

Software Requirement Specification

Final

1. Introduction

1.1. Purpose

1.1.1. SRS Document

This document provides a detailed description of the software requirements for HATA. This document shall also describe how users shall interact with the application, a detailed description of behavioral requirements and developmental quality attributes, as well as the development process, timeline, and constraints.

1.1.2. Homework Assignment Tracking Application (HATA)

The purpose of the Homework Assignment Tracking Application is to provide a dynamic, organized, and efficient method for students to view all of their upcoming assignments. This application is specifically designed for students during their educational career. HATA shall help students find their assignments faster, decrease the doubt of missing an upcoming assignment, improve their productivity, and reduce overall frustration among all students.

1.2. Scope

HATA shall primarily be a mobile phone application that shall be built on both Apple's iOS and Google's Android platforms. HATA shall also integrate with the I-Learn system. In addition, HATA shall have a web service for storing and handling created data that shall exist outside of the I-Learn system. HATA shall also integrate with third party user authentication systems.

HATA is designed to allow students to directly access their course assignments through a list or calendar view. The assignment descriptions in the list or calendar shall pull the assignment information directly from I-Learn so the student can see exactly what the instructors expect the student to submit and when the assignment is

to be submitted. Notifications from the student's mobile device shall also remind the student when a certain assignment is due. Students shall also be able to see assignment changes minutes after their instructors have made the assignment changes .

An objective of HATA shall be to create, manage, and edit assignments. This shall benefit students by giving the students tools to plan and manage the student's available time and assignment workload. As students mark assignments as complete, students shall benefit from increased efficiency through a smaller mental model as these assignments are removed from their assignment list.

In order to facilitate ease of use for HATA, there shall be search and filter functions which allow the student to quickly find which assignments are due soon or find the assignments that are assigned during any given week for any given course. Through the use of tags and color coding, the student shall be able to easily discern which assignments are due and when they are due with just a glance at the application screen.

HATA shall also provide the ability for the software to be used offline without an internet connection. This shall benefit students by giving the students the convenience of seeing assignments in geographic locations where internet is limited or not available.

The last high level objective for HATA is to notify students of upcoming due dates for assignments. This shall benefit students as students shall receive reminders to help the students avoid turning in assignments late.

1.3. Product Overview

1.3.1. User Interfaces

1.3.1.1. HATA shall have user interfaces (UI) for Android and iOS devices.

1.3.1.2. HATA's primary UI shall consist of:

- A list of assignments and tasks with their due dates and times.
- An icon to add new tasks.
- A settings icon.

1.3.1.3. HATA's UI for adding a new homework task shall consist of:

- A field to enter a name for the homework task.
- A field to choose the date component of the due date.
- A field to choose the time component of the due date.
- A field to specify how long before the due date a notification should be given.
- A field for any notes or description.
- A cancel icon to return to the primary UI without saving.
- A save icon to save the homework task and return to the primary UI with the newly added homework task in the list of homework tasks.

1.3.2. Hardware Interfaces

- The app shall be compatible with all operating systems of Android version 4.1 or higher as well as iOS version 7 or higher.

1.3.3. Software Interfaces

- HATA shall interact with the Learning Management System (LMS) used by Brigham Young University - Idaho (BYU-I) called I-Learn, using the provided API in order to retrieve the assignments that exist on I-Learn. If a new assignment is obtained from I-Learn, HATA shall add this assignment to the list of other displayed assignments.

1.3.4. Communication Interfaces

- The app shall send network communication requests using Wi-Fi when available.
- The app shall use the device's mobile data communication protocol when Wi-Fi is not available.

1.3.5. Memory

- HATA shall store all entered and synced assignments, assignment settings, tasks, task settings, and notes in the mobile device's memory.
- If the assignment or task is marked complete, the assignment or task shall remain stored in the mobile device's memory until the student-chosen time limit has elapsed and then the assignment shall be removed from the mobile device's memory.
- If the assignment or task is deleted, the assignment or task shall be stored in the mobile device's memory until the student-chosen time limit has elapsed and then the assignment or task shall be removed from memory.
- If the mobile device is out of memory for saving a task or assignment, deleted tasks and deleted assignments shall be removed from memory.

1.3.6. Operations

- The student shall add assignments by selecting the add assignment icon.
- The student shall delete tasks by selecting the specific assignment and selecting the delete icon to delete it.
- The student shall mark an assignment or task as complete by selecting the checkbox next to the specific homework task in the main list.
- The student shall log in to the student's Google Play account if the student is using an Android device or Apple iCloud account if the student is using an iOS device.
- Assignments, tasks, and settings shall be stored in the cloud and linked to the student's Google Play or Apple iCloud account.
- The student shall log in to the student's Google Play or Apple iCloud account to recover the student's saved assignments, tasks and settings if a new device is being used.

1.3.7. Product Functions

- 1.3.7.1. HATA shall give the student the ability to track the student's incomplete assignments and tasks.
- 1.3.7.2. HATA shall give the student the ability to track the student's completed assignments and tasks.
- 1.3.7.3. HATA shall send notifications to the student's mobile device when the due date of each incomplete assignment or task is approaching.

1.3.8. User Characteristics

- 1.3.8.1. The primary users of HATA shall be the students of BYU-I.

1.3.9. Limitations

- 1.3.9.1. The student shall not be able to completely delete assignments or tasks obtained from the I-Learn synchronization. The student may mark the assignments as complete, but the assignments shall not be completely removed from the application until the student-specified time after the due date has passed.

1.4. Definitions

- 1.4.1. **Airplane Mode** - A mobile device setting that suspends radio-frequency signal transmission by the device, thereby disabling Bluetooth, GPS, telephony, and Wi-Fi once the setting is activated.
- 1.4.2. **App Data** - The information that the mobile app uses to provide its intended functionality. This includes information such as assignments, student-provided information, courses, business logic constraints, pictures, and authorization tokens.
- 1.4.3. **Approve** - When the student gives permission for the given operation or setting usually through the form of a window asking for confirmation.
- 1.4.4. **Archived** - The state of a task when its information has been stored in the internal storage of the mobile device.

- 1.4.5. **Assignment** - an objective that a student needs to accomplish. An assignment can be created by an instructor on I-Learn. An assignment is a task when the assignment is created by a student on HATA. An assignment can be assigned by an instructor to one or more students who are part of a course. The assignment has the following attributes: assignment name, assignment course, assignment due date, assignment notes, assignment link, and an assignment reminder setting. The assignment may also contain multiple assignment reminders, assignment difficulty, assignment start date, assignment priority, and assignment completion percentage. If an assignment was created by an instructor, a student can only modify an assignment's notes or assignment reminder settings.
- 1.4.6. **Assignment Completion Percentage** - The metric used to judge how much progress has been made on a assignment.
- 1.4.7. **Assignment Difficulty** - The metric set by the user to rank the amount of time and effort a given assignment shall require.
- 1.4.8. **Assignment Information** - The attributes of an assignment including but not limited to the assignment name, course, due date, and assignment notes.
- 1.4.9. **Assignment List** - The default list of tasks displayed upon entry to HATA that lists tasks by the set filter and their general information
- 1.4.10. **Assignment List Width** - The set width of the Assignment List allowed to display tasks.
- 1.4.11. **Available Network Communication** - When either a network packet has been received within the last 500ms or the mobile device OS has notified the application that network communication is available.
- 1.4.12. **Backend Web Service** - An application programming interface hosted by one or more servers that user facing applications or devices can make calls to by sending and receiving data through a series of HTTP requests.
- 1.4.13. **Block** - To disable the ability to perform an action.
- 1.4.14. **Character Limit** - The maximum number of letters, numbers, symbols, spaces, etc.

- 1.4.15. **Checkbox** - A rectangular box that can be selected to trigger an operation and when selected a checkmark shall appear.
- 1.4.16. **Course** - an organizational unit that is focused on the teaching of a specific subject matter with a beginning and end time that is comprised of one or more instructors and one or more students.
- 1.4.17. **Color-Coded** - The assigning of colors to indicate a specific commonality amongst items.
- 1.4.18. **Completed Assignments List** - A list of assignments the user has marked as completed.
- 1.4.19. **Consistent Internet Connection** - Uninterrupted communication between the data source and HATA.
- 1.4.20. **Contact Information** - The user's phone number and email to be used for communicating with the user.
- 1.4.21. **Create a New Task** - Entering details for a task that does not exist and that are then saved and displayed on the assignment list.
- 1.4.22. **Date Selector** - Controls provided by the operating system that allows the user to pick a date.
- 1.4.23. **Daily Calendar View** - A view that allows the user to only see assignments and tasks that correspond that the selected day.
- 1.4.24. **Default Input Method** - The means by which the user provides the requested information to HATA.
- 1.4.25. **Default Tag Options** - A predetermined label attached to Quizzes, Discussion Board, Reading, Group Project, Activity, Individual Project, Course Name, Due Dates, and Contact Information to aid the user in the task of filtering.
- 1.4.26. **Default View** - The characteristics and method of viewing a given part of HATA that shall be set prior to modifications of the user.

- 1.4.27. **Delete Time** - The time that is set in the application for how long a assignment shall remain on the assignment list after the assignment due date has passed.
- 1.4.28. **Deleted Task** - A task that has reached its due time as well as its delete time and has been removed from HATA.
- 1.4.29. **Device Notification** - A message that appears in the notifications window on the mobile device alerting the user to an update of some kind.
- 1.4.30. **Device System** - The internal operations and settings of the used mobile device.
- 1.4.31. **Drop Down Menu** - A list of options shall “drop down” and appear when the user selects the menu.
- 1.4.32. **Due Date** - The date (month and day) and time (hours, minutes, seconds) that an assignment or task must be completed.
- 1.4.33. **Easy Access Mode** - When enabled this allows the user to access their information by opening the application without requiring the user to provide authenticate.
- 1.4.34. **Enter** - To put information into HATA.
- 1.4.35. **Error Message** - A window that appears over the regular application alerting the user to failure to complete an operation.
- 1.4.36. **Filtering** - A process that sorts a set of objects based on the labels attached to the objects.
- 1.4.37. **Framework** - The design and structure of the app.
- 1.4.38. **General Task Delete Time** - The delete time that shall be the default configuration when a task is created.
- 1.4.39. **Grade Weight** - The percentage the assignment is worth within the overall total grade of the course.
- 1.4.40. **Group Project** - A task that has been assigned to complete with efforts from multiple students.

- 1.4.41. **Home Page** - The default view of the application, from which the user may navigate to any other view.
- 1.4.42. **Hypertext Transfer Protocol** - A method of packaging and transmitting data through the use of network communication.
- 1.4.43. **I-Learn** - The third and most current version of the learning management system that the university BYU-Idaho uses for the delivery of courses to students.
- 1.4.44. **I-Learn Synchronization** - The process of retrieving assignment information that is new or has changed since the last network communication with I-Learn.
- 1.4.45. **Immediate Deletion** - As soon as a task reaches its due date, the task is removed from HATA.
- 1.4.46. **Import** - Synchronize assignments with I-Learn.
- 1.4.47. **Incomplete assignment** - An assignment that a student has not marked as completed.
- 1.4.48. **Inhibit** - To make difficult or impossible.
- 1.4.49. **Input** - Putting data into HATA.
- 1.4.50. **Instructor** - The individual that oversees the instruction of a course as well as creates assignments in I-Learn.
- 1.4.51. **Learning Management System** - a software application that automates the administration, tracking, and reporting of training events or courses.
- 1.4.52. **Low on Storage** - The state of the mobile device when the mobile device lacks the necessary available memory to complete a basic operation.
- 1.4.53. **Mobile App** - An application developed for and run on a mobile device.
- 1.4.54. **Mobile Data** - The communication mechanism where information is both sent and received through the cell phone communication transmitter on a mobile device.

- 1.4.55. **Model-View-Controller** - A software design pattern that manages complexity and provides a separation of concerns. Software is organized into areas pertaining to data and business logic (Model), presentation of data and logic, as well as receiving input from the consumer of the application (View), and the code that arranges data and communication between both the model and the view (Controller).
- 1.4.56. **Network Communication** - Communication between two or more devices where information is both sent and received through a network interface such as a cell phone communication transmitter on a device or through Wi-Fi or Ethernet.
- 1.4.57. **Network Problems** - An error or errors in communication between a source and HATA.
- 1.4.58. **Notification** - A message delivered from a software application to a mobile device without a prompt from the user.
- 1.4.59. **Notification Time** - The time that is set in the application for how long before the assignment is due a notification should appear.
- 1.4.60. **Notify** - Alerting the user to the progress, completion, or failure of an operation.
- 1.4.61. **Object Class** - A grouping of related methods and data attributes from which objects in a software system are instantiated from.
- 1.4.62. **Offline** - The state of the mobile device when the mobile device has no data connection.
- 1.4.63. **Onscreen Keyboard** - A virtual keyboard displayed on a touch device.
- 1.4.64. **Ordered Location** - The position of a task in the assignment list set according to the student-specified filter.
- 1.4.65. **Password** - A unique security phrase a student shall use to log into the student's I-Learn.
- 1.4.66. **PIN Code** - A password a student shall use to either authorize or gain access to a restricted area of the mobile app.

- 1.4.67. **Progress Bar** - A graphical bar that shows the progress of I-Learn synchronization.
- 1.4.68. **Profile Picture** - An image set up by the student for display in HATA.
- 1.4.69. **QA Engineer** - A type of user that verifies the functionality of HATA is correct.
- 1.4.70. **Refresh of Content** - The application calls out to I-Learn to fetch data and updates that data stored on the user's mobile device.
- 1.4.71. **Remember** - When the application stores a user's selection in the mobile device's internal memory as well as on the cloud so as to keep settings and information consistent between uses.
- 1.4.72. **Required Text Field** - A text field that must contain information before the task can be saved.
- 1.4.73. **Restore** - To retrieve a task and make the task appear as though the task had not been deleted.
- 1.4.74. **Saving a Task** - When a task has been created or modified and the user selects to store the creation or modification on the mobile device's storage and the cloud.
- 1.4.75. **Search Bar** - A text input box that allows the user to search through an application by keyword.
- 1.4.76. **Select** - When an item is selected, the item is "touched" by the user.
- 1.4.77. **Semester** - a 14-week period at BYU-Idaho during which a student can enroll in one or more courses.
- 1.4.78. **Server** - a computer program or a device that provides functionality for other programs or devices called "clients". See 2.4.
- 1.4.79. **Settings Window** - The window that contains all of the general settings that can be modified by the user for the entire application.
- 1.4.80. **Setting** - A configuration for the application.

- 1.4.81. **Shall** - The app is required to or must have this functionality.
- 1.4.82. **Should** - The app is expected to have this functionality, but the functionality is not a requirement.
- 1.4.83. **Slider** - A switch-like UI element that is toggled by the user to an “on” or “off” state.
- 1.4.84. **Smartphone** - A mobile device with phone, messaging, and internet capabilities that runs a modern operating system such as iOS or Android.
- 1.4.85. **Software Method** - An atomic piece of functionality that belongs to an object class in a software system.
- 1.4.86. **Sort/Sortable** - The ability of a given list of tasks to be ordered by a user specified metric.
- 1.4.87. **SSL Certificate** - Secure Socket Layer Certificate which is a file that is used by servers participating in network communication to encrypt and validate data being transmitted using the SSL protocol.
- 1.4.88. **SSL Vulnerability Scanner** - A software system that scans servers to verify that the server is using SSL properly and is not exposed to any known security holes or vulnerabilities. This can be a stand-alone software or a web service.
- 1.4.89. **String** - An object that represents a sequence of characters, usually plaintext.
- 1.4.90. **Student** - This is a type of user of the system who participates in a course and receives assignments that must be completed as part of being a member of that course.
- 1.4.91. **Synchronize** - Connecting to the external source and verifying that the shared information is consistent between the two and resolving differences if differences exist.
- 1.4.92. **Tags** - A label attached to assignments to aid the user in the task of filtering.
- 1.4.93. **Task** - A task is a type of assignment that has been created by a student on HATA.

- 1.4.94. **Task Course** - The course that a student has associated a task with.
- 1.4.95. **Task Creation Screen** - The window where the user inputs the information about the task he or she is creating.
- 1.4.96. **Task Details** - All of the detailed information that has been provided for a task.
- 1.4.97. **Task Details Screen** - The window displayed to a student on HATA that shows all of the attributes of a task..
- 1.4.98. **Task Link** - A URL that connects to a website which has additional information to read or learn about a task.
- 1.4.99. **Task Name** - The short, student or I-Learn provided, description of what a task is.
- 1.4.100. **Task Notes** - Additional textual information that the student has associated with a task that further describes the task or is information that the student wants to remember about the task.
- 1.4.101. **Task Priority** - The level importance set by the user to indicate the importance given to a specific task.
- 1.4.102. **Task Reminder Setting** - An attribute of a task that is the time from the task due date, that a student shall be sent a notification that the task is due. The valid values of this attribute are: 10 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 12 hours, 1 day, 2 days, 3 days, 5 days, and 1 week.
- 1.4.103. **Task Start Date** - The date at which the user may begin work on a task.
- 1.4.104. **Team Members** - The fellow members of a course who have chosen or been assigned to participate with the student in work on a task.
- 1.4.105. **Text Area** - An area to enter multiple lines of text.
- 1.4.106. **Text Field** - An area that either displays text or allows the user to enter text.
- 1.4.107. **Timed Out** - When an operation has not completed in its allotted time and the operation is cancelled.

- 1.4.108. **Unit Test** - A unit is the smallest testable part of an application like functions, object classes, procedures, interfaces. A unit test verifies that the unit under test fulfills all of its required functionality.
- 1.4.109. **User** - The person (typically a student or professor) using the application on their phone.
- 1.4.110. **User Authentication System** - A third party authentication system that authorizes a user and provides a token to the calling application to use for current and future identification of the user.
- 1.4.111. **User Image** - A generic picture used as a placeholder for a profile picture until said profile picture is configured by the student.
- 1.4.112. **Username** - An identifying title unique to a specific user.
- 1.4.113. **Verify** - To check a certain item against a known value or state.
- 1.4.114. **Verified Defect** - A problem identified by a stakeholder in the application software that has been independently verified by a software engineer or quality assurance engineer.
- 1.4.115. **Voice Input** - The process of translating speech to text which can then be used in a text input field.
- 1.4.116. **Wi-Fi** - A technology that allows a device to send and receive information through a wireless local area network (WLAN).

2. References

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3. Specific Requirements

3.1. Interfaces

3.1.1. Task Creation Screen

- 3.1.1.1. The default input method to enter task information shall be the onscreen keyboard.

3.1.2. Mobile Network Communication

- 3.1.2.1. HATA shall use Wi-Fi for all network communication when the device system detects there is Wi-Fi available.
- 3.1.2.2. HATA should use mobile data when Wi-Fi is not available on the condition that the student approves use of mobile data.
- 3.1.2.3. HATA should remember whether or not the student approves HATA to use mobile data.
- 3.1.2.4. In order to indicate any network problems that are detected when trying to sync, the app shall display the error message, "Unable to sync. Network not available. Please try again later."
- 3.1.2.5. HATA shall function without an available internet connection.

3.1.3. Server Network Communication

- 3.1.3.1. Communication to the backend web service shall be secure.

3.2. Functions

3.2.1. Task Creation

- 3.2.1.1. On the assignment list screen, an icon shall allow the student to create a new task when selected.
 - The task shall be created by typing or voice input.
- 3.2.1.2. The student shall see an icon when saving the task to indicate the task has been saved.
- 3.2.1.3. The student shall see an icon when the task has been saved to indicate the task has been saved.
- 3.2.1.4. If the task cannot be saved, the student shall be notified.
- 3.2.1.5. If the task cannot be saved due to lack of connectivity, then the student shall be able to continue editing offline.
- 3.2.1.6. Upon creation of the task, the task shall appear in the assignment list in its correctly ordered location.

3.2.2. Assignment and Task Hiding

- 3.2.2.1. HATA shall ask the student for confirmation before hiding an assignment.
- 3.2.2.2. The confirmation that HATA asks shall include an option to disable future confirmations.
- 3.2.2.3. Assignments that have been created by I-Learn synchronization that have also been hidden by the student shall not be restored by future syncs.
- 3.2.2.4. A student shall see a failure notification when an assignment fails to be hidden.

3.2.3. Task Creation Screen

- 3.2.3.1. On the task creation screen, the following items shall appear: the task name, the task course, the task due date, the task due time, the task notes, the task link, and the task reminder setting.
- 3.2.3.2. The task notes shall allow the student to enter unlimited characters.
- 3.2.3.3. The task shall have a single task reminder setting.
- 3.2.3.4. The student shall be able to save a new task on this screen.
- 3.2.3.5. On the task creation screen, the following items should appear: an option to add multiple reminders, the difficulty of the task, the start date of the task, a numeric priority of the task, and an area to track the completion percentage of the task.
- 3.2.3.6. When the start date section is selected, the OS's default date selector shall allow the student to set the due date.
- 3.2.3.7. The priority level should appear with the task.

3.2.4. Assignment Options

- 3.2.4.1. Hidden assignments shall remain stored in the system to accommodate I-Learn synchronization.
- 3.2.4.2. A task should have the ability to be duplicated.
- 3.2.4.3. The student shall be able to disable or enable notifications of an assignment.
- 3.2.4.4. If the SMS notification option is enabled, a SMS message shall be sent to the desired phone number with the task information when the notification time of a task has been reached.

3.2.5. Task Structure

- 3.2.5.1. Assignments and tasks shall be grouped by course.
- 3.2.5.2. Courses shall be grouped by semester.

- 3.2.5.3. In order for the student to see the assignment list for a course, the student shall first select a semester and then select a course within the semester.

3.2.6. Notifications

- 3.2.6.1. When the reminder time for an assignment has been reached, a device notification shall alert the student to the upcoming assignment.
- 3.2.6.2. The device notification shall include the due date and time of the task, the course associated with the task, the name of the task, and a warning sound if the student has sound enabled on the student's mobile device.
- 3.2.6.3. Multiple task notifications for tasks with the same due date should be combined into one notification with a list of the tasks inside the notification.
- 3.2.6.4. Selecting an assignment or task notification shall lead the student to the Daily calendar view for the assignment.
- 3.2.6.5. Notifications shall cease when the student opts out of notifications.
- 3.2.6.6. Notifications shall cease when notifications have been muted.
- 3.2.6.7. Students should have the option of setting specific times of day when students can mute notifications in blocks of at least 1 hour and no greater than 24 hours.
- 3.2.6.8. Students may view the 10 most recent assignment or task in descending order by due date and time from the Home Page by selecting the Notifications icon.
- 3.2.6.9. Selecting the Notifications icon on the Home Page shall bring students to a Notifications view, with a log of the 10 most recent assignments or tasks in descending order by due date and time. Which will include the assignment or tasks name, type, and due date and time.

3.2.7. Settings

- 3.2.7.1. A setting shall exist in the settings window to specify the general task delete time.
- 3.2.7.2. The default delete time shall be set when HATA is downloaded to one week and shall have options to change the default delete time to immediate deletion, one day, three days, one week, one month, six months, and one year.
- 3.2.7.3. An option should exist in the settings window to allow the student to choose to have deleted tasks archived and available for restoring or completely removed from HATA.
- 3.2.7.4. An option should exist in the settings window to allow the student to specify whether deleted tasks can be removed from HATA if the device is low on storage.
- 3.2.7.5. An option shall exist in HATA's settings to send SMS notifications instead of phone notifications.

3.2.8. Group Work

- 3.2.8.1. Tasks may be shared with team members on group projects.
- 3.2.8.2. HATA shall allow tasks to be sent and received via email.

3.2.9. Completed Tasks

- 3.2.9.1. When a task is marked as completed the task shall be archived or completely removed from HATA depending on the setting in the settings window.
- 3.2.9.2. When a task has passed the delete time, the task shall be archived or completely removed from HATA depending on the setting in the settings window.

3.2.10. PIN Code to Access HATA.

- 3.2.10.1. A PIN code shall be required to enter HATA, preventing unauthorized use of HATA.

- 3.2.10.2. The student shall be redirected to the assignment list after a successful login attempt.
- 3.2.10.3. If the student enters an incorrect PIN code, a window shall appear with an error message (stating that the PIN code is incorrect) and a link to reset the PIN code.
- 3.2.10.4. If the student fails to enter a correct Login screen PIN code three times, the HATA shall disable the entering of a PIN code again for 30 seconds.

3.2.11. Account Management

- 3.2.11.1. A student shall be able to create an account by selecting a link on the Login Screen labeled “Create Account” if the student does not already have an account. A successful account creation attempt shall send a confirmation email to the student.
- 3.2.11.2. To create an account, a student shall type in a unique username and password of the student’s choice that shall be entered twice identically, and password characters shall be hidden using asterisks.
- 3.2.11.3. Duplicate usernames shall not be allowed and shall prompt the student again until a unique username is chosen.
- 3.2.11.4. A first-time student (user) shall log in using the student's username and password from the student's created account.
- 3.2.11.5. After a first-time student has logged in, the student shall be prompted to allow easy access mode which shall not require a username and password each time the student uses the app.
- 3.2.11.6. Students that choose to enable easy access mode shall be able to open the app and be logged in without entering the student's username and password.
- 3.2.11.7. In order to navigate to the settings page, the student shall be able to select the profile picture to display the settings screen.
- 3.2.11.8. The student shall be able to adjust the student’s account information which consists of profile picture, username, contact information,

notifications, alarms, linking social media accounts, background refresh toggle slider.

- 3.2.11.9. A student shall be able to login using OAuth API provided by Facebook, Google+, or I-Learn.
- 3.2.11.10. The student shall see a message on the login screen notifying the student that the student may login using Facebook, Google+, or I-Learn.
- 3.2.11.11. A profile picture shall be displayed in every view. If a profile picture has not been uploaded and saved, a default user image shall appear here.
- 3.2.11.12. A student shall be able to change the profile picture in the account settings page.
- 3.2.11.13. The student shall be able to upload .jpg, .jpeg, and .png file formats for the profile picture. Any picture size should be uploadable, but shall be scaled down in width and height to the correct dimensions after the picture has uploaded but before being stored.
- 3.2.11.14. Notifications shall be configurable by course.
- 3.2.11.15. Different sounds shall be configurable for the notifications.
- 3.2.11.16. The app should be able to fetch data while running in the background. This should involve pulling new or changed assignments from instructors, or messages from other students.
- 3.2.11.17. The student shall be able to see the student's contact information on the student's account management page.

3.2.12. Daily Overview Notifications

- 3.2.12.1. Students should have the option of enabling Daily Overview notifications.
- 3.2.12.2. Selecting the Daily Overview notifications shall take students to that day's Daily calendar view.
- 3.2.12.3. Students should select the time of day, to the half hour, that the student would like to receive Daily Overview alerts.

- 3.2.12.4. HATA shall send Daily Overview Notifications at a time designated by the student.
- 3.2.12.5. Students may opt out of Daily Overview Notifications entirely in the Notifications view (see section 4.2.6).

3.3. Usability requirements

3.3.1. Automatic Color Coding

- 3.3.1.1. HATA shall assign priority of an assignment through colors.
- 3.3.1.2. Colors shall represent High, Medium, and Low priorities for assignments and tasks according to due date.

Priority	Color	HTML Hex Code	
High	Red	#ff0000	
Medium	Yellow	#ffff00	
Low	Green	#008000	

- 3.3.1.3. The student may choose a customized color to replace the default assignment or task color in the list from 10 unique colors from the table below:

#	Color	HTML Hex Code	
1	Blue	#0000ff	
2	Cyan	#00ffff	
3	Lime	#00ff00	

4	Green	#008000	
5	Yellow	#ffff00	
6	Peach	#ffaa2b	
7	Orange	#ffa500	
8	Red	#ff0000	
9	Purple	#800080	
10	Gray	#808080	

3.3.2. Search Display Results

- 3.3.2.1. The default view shall display assignments and tasks in ascending order according to due date.
- 3.3.2.2. The student shall be able to filter search results by color priority tags.
- 3.3.2.3. HATA shall display filter results as a list of assignments, filtered by the student defined filter, and in ascending order by due date.
- 3.3.2.4. The student may further filter assignments through the use of text-based tags.
- 3.3.2.5. HATA shall filter out assignments that don't match the color priority selected by the student.
- 3.3.2.6. HATA shall display assignments in ascending order by due date that are associated with the color priority selected by the student.
- 3.3.2.7. The student can select and view a desired assignment or continue filtering through color coding selection.

- 3.3.2.8. There shall be a search bar that has both a search icon and input search bar for students to type in text.
- 3.3.2.9. In order to initiate the search, the student shall select the search icon.
- 3.3.2.10. HATA shall use any text that is in the input search bar to search throughout all assignments and courses stored on HATA for the associated text.
- 3.3.2.11. HATA shall display any assignment or course that contains the text typed in by the student in the “Search Results” screen while filtering out any assignments or course that does not match the searched text.

3.3.3. Quick Filtering Tags

- 3.3.3.1. HATA shall automatically populate each assignment and task with a tag to identify the assignment or task type.
- 3.3.3.2. HATA shall allow the student to add tags to assignments and tasks to allow filtering for each assignment or task type.
- 3.3.3.3. The default tag options that shall be added are: Quizzes, Discussion Board, Reading, Group Project, Activity, Individual Project, Course Name, and Due Dates.
- 3.3.3.4. HATA may allow students to create custom tags for assignments and tasks.
- 3.3.3.5. Students may select a default tag for an assignment or task in order to filter assignments and tasks of the same type.
- 3.3.3.6. HATA default display shall order the results in ascending order by assignment and tasks due date.

3.3.4. Home Page View

- 3.3.4.1. The Home Page: Assignments and tasks organized by due dates and times shall be the default view of HATA.
- 3.3.4.2. Students shall be able to navigate between two Home Page views: assignments and tasks due by course and assignments and tasks by due date.

- 3.3.4.3. Navigation tabs shall be located at the top of the home page to navigate between course and due dates..
- 3.3.4.4. Selecting the tab with the associated view name shall change and display the selected view.
- 3.3.4.5. A notification icon shall be located on the Home Page.
- 3.3.4.6. Due Date and Course views shall be populated with only upcoming assignments up to two weeks into the future.
- 3.3.4.7. All assignments shall be displayed in an ascending, unordered list.
- 3.3.4.8. Each assignment shall be listed in accordance with requirement 3.3.6 Assignments View.
- 3.3.4.9. Students shall select an assignment or task directly from the Due Date view or Course view to see more information about it, such as the course, due date, and specific time of day the assignment or task is due.
- 3.3.4.10. HATA shall import all assignments and display the assignments on the Home Page.
- 3.3.4.11. HATA shall sort all imported assignments by Due Date in ascending order by default.
- 3.3.4.12. HATA shall sort the imported assignments by its associated course.
- 3.3.4.13. If this is the first time HATA has synced with I-Learn, a progress bar shall appear displaying the I-Learn sync progress.

3.3.5. Calendar View

- 3.3.5.1. Students shall be shown all assignments and tasks listed in each date block by due date in ascending order by order of time due.
- 3.3.5.2. Students shall be shown all assignments and tasks listed in each date block with the associated assignment or task name and due date to allow the students to identify assignments and tasks in each view.
- 3.3.5.3. The Monthly Calendar view shall be the default view when the student navigates to the calendar view option from the Home Page.

- 3.3.5.4. HATA shall display Monthly, Weekly, and Daily Navigation tabs located at the top of the calendar views.
- 3.3.5.5. Selecting the tab with the associated view name shall lead the user to navigate to that view.
- 3.3.5.6. All assignments shall be imported into the assignments' corresponding due dates in the Monthly, Weekly, and Daily calendar views.
- 3.3.5.7. Users should select an assignment or task directly from the Monthly, Weekly, and Daily calendar views to see more information about it, such as the course, due date, and specific time of day the assignment or task is due.
- 3.3.5.8. HATA shall generate a calendar of the default Monthly view and populate each day with its associated assignment and task on the correct due dates.
- 3.3.5.9. HATA shall generate a calendar of the Weekly view and populate each day with its associated assignments and tasks on the correct due dates.
- 3.3.5.10. HATA shall generate a calendar of the Daily view and populate the selected day with its associated assignments and tasks due on the selected day.

3.3.6. Assignments View

- 3.3.6.1. Each assignment and task listed on the Home Page shall have an icon containing the due date of the assignment or tasks.
- 3.3.6.2. The icon containing the due date shall be color-coded according to Color-Coded standards.
- 3.3.6.3. Each assignment and task shall contain the name of the given assignment or task.
- 3.3.6.4. Each assignment and task shall display the course associated with it on the assignment list.
- 3.3.6.5. Each assignment and task type shall be indicated with a color coded label.

- 3.3.6.6. HATA shall display an expanded view that displays all of the information for a specific assignment or tasks when the student selects an assignment or task.
- 3.3.6.7. HATA shall import student information to populate the assignments associated with the student and display the assignments on the assignment list.
- 3.3.6.8. The assignment or task name that is displayed in the assignment list shall fit within the assignment list width.
- 3.3.6.9. When a student selects an assignment or task from the assignment list, the assignment or tasks details screen shall appear, which shall display the name, due date, course, link, notes, and notifications associated with the assignment or task.
- 3.3.6.10. Each assignment or task in the assignment list shall have a checkbox to the right of the assignment or tasks to mark that the assignment or task is complete.
- 3.3.6.11. Upon marking an assignment or task as complete, the assignment or tasks shall be removed from the assignment list and shall be moved to the completed assignments list.
- 3.3.6.12. The student shall be able to sort the assignment list by due date or by course.
- 3.3.6.13. The default view for the assignment list shall be sorted by due date with the highest assignment or task priority showing first on the list.
- 3.3.6.14. When a student selects an assignment link, the link should be sent to the default web browser of the device for the web browser to display it.
- 3.3.6.15. Assignments and tasks in the assignment list should be color-coded by week, course, and type of assignment.

3.4. Performance requirements

3.4.1. Assignment Display

- 3.4.1.1. Upon opening the application, assignments shall appear in the assignment list within one second based on the latest saved assignments and tasks and the latest sync with I-Learn.

3.5. Logical Database and Data requirements

3.5.1. Mobile App Data Storage Requirements

- 3.5.1.1. All app data should be stored in the mobile device storage for use when there is no available network communication.
- 3.5.1.2. All tasks created by the student should have task details associated with the task stored on the HATA web service for holding student created app data.
- 3.5.1.3. When a task is deleted the task and the task details associated with the task should be removed from the server storage through network communication with the HATA web service.

3.5.2. I-Learn Synchronization

- 3.5.2.1. Assignments created by I-Learn synchronization shall be able to have task notes added to the assignment information, but shall block the original assignment information from being changed.
- 3.5.2.2. Assignments created by I-Learn synchronization shall be able to revert saved assignment information to match I-Learn's assignment information.
- 3.5.2.3. If the details of the assignment from I-Learn change, the details in HATA shall change, overwriting any changes made by the student to the assignment information.
- 3.5.2.4. I-Learn synchronization shall happen at five minute intervals and the student shall be notified of any new assignments or updates to existing assignments.

- 3.5.2.5. Synchronization shall use less than 512kb of mobile data.
- 3.5.2.6. Synchronizations that take longer than one minute shall be cancelled and notify the student that the synchronization has timed out.

3.6. Design Constraints

- 3.6.1. Student shall be constrained to a variable size touch screen.

3.7. Software System Attributes

3.7.1. Availability

- 3.7.1.1. Students shall continue to be able to edit or create tasks when there is no available network communication.
- 3.7.1.2. I-Learn synchronization shall pause when the mobile app has no available network communication shall resume when HATA establishes a network connection.

3.7.2. Maintainability

- 3.7.2.1. Every verified defect in HATA that inhibits the student's ability to create tasks or to view assignments and tasks shall be resolved.
- 3.7.2.2. This application shall use a model-view-controller framework.

3.7.3. Security

- 3.7.3.1. Student authentication passwords for connecting with I-Learn shall be saved securely.

3.8. Supporting information

- 3.8.1. Contact information shall be found in the account settings page. If no account information has been entered, the form fields shall be blank.
- 3.8.2. There shall be an "edit" icon which can be selected which shall allow the student to enter and save the student's information in contact info fields.

3.9. Requirements Not included

3.9.1. Security

- 3.9.1.1. Students shall not have to enter a password to enter the app. This requirement is already met by default by not having functionality requiring a password.

3.9.2. Software Interfaces

- 3.9.2.1. Any assignment alterations made in HATA to assignments obtained from the syncs with I-Learn's API shall be changed when a sync is performed only if the information on the assignment obtained from the I-Learn sync is different from that obtained originally from the I-Learn sync for the specific assignment. As assignments from I-Learn are read-only this requirement is not included.

4. Verification

4.1. Interfaces

4.1.1. Task Creation Screen

- 4.1.1.1. This shall be verified by going to the primary interface of HATA and selecting the icon to add a task. Once in the task creation window, select the input for the task name. When the device keyboard appears to enter the task name, this is verified.

4.1.2. Mobile Network Communication

- 4.1.2.1. This shall be verified by connecting to a Wi-Fi network and disabling mobile data on the mobile device. Select to sync with I-Learn, and then add a new task. If the sync with I-Learn and the new task creation were successful, this is verified.
- 4.1.2.2. This shall be verified by enabling the mobile device's data and disabling Wi-Fi connectivity. If the QA Engineer exits the app and reenters HATA, the setting shall be remembered. Select to sync with

I-Learn, and then add a new task. If the sync with I-Learn and the new task creation were successful, this is verified.

4.1.2.3. This shall be verified by putting the device in Airplane Mode. Then, enter HATA. If a notification appears alerting the QA Engineer that a connection could not be established, this is verified.

4.1.2.4. This shall be verified by putting the device in Airplane Mode. Then, enter HATA. If the QA Engineer is still able to use the app without internet connection, this is verified.

4.1.3. Server Network Communication

4.1.3.1. This shall be verified by using an SSL vulnerability scanner to make sure that the backend web service is secure.

4.2. Functions

4.2.1. Task Creation

4.2.1.1. Adding a task shall be verified by selecting the options icon from the assignment list screen and assuring that an option to create a new assignment by typing or by voice input is available.

4.2.1.2. This shall be verified by attempting to save a task. If an icon appears showing the QA Engineer that saving the task is in progress, this is verified.

4.2.1.3. This should be verified by activating Airplane Mode on the device. If HATA attempts to sync, and the error message, "Unable to sync. Network not available. Please try again later." is displayed, this is verified.

4.2.1.4. This shall be verified by saving a task. If the task cannot be saved, and the user is notified, this shall be verified.

4.2.1.5. This shall be verified by activating Airplane Mode on the device. If the QA Engineer attempts to save a task, but the task fails to save due to lack of connectivity, the QA Engineer shall be able to continue to edit the task offline.

- 4.2.1.6. This shall be verified by creating a new assignment. If the newly created assignment appears on the assignment list in its correctly ordered place, this is verified.

4.2.2. Assignment and Task Hiding

- 4.2.2.1. This shall be verified by entering HATA and selecting the delete icon on an assignment in the assignment list. If a dialog box appears with an option to disable future notifications, then this feature is verified.
- 4.2.2.2. This shall be verified by entering HATA and selecting to delete a homework task in the assignment list that was obtained by syncing with I-Learn. Then wait until the next I-Learn sync occurs. If the deleted homework task does not return, this is verified.
- 4.2.2.3. This shall be verified by the QA Engineer manually throwing a deletion exception. If a notification appears alerting the QA Engineer that the task could not be deleted, this is verified.

4.2.3. Task Creation Screen

- 4.2.3.1. This shall be verified by confirming the presence of a text field labeled “Name”, a text field labeled “Course”, a text field labeled “Due Date”, a text field labeled “Due Time”, a text area labeled “Notes”, a text field labeled “Link”, a text field labeled “Reminder.”
- 4.2.3.2. This shall be verified by inputting more than 1,000 characters into the task notes text area. If the QA Engineer is able to put in more than 1,000 characters, this is verified.
- 4.2.3.3. This may be verified by confirming the presence of only one field labeled “Reminder.”
- 4.2.3.4. This may be verified by confirming the a new task can be saved. If the task appears in the assignment list, this is verified.
- 4.2.3.5. This may be verified by confirming the presence of the following text field: an option to add multiple reminders, the difficulty of the task, the start date of the task, a numeric priority of the task, an area to track the completion percentage of the task.

- 4.2.3.6. This may be verified by confirming the presence of a text field labeled “Start Date”, selecting the start date text field and confirming the OS’s default date selector appears.
- 4.2.3.7. This can be verified by confirming the presence of a text field labeled “Priority” and of the numeric priority of the assignment.

4.2.4. Assignment Options

- 4.2.4.1. This shall be verified by creating a new task, then deleting the newly created task. If the task is no longer on the assignment list then the task is successfully deleted, this is verified. The QA Engineer shall be able to hide an assignment that was imported by I-Learn and then import assignments from I-Learn. If the hidden assignment doesn’t reappear in the assignment list, this is verified.
- 4.2.4.2. This should be verified by copying the task. If a new task is created using all the information from the copied task, this is verified.
- 4.2.4.3. This shall be verified by going to the settings menu of the application and confirming the presence of an option to turn off or on notifications for the entire application. If the option to receive notifications is selected and the user receives a notification when an assignment is due, or if the option to receive notifications is turned off and the user does not receive a notification when an assignment is due, this is verified.
- 4.2.4.4. This shall be verified by going to the settings menu of the application and confirming the presence of an option to switch to and from SMS notification instead of phone notifications. If the option to receive SMS notifications is selected and the user receives an SMS notification when an assignment is due, or if the option to receive SMS notifications is turned off and the user does not receive an SMS notification when an assignment is due, this is verified.

4.2.5. Task Structure

- 4.2.5.1. This should be verified by confirming that assignments and tasks are grouped by course.

- 4.2.5.2. This should be verified by confirming that courses are grouped by semester on the assignment list.
- 4.2.5.3. This shall be verified by selecting a semester followed by selecting a course within the semester. If the assignment list appears, this is verified.

4.2.6. Notifications

- 4.2.6.1. This shall be verified by setting a reminder on a task reminder. If the device notification alerts the QA Engineer during the time for which the reminder was set, this is verified.
- 4.2.6.2. This shall be verified by confirming that the device notification includes the due date and time of the task, the course associated with the task, the name of the assignment and a warning sound if the QA Engineer has sound enabled on the mobile device.
- 4.2.6.3. This should be verified by setting reminders for multiple tasks for the same due date. If there is one combined notification with a list of the assignments inside the notification, this is verified.
- 4.2.6.4. This shall be verified by the HATA navigating to the Daily calendar view when the QA Engineer selects the Daily Overview Alert notification.
- 4.2.6.5. This shall be verified by HATA disabling notifications when the QA Engineer selects the option to opt out of receiving notifications.
- 4.2.6.6. This shall be verified by HATA having settings that shall allow the QA Engineer to customize when alerts and notifications are muted.
 - This shall be verified by HATA providing the QA Engineer the option of muting alerts in blocks of no less than 1 hour and no greater than 24 hours.
- 4.2.6.7. This shall be verified by HATA disabling alerts during the time the QA Engineer has set for alerts to be muted.
- 4.2.6.8. This shall be verified by the QA Engineer selecting the Alerts icon on the Home Page and the system shall navigate to the Alerts view with a log of the 10 most recent assignment due date alerts. The stored

alerts shall include the assignment name, type, due date, and time the assignment is due.

4.2.6.9. This shall be verified by HATA storing the 10 most recent assignments and tasks due date alerts through the Home Page Alerts icon

- This shall be verified by the notifications being displayed in descending order.
- This shall be verified by the Notifications including assignment name, type, due date, and time the assignment or task is due.

4.2.7. Settings

4.2.7.1. This shall be verified by entering the settings window and setting a task delete time and then creating a task and allowing the appropriate time to pass for the assignment to be deleted. This setting is then verified.

4.2.7.2. The default task delete time shall be verified by waiting one week for the assignment to be deleted. Then, to verify the other settings of immediate deletion, one day, three days, one week, one month, six months and one year, set the delete time to each of these and allow sufficient time to pass to verify that the assignment has been deleted by this process. These settings are then verified.

4.2.7.3. This should be verified by entering the settings window and selecting archived and available then seeing if the tasks is archived and then restoring it. To verify the remove from application setting it shall be selected in the settings window and a task shall then be deleted. If there is no longer a record archived of the assignment then this is verified.

4.2.7.4. This should be verified by selecting the setting to remove deleted tasks from HATA when storage is low. If there is no longer a task archived this is verified.

4.2.8. Group Work

- 4.2.8.1. This may be verified by sharing a task with one or more people via email.
- 4.2.8.2. This shall be verified when the QA Engineer sees tasks sent and received by email.

4.2.9. Completed Tasks

- 4.2.9.1. This shall be verified by marking a assignment as completed and verifying that the assignment has been archived or completely removed from HATA depending on the setting in the settings window.
- 4.2.9.2. This shall be verified by letting a task pass the deletion and verifying that the task has been archived or completely removed from HATA depending on the setting in the settings window.

4.2.10. PIN Code to Access HATA

- 4.2.10.1. Verified when the student inputs the correct PIN code when prompted and access is granted to HATA.
- 4.2.10.2. Verified when the student enters the correct PIN code and is successfully redirected to the assignment list.
- 4.2.10.3. Error text prompt is verified when the QA Engineer fails to input the correct PIN code and the required error message is displayed with a link to reset the PIN code.
- 4.2.10.4. This is verified if an incorrect PIN code is input three times and the QA Engineer locked out and unable to enter another PIN code for 30 seconds.

4.2.11. Account Management

- 4.2.11.1. The QA Engineer shall be sent a confirmation email stating that the QA Engineer created an account.
- 4.2.11.2. Verification for this shall be successful when the QA Engineer has created a username and password for the QA Engineer's account on

HATA. Passwords shall not be displayed in plain text and shall be entered twice to ensure password accuracy.

- 4.2.11.3. The student shall be redirected to the student's Home Page View (see 4.3.4) showing a successful login.
- 4.2.11.4. A prompt with options shall appear to choose whether or not to allow easy access mode.
- 4.2.11.5. If Easy Access Mode is enabled, and the QA Engineer exits and reenters HATA, the QA Engineer shall not be prompted for the QA Engineer's username and password.
- 4.2.11.6. The QA Engineer shall tap the profile picture to find the settings page. This feature is then verified if the settings page appears.
- 4.2.11.7. Adjusting QA Engineer settings should be verified by seeing if the QA Engineer filled in the information: profile picture, username, contact information, notifications, and linking social media accounts, background refresh toggle slider.
- 4.2.11.8. If a QA Engineer can log into HATA using Facebook, Google+, or I-Learn OAuth, the OAuth login feature is verified.
- 4.2.11.9. The QA Engineer may verify the student's account settings if the QA Engineer has a Facebook, Google+, or I-Learn account linked by successfully logging into Facebook, Google+, or I-Learn.
- 4.2.11.10. When the QA Engineer's profile image changes, then it is verified that the profile photo has been changed.
- 4.2.11.11. Verified by QA Engineer successfully changing a profile picture in the settings and the new profile picture showing at the top of the screen.
- 4.2.11.12. Verified by QA Engineer successfully uploading profile picture.
- 4.2.11.13. The QA Engineer shall be able turn on and off the notifications. The QA Engineer shall also receive a verification notification.
- 4.2.11.14. This shall be verified by the QA Engineer when different sounds are heard for different notifications. .

- 4.2.11.15. The QA Engineer can verify this step when new content appears as a result of the background functions.
- 4.2.11.16. The QA Engineer shall be able to view the QA Engineer's contact information.

4.2.12. Daily Overview Notifications

- 4.2.12.1. This shall be verified by HATA providing a setting for the QA Engineer to select that enables Daily Overview notifications in the Task Notifications Display view.
- 4.2.12.2. This shall be verified by the QA Engineer setting the time of day the QA Engineer wants to receive the Daily Overview notification, receiving the notification at the specified time.
- 4.2.12.3. This shall be verified by the QA Engineer only being able to set the time in increments of 30 minutes.
- 4.2.12.4. This shall be verified by HATA sending a Daily Overview notification at the time designated by the QA Engineer.
- 4.2.12.5. This shall be verified by HATA providing a setting for the QA Engineer to opt out of Daily Overview notification in the Task Notifications Display view.
 - This shall be verified by HATA no longer displaying the Daily Overview notification once the option is selected by the QA Engineer.

4.3. Usability requirements

4.3.1. Automatic Color Coding

- 4.3.1.1. This shall be verified by the QA Engineer seeing that assignments are tagged with colors the help differentiate between priority levels.
- 4.3.1.2. HATA shall change the colors that indicate priority level for assignments as an assignment due date draws near.

Assignment	Color	HTML Hex	
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Priority Label		Code	
High	Red	#ff0000	
Medium	Yellow	#ffff00	
Low	Green	#008000	

- 4.3.1.3. The QA Engineer shall be able select a customized color from the color list below and verify that the default color is replaced by the selected customized color in the assignment list.

#	Selectable Color	HTML Hex Code	
1	Blue	#0000ff	
2	Cyan	#00ffff	
3	Lime	#00ff00	
4	Green	#008000	
5	Yellow	#ffff00	
6	Peach	#ffa2b	
7	Orange	#ffa500	
8	Red	#ff0000	
9	Purple	#800080	

10	Gray	#808080	
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4.3.2. Search Display Results

- 4.3.2.1. This shall be verified when the default view displays assignments and tasks according to the assignments' and tasks' due dates.
- 4.3.2.2. This shall be verified by the QA Engineer selecting a certain assignment priority color and verifying that the view only displays assignments that are assigned to the selected priority and hide the assignments of any other priority level.
- 4.3.2.3. This shall be verified by the QA Engineer typing text in the search bar in order to find assignments that include the typed text string.
 - This shall be verified by the view only showing those assignments that have matching text and hide assignments that don't match the text that was searched when the QA Engineer confirms the search.
 - This shall be verified by the QA Engineer being able to type a string of characters into the search bar
 - This shall be verified by the filtered results being displayed through the search criteria as well as in order of due date.
- 4.3.2.4. This shall be verified by the QA Engineer selecting an assignment tag before or after having filtered the assignment list. The view shall only display assignments from the previous list that also match the assignment tag selected.
- 4.3.2.5. This shall be verified by the view filtering out assignments that don't match the color priority selected by the QA Engineer.
- 4.3.2.6. This shall be verified by the assignments being ordered according to the assignment's due dates in ascending order.
 - This shall be verified by the view only showing assignments that match the color priority selected by the QA Engineer.

- 4.3.2.7. This shall be verified by the QA Engineer selecting an assignment or color priority.
- If the QA Engineer selects an assignment this shall be verified by the assignment information view being displayed.
 - If the QA Engineer selects a color priority this shall be verified by the assignment list being filtered even further to display only assignments assigned the selected color priority in the Search Results view.
- 4.3.2.8. This shall be verified by the QA Engineer selecting the search bar and being able to type text into the search bar.
- 4.3.2.9. This shall be verified by the HATA displaying the search results view after the QA Engineer selects the search icon.
- 4.3.2.10. This shall be verified by the QA Engineer visually verifying that each assignment or task in the search results list matches the text that was searched for by the QA Engineer.
- 4.3.2.11. This shall be verified by the view filtering out assignments that don't match the filter criteria and showing assignments that match the filter criteria.

4.3.3. Quick Filtering Tags

- 4.3.3.1. This shall be verified by the assignments or tasks being automatically populated with tags to identify the assignment or task type on page load.
- 4.3.3.2. This shall be verified by the QA Engineer adding a custom tag to multiple assignments or tasks. Then the assignments or tasks shall be filtered when the QA Engineer selects the tag added to the assignments or tasks.
- 4.3.3.3. This shall be verified by the default tags being automatically populated to the correct type of assignments and tasks on page load.
- 4.3.3.4. This shall be verified by the QA Engineer creating a custom tag.

- 4.3.3.5. This shall be verified by the assignments and tasks that aren't associated with the selected tag being filtered out when the QA Engineer selects a custom tag.
- 4.3.3.6. This shall be verified by the assignments and tasks being ordered by due date in the default display.

4.3.4. Home Page View

- 4.3.4.1. This shall be verified by the Home Page: Assignments and tasks organized by due dates and times being the first page to be displayed when the application is opened.
- 4.3.4.2. This shall be verified by the QA Engineer being able to navigate between the two different views, assignments and tasks due by course and assignments and tasks by due date, from the Home Page.
- 4.3.4.3. This shall be verified by the QA Engineer being able to see the navigation tabs at the top of the page.
- 4.3.4.4. This shall be verified by the assignments and tasks being sorted by course or due date when the QA Engineer selects the Course tab or Due Date tab.
- 4.3.4.5. This shall be verified by the QA Engineer being able to see the notification icon on the Home Page display.
- 4.3.4.6. This shall be verified by the system only populating two weeks worth of upcoming assignments in the Due Date and Course views.
- 4.3.4.7. This shall be verified by QA confirming that the list is coded as an unordered list.
- 4.3.4.8. This shall be verified by the success of all verifications for 4.3.7 Assignments View.
- 4.3.4.9. This shall be verified by the QA Engineer selecting an assignment or tasks from either the Due Date view or Course view.
 - This shall be verified by the selected assignment opening up a new view that displays the course, due date, and specific time of day the assignment is due.

- 4.3.4.10. This shall be verified by the Home Page view being automatically being populated with the assignments from the students courses for the current semester.
- 4.3.4.11. This shall be verified by the assignments being sorted by Due Date after the assignments have been imported by default.
- 4.3.4.12. This shall be verified by the QA Engineer switching to the Course view and verifying that the assignments have been sorted according to course instead of due date.
- 4.3.4.13. This may be verified by syncing the HATA with I-Learn for the first time.

4.3.5. Calendar View

- 4.3.5.1. This shall be verified by the assignments and tasks displaying in order of due date, grouped together by day, and sorted by the assignment due time of day within each block.
- 4.3.5.2. This shall be verified by the assignment or task name and due date for each assignment being displayed when the QA Engineer navigates to the Calendar view.
- 4.3.5.3. This shall be verified by the default calendar view being the Monthly Calendar view.
- 4.3.5.4. This shall be verified by the “Monthly”, “Weekly”, and “Daily” navigation tabs being displayed above the calendar view.
- 4.3.5.5. This shall be verified by HATA changing to the Daily view when the QA Engineer selects the Daily navigation tab.
 - This shall be verified by HATA changing to the Weekly view when the QA Engineer selects the Weekly navigation tab.
 - This shall be verified by HATA changing to the Monthly view when the QA Engineer selects the Monthly navigation tab.
- 4.3.5.6. This shall be verified by the assignments being grouped into the selected time frame of the Monthly navigation view.

- This shall be verified by the assignments being grouped into the selected time frame of the Weekly navigation view.
 - This shall be verified by the assignments being grouped into the selected time frame of the Daily navigation view.
- 4.3.5.7. This shall be verified by the following information about the selected assignment or tasks being displayed in an extended view: course, due date, and time of day the assignment or tasks is due.
- 4.3.5.8. This shall be verified by each day of the Monthly calendar view being populated with the correct assignments and tasks on the day the assignments or tasks are due.
- 4.3.5.9. This shall be verified by selecting the Weekly view and the calendar is populated by the appropriate assignments and tasks by due dates and times.
- 4.3.5.10. This shall be verified by selected day of the Daily calendar view being populated with the correct assignments and tasks on the selected day.

4.3.6. Assignments View

- 4.3.6.1. This shall be verified by HATA displaying an icon on each listed assignment and task containing the due date of the individual assignment or task.
- 4.3.6.2. This shall be verified by HATA displaying the icons in accordance the the assignment color priority.
- 4.3.6.3. This shall be verified by HATA displaying the name of each given assignment and task on the assignment list.
- 4.3.6.4. This shall be verified by HATA displaying the name of each course associated with each individual assignment and task.
- 4.3.6.5. This shall be verified by HATA displaying the color associated to the type of assignment and task.
- 4.3.6.6. This shall be verified by HATA displaying information about an assignment or task in an expanded view when the QA Engineer selects an assignment or task.

- 4.3.6.7. This shall be verified by HATA populating the QA Engineer's assignments by importing the data from associated servers and automatically populating the assignment list.
- 4.3.6.8. Assignment or task names longer than the width of the screen shall be truncated.
- 4.3.6.9. This shall be verified by selecting an assignment or task from the assignment list. The assignment or task details for the selected assignment or task appear and display the full title, due date, course, and any links, notes, or notifications associated with the assignment or task.
- 4.3.6.10. This shall be verified by confirming the presence of the checkbox on the right side of the screen and verifying the assignment or task can be marked as complete by selecting the checkbox.
- 4.3.6.11. This shall be confirmed by marking the assignment or task as complete. If the assignment or task is removed from the assignment list and appears in the completed assignments list, this is verified.
- 4.3.6.12. This shall be verified by confirming the presence of the options to sort the assignment list by due date or by course and confirming that the sorting works.
- 4.3.6.13. This shall be verified by viewing the assignment list screen. If the default view is by due date with the highest priority showing first on the list, this is verified.
- 4.3.6.14. This should be verified by selecting a link within a assignment. If the device's default web browser opens the link, this is verified.
- 4.3.6.15. This should be verified by confirming that assignments and tasks in the assignment list are color-coded by week, course, and type of assignment.

4.4. Performance requirements

4.4.1. Assignment Display

- 4.4.1.1. This shall be verified by opening HATA. If the assignments and tasks appear on the assignment list within one second of opening HATA, this is verified.

4.5. Logical Database and Data Requirements

4.5.1. Mobile App Data Storage Requirements

- 4.5.1.1. This should be verified by activating Airplane Mode on the mobile device. If the QA Engineer is able to enter HATA and perform basic functions (i.e., edit or create tasks), this is verified.
- 4.5.1.2. This should be verified by creating a task and performing a sync with the HATA web service. If the task is stored on the HATA web service, this is verified.
- 4.5.1.3. This should be verified by creating a task, performing a sync to store the data in the HATA web service, deleting the synced task, then performing another sync to the HATA web service. If the task is no longer stored on the HATA web service, this is verified.

4.5.2. I-Learn Synchronization

- 4.5.2.1. This shall be verified by syncing the app with I-Learn. If the assignments' original information is disabled but notes can be added to the task, this is verified.
- 4.5.2.2. This shall be verified by adding assignment information onto an I-Learn assignment and performing a sync. If additional assignment information is reverted to match I-Learn's assignment information, this is verified.
- 4.5.2.3. This shall be verified by performing a synchronization after details of an assignment were updated on I-Learn. If the details in HATA update to match I-Learn and the assignment detail updates are overwritten, this is verified.

- 4.5.2.4. This shall be verified by confirming that HATA is synchronizing every five minute from when HATA opens and that a notification is sent detailing any new assignments or changes.
- 4.5.2.5. This shall be verified by checking how much data the app has used during a synchronization. If less than 512kb of data is used, this is verified.
- 4.5.2.6. This shall be verified by confirming that the QA Engineer is notified of the time out when a sync exceeds the one minute.

4.6. Design Constraints

- 4.6.1. This will be verified by the size of the screen that the user has.

4.7. Software System Attributes

4.7.1. Availability

- 4.7.1.1. This should be verified by activating Airplane Mode on the mobile device. If the app is able to be accessed and perform basic operations (i.e., edit or create assignments), this is verified.
- 4.7.1.2. This shall be confirmed by activating Airplane Mode on the device during I-Learn synchronization and then deactivating Airplane Mode. If synchronizing pauses and then resumes, this is verified.

4.7.2. Maintainability

- 4.7.2.1. This shall be verified by testing HATA for any defect that inhibits the QA Engineer's ability to create tasks or to view assignments and tasks. If no defects inhibit the QA Engineer's ability to create tasks or to view assignments and tasks, this is verified.
- 4.7.2.2. This shall be confirmed by reviewing HATA's framework. If HATA follows the model-view-controller framework, this is verified.

4.7.3. Security

- 4.7.3.1. This shall be verified by attempting to find the QA Engineer's password stored on the mobile device. If the QA Engineer's password is secure, this is verified.

4.8. Supporting Information

- 4.8.1. This shall be verified by opening the account settings page. If contact information has already been entered, contact information shall appear. If contact information has not already been entered, black form fields shall appear.
- 4.8.2. This shall be verified by opening the account settings page. If an "edit" icon appears that allows the user to update contact information, this is verified.

4.9. Requirements Not Included

4.9.1. Security

- 4.9.1.1. This shall be verified by entering the HATA and not being asked for a password to do so.

5. Appendices

5.1. Assumptions and Dependencies

- 5.1.1. The student must have a smartphone running either Android or iOS.
- 5.1.2. The student must have either mobile data or Wi-Fi periodically available to the student so that the student has a connection to I-Learn servers.
- 5.1.3. The student must allow feature alerts to utilize important notifications regarding projects, grades, and emails.
- 5.1.4. The student should be using either of the following ebook reader: iBook, Kindle or some type of OpenDocument Reader

- 5.1.5. To meet requirement 3.2.3.2 HATA assumes that the student shall not enter in more text data than the device has storage space to hold.

5.2. Acronyms and Abbreviations

- 5.2.1. BYU-Idaho - Brigham Young University - Idaho
- 5.2.2. GPS - Global Positioning System
- 5.2.3. HATA - Homework Assignment Tracking Application
- 5.2.4. HTTP - Hypertext Transfer Protocol
- 5.2.5. HTTPS - HyperText Transfer Protocol Secure
- 5.2.6. IEEE - Institute for Electrical and Electronic Engineers
- 5.2.7. iOS - iPhone Operating System
- 5.2.8. LMS - Learning Management System. See section 1.4 for definition.
- 5.2.9. OS - Operating System
- 5.2.10. PIN - Personal Identification Number
- 5.2.11. QA - Quality Assurance
- 5.2.12. SMS - Short Message Service
- 5.2.13. SSL - Secure Socket Layer
- 5.2.14. Sync - Synchronize
- 5.2.15. Synced - Synchronized
- 5.2.16. UI - User Interface
- 5.2.17. URL - Uniform Resource Locator
- 5.2.18. WI-FI - Wireless Fidelity
- 5.2.19. WWW - World Wide Web

