CS 411W Lab II
Study Buddy
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Professor Kennedy
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Version 1
Table of Contents

1 Introduction .................................................................................................................................................. 1
  1.1 Purpose .................................................................................................................................................. 2
  1.2 Scope .................................................................................................................................................... 3
  1.3 Definitions, Acronyms, and Abbreviations ............................................................................................ 5
  1.4 References ............................................................................................................................................ 7
  1.5 Overview ............................................................................................................................................... 8
2 General Description ...................................................................................................................................... 9
  2.1 Prototype Architecture Description ....................................................................................................... 10
  2.2 Prototype Functional Description .......................................................................................................... 13
  2.3 External Interfaces .................................................................................................................................. 13

List of Figures

Figure 1 Study Buddy Product Prototype Diagram .......................................................... 3
Figure 2 Intelligent Buddy Matching Algorithm Diagram ................................................... 4
Figure 3 Major Functional Components Diagram ........................................................................ 12

List of Tables

Table 1. Feature Comparison Final Product and Prototype ........................................................... 10
1 Introduction

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 groups. The lack of interaction and communication within the class has created problems for shy and online students when it comes to forming study groups, often leaving students falling behind in the class. Shy students are often uncomfortable with asking other students for study help while Online students are physically unable to meet up, which leaves both students missing the study group interaction.

People tend to work on assignments at different points in the day alone due to their personal schedules and learning preferences. This could vary from the way students’ study to when students start working on their assignments and the amount of time they put in completing the assignments. Students often find themselves having issues forming a study group and leaves them wishing there was an existing tool out there that offered this experience.

Old Dominion University’s Team Gold is currently developing software that offers creating a study buddy group based off your preferences and schedule. Study Buddy hopes to encourage students to become more social and further their academic interests.
1.1 Purpose

The Study Buddy web application product is being developed to provide a platform that helps students and people pursuing new knowledge by finding the perfect match for study groups. The web application is currently only being offered for students in universities but hopes to become available for high school students and more. Study Buddy will be integrated through myODU portal and will be offered as an extension through the site. Currently, the Study Buddy web application is being built strictly for the myODU portal extension due to limited development time.

The product will offer external services like Google Hangouts and Slack. Google Hangouts, Slack will offer features like group messaging and virtual meetings. Newly formed study groups will be able to communicate, create schedules and send assignments through the external services Study Buddy has to offer. This will help keep group members updated with different assignments and due dates. Since development time is limited, features like Private Messaging, set wait times, and the mobile application version will not be featured in the final product. Old Dominion University’s Team Gold decided that the mobile application version will not be featured strictly due to language unfamiliarity and lack of resources. After debugging, Team Gold found issues using the Firebase database and decided to switch to a JSF database. The team also decided to switch from swift in XCode to Java SE in Eclipse due to constricted development time and language familiarity.
1.2 Scope

The Study Buddy Prototype will allow users to experience it through any device that has internet capabilities. The user will be prompted by an Account Creation page that will consist of create new user or returning user. Once the user has passed the Account Creation page they will then be able to select their study preferences and then select “Select Find a Study Buddy”. Users will then be prompted to enter their availability and class schedule which will alert the intelligent study buddy matching algorithm to start searching for the most accurate match. Once the perfect match has been found the user will be able to match with the appropriate buddy and the study group is formed.

![Study Buddy Product Prototype Diagram](image)

Looking at the benefits that come with Study groups is impressive. “Study groups are so effective because they provide a way for students to make the lecture notes their own” (Sawyer, Keith). Students will be able to share knowledge, motivate each other and stay on track throughout the semester. Study Buddy will also help students become more involved with the class, encouraging reminders to finish upcoming assignments early and eliminate procrastination.
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. Using similarity scores, Users will only match if their study preferences, class schedule, learning styles and availability are the same or very close. This Algorithm can detect similarities and differences, ensuring that the correct partners are matched. From the chart below, we can determine that Jamal Williams and John Crozer would not be matched based off the similarity score difference. The Intelligent Buddy Matching Algorithm will measure similarity by computing the cosine of an angle between 2 vectors. Based off the results from the similarity score the Algorithm will determine a match for each user.

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

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

Figure 2: Intelligent Buddy Matching Algorithm
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.
1.4 References


Codeshare information, Retrieved September 12, 2018, from: https://codeshare.io/


Forgetting All Your Coursework, Retrieved September 16, 2018, from: https://www.blackboard.odu.edu/webapps/discussionboard/do/message?action=list_messages&course_id=_323209_1&nav=discussion_board_entry&conf_id=_351171_1&forum_id=_309142_1&message_id=_7348213_1


Slack Information, Retrieved September 12, 2018, from: https://slack.com/ Google

Meet information, Retrieved September 12, 2018, from: https://support.google.com/a/answer/7303775?hl=en


1.5 Overview

This Product specification shows the problems students face when they want to form a study group and shows how the Study Buddy Prototype’s overall goal is to help benefit students in college. Through the different figures referenced you can gain a better understanding of how the prototype looks and some functional capabilities it offers. The specification also describes how the software utilizes external services to assist with built in features. After removing certain requirements, the prototype must be able to satisfy the remaining requirements.
2 General Description

The Study Buddy web application was developed to assist college students in forming different study groups to help study for their academic schedule. Students will be able to collaborate on different homework assignments together utilizing the Study Buddy features such as slack or google hangouts. Once a study group is formed their information is securely stored on the JSF database, which developers can freely access and edit in real time. At the user level, Study Buddy will consist of a simple menu user interface that will list create a new study group or view current study group. This will help keep users updated on communication and notify which groups they have joined.

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2.1 Prototype Architecture Description

The Study Buddy prototype will offer less features than the final product. Table 1 shows a comparison between the two products. The major reason some features were cut was due to the lack of development time. This was the case for the Mobile application version of Study Buddy and Team Gold decided to remove it from development.

<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></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 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>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 &quot;Buddy&quot;</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. Feature Comparison Final Product and Prototype*

[This space intentionally left blank]
The login GUI will allow users to enter their authentication credentials to gain access to the Study Buddy application. The Study Preference Settings will offer users to select between different availability and study habits to find the perfect match. Once the study preferences are entered the system will begin searching for study partners. After matches are found users will be able to create study groups based off the matching algorithm results.

The Study Buddy front-end will be written in Java SE, CSS and HTML. The back-end will mainly deal with JSF database and can be edited using the Microsoft SQL server management studio program. Entering the secured credentials, Team Gold members can make changes and monitor the database in real time. Using the eclipse IDE Team Gold members can make changes to source code and update the Study Buddy GUI in real time.

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The End users will be anyone who is interested in pursuing knowledge and forming a study group. Through the user’s internet device, they will be able to connect to the Study Buddy web application. Any information the user enters into the application will be stored in the Java Server Faces (JSF) database. The 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. As mentioned before, Study Buddy will utilize external services such as Git, Slack and Google Drive to provide additional tools.

![Figure 3: Major Functional Components Diagram](image)

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2.2 Prototype Functional Description

When a new or returning user wants to access the web application, the system will ask for security credentials to verify the user’s identity. If the users are new they will have to create an account using a google email, create a username and password. This newly entered information will be securely stored in the JSF database. If the user already has an account created they will simply have to enter the correct information, or they simply won’t have access to the account. Study Buddy hopes to utilize modern security practices such as 2-step verification which will help increase account security.

After the users have entered into the system they will be able to start interacting with the web interface. If developers need to make changes to the application or even edit a user’s account, they will have to enter the credentials they created during the SQL server setup to gain access to the database and make changes. It is extremely important that the developers have access to the back-end without messing up the front-end. Using several design patterns such as, Model View Controller (MVC), Façade design, and Data Access Object (DOA), The developers will be able keep a clean interface during development.

2.3 Extended Interfaces

Study Buddy’s system will mainly deal with external services to operate. With the use of the Java Persistence API, it will create tables inside the database and will supply the mechanism for SQL query construction. This helps keeps things organized for rapid development in both the front-end and back-end. Users will be able to access the interface using a mouse and keyboard on any device.