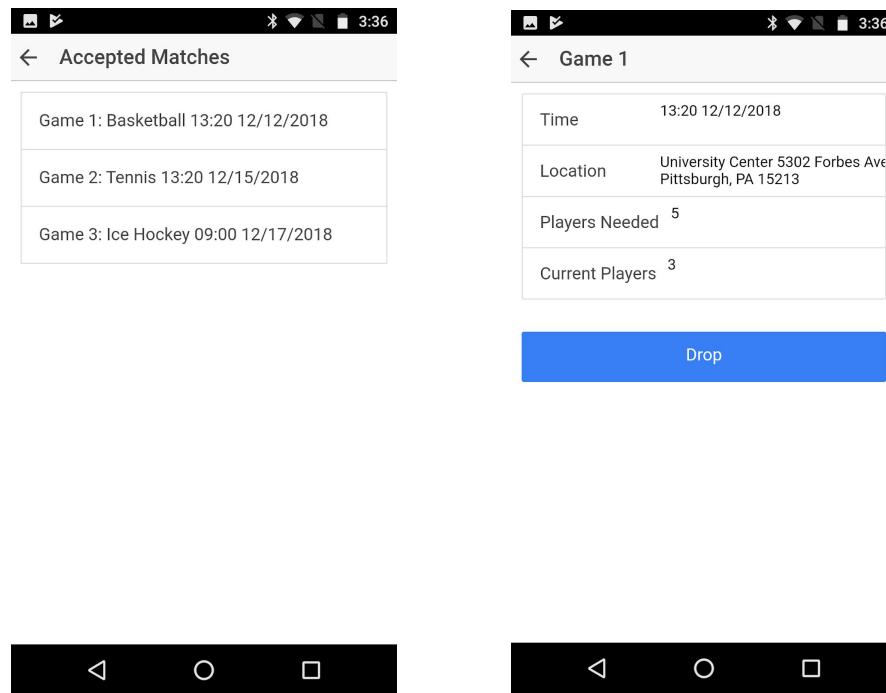
Similar as the process of make post. By clicking on one game in discovered games, all of the information about this game is shown.



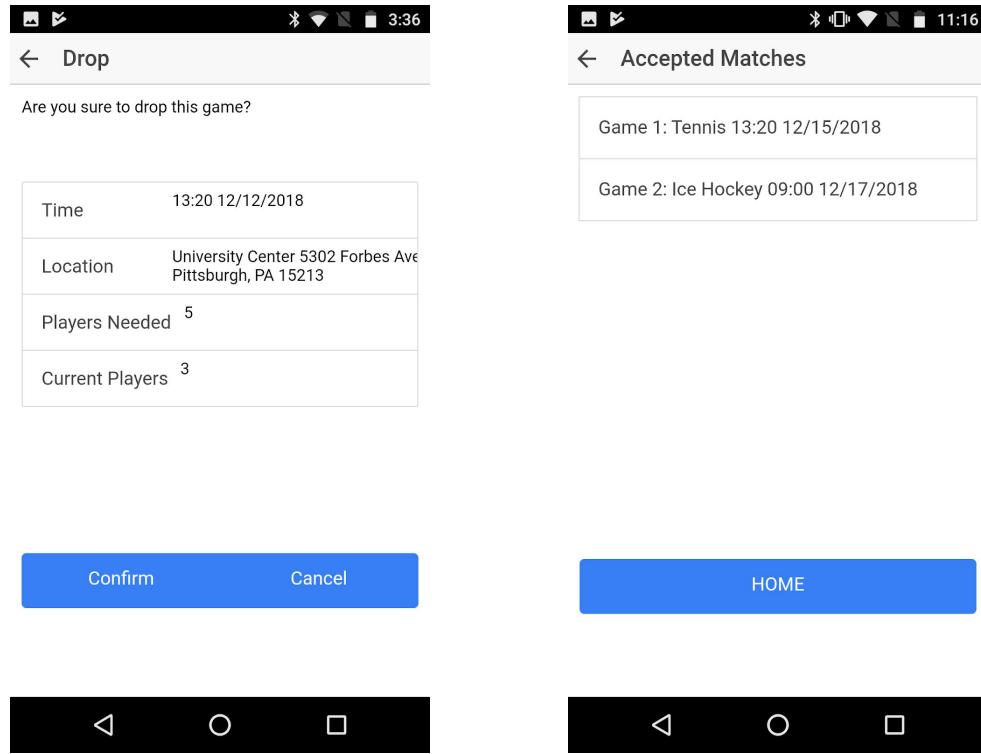
My Games

In paper prototype, if the user is an organizer, then for each game, the user should close a post so that no more people can join in this game. But according to the result of question 11 on survey 2, 35.3% people want a post not to be closed until the game ends and 23.5% people want it not to be closed until game starts. So we decide declining the close button for an organizer and let our system to close posts until game ends.

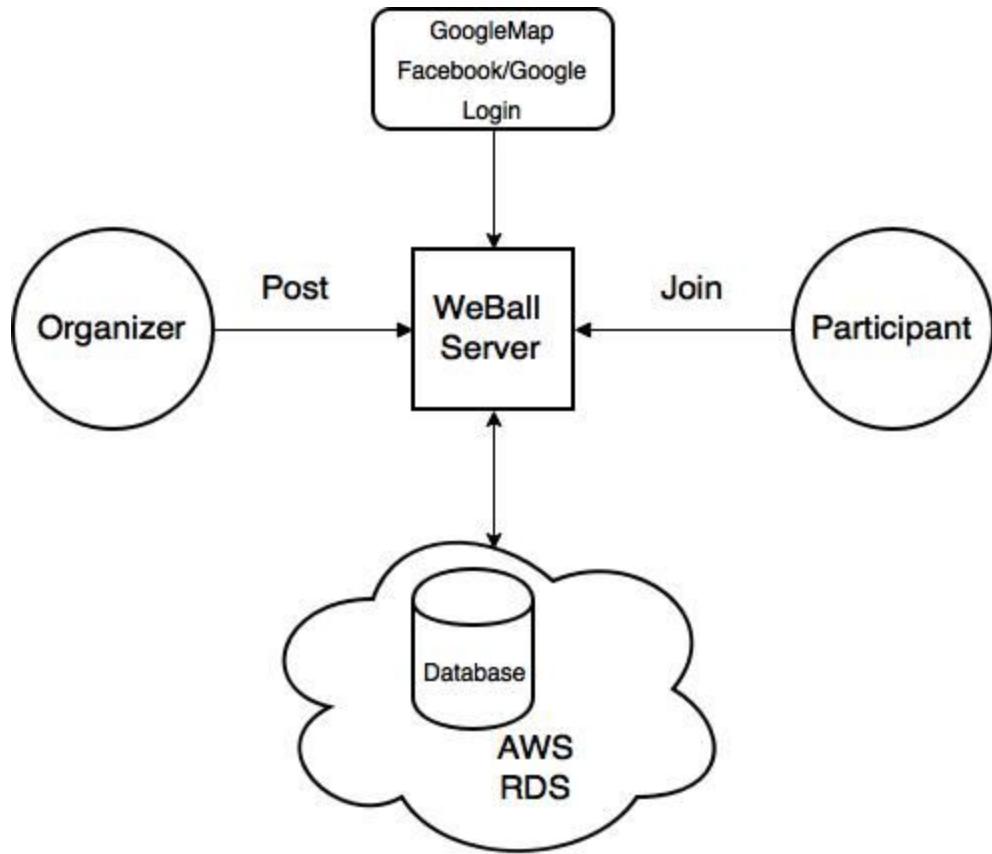
In paper prototype, we assign different colors to games joined as an organizer and games joined as a participant because page for a organizer contains close function. Since now an organizer can be treated equally as a participant after the organizer finish making post, we delete that color function.



In user test, a user complained about no confirmation after clicking on dropping, so we add a drop confirming page to avoid incorrect action. After dropping a game, the game is removed from the list of accepted matches.



Architecture



Our system mainly consists of two parts: the frontend Android phone managed by users and the backend PostgreSQL database running on AWS (Amazon Web Services) RDS managed by us.

All user activities will be on the Android phone. Users would be able to post new games, search for games and view their profile on the phone.

Our data storage system is PostgreSQL database running on AWS RDS. With RDS, it is easier to set up, operate and scale PostgreSQL deployments in the cloud

(<https://aws.amazon.com/rds/postgresql/>). We are expecting no more than 2 database requests per user per day. We are going to store all user credentials and posts details in our PostgreSQL database. When users make new posts, we would store the posts into our database. When users want to search for games, we would fetch data records from our database based on the criteria that users provided. The storing and fetching are both handled by our app server. When a post is expired (i.e., reach the starting time), we would delete the post from our database.

The 3rd party APIs we are planning to use includes Google Maps Android API and Google Sign-In provided by Google and Facebook Sign-In from Facebook Android SDK provided by Facebook. With the Google Maps Android API, our users would be able to navigate themselves and select the target location of their post. With Google Sign-In and Facebook Sign-In integrated into our app, we enable our users to sign in with their Google and Facebook account.

Privacy and Security

Privacy Policy

- What information would we collect from users and why we need that information?

Users' privacy is of our utmost concern. We strive to collect minimum user information in order to protect user privacy.

The only requisite information that we need our users to provide is their email address. We would ask for that when users register for our app. With authentication purposes, we would need to send a random code to the email address provided to make sure that the user is not robot. If they are logging in with their Google or Facebook account, email address is not necessary. Both Google and Facebook sign-in APIs are using OAuth 2.0 protocol for authentication and authorization.

Users would be able to manage their privacy preferences in their account settings. They can choose whether to share their current location with our app and whether to receive notifications from our app. With user's current location, we can provide users information like how can they reach the game location from their current location. Moreover, our app can sort games based on distance. So users can see what games are nearby. The privacy preferences can be changed anytime. With notification on, we can send users alert when their games are starting in fifteen minutes as a reminder.

Our app would also ask for access to users' photo library if they want to add or change their profile icon.

Also, as a pickup game scheduler, we care about users' physical security because they would meet strangers on our app. Thus, we would also ask for users' age, gender and occupation when they register. So users can choose to join a game or not based on these information from other participants. But this information is optional and users can choose not to let other users see this information even they provide us with it when they register.

- When would we collect information from users?

We collect users' email address, along with their age, gender and occupation when they register. If users would like to share their current location with us, we would collection that information whenever our app is open.

Security

- User data protection

We would encrypt all the data we get in order to protect the data and our users. We store all user information in the PostgreSQL database running on AWS RDS. AWS RDS provides us the option to encrypt data using keys that we manage through AWS Key Management Service (KMS). With Amazon RDS encryption, data stored at rest in the underlying storage is encrypted, as are its automated backups, read replicas, and snapshots (<https://aws.amazon.com/rds/postgresql/>).

- Data Accessibility

Information that users provide us would only be available to our app. We would definitely not share it with any third party. Also, when a user uninstalls our app, we would delete all information about that particular user from our database.

Conclusion and Future Development

Conclusion for mini3

As now, here is what we have finished for mini3:

1. Design and Proposal

Our team has met and discussed about all the possibility and potentials of our App. And after the process of brainstorm, we wrote a detailed project proposal, and we also finished the overall design of our Apps' workflow, functions and UI.

2. Survey and result analysis

After our deep discussion, we added much important questions and concerns in our survey and sent to other people. We analyzed the results and created WeBall's basic functions according the users' need.

3. App implementation

We also finished the major part of our App design on Ionic Creator. We have completed the basic features of our Apps.

Future development

1. Currently only users accepting the invite can add comments; but this feature will be made available to users rejecting posts in the next version of the prototype
2. Optional profile sharing to be included in future developments
3. People can invite friends from contacts on phone to our app.
4. Time period more than one hour can be split to slots of one hour to allow people join game in different time slot.

Appendix

a) Code available in the Github repository for our project:
<https://github.com/Tianyu0312/08781>

b) Market sizing calculations for an initial release in Pittsburgh –

Student enrolment in US -

1. Grades 9 to 12 – 15M (~30% of 50M)
2. Additional private elementary and secondary – 5M (30% -> 150K)
3. Colleges and universities (attendance in Fall of '17) – 20M

Student enrolment in Pittsburgh -

Population of Pittsburgh = 2.4M (city = 300K)

% conversion = $2.4M / 325M \sim 0.74\%$

Targeting students in schools (elementary & primary), undergraduates, and graduates in Pittsburgh -

1. Grades 9 to 12 – $0.74\% * 15M = 111K$
2. Additional private elementary and secondary – $0.74\% * 5M = 37K$
3. Colleges and universities (attendance in Fall of '17) – $0.74\% * 20M = 148K$

Number of students in Pittsburgh = 296K ~ 0.3M

Number of students who have played basketball in Pittsburgh = $0.3M * 9\% = 26,640$

As of spring 2017, 30M people played basketball in US in last 12 months -> 9%

Total non-farm working population = 1.2M

Number of people who have played basketball in the last 12 months in Pittsburgh among the non-farm working population = $108K * 0.74\% \sim 800$

Total people (students + working) who have played BB in the last 12 months in Pittsburgh = 27,440

Coverage of OTT (over-the-top) messaging apps in US -

Whatsapp – 16%

Messenger – 40%

Assuming 50% use above + another 20% (others – WeChat/GroupMe/Line) -> 70% coverage

So, maximum number of people who can be offered WeBall and who likely do not use any competing app = $30\% * 27,440 = 8,232$

