CS 411W Lab II

Product Specification

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Lab 2 - Product Specification Outline

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1 Introduction

Study Buddy is designed to redefine the ways in which students, professionals, and others form study groups, study for exams, and prepare for professional certifications. Study Buddy accomplishes this through the Intelligent Buddy Matching algorithm, forming more successful study groups, helping students earn better grades and professionals pass their certifications they need for their career and professional development.

In addition to matching up buddies, Study Buddy provides tools for success which allow collaboration and communication channels.

1.1 Purpose

Study Buddy changes the current method of finding a study partner. Study Buddy takes all the work out of the current process of finding a study partner. With Study Buddy, the user no longer has to search for a ‘Buddy’ themself. The user does not have to look all over campus or social media searching for someone with which to study. The user does not have to try to match schedules with someone, and does not have to worry about being shy and talking to someone they do not know to find someone to study with. Study Buddy allows the user to enter their courses, their availability, and learning style, and finds a match based off the courses they want to study for and when they are available to study, as well as the learning style the user enters.

Study Buddy matches users to other users who wish to form a study group. Study Buddy matches users with its Intelligent Buddy Matching algorithm. The algorithm matches users based on their learning style and assigns values to each learning style (1 or 0) and computes a compatibility score. Figure 1 is a greater detailed map of the algorithm.
The compatibility score then determines how well these two partners match up. Study Buddy then matches users based on their availability once it recognizes that they have a matching compatibility score. The explanation of the Intelligent Buddy Matching algorithm in Figure 1. Their availability is based on preferences to study in the morning, during the day, at night, rather they work or not and need to study with a partner after work hours.

This solves the major problem of finding a Buddy to study with, this being, the awkwardness in searching and asking people if they want to be in a group, finding out they either:

1. can be in a group and turn out to not be a good partner or match or
2. finding out they would be a perfect match, and the availability just not being the same and unable to find a time that works best for both partners.

![Learning Style](image)

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>User: Jamal Williams</th>
<th>User: John Crotzer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>[1]</td>
<td>[1]</td>
</tr>
<tr>
<td>Auditory</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Reading/Writing</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\[
\cos \theta = \frac{\mathbf{W} \cdot \mathbf{C}}{||\mathbf{W}|| ||\mathbf{C}||} = \frac{2}{\sqrt{2} \times \sqrt{3}} = \frac{2}{\sqrt{6}} \approx 0.8165
\]

Figure 1: Intelligent Buddy Matching Algorithm
Another distinguishing quality of Study Buddy, is the integrated applications. Integrated in Study Buddy are:

- Google Drive: which enables sharing of documents between buddies.
- Google Hangouts: which enables communications and scheduling between buddies.
- Codeshare: which enables real time coding development.
- Jupyter Notebook: another way to share code, but it also allows for sharing equations and other forms that cannot be represented in plain text.
- Slack: which is used for communication, allowing buddies to create topic channels.
- Git: which will allow buddies to upload and share their code repositories.

1.2 Scope

The goal is to achieve a working version of Study Buddy with the prototype with one or two integrated applications. The Study Buddy prototype capabilities will be slightly reduced, with no private messages, ability to block 'bad' buddies, or scheduling syncing with a buddy right away. Study Buddy will not include in the prototype slack integrations or codeshare integration. The complete table is labeled Table 1.

[This Section Intentionally Left Blank]
<table>
<thead>
<tr>
<th>Features</th>
<th><strong>STUDY BUDDY</strong> Final Product</th>
<th><strong>STUDY BUDDY</strong> Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI</td>
<td></td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Login</td>
<td>Allows user entry of authentication credentials</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>New User</td>
<td>Allows a user to create an account</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Study Preference Setting</td>
<td>Allows users to set study preferences for intelligent buddy matching algorithm</td>
<td>Will be implemented with limited study preference fields</td>
</tr>
<tr>
<td>Search for buddies</td>
<td>Allows user to search for study buddies</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Create a study group</td>
<td>Allows user to create a study group</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Set wait time</td>
<td>Allows user to set wait time in case of no matched buddies found</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td><strong>Features</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web Application</td>
<td>The way in which the user will interact with the Study Buddy application using a web browser</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Mobile Application</td>
<td>The way in which the user will interact with the Study Buddy application using their smartphone device</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Private Message</td>
<td>Allows users to send and receive private messages within the Study Buddy App</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Block buddies</td>
<td>Allows users to block buddies with different goals</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Partner match by subject of interest</td>
<td>Matching Study Buddies by their own subject interest</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Intelligent Buddy Matching</td>
<td>Matching Study Buddies with the proprietary algorithm</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Google Hangout Integration</td>
<td>Allows users to integrate their Google Hangouts accounts for setting meeting times and web conferencing</td>
<td>Will be implemented</td>
</tr>
<tr>
<td>Google Drive Integration</td>
<td>Allow users to share documents</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Slack Integration</td>
<td>Allows users to integrate their Slack accounts, allowing channels to be made to aid in communication between Study Buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Git Integration</td>
<td>for creating repositories to share with your study buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Codeshare integration</td>
<td>Allows users to share their code real time with their Study Buddies</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Schedule syncing with “Buddy”</td>
<td>Allows users to make matches with Study Buddies based on the availability they input</td>
<td>Will not be implemented</td>
</tr>
<tr>
<td>Rate your buddy</td>
<td>Allows users to provide feedback on their Study Buddies</td>
<td>Will not be implemented</td>
</tr>
</tbody>
</table>

Table 1: Prototype Features
1.3 Definitions, Acronyms, and Abbreviations

**Auditory Learner** - best comprehend information by listening to information rather than reading it or seeing it visually.

**Business Logic** - The programming that manages communication between an end user interface and a database.

**CRUD** - Stands for Create, Read, Update, and Delete. Basic database/application operations.

**Entity Class** - A simple Java Class with member variables and getter and setter methods defined.

**JPA** - Java Persistence Application Programming Interface is an API for handling all database operations such as storing or retrieve entities from the database.

**JSF** - Java server faces is a java framework that couples the view and servlet into one managed component.

**Kinesthetic Learner** - best comprehend information by participating in activities or solving problems in a hands-on manner.

**ORM** - Object-relational mapping. Technique for persisting objects into a database table. Tables are modeled after Entity classes.
**Procrastination** - delaying or postponing a task, which needs to be completed, often to the detriment of the procrastinator.

**Prototype** - the prototype of Study Buddy will be a reduced scale version of the final product, and will demonstrate the functionality of the completed product in a simulated environment.

**Reading/Writing Learner** - best comprehend information by reading texts to further absorb information by condensing and rephrasing it in traditional lecture and note-taking environments.

**Study Group** - a small group of students with similar goals who meet regularly to review course material and prepare for exams.

**Visual Learner** - best comprehend information by visualizing relationships and ideas through maps, charts, diagrams and even essays.

**Web Application** - an application that uses a website as the interface.

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1.4 References

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1.5 Overview

Google Hangouts will be the only integrated application in the prototype with more features integrated to follow after the prototype is successfully developed. Google Hangouts will be the proof of concept for integration into the Study Buddy application.

The final product version of study Buddy will have some features not present in the prototype. The listing is in Table 1 which gives a thorough explanation of the GUI and features available in both the final product and the prototype.

2 General Description

Study Buddy will be a web application in the initial prototype with integrated components to help study groups communicate and collaborate. A user will be able to create and manage their account on the web interface as well as input their preferences for a study partner. A user can also search for buddies based on their preferences and the preferences of someone with whom they match. Study Buddy will be accessed via the internet with user privacy and security in mind. All that is required of the user is a steady internet connection, most web browsers will work, details of all requirements and security measures are explained in greater detail later on.
2.1 Prototype Architecture Description

Table 1 lists a detailed explanation of what will be in the initial prototype and what the final product Study Buddy will be.

Study Buddy Prototype, the details are laid out in Table 1, is comprised of the following major components:

- Intelligent Buddy Matching Algorithm: matches partners based on their compatibility scores.
- Web Application: the interface with which the user will interact with the Study Buddy program.
- Integrate Components: these integrated components will make Study Buddy more useful to its user base through increased functionality.

2.2 Prototype Functional Description

The prototype will allow for a user to create an account, manage their account; including updating information and recovering password, searching for buddies, forming study groups, and even two external APIs.

- User Account Creation: the user will be able to create an account and receive a confirmation email regarding the status of their new account. During the creation of a new account the users will be prompted to complete a survey, determining their study preferences.
• User Account Management: the user will be able to edit their account information to change their name, email, or other information that may need updating. The user will also be able to reset their password in the event they forget their current password. The user will also be able to update, that is add or remove, buddies from their block list in case of conflict among users. The user will also be able to update their study preferences through the account manager. The user will also be able to make a choice of which information will be displayed publicly, including but not limited to their:
  ○ Real name
  ○ Profile picture
  ○ Phone number
  ○ Email address

• Searching For Buddies: a user will also be able to search for buddies with which to form a study group. A user will be able to search for buddies based on a class, a subject, or a particular topic. Study Buddy will then:
  ○ Populate an initial list of possible matches
  ○ Remove Buddies who's schedule or availability does not match the users.
  ○ Blocked Buddies will appear on the list with an appropriate annotation in the even the buddies may want to reconcile differences or give another a second chance at become study buddies.
  ○ The program shall then calculate the similarity score and this list will be an descending order with best matches on the top and worst matches going down.
  ○ If an appropriate user is not present the user will have an option to set a waiting time.
Example: a major test is coming up in three weeks, I want a Study Partner, I am willing to wait up until three days prior to the exam to find a study partner, Afterwards I can choose to stop actively searching.

- Forming Study Groups: a user will be able to send out invitations to others wishing to form an ongoing study group. The user will also be able to view contact information for buddies with whom they match. Users will be able to rate study groups after for feedback on the effectiveness and productiveness of the study group.

- External API Integration: the application shall have additional external APIs integrated within it. These APIs for the prototype include:
  - Google Hangouts: for communication among buddies including video conferencing with screen sharing.

After the prototype additional APIs will be integrated and these include:

- Slack: for communication among buddies as well.
- Codeshare: allows for real-time collaborative coding.
- Google Drive: for document sharing, storage, and management.
- Git: allowing users to share their code and repositories for collaborative development.
2.3 External Interfaces

The external interfaces required for Study Buddy are hardware and software. A device with an internet connection is the only hardware required of the user for access of the application. The back-end hardware is composed only of the physical host of the database. The user needs no software other than an internet web browser. The back-end software is mainly composed of SQL statements for accessing user data and Java Server Faces and Primefaces for development of the web application.

2.3.1 Hardware Interfaces

- In the prototype the only hardware implemented will be a device with internet connectivity to access the database and enable the use of the application. Figure 2 is a detailed map of the way in which the users will connect and access the database during operation of the application.

2.3.2 Software Interfaces

The user information being stored includes, but is not limited to:

- First name
- Last name
- Username
- Past courses
- Study preferences
- Type of learner
The application shall be developed in java but rely on SQL statements and/or queries to gather and input information into the database and retrieve information from the database. The application will utilize Java Server Faces and Primefaces for development of the web application.

2.3.3 User Interfaces

The user interface will be any web browser enabled device to which the user has access. This device can be a personal computer, a laptop, or smartphone. This will be the only method of accessing the application in the initial prototype.

2.3.4 Communications Protocols and Interfaces

To ensure adequate operation the user must have a reliable internet connection with access to one of the following web browsers:

- Google Chrome Version: 72
- Safari Version: 12
- Microsoft Edge Version: 17

The application does not require a specific speed of internet at this time.
Figure 2: Major Functional Components Diagram