Lab 2 - Study Buddy Product Specification

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CS 411W

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Version 2
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1 Introduction

Study Buddy will be a platform designed to help anyone pursuing knowledge, especially students, find ideal matches to form a successful study group using online collaboration tools. The Student Success Center defines a study group as “a small group of students with similar goals who meet regularly to review course material and prepare for exams.” According to the website education corner, there are many benefits to join a study group. Key benefits include utilizing individual talents, sharing knowledge, and motivating each other to stay focused and engaged.

1.1 Purpose

As depicted in Figure 1, forming a study group can often be difficult for students. This is especially true for online students and shy students. Shy students feel uncomfortable approaching other students and asking for help. Online students often utilize online discussion boards, but that does not always provide constructive responses. Even though a student may find someone who is interested in forming a study group, setting up a time and place can be challenging. Having people join a study group does not always mean it will be a successful study group. When students join a study group, they often have different motives. For example, some students might want to get a head start on an assignment while others just want to meet a deadline. Students also have different responsibilities such as, family or work. Moreover, individual study habits can affect the success of a study group. Different students often have different learning styles and preferences. These preferences can be visual, auditory, kinesthetic, or written.
The Study Buddy application will make forming a successful study group easier. As illustrated in Figure 2, Study Buddy will simplify the process of forming a study group. Once a person wants to form a study group, that person will simply access Study Buddy application.

If the person is a new user, a new profile must be created with study preferences. However, if the person is an existing user, the person will simply log on to the system. By selecting “Find a Study Buddy”, the system will prompt the user to specify the class, subject, or topic of the intended study group. The system will then search for people looking for a study buddy with the same search criteria. The Intelligent Buddy Matching algorithm will then be used to find a perfect study buddy for the user.
The Study Buddy prototype will primarily be a web application, since it can be easily accessed via many devices with internet access. Due to the popularity of mobile phones and tablets, Study Buddy will also be available as a mobile devices application. Current applications on the market only match buddies based on topic of interest. Study Buddy, on the other hand, will use the Intelligent Buddy Matching system which can better match study buddies, based on user preferences and study habits. No other applications currently integrate any online collaboration tools. Study Buddy is unique in that it will integrate some external services such as Slack, Google Hangouts, Codeshare, Google Drive, Jupyter Notebook, and Git to facilitate online study groups.

The main customer target of Study Buddy application will be universities. Universities have many online and shy students. High schools, and any organizations that requires licenses or certifications will also find Study Buddy application to be useful. In short, Study Buddy is an ideal application for any organization that has a requirement for studying or learning.
1.2 Scope

Prototype features will be scaled for Study Buddy final product. It is going to be deployed as a web application. Some features and algorithms will be eliminated due to time constraints. The prototype will perform study buddy matches via the finder on a limited number of study preferences along with external service integration. A complete list of features is available in Table 1.

<table>
<thead>
<tr>
<th>Features</th>
<th>Study Buddy</th>
<th>Study Buddy</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI</td>
<td>Final Product</td>
<td>Prototype</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>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Features</th>
<th>Study Buddy</th>
<th>Study Buddy</th>
</tr>
</thead>
<tbody>
<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>Allows 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>Codelshare 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</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

**Learning outcomes** – statements that identify the knowledge, skills, or abilities learners should gain by the end of a particular assignment, class, course, or program.

**Modern Interface Design** - the process of making manageable interfaces for computing devices, with a focus on current styles.

**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
1.4 References


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1.5 Overview

This product specification describes the architecture, functionality, and interfaces of the Study Buddy prototype. Other topics that cover are the capabilities, features and components of Study Buddy. The information in the following sections detail the hardware, software, and interface of the Study Buddy prototype. The product specification requirements document is provided in Lab II Section 3.1 which can be found in a separate document.
2 General Description

The primary goal of Study Buddy prototype is to provide a working demonstration of the web application. The web application will have basic web application interface design. It will include only the fundamental features and algorithms of the real-world product.

2.1 Prototype Architecture Description

The prototype architecture will consist of the three main components that will also be seen in the real-world product as show in Figure 3.

2.1.1 Computer or a mobile device with internet connection will be used to access Study Buddy application.

2.1.2 Study Buddy will be built on the framework of Java Server Faces which will provide a solid and modern user interface design. Microsoft’s SQL Server Management Studio will be used as the Study Buddy database management system. With the database management system, Study Buddy users will be able to create, read, update and delete data in a database. Glassfish Server will be used to deploy the web application. As a web application server, Glassfish will be handling requests from web browsers. It also provides interactive administrative console which will allow the administrator to easily test the web services.

2.1.3 An External API, namely Google Hangout, will be integrated to demonstrate external services integration.

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2.2 Prototype Functional Description

The major functional components of Study Buddy prototype include the following:

- **Account creation**: This function will allow users to create a new account by filling in basic personal information as well as answering to study preferences questionnaire. The study preferences questionnaire that will be used in the prototype will be a small set of selected questions from the final product’s questionnaire.

- **Account Management**: This function will allow users to update or edit their account information including study preferences.

- **Searching for buddies**: This function will allow users to search for buddies using Study Buddy’s intelligent buddy matching algorithm.

- **Forming study groups**: This function will allow users to send invitations to matched buddies.

- **Communication**: This function will allow users to communicate using external service namely Google Hangout.
2.3 **External Interfaces**

Study Buddy prototype will use certain interfaces to demonstrate the application functionalities. Study Buddy prototype consists of two external interfaces: Software Interface, and User Interface.

2.3.1 **Software Interfaces**

Study Buddy prototype will be implemented using Java Server Faces framework as well as utilizing Microsoft’s SQL Server Management Studio 17 to store users’ information. Google Hangout API will also be integrated to the Study Buddy prototype.

2.3.2 **User Interfaces**

Users will need a computer or mobile device, internet access, a modern web browser to interact with Study Buddy. The computer monitor or the mobile device screen will display the application once it is launched. A physical keyboard and a mouse, or a touch screen will be needed for data entry and web application navigation.

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Appendix

Intelligent Buddy Matching Algorithm

The Study Buddy application aims to help students find the right study partners. This means Study Buddy will match users based on class, subject, or topics of interest. Another option that users have is using Study Buddy’s unique intelligent buddy matching algorithm. The Intelligent Buddy Matching Algorithm (shown in Figure 5) performs the following steps:

1. The algorithm will find similarities between the searcher and their potential matched buddies.
   a. The system will compute a similarity score of each study preference between the searcher’s and the possibly matched buddies.
   b. The similarity score is the sum of the result from computing cosine of an angle between 2 vectors.
   c. The higher similarity score directly correlates between the similarity they will have.

2. This similarity score will be used to sort the potential buddy match list in descending order to help the searcher making decision when inviting someone to join the study group.

\[
\cos \theta = \frac{\mathbf{W} \cdot \mathbf{C}}{\|\mathbf{W}\| \|\mathbf{C}\|}
\]

\[
= \frac{2}{\sqrt{2} \times \sqrt{3}}
\]

\[
= \frac{2}{\sqrt{6}}
\]

\[
\approx 0.8165
\]

Figure 4: Intelligent Buddy Matching Algorithm