Lab 1 - Study Buddy Description

John Carlson

CS 411

Mr. Thomas Kennedy

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1. Introduction

Study Buddy is going to be a web application designed to help match students together according to their academic schedules and form study groups. Study Buddy will also provide students with study group messaging, external applications and organized scheduling. Study Buddy hopes to encourage students to become more social and further their academic studies.

Study groups have many fundamental benefits that come with them and often leave students finding themselves staying on track and maintaining good grades. Study Buddy will also help students become more involved with the class than before. Students can interact, socialize and motivate their partners within the study group. The benefits that Study Buddy has to offer are all it takes to lower stress levels and increase academic success.

Understanding learning styles between like-minded peers to form a study group is a challenge to students. This results from the lack of software to help guide existing students on forming study group. The lack of interaction and communication within the class has created problems for forming study groups. This mainly has to deal with the online and in-class students that ultimately will never reach out to each other and form a study group. Students often work on assignments at different times due to their personal schedule or preferred learning style. This could vary from the way students’ study to when students start working on their assignments and even different responsibilities outside of classes. Students often find themselves having issues forming a study group and makes them wish there was an existing tool out there that helped with this process. After tons of searching students may find the motivation to schedule a meet time
and study group is formed. Study Buddy hopes to become that existing tool everyone has been waiting for.

Study Buddy will provide a platform that helps students and people pursuing new knowledge by finding the perfect match for study groups. Users will be able to access the Study Buddy web application and create a new user or log in. If the users is new, they will need to create a new study profile and fill out their study preferences. After being logged into the system, Users must fill out their study preference accurately to get the best match. Once each user has created a study preference a variety of buttons will help them find a study group and enter class information. Study Buddy will use the Intelligent Buddy Matching algorithm to help pair students and form study groups according to class requirements. After the algorithm has found a match the system will add users to the study group.
2. Study Buddy Product Description

Study Buddy will consist of a User Interface that allows new or returning users to navigate through the software after entering the correct login information. Users will be able to select between availability, classes and scheduling to help match to the perfect group. Users will also be able to restart at any time during the menu selection, ensuring the perfect matches are found. Study Buddy’s goal is to bridge the gap between online students, in-class students, and shy students. Eliminating this gap will help ensure students feel more confident about their classes and increase productivity.
2.1. Key Product Features and Capabilities

One of Study Buddy’s Key Product Features is the Intelligent Buddy Matching algorithm. The algorithm creates a list of possible matches based off similarity scores and can remove users with different availability. Through a point system that is based off 0 or 1, we can tell that Jamal Williams and John Crotzer in this test case are both Visual and Kinesthetic learners but not reading/writing. This Algorithm is capable of detecting similarities and differences, ensuring that the correct partners are matched. Since Jamal and John only matched on 2 out of 4 the system will continue to keep searching for the perfect match. The Intelligent Buddy Matching Algorithm will measure similarity by computing the cosine of an angle between 2 vectors. The Similarity score will find possible matches and create a match list. Once that is completed a matched buddy list is created. Matches will be based off similarity scores and class schedules.

<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>

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

*Figure 3: Intelligent Buddy Matching Algorithm*
2.2. Major Components (Hardware/Software)

End Users will be able to access the Study Buddy web application through an internet capable device. The End users will be anyone who is interested in pursuing knowledge. The Web application created under the framework of Java Server Faces will store the information on the secured Database. Java Server Faces (JSF) tools will be the foundation for the Study Buddy web application. JSF will provide support for the communication of data between the Study Buddy application and database. This will allow users information to be stored on the database as its being entered. The Java Persistence API will create tables inside the database and will supply the mechanism for SQL query construction. Study Buddy will use external services such as Git, Slack and Google Drive to provide additional tools for the Study Buddy application.

![Major Functional Components Diagram](image)

*Figure 4: Major Functional Components Diagram*
3. Identification of Case Study

Study Buddy is being developed for students in high schools and universities. It will be integrated through external applications like myODU portal, SAT/ACT Test Prep and other certification services. The future aim for this product is to assist everyone no matter the level of education to help further their academic success. As of right now the study buddy web application is being built strictly for the myODU portal extension. It will become available on site as another external web application and users will be able to launch from there.

The Study Buddy Product hopes to become available to outside organizations like SAT/ACT testing, CompTIA/AWS Certifications and Bar Examinations. After the launch of Study Buddy for colleges, Study Buddy also plans to be integrated in all academic environments as a study tool. Through funding and exposure Study Buddy hopes to become the #1 free Study Tool and plans to gain funding through selling the product to universities and other testing organizations.

4. Study Buddy Product Prototype Description

The Study Buddy Prototype will allow users to experience it through any device that has internet capabilities. Once a user creates their account they can decide if they want to receive message notifications. The Study Buddy Prototype menu UI will allow users to navigate through the application and log off at any time. After debugging, Team Gold found issues using Firebase database and decided to switch to JSF database. The team also decided to switch from XCode to Java SE in Eclipse due to constricted development time.
4.1. Prototype Architecture (Hardware/Software)

The Prototype architecture will consist of a JSF database, a web application and different users. The prototype database will stay the same through development and the final product. The Prototypes core feature is to match students based on set preferences and filters. The algorithm will be able to do this through the use of the similarity score that detects the Individual’s availability, study subjects, learning styles and group sizes.

Since the Prototype is being developed on eclipse the code can be edited and updated real time through git so that all team members can interact with the code at the same time. The Prototype will leverage several design patterns to keep clean concise code. Using the Model View Controller (MVC) pattern team gold can spread out and development different parts of the application simultaneously. Using a Facade design will allow the Prototype to have a clean interface keeping things organized for development. Having the Data Access Object (DOA) in place will help when it comes to adding or searching for a database.

With the change to a JSF database, team gold can edit their database through the Microsoft SQL server management studio program. Using their credentials, team members can make changes and monitor the database. The team will also utilize Glassfish Tools that Eclipse has to offer making it easier to edit the web application code.
4.2. Prototype Features and Capabilities

Looking over the Prototype Feature table there have been many changes since last semester’s prototype. Features that stayed for GUI were the login screen, search for buddies, create a study group and study preferences settings that the Intelligent buddy matching algorithm will use to match groups. Features that were removed for GUI were wait time and private messaging, due to limited development time. Another major feature that changed was deciding to develop a Web application over a Mobile application due to a lack of resources within the team. Features that were dropped are Block buddies, Slack/Codeshare Integration, schedule syncing and rate your buddy, due to limited development time.

<table>
<thead>
<tr>
<th>Features</th>
<th>STUDY BUDDY Final Product</th>
<th>STUDY BUDDY Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI</td>
<td></td>
<td></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>Features</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 Hangouts 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>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>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
4.3. Prototype Development Challenges

During development the team will have to prepare for any challenges this prototype might bring. Challenges such as language, framework, and software unfamiliarity. Some more Challenges are learning new server integration, setting up developmental tools and making sure each team member has established a successful SQL server ping. Making sure external antivirus software’s allow the SQL database to connect properly will have to be accounted for. Potential database crashes will always be possible and need to be addressed appropriately.

Ensuring confidential information stays protected through encryption methods and. avoiding any database leaks using security protocols might pose a challenge during development. Inaccurate data input by data users and staff could pose a challenge. Customers dissatisfaction can pose a possible problem during Prototype development and the use of feedback will help with fixing those issues. Database failure for the web application could occur and might pose a challenge restoring it. Possible software bugs and updates need to be considered during Prototype development.

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5. Glossary

**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.
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