



College of Engineering

CS CAPSTONE REQUIREMENTS DOCUMENT

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PROJECT BOXSAND: SHARED WHITEBOARD

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1 INTRODUCTION

1.1 System Purpose

The system is intended to replace the current online homework system used by introductory physics students at Oregon State University (OSU) with a free and open source learning platform. By replacing the current online homework platforms that are currently being used at OSU. The system will allow instructors and professors to continuously adapt learning materials to facilitate the online learning experience for students. Furthermore, another goal is generating data about the learning tools being used, which will allow researchers to study the efficacy of the learning material, and the system. Lastly, the system is meant to increase the communication, and dialogue between students while learning. This system will give students the option to work on problems simultaneously, share ideas and help one another learn.

1.2 System Scope

Our objective is to create an online-interactive shared-whiteboard, which will allow students to collaborate on homework in real-time. It will provide an area in which they can draw shapes, objects, equations, etc., and share ideas to improve the learning experience. Another feature that will be integrated into the whiteboard will be a medium of communication via video or text chat. In addition, the system will be providing valuable data to researchers studying the effectiveness of the learning material and the online learning system. Lastly, the system will work in unison with the existing BoxSand project, be scalable, and adaptable for future additions to the project.

1.3 System Overview

When users sign-in to BoxSand, they will have the option to enter a lobby, in which they will be able to ask one another to collaborate on an assignment. When the students agree to work together, they will enter a shared workspace, which is in the form of a whiteboard. With the whiteboard, students will be able to communicate with one another, draw shapes, objects, equations, and share ideas. Additionally, a user will be able use the whiteboard individually, if they choose to do so. However, a list of other users that are working on the same problem will be displayed on the screen of the user working alone. If they change their mind, they will be able to message anyone on that list to share a whiteboard workspace. Lastly, the system will anonymously be tracking how the users navigate the material, what they click on, how long they are on a page, and any other valuable information that can provide researchers insight into the efficacy of the materials and software. Users will be able to chat with one another by text or video. BoxSand has replaced the need for students to purchase textbooks and this whiteboard aims to replace the online learning software they are paying large publishing companies to use.

1.4 Definitions

- 1) BoxSand: A website created by the Physics department at Oregon State University to replace textbooks with free learning material.
- 2) OSU: Oregon State University.

2 SYSTEM REQUIREMENTS

2.1 Functional Requirements

2.1.1 Online Shared Whiteboard

This includes the functions of the online shared whiteboards, which are currently available online. It may include drawing, writing, editing, and etc. Students may be able to bring their work to the board and solve it with other students.

2.1.2 Tracking System

The software requires the ability to track students work. To be more specific, the program should allow the professors to visually check that the students have actually contributed their work. This information includes about exactly what the students draw or write on their work. This will be important data for professors to evaluate each student in the future. For instance, we can assume someone works with two other people, but only the other two people have done most of the work. It would be unreasonable for the two people who did the most of work, but they will get the same grade as the one who has only done a small amount of work. Therefore, this feature will help get better grades for students who are deserving. This feature will be only available to the professor and specific TAs, who are authorized by the professor. Whenever students start their work, it may keep recording the entire work from the start to the end.

2.1.3 Read-time Chat Client

For smooth communication during work, a voice chat or a regular chat will be available while students are working on the whiteboard. Everything will be done in real time. This function should be stable and immediate. When a new message arrives, the other students should be able to immediately check the messages. They may can open or close the chatting windows. The students should be able to choose whether they are using the voice chat or the regular chat. This choice can be changed anytime during use.

2.1.4 Lobby System

This lobby feature would help many students work more smoothly and efficiently. Students may see the lobby screen when they first connect. They can invite or ask other people to work together on some problems they need to solve, or they can see other students who work on the problems while they are working on it. Therefore, students, who are working on the same problem in a different whiteboard, may be able to ask each other for help. The function can be enforced by a professor or a designated TAs. They may assign other students to a specific group for a specific problem to solve.

2.2 Usability Requirements

2.2.1 Understandability

The software should be easy to learn and remember how to use for both former BoxSand users and new users. A user can learn how to use the shared whiteboard by using the help system. The usage should be simple as users once learns it, they do not need to check it again. The software is simple to navigate through user friendly interface and if any guidance or help is ever needed a student can always refer to the help tool for extra instructions.

2.2.2 Effect and Efficiency

The software should be appropriate for assignment collaboration. Students have to efficiently use it without unnecessary obstacles. The system response to command should be fast enough, so students should not feel uncomfortable sharing their works. Also, instructors are able to efficiently track every single change on the Whiteboard. The software should minimize the time it takes to load changes.

2.2.3 Error Tolerant

The software aims to minimize error. It has to protect user from errors. When an error occurs, it should process error recovery and handle it without notifying the user. Error recovery should have a minimal or no impact on response speed, so users should not notice delay caused by errors.

2.3 Performance Requirements

2.3.1 Latency requirement (Response Time)

Since it is a real-time shard whiteboard and chatting system, everything needs to be immediate. In other words, all people in the same workspace will see the same thing as the other people is drawing or writing on the board. The feature may require a better network connection for users.

2.4 System Security

2.4.1 Servers

SELinux refers to a specific linux kernel used at the university. Supported by the Red Hat Enterprise, CentOS and Fedora feature this security enhanced kernel. The importance behind this feature is compliance with FERPA, in that less secure builds will be more vulnerable to attack.

2.4.2 Logins

Users will login to AsyncSync with a username and password combination. Since we hope to make this software available to students outside the university, we do not intend to require ONID logins. However, ONID logins will be acceptable as a username and password combination. A secure database will be necessary to store login keys, we will use a third party service if available for the sake of security.

2.4.3 Encryption

Encryption will play a key role in securing user data and information transfer. Modern web pages rely on HTTPS to encrypt and decrypt their data at either end of a tunnel. Using this protocol we should not need to worry about the interception of user data during transmission. Since we may end up hosting our web application on Canvas, the web servers will already be running compliant with FERPA regulations. Therefore we do not need to concern ourselves with hard drive level encryption as it has already been taken care of.

2.5 Information management

The software has a database. The database creates a storage space for each shared whiteboard. It has to save every single change on the whiteboard. The database allows instructors track changes and students are able to go back to previous work statue. Therefore, the software should be free of data loss or collisions.

2.6 Interface

The interface of the system will be in the form of an online whiteboard, which will allow multiple users to simultaneously edit a single workspace. The look be simple with a white backdrop, and there will be a tool bard on the edge of the screen from which users can select different items to perform different actions. For example, a user can select different shapes, lines, or colors to create different objects on the whiteboard. Furthermore, on the interface, there will be different options for users to save, record, and export the work they have done.

3 GANTT CHART

