

Marissa Stephens
Nick Mohr
Danielle Man
6.170 Software Studio: Project 3.2

GroupFinder

Overview

Motivation

We seek to make it easy for students to form teams for group projects

Key purposes

1. The main purpose of our app is to allow MIT students to easily find teammates for group projects. From what we've noticed, MIT students (especially in course 6) often have difficulty forming groups for team projects due to the vast size of classes and restrictions imposed on the projects - like not being able to work with people with whom you've worked before. As the compatibility of the team often affects the grade a team receives, students want teammates that they can rely on. Students usually don't want to work with strangers, and in large classes, it's hard to know how many of your acquaintances are in the class (and which of those are actively looking for partners). By providing the names of people who are looking for partners for a particular project, this app attempts to rectify that issue.
2. We seek to ensure team compatibility. There are many factors that affect team cohesion, such as location, workstyle, and schedule. Often, students want to share things in common with their teammates, like classes, extracurriculars, and dorms/FSILGs. Students can also have very different styles of working- some are procrastinators; some like to get things done early; some like to work in a group; some like to work alone; some like to commit 20 hours a week; some only want to commit 5 hours a week. If students can find partners with similar workstyles, then the team as a whole will have a better understanding of how it can be most efficient.
3. We want to help students form teams with complementary skill sets. Each student is a unique person with a unique set of skills. Some are natural leaders and organizers whereas others can work hard as long as they have some direction first. Some students prefer frontend, others backend, still others testing (although very rare). A good team has a balanced set of skills, and allowing users to know their teammates' strengths can make dividing the workload a lot easier.

Deficiencies of existing solutions

Currently there is no commonly used system for creating teams other than speaking to students who are in the class. For the most part, students prefer to work with people they have had some previous interactions with outside of the class, rather than complete strangers. In large classes however, it's often hard to know which of your acquaintances are also taking the class. Previously, there has been an app called Setup that allowed users to find pset partners that have the similar study styles. In a group project, you need a variety of skillsets to be optimally productive. Classes also allow students to fill out a google form (if they were not able to find a team on their own) and allowing the class staff to assign them to other teams. We witnessed this in 6.005: people were writing Kerberos names on the board and yelling to find other people who they had never met before, but were now about to work on a big project with. For this project we also saw many sponge-talk emails to our dorm, where people were asking for one or two more group members for this project and just hoping that someone would respond. The deficiencies of existing solutions mainly boils down to leaving something extremely important (which is group dynamics for a big class project) to chance.

Context diagram

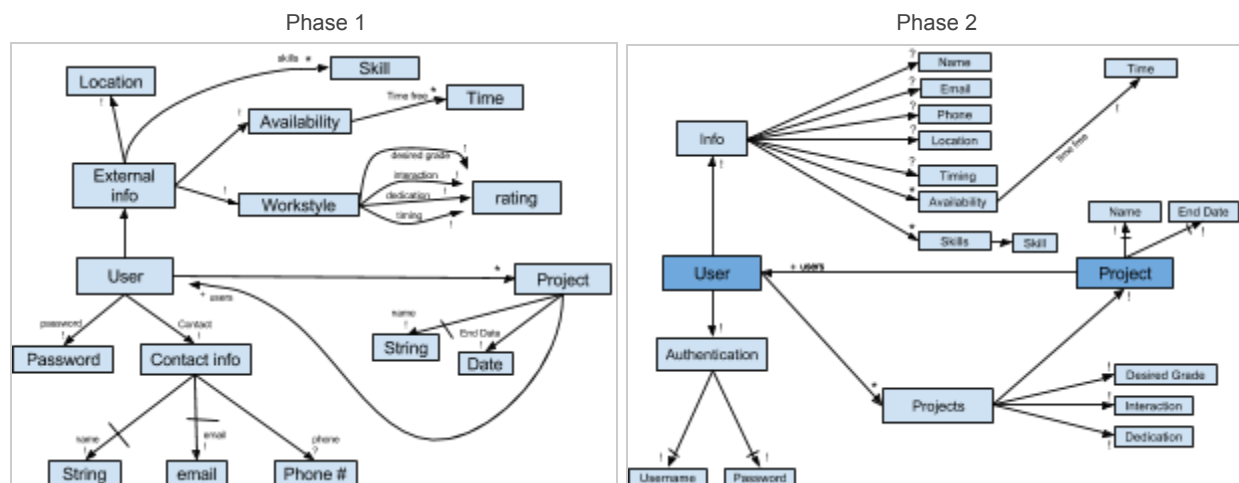


Design Model

Concepts

1. **Project:** created by a user such that it can be accessed by other students (helps fulfill purpose 1)
2. **Prioritization** by external factor: Users can prioritize other users that have specific external factors (helps fulfill purpose 2)
3. **Matches:** Users that have a desired external factor (helps fulfill purpose 3)
4. **External Factor:** something such as location, workstyle, availability, or skillset that a user might want their teammates to have. (helps fulfill purpose 2 and 3)
5. **Skill:** A student can have some specific skills that will help other people select based on skills (helps fulfill purpose 3)

Data Model

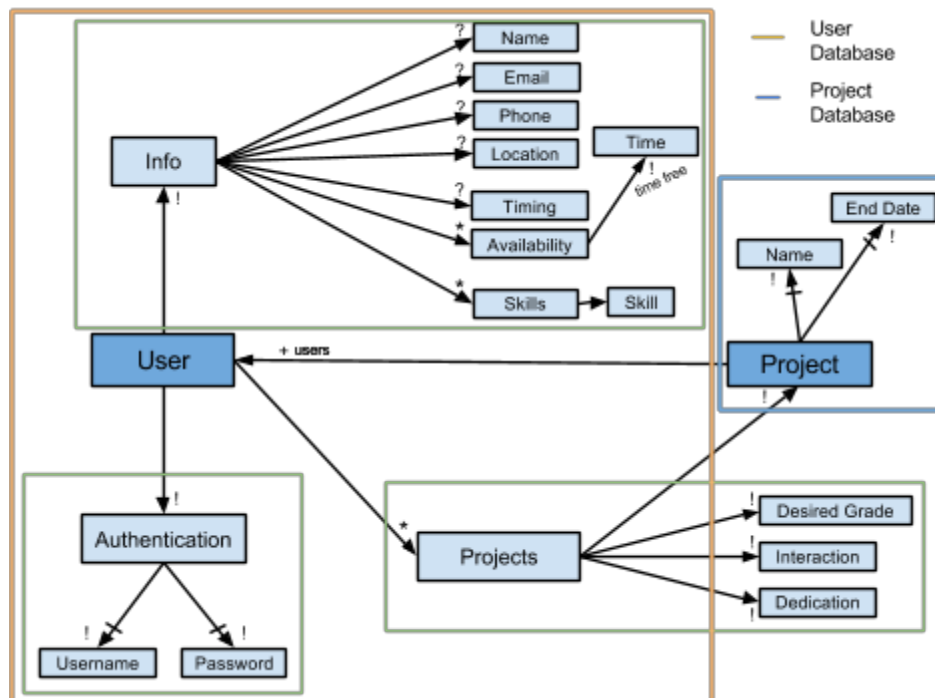


Here we show two data models, the one on the left being the data model from phase 1 of the project, and the one on the right being our updated data model for phase 2 of the project.

One can see that the model has changed quite significantly, the underlying change being that we altered how a User's information is stored. For organizational (and security and readability) purposes, we segmented the Users metadata into 3 categories: Authentication, Information, and Projects. There were many reasons to do this, the foremost being the improvements to security that it brings. When we return a user's JSON in our API, we don't want to expose a user's password - thus we only ever allow access to `user.projects` or `user.info` - `user.authentication` is solely used by the signup/login/logout methods, and is never exposed as JSON. We also realized that 'Contact Info' and 'External Info' could be combined into an overarching category of 'Info', because when we do want information about the user (mainly in our filter), we want access to all of that information at one time. Lastly, a user's projects are in their own category, separate from the authentication of the user's account and from the profile information that a user has. This did not change from our first iteration of the data model; however, we have moved the fields *desired grade*, *interaction*, and *dedication* to be specific to each of the users projects, as opposed to being set globally. The change was intuitive because a user might have a different desired grade for his/her projects in different classes (depending on the user's status in the class), so it didn't make sense to have only one overarching *desired grade* information field; the same logic applies for a user's *interaction* and *dedication* to a project.

There are a few other minor edits to the data model. We decided to authenticate our users based on usernames (as opposed to email), so email is no longer an immutable field and the field of username has been added. A project's end date is now also immutable, because this is how we will be removing expired projects from the app. For clarity, the distinction between *timing* and *availability* is that timing refers to the times of day when a user prefers to work (and is a number that represents this), and availability is an array that represents the user's weekly schedule.

Data Design



Challenges

Design Challenges

1. How do we represent the availability of a student? We basically have two options, make a grid that our users can fill out or just have a plaintext and hope they input correctly. The grid is good because it allows for very exact timings, but bad because it takes a lot of time to fill out and to create for us the developers. It might also be scary to a new user because it basically represents a few hundred boxes they might want to fill out. The plaintext is bad from a security standpoint as well as having to have the user follow some format that might not be the most convenient. We decided to go with the calendar because it is the best representation for what we envisioned and it's fairly intuitive to fill out, even if it does take a while to do so.
2. How should we represent the external factors? There are factors that are universal across all projects for a user such as availability, when they like to work on projects, their skills, and their location. On the other hand there are factors that may vary from project to project such as desired grade, dedication, and amount of interaction. We could have users define each factor for each new project, but that would take up a needless amount of the user's time. Alternatively, we could set these factors to be the same for any of the projects the user is a part of. This saves user time but sacrifices user's desired functionality. To compromise, we set some factors on a per-project basis and others just universally for the given user.
3. How do we test? For this section, we just used a series of ajax calls that can be found in the public folder in `unit_tests.js` and viewed in the routes/views of the app at `/tests`. While we could have used some better testing frameworks, the lack of instruction and time to learn on our own prevented us from using complex frameworks. Additionally, since JavaScript runs functions asynchronously, we needed all of our test to cascade, which made traditional frameworks like Qunit much more difficult to use, because those testing suites usually test individual functions and our tests depend on a series of AJAX calls *in order*, and their corresponding responses. It needs to be guaranteed for example that you sign up a user before adding them to a project, and those two events might not necessarily happen in order if they are not cascaded.
4. How do we filter? We want to be able to display best matches with the current student without too much difficulty. We could do some machine learning, or we could sort based on how good the match is in one category, or we could do somewhat arbitrary weightings on what is important in a group. We decided to go with the latter because it is somewhat simple to implement (unlike machine learning) and also allows for users to create their own weightings via the URL.
5. Should a user contain a list of projects or should a project contain a list of users? A user containing a list of projects makes it easier to sort users based on their projects. However, a project containing a list of users makes it easier for a group of users to be associated with the same project, so if project information changes then it only has to change in one place, which is why we decided to give project a list of users.
6. How do we get rid of old projects? One solution is to never get rid of them. That was unfavorable since that could lead to a lot of unused, expired projects clogging up the database. Another idea was to have a specific end date, say the date the project is due. This was obviously preferable so that led to the question of who gets to set the end date. Either the first user who created the project gets to set the end date, which could lead to an unfortunate case where the user sets it too early or too late, or we automatically delete a project if it has no users actively searching for a partner. This is problematic since if the users do not all notify the database that they are no longer looking for a partner, then we

have the same issue as if we never got rid of any project. Therefore we decided to allow the first user to set a project due date at which time the project is deleted.

7. How do we create projects? One solution was to get a list of all MIT courses and then allow users to select the course for the specific project they were trying to build a team for. However this does not take into account the fact that students might have several group projects in a course or the fact that not all group projects will be associated with a course-such as a hackathon team. Therefore, we decided to let the users create projects, or select a pre-existing project. While this does allow users the chance to create several similarly named projects, it was decided that the benefit of extending the definition of group project far surpassed the error that could occur between the mouse and the keyboard.
8. How do we authenticate users are from MIT? While it would be nice to use certificates, some students might not want the app to access their certificate if it is not safe, which would reduce the appeal of the app. Instead, we chose to allow users to login with their MIT email, which would then also be used as contact information and still checks that they are related to MIT. We decided to use passport to login users and not authenticate that they are from MIT.
9. How do we retrieve MIT data, like class numbers and dorm locations? We could hard code this ourselves in the app, we could ask users to input it as they go, or we could pull from one of IS&Ts resources. The cleanest way would probably be to pull from IS&Ts resources, but that would expand the scope of the app quite significantly. Else we would have to ask for a lot of information from users, which significantly takes away from the experience of the user. Ultimately we decided to forgo this step and allow users to simply create any unique project they desire. This makes the app more applicable to non-mit based projects.
10. Using handlebars required learning the new framework in addition to creating the UI as a result, some of the organization and user-friendliness was sacrificed. It would have been nice to have more time to work on improving the UX, but sadly due to time constraints this was impossible.

GroupFinder: API Documentation

AJAX References can be found in the public/unit_tests.js method calls

----- Accounts -----

POST /signup

Adds a new user

username: a string representing a user's username

password: an object representing an user's encoded password.

POST /login

Logs in user

email: user's email

password: user's password

POST /logout

logs out current user

----- Users -----

GET /users/{username}

Returns the user info associated with the requested user, if that user is logged in.

username: id of a specific user

GET /users/{username}/projects

Returns a list of projects that the user with the requested username is part of, if that user is logged in.

username: username of a specific user

PUT /users/

Updates the information of the logged in user.

password: String representing a user's password

name: String representing a user's name

email: String representing a user's email

phone: Number representing a user's phone number

location: String representing user's location

availability: Array of Strings representing times a user is available to work

skills: Array of Strings representing different skills of the user

timing: Number between 0 and 1 representing when a user likes to work on his/her projects

DELETE /users

Deletes the logged-in user. Otherwise throws an error

----- Projects -----

GET /projects

Returns a list of all the projects created thus far

GET /projects/{project_name}/users

Returns a list of all usernames for a specific project

project_name: String representing the name of a project

GET /projects/{project_name}

Returns info for a specified project

project_name: String representing the name of a project

GET /projects/{project_name}/users/filter

returns a list of users that are a part of project that are ranked with respect to how well they match with the user given a user-inputted weight system

project_name: String representing the name of a project

URL Variables:

location: Number, default value of 1, representing weight of matched location

availability: Number, default value of 1, representing weight of matched hours available

grade: Number, default value of 1, representing weight of matched desired grade

interaction: Number, default value of 1, representing weight of matched type of interaction between teammates

dedication: Number, default value of 1, representing weight of matched hours dedicated to project

timing: Number, default value of 1, representing weight of matched timing

skills: Number, default value of 1, representing weight of matched skills

skillset: array of strings, default to empty, representing different skills

POST /projects/

Adds a new project to the list of projects

URL Variables:

project_name: string representing the name of the project

project_due: date representing when the project will be deleted

POST /projects/{project_name}/users/

Adds the logged in user to a specific project

project_name: String representing the name of a project

grade: Number, default value of 1, representing weight of matched desired grade

interaction: Number, default value of 1, representing weight of matched type of interaction between teammates

dedication: Number, default value of 1, representing weight of matched hours dedicated to project

DELETE /projects/{project_name}/users/

Deletes the logged in user from a project

project_name: String representing the name of a project

DELETE /projects/{project_name}

Deletes a project

project_name: String representing the name of a project

GroupFinder: Wireframes

----- Sign Up Page -----

← → ↺ ⬆

Title

groupFinder

Group Finder

[Logout](#)

[Home](#)

Sign up to use Group Finder

Username

Password

Confirm Pwd

Sign up

----- Login Page -----

← → ↺ ⬆

Title

groupFinder

Group Finder

[Logout](#)

[Home](#)

You must first login to use Group Finder

Username

Password

Login

[Sign up](#)

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Title

Group Finder

[Logout](#)
[Home](#)

Test User

Name

Email

Phone

Location

Skills

When do you start projects compared to when they are due?

Late

Early

Availability

Day	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2
M	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Su	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Back to Project

----- User Home Page -----

Title

← → ↻ ⬆

groupFinder

Group Finder

[Logout](#) [Home](#)

Test User

Projects

[Project 1](#)

[Project 2](#)

[Project 3](#)

New Project

Existing Projects

Name	memembers	due date	status
project1	2	August 12	member
project2	3	August 13	join

Join Project 2

Low

High

Desired Grade

Team interaction

Dedication

Join Project

----- New Project Page -----

Title

← → ↺ ⬆

groupFinder

Group Finder

[Logout](#) [Home](#)

Create a new project

Name

Project Name

Due Date

1/1/10

☒ Add me to project

Create

----- Project Page -----

Title

← → ↺ ⬆

groupFinder

Group Finder

[Logout](#) [Home](#)

Test Project

Due Date:
1/10/2015

Importance

low high

Location

Availability

Desired Grade

Interaction

Dedication

Timing

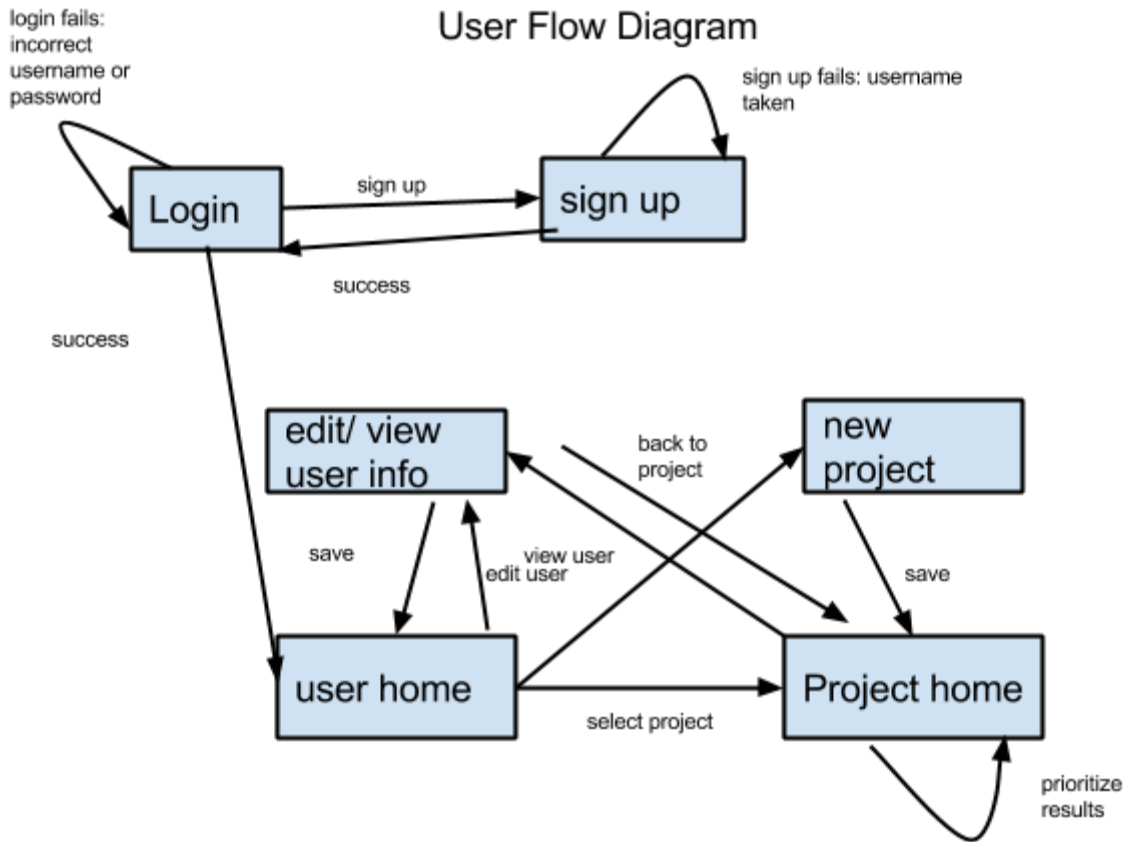
Skills

skillset

Prioritize

Members

Rank	Name	Location
1	James	Simmons
2	Ella	Burton Connor
3	Tom	Kappa Sigma



Reflection

We thought that there were several issues in the way the project was divided. Instead of focusing on the API and UI as two separate parts, they should have been done in conjunction. While we were designing the API, we were trying to put it in the context of the UI that wasn't yet created. Although data-driven design is one approach to programming, we feel as though the UI is important in terms of obtaining a final project. Had the UI been created before the API or even in conjunction with the API, there would be more time to learn new frameworks such as handlebars that we were expected to learn and understand in a week's time. This would result in better-looking UI components and a better user experience in general. While we would like to say we learned how to properly use handlebars, a more accurate lesson we learned was how to mimic example code written in handlebars. Additionally, it is rather hard to create uniformity when trying to divide up the UI amongst three people. While the API is easier to split into individual methods that do not interact with each other, the UI must all connect and thus it is very hard to divide the coding so it can be done independently, which was necessary since two of our teammates were out of town for the weekend for interviews. We learned that keeping uniformity of style among three different people is difficult especially when we cannot collaborate in the same space. We learned that for the next project, it would be best to design the UI and API simultaneously and code them in parallel instead of in series. That way, changes could be made more rapidly and more thought could be put into creating a cohesive, unified design.