

Union Pacific Multimedia Wall CyRIS (May15-19) Design Document

Team Members:

Randy Groh
Alex Haynes
Brandon Kuha
Brylee Raupp-Timmons
Ian Rosenbery
Maria Vognsen
Aaron Zatorski

Advisors:

Dr. Manimaran Govindarasu
Brock Ascher

Table of Contents

[I. High Level Architecture Diagram](#)

[II. User Interface Design Layout](#)

[UI Flow Diagram](#)

[Mock-Ups](#)

[Media Wall Homescreen](#)

[Club & Research Spotlight \(Application on wall\)](#)

[Club & Research Spotlight \(Web Application\)](#)

[Ticker](#)

[InCadence \(Music Machine\)](#)

[Directory Search](#)

[III. Module Architecture Diagrams](#)

[Club & Research Spotlight](#)

[Ticker](#)

[InCadence \(Music Machine\)](#)

[Directory Search](#)

[Stellarium \(Black Box\)](#)

[Daily Brain Byte](#)

[IV. System Integration](#)

[Test Cases](#)

[Club & Research Spotlight \(Main Application\)](#)

[Club & Research Spotlight \(Web Application\)](#)

[Ticker](#)

[InCadence \(Music Machine\)](#)

[Directory Search](#)

[Stellarium \(Screensaver\)](#)

[Stellarium \(Application\)](#)

[Daily Brain Byte](#)

[CyRide Maps](#)

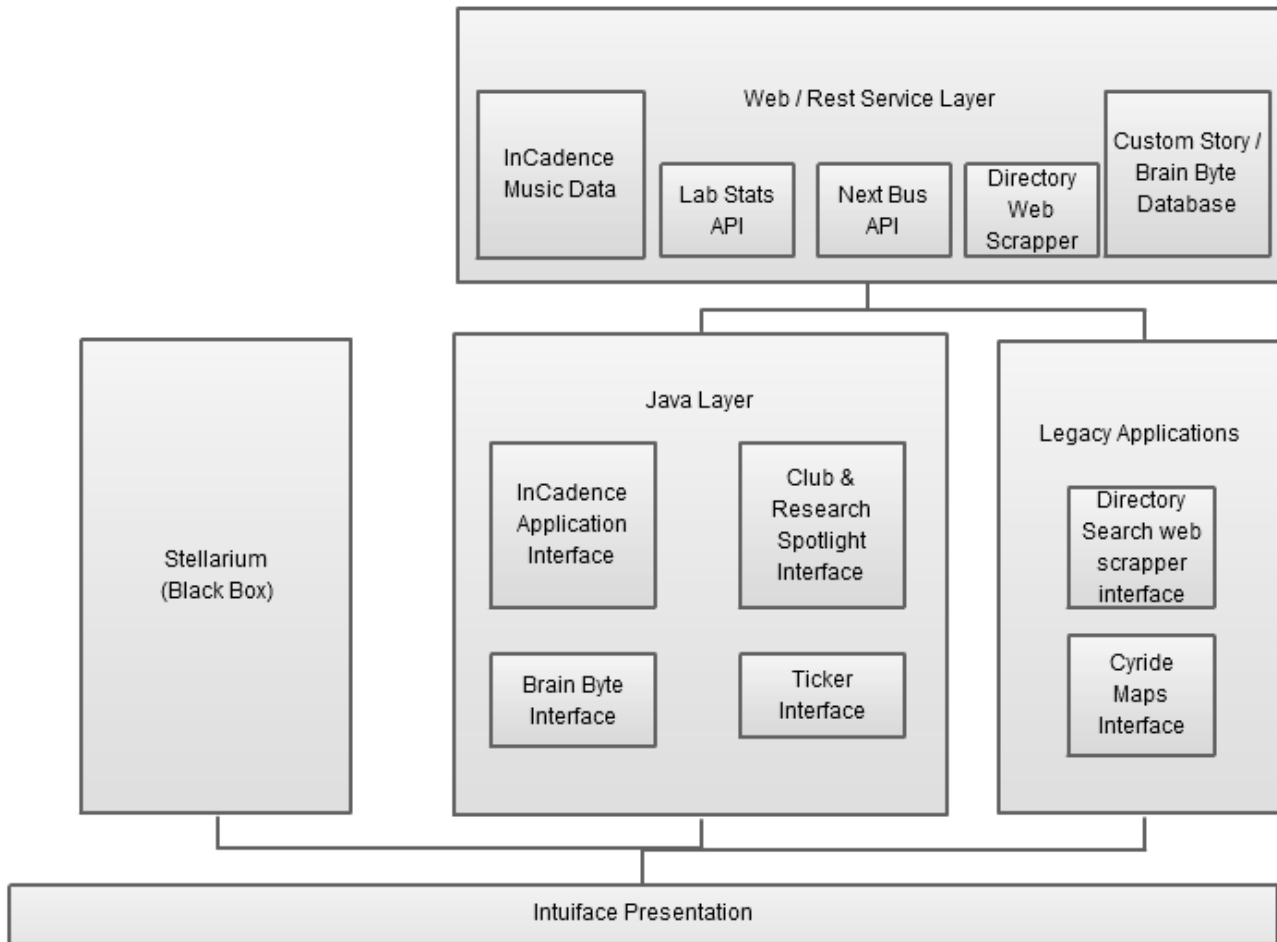
[User-Level Tests](#)

[Performance Tests](#)

[Security Tests](#)

[V. Conclusion](#)

I. High Level Architecture Diagram



The four main abstractions in the project are: the existing Intuiface presentation (will be extended to include new apps), the Java layer containing code for new applications as well as the legacy applications, the web service layer that provides various endpoints for the apps in order to pull external data into the project, and the Stellarium black box.

Intuiface's native interface asset element will be utilized to display web data from specific ISU-related feeds, if possible.

Our Java layer will contain the front end code supporting multi-touch gestures that will allow users to interact with applications in a meaningful way.

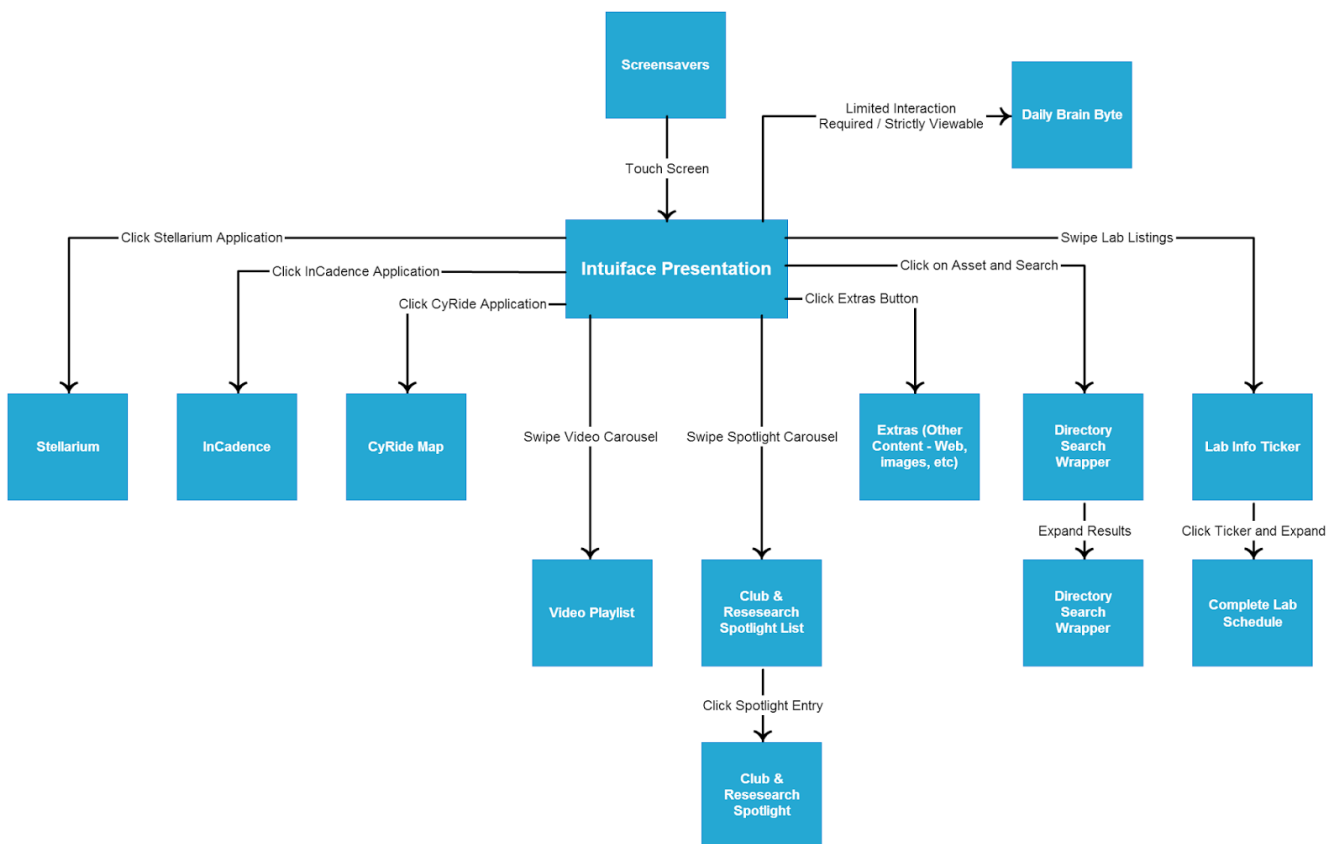
The web services we leverage will return staff directory information, InCadence music data, club & research spotlight information, Cyride information, lab stats information, brain byte information, as well as any other external data that may become useful for the applications.

The Stellarium black box will be a C component utilized through an interface. It will give us star data - pulling from its own external resources as well as other features.

II. User Interface Design Layout

UI Flow Diagram

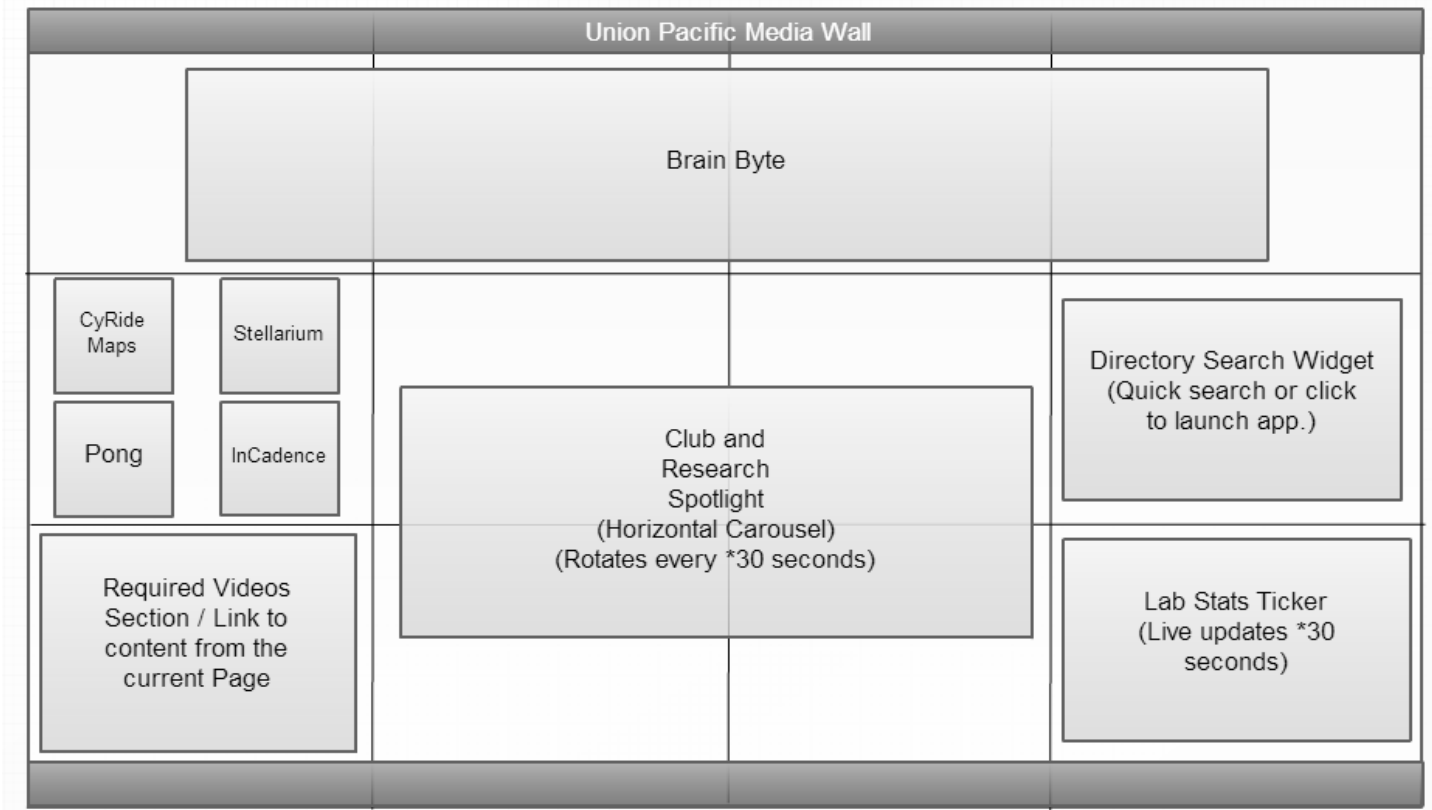
User interface design is the most important part of this project because the team’s main end goal is to create a more intuitive and enticing interface that will attract users’ attentions toward the wall. The below diagram is a proposed flow for the new wall interface design:



The boxes represent different views within our display while the arrows represent a general way of getting to the specified view.

Mock-Ups

Media Wall Homescreen



The main wall display will be redesigned for a more intuitive experience. The wall will be “split” into different sections for clarity and modularity. One section will be the applications in which are not part of the Intuiface application. The applications will be represented by rounded squares to make them intuitively recognized because this is how applications are identified in both Android and iOS. Another section will be a pathway to extra content that is also available in the current wall display but may not exactly fit or have a place in the new overall main display. The Daily Brain Byte will have a section across the top displaying the daily fact, quiz, tidbit, etc. because this information is strictly viewable so no physical interaction is required. This saves from wasting the wall’s valuable “real estate” that can be utilized for other touch interaction. The right side will have the Directory Search Widget and Lab Info Ticker for easy access and interaction. The Directory Search will be above the Ticker for easier user accessibility because the Directory search will require more user interaction than the Ticker, in general. The middle space will be used for displaying the Club & Research Spotlight as well as Images and videos in an interactive carousel or list format. These receive the most “real estate” because they will be the items most directly related to the department.

Club & Research Spotlight (Application on wall)

SAMPLE TITLE

SAMPLE TITLE

SAMPLE TITLE

SAMPLE TITLE

SAMPLE TITLE

SAMPLE TITLE

SAMPLE TITLE

IASG - 2015 Cyber Defence Competition

SAMPLE TITLE

SAMPLE TITLE

Relevant Picture

Information Assurance and Security Group (IASG) - 2015 Spring Cyber Defense Competition

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis in pede. Nulla facilisi. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis in pede. Nulla facilisi. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis in pede. Nulla facilisi. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis in pede. Nulla facilisi. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis in pede. Nulla facilisi. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis in pede. Nulla facilisi. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis in pede. Nulla facilisi.

Scrollable Stories



Exit Button

This screen will automatically scroll through stories pausing for 1 minute for each story if there is a 15 minute inactivity period. A user can exit the Club and Research spotlight application to the main presentation screen via the exit button.

The screen should automatically scroll through stories pausing for 1 minute for each story after a 15 minute inactivity period. A user can exit the Club & Research Spotlight application to main presentation via the exit button (if not an intuiface application). Relevant pictures, titles, information and descriptions will be displayed to the right of the list if a topic is selected.

Club & Research Spotlight (Web Application)

Cyris: Club & Research Spotlight

https://www.ece.iastate.edu/CRS

Q Cyris

Sign In

User Name:

Password:

New User

Club & Research Spotlight Logout

Home | Submit Story | My Stories

Club & Research Spotlight Logout

Home | Submit Story | My Stories

Title

Description

Club or Research Group

Club & Research Spotlight: My Stories Logout

Home | Submit Story | My Stories

| Story Title | Status | Date Last Updated | |
|-------------------------|----------|-------------------|-------------------------------------|
| ISU Robotics: BattleBot | Approved | 10/13/2014 | <input type="button" value="EDIT"/> |
| ISU Robotics: Deathbot | Pending | 11/03/2014 | <input type="button" value="EDIT"/> |

Club & Research Spotlight : My Stories Edit Logout

Home | Submit Story | My Stories

Title

Description

Club or Research Group

Club & Research Spotlight Logout

Home | Manage Stories | Manage Users

Club & Research Spotlight: Manage Stories Logout

Home | Manage Stories | Manage Users

| Story Title | Status | Date Last Updated | |
|------------------------|----------|-------------------|-------------------------------------|
| ISU Robotics: Deathbot | Pending | 11/03/2014 | <input type="button" value="View"/> |
| Team Prisium | Approved | 11/03/2014 | <input type="button" value="View"/> |

Club & Research Spotlight: Manage Stories Logout

Home | Manage Stories | Manage Users

Title


ISU Robotics: Deathbot

Description

TextField

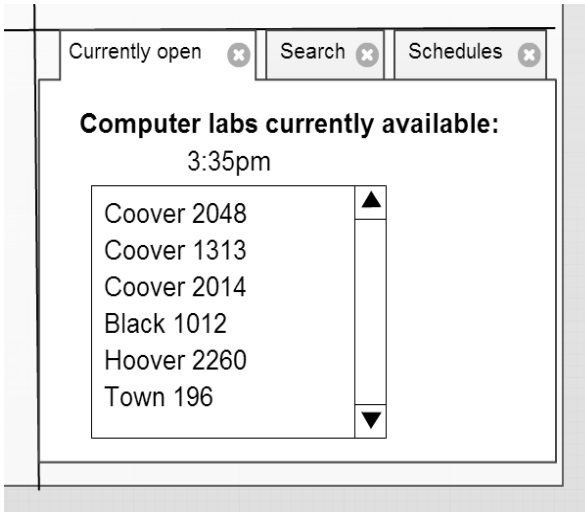
Club or Research Group

ISU Robotics

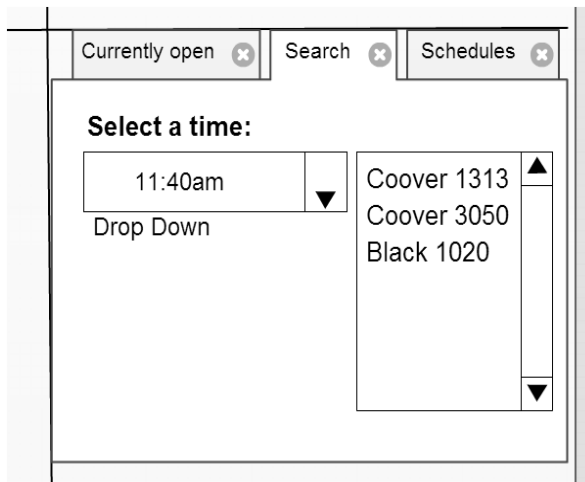


The Club & Research Spotlight web application will provide an interface for approved story committers and administrators. This interface will allow a user to log in to manage, upload, delete, and organize viewable stories. The interface also allows an admin to manage users. All things related to back-end side of the Club & Research Spotlight will/can be managed through this web interface that resides elsewhere (not on the wall).

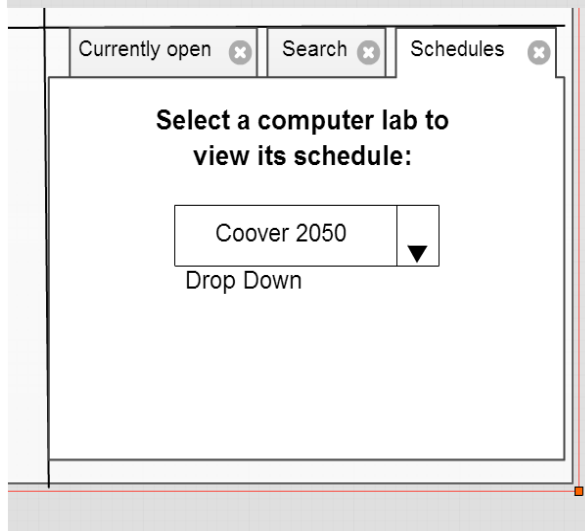
Ticker



The Ticker will be a widget on the main display. It will display real-time updates of available labs open at the current time. Users will also be able to search and expand to see full lab schedules. A list of available labs at the current time will be shown.

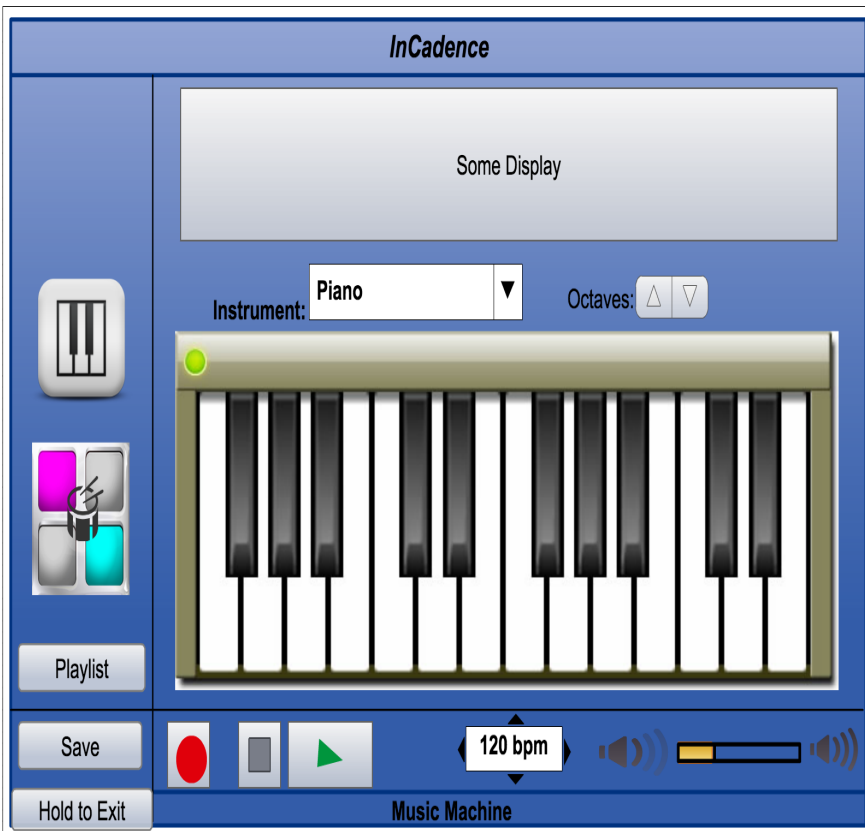
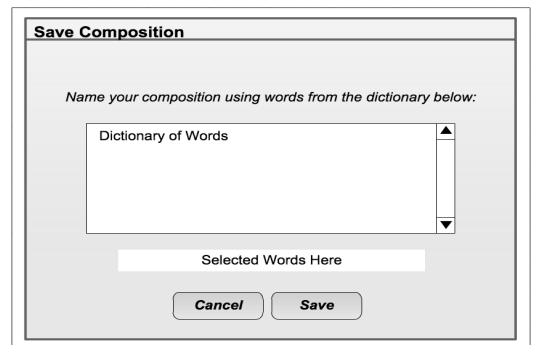
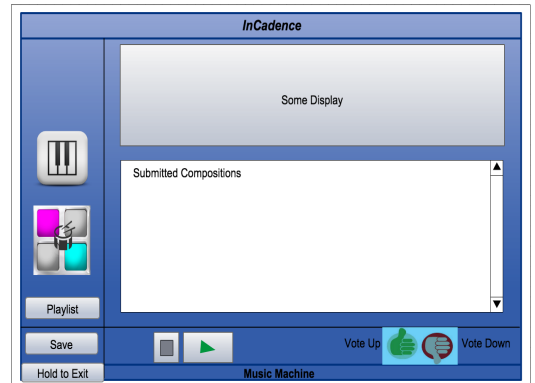
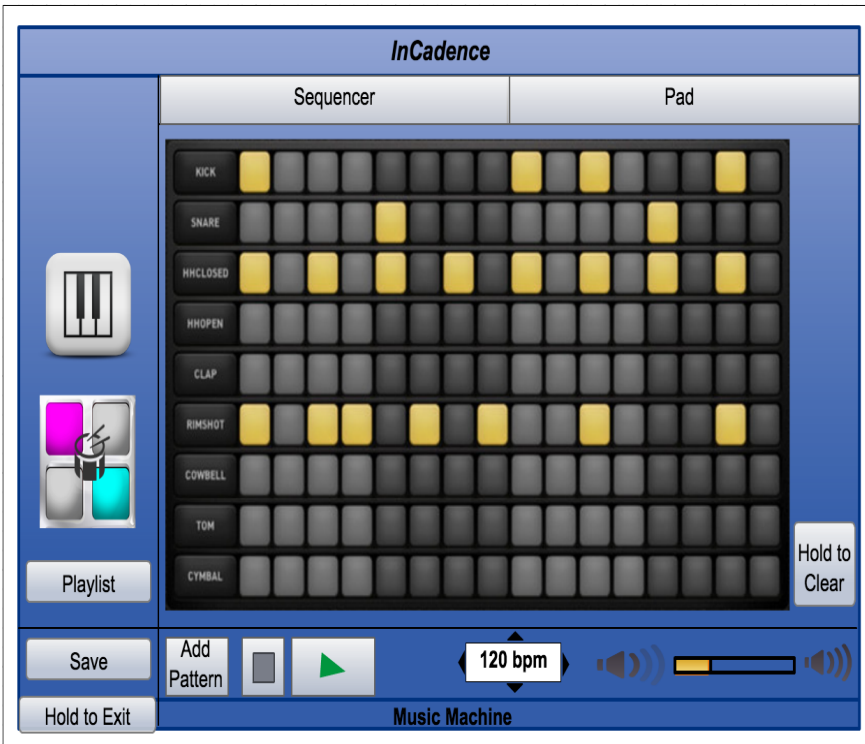


The search will allow users to look-up labs that are open at a specified time. All available labs will be shown in the list.



Certain labs will be selectable to view an entire lab schedule if a user wants to see when the lab is busy or open without searching for specific times.

InCadence (Music Machine)



InCadence has 3 views and one pop-up. One view will have the ability to play a Piano/Synth with dozens of instrument sounds. You can record and playback. The second view is actually two different views. One split is to use a Drum Sequencer and the other split is to play on a Drum Pad. You can play and record with dozens of percussion sounds. The third view allows users to playback submitted recordings and vote up/down on them. The pop-up occurs when you try to submit a recording. Choose from a dictionary of words to name your recording.

Directory Search

The application window features a search bar at the top left with a magnifying glass icon and the text "Search". To its right is a "Go" button. Below the search bar is a scrollable list of search results. Each result contains the following fields: Name, Title, Dept, Email, Office, and Phone. A vertical alphabetical index is located to the right of the list, with letters A through Z and a "<X" option. A small "Go" button is positioned at the bottom right of the scrollable area.

App

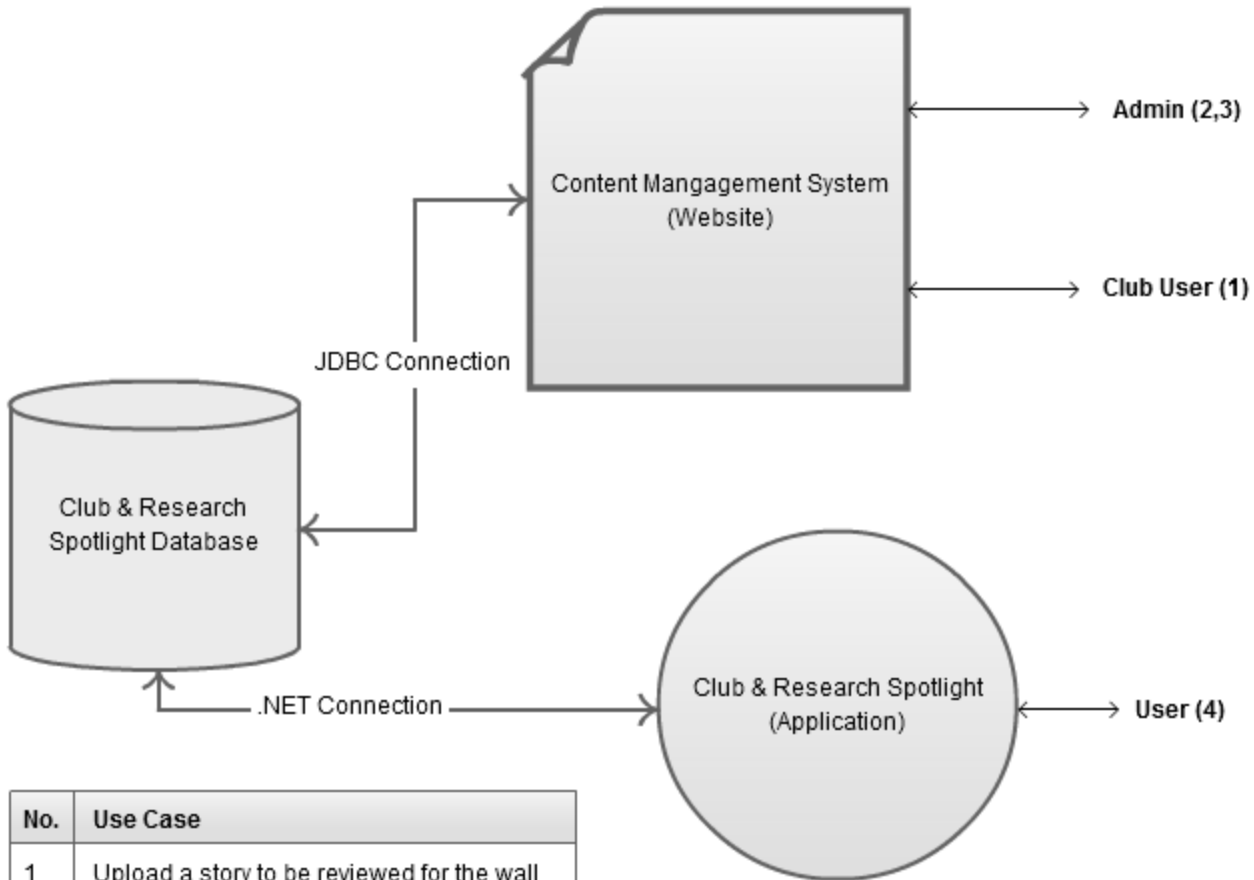
The widget application is a smaller version of the desktop app. It includes a search bar with a magnifying glass icon and the text "Search", and a "Go" button. Below these is a scrollable area containing a single search result with the following details: Name: Govindarasu, Manimaran; Title: Professor; Dept: Electrical and Computer Engineering; Email: gmani@iastate.edu; Office: 3227 Coover; Phone: 515-294-9175.

Widget

The Directory Search will be built as a widget application for the the main display. It can be expanded into a full application for more results. Use a custom keyboard to search for info related to any ISU student or faculty. Picture and info will be shown, if available.

III. Module Architecture Diagrams

Club & Research Spotlight



| No. | Use Case |
|-----|--|
| 1 | Upload a story to be reviewed for the wall |
| 2 | Review a submitted story to place on wall |
| 3 | Manage existing stories on wall |
| 4 | View stories on wall |

In the Club & Research Spotlight application, users will be able to see stories from different clubs and research as well as photos and videos associated with them. Users will be able to scroll through several stories and expand ones they're interested in.

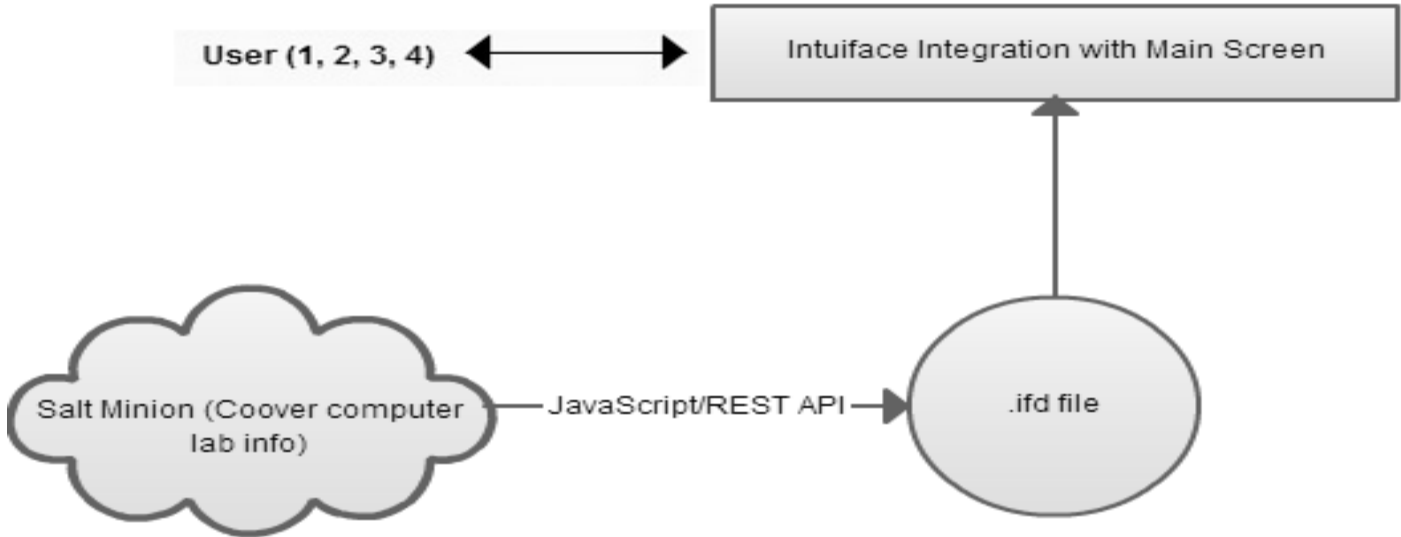
Additionally, club members can apply to be an approved content submitter. There will be several administrators approving content and club users. This will regulate the content on the main screen and prevent inappropriate content from showing to the university.

The Database will have the following tables:

| Content Table | User Table |
|----------------------|-------------------|
| Content ID (Key) | User ID (Key) |
| Content Text | Username/email |
| Content Submitted ID | Password |
| Content Approved ID | Approved |
| Content Photo | Admin Status |
| Content Video? | |
| Content Date | |
| Archived Date | |
| Content Title | |

These tables will keep track of the content and users management system.

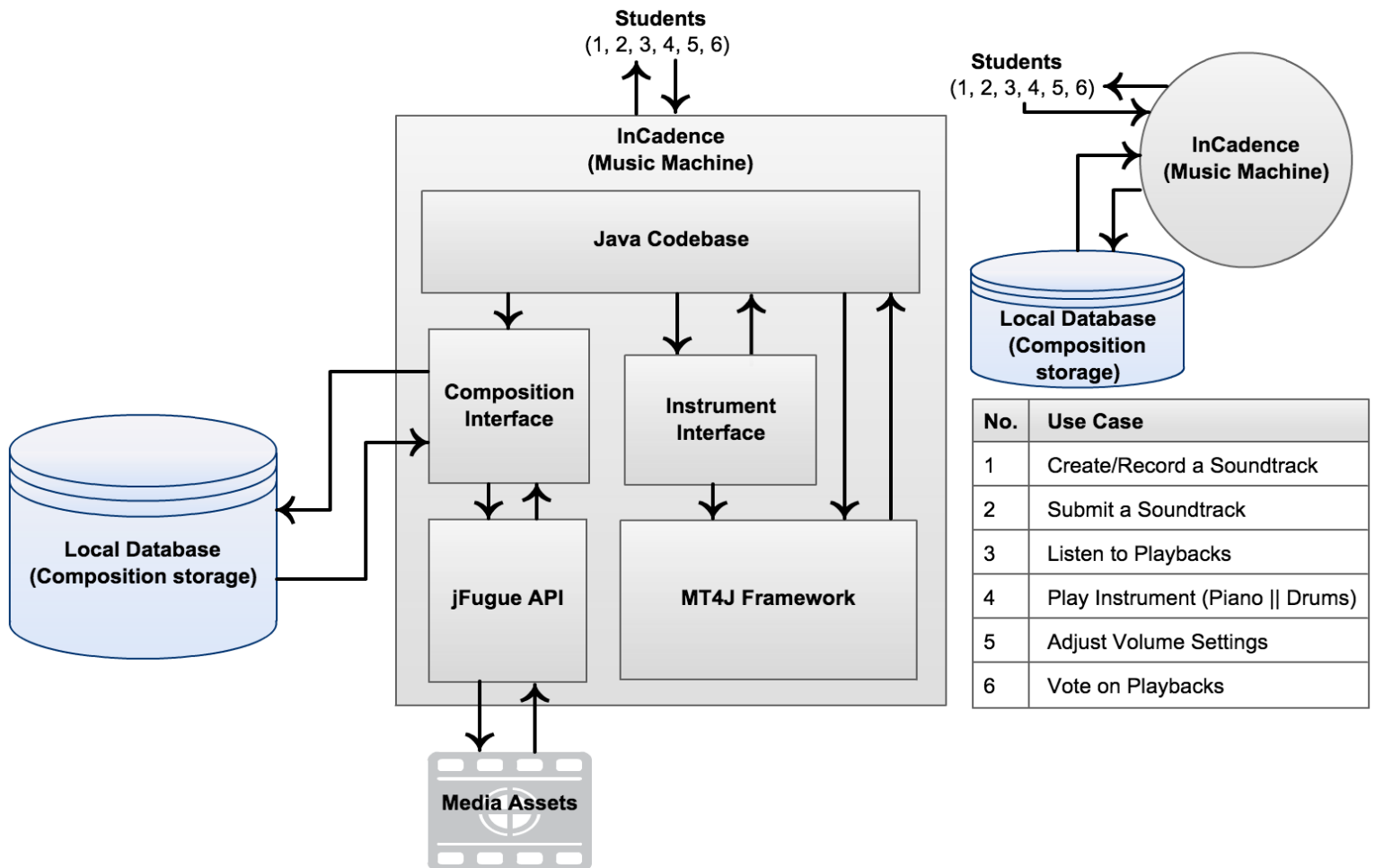
Ticker



| No. | Use Case |
|-----|--------------------------------------|
| 1 | View curently opened labs in coover |
| 2 | Sort lab openings by category |
| 3 | View future open lab times |
| 4 | View lab listings in other buildings |

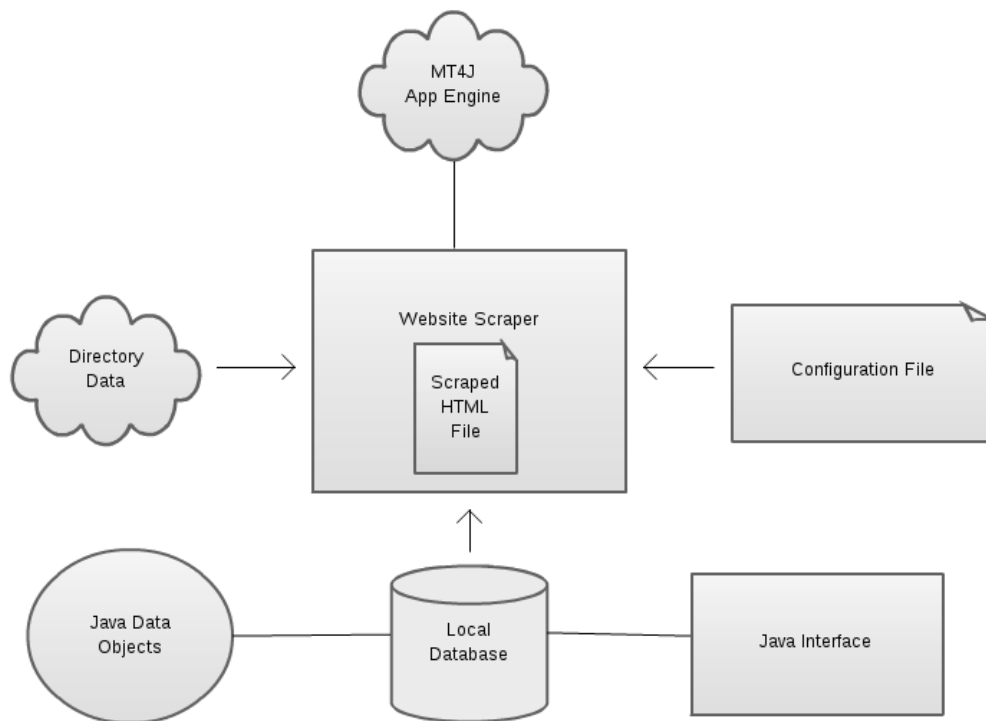
The Ticker application will be built on top of the Intuiface platform while utilizing a few Java and JavaScript components to display lab information. The Ticker will take advantage of the Intuiface's custom asset capabilities to accomplish this. The application will also utilize multi touch capabilities in order to view additional lab information. By using Intuiface's built in communication/polling services, lab information regarding open rooms, operating systems, open work stations, etc., will be retrieved using JavaScript and REST API from Salt Minion.

InCadence (Music Machine)



In the InCadence (Music Machine) application, we have a codebase running the main application through Java. Inside this code, we have two interfaces. The instrument interface, used to play various instruments, as well as the main GUI are built on top of the MT4J (Multi-touch for Java) Framework. The composition interface, which deals with playing, recording, uploading, etc., is built on top of the open-source jFugue API that uses MIDI media assets to play music and rhythms through what is called music strings. The composition interface is also integrated with a local database for storing uploaded compositions. The database can be referred to in order to access playbacks of stored compositions as well.

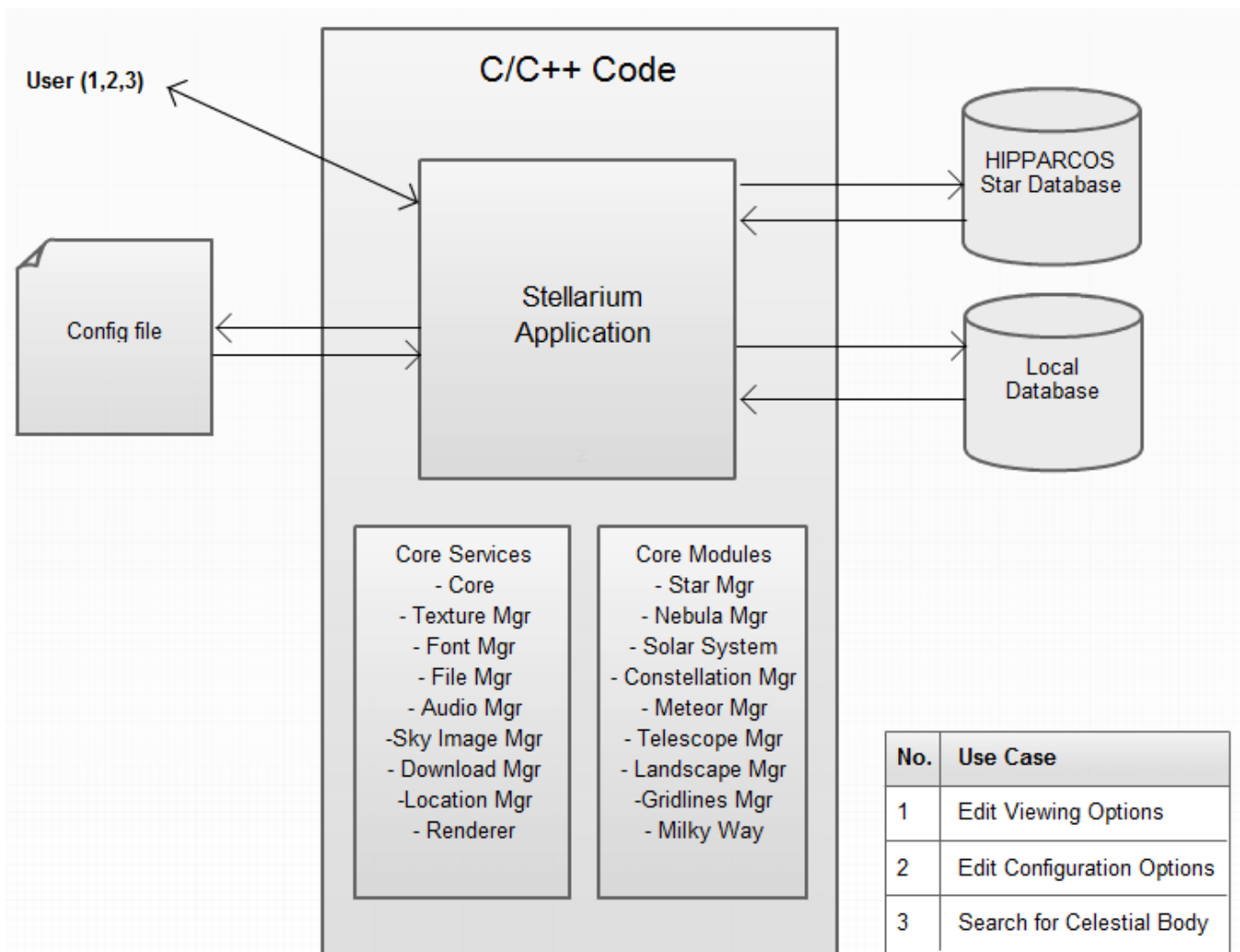
Directory Search



This design is from the Phase 1 team. We will be creating a new java application while utilizing the web scraper previously implemented. The following description of the web scraper is from the phase 1 design document.

In the Staff Directory Application, we will periodically parse and save data from the Iowa State University engineering staff directory into a local database. To do this, we will be utilizing the Java library JSoup. The database will be emptied and repopulated with each call. This data will then be displayed in a Java application interfaced with the content manager. This application will display the staff directory in a similar manner to that of the online version except without requiring to scroll through pages of information and giving the user internet access.

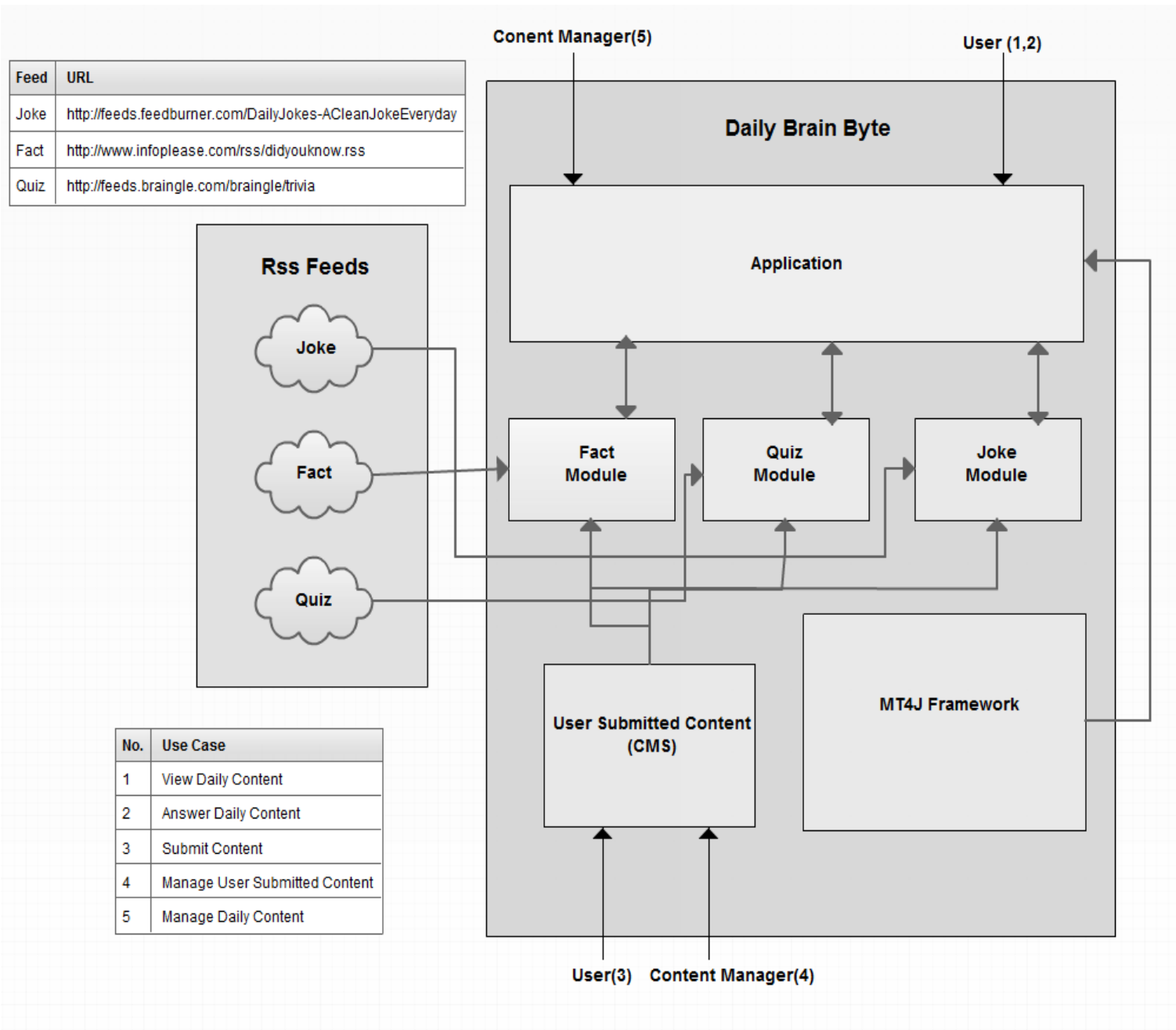
Stellarium (Black Box)



The Stellarium application will be a two-tiered application. One part of it will be a screensaver, and the other will be an interactive star-exploration application.

The screensaver will automatically trigger from 8pm to 8am after 5 minutes of inactivity on the wall. The screensaver will be a real time image of the constellations in the night sky. The screen will also have a touch to start text across the center of it. Upon a user touch event, the screen will return to the Intuiface home screen.

Daily Brain Byte



The Daily Brain Byte application will display a daily joke, fact and quiz. The application gets this information from the respective fact, quiz or joke module. Each module is connected to an RSS feed which is updated daily with a new joke, fact and or quiz. The application will be built upon the MT4J Framework. Users are able to submit content via a Content Management System and a content manager is able to view, edit and delete content that has been submitted.

IV. System Integration

Test Cases

All applications will undergo unit testing continuously throughout the development process. The team is following a modified Agile approach to make sure at least basic functionality is being developed correctly. The purpose of this section is to refer to test cases that may be possibly tested by the team, users, bypassers or selected individuals on completion of certain components or full applications.

Club & Research Spotlight (Main Application)

Test 1: Inactivity

Primary Testers: N/A - The team (No specific user is required for this test)

Description: The Club & Research Spotlight should start cycling through the list of available and viewable stories every minute after 15 minutes of inactivity.

Test 2: Usability and Accessibility

Primary Testers: Student bypassers

Description: The Club & Research Spotlight should be evident at first glance of the wall and easily navigable, useable and accessible. The team will ask a student to find a particular story within the list and tell us one thing about the item. If successful, the student can describe the ease or difficulties he/she had.

Test 3: Real-time Updating

Primary Testers: N/A - The team (No specific user is required for this test)

Description: The Club & Research Spotlight should be able to update in real-time whenever new stories are uploaded and approved. The team will test this by submitting demo stories through the web application and monitoring if, and how long until, the list gets updated with new content.

Club & Research Spotlight (Web Application)

Test 1: Usability

Primary Testers: Volunteered Club Leaders and CyRIS wall content managers

Description: The Club & Research Spotlight will require a content manager. As a result, the will ask a current CyRIS wall content manager to try and manage a demo story the team will submit. The web application needs to be quick and easy since the content manager of this application could likely already have a large workload. The team will interview the tester after the test is completed for any feedback. The team will ask a volunteered club leader to go through a series of tasks regarding the submission of a new story. The team will compare the results with its own. On completion, the volunteer can describe the ease or difficulties he/she had.

Test 2: Navigation

Primary Testers: CyRIS wall content managers

Description: Content managers may already have a large workload so navigation and management of this application needs to be quick and easy. The team will ask the tester to navigate to a few selected places as a way to observe if the flow is intuitive, and quick (minimal clicks taken to get from one place to another).

Ticker

Test 1: Real-time Updating

Primary Testers: N/A - The team (No specific user is required for this test)

Description: For the Ticker to be effective, it needs to update every so often. The team will monitor the Ticker to make sure it updates automatically on every quarter hour (i.e. xx:00, xx:15, xx:30, xx:45). The team will use demo test data that represents new labs closing and opening on every quarter hour as a way to test this case.

InCadence (Music Machine)

Test 1: Usability

Primary Testers: Volunteered students with music interest and willing bypassers

Description: InCadence is one of the larger and more complex applications the team is developing. It will need to be tested for overall usability because of the number of “moving” parts within the app. Volunteers and willing bypassers will try and use the application as a whole on their own without guidance starting from the main wall display to see if they can find and play different instruments and sounds. The team will observe the testers as they follow through with this test. After the test, the team will interview them and discover if the testers had any issues with response times or delays.

Test 2: Navigation

Primary Testers: Volunteered students with music interest and willing bypassers

Description: InCadence is made up of many “moving parts” including a numerous amount of functions. The team will assign a list of tasks to the testers and observe them as they execute each task on the list. The team will compare the results and observations with its own expectations.

Test 3: Recording, Playback & Submit

Primary Testers: Volunteered students with music interest and willing bypassers

Description: InCadence has the ability to play, create and submit new recordings as well as listen to previously submitted recordings by other users and down/up vote on them. The team will ask the testers to try and record anything and submit it. The team will ask if the testers had any issues or opinions on the flow of recording something and what their thoughts were on the dictionary naming scheme. The team will also observe the testers as they try to listen to other submitted recordings and vote on the recordings. The team will ask the testers how their overall opinion on the ability to upload recordings, and listen and vote on others’ recordings.

Directory Search

Test 1: Usability

Primary Testers: Willing student bypassers

Description: The Directory Search should be intuitive and quick to search for ISU directory information. The team will ask the testers to try searching for their favorite professor or a friend and observe the testers as they do it. The testers should be able to use the custom keyboard easily, and not hinder their ability to search.

Test 2: Correct and Updated Information

Primary Testers: N/A - The team (No specific user is required for this test)

Description: The Directory Search should display accurate and up to date information just as you would see on the ISU website version of the application. The team will make various searches through the application and compare the results with the same searches conducted on the ISU webpage directory search looking for any discrepancies.

Stellarium (Screensaver)

Test 1: Inactivity

Primary Testers: N/A - The team (No specific user is required for this test)

Description: Stellarium screensaver should only be displayed after some time of inactivity and between sunset and sunrise. The team will have to observe this functionality at night and in the morning to make sure that the screensaver actually operates on schedule with the appropriate sunset and sunrise times.

Test 2: Real-time Updating

Primary Testers: N/A - The team (No specific user is required for this test)

Description: Stellarium is supposed to show information in real-time. The team will need to make sure that the data on the screen is constantly updating and that the screensaver doesn't crash if connection is lost. If connection is lost, the screensaver should continue to operate as normal using the last known information received.

Stellarium (Application)

Test 1: Usability

Primary Testers: Selected individuals, volunteered students and willing bypassers

Description: Stellarium is a very complex open-source application with many features that may not be useful to most users. After making changes to the application, the team will ask the testers to try and use the application to find the Sun (or any other object) and observe the results. The team will interview the testers to see if the testers would have liked less features visible or more features available, and what difficulties they had, if any.

Daily Brain Byte

Test 1: No Content - Display

Primary Testers: N/A - The team (No specific user is required for this test)

Description: The Daily Brain Byte will show new information each day based on RSS Feeds on the internet. As a result, we do not have control over the reliability of those RSS feeds. In the case that an RSS Feed goes down or internet connection is lost, we do not want a blank message or error message to be displaying on a wall. To test this, the team will simulate a loss in connection to a RSS Feed and make sure that the application displays a nicely formatted notification or a previous fact. Having unwanted and unformatted info on the wall will decrease the “curb appeal.”

CyRide Maps

Test 1: Real-Time Updating

Primary Testers: N/A - The team (No specific user is required for this test)

Description: The CyRide maps application uses the NextBus api. This application should update in real-time within every 30 seconds or on touch. The team will open the application on the wall and let it run continuously without interaction for one hour to make sure data is always updating. One hour should be enough time because the maps application will likely never be open for that long without being used or touched. The information should also always be correct. The team will compare the information in the app with the information found on the actual NextBus application looking for any discrepancies.

Test 1: Error Close

Primary Testers: N/A - The team (No specific user is required for this test)

Description: This application was developed by a previous team, and minimal documentation is done on it. As a result, the team is aware that the application works but it has some unknown bugs that the team can not easily reproduce. Since the maps application is a full screen, non-Intuitive application, the wall should not become unusable in the event that an error occurs. The team will introduce purposeful errors to observe that the application will close automatically in the event of an error as a way to keep the wall responsive.

User-Level Tests

When the main wall display is fully functional and a variety of our applications are available for full use, the team will invite a few selected individuals, ask for volunteers and ask bypassers to help test. The team may also hold a Fan-Club event with another team, if possible, as a way to demo our applications and spread the word about the new CyRIS wall. Our testers will interact with the wall while thinking about the performance, usability, accessibility, intuitiveness, usefulness, responsiveness and overall enticement. The goal is to show that the media wall has become a more user friendly and interactive experience for all users.

Performance Tests

Since the media wall is a user interactive experience, performance is a top priority. Users expect an instantaneous response because that is how all other modern touchscreen devices behave. When using any customer facing system, if the response and/or loading times are too slow, users will start having qualms about using it in the first place. Negative reviews on the wall could result in negative reflections among other prospective users. A system with minimal delays will be ideal for both users and developers in creating a successful experience.

The response times between the main display and the test station vary slightly. The test station has very minimal delay in its touch response while the main display has some lag and accuracy deficiencies due to its IR sensors. Because the team needs to minimize the response times and the team has limited power over the ability to improve the IR sensors, we will test all applications on the test machine in order to optimize the computation and execution times. The team will attempt to do this by developing the applications as modular and cohesive as possible to reduce the number of calls within the code. Once optimized programming is finished, the team will test each application on the test system with simultaneous users to study performance. The team's applications will not be

dual-operational so simultaneous application processing doesn't have to be considered. Once computation and execution times are minimized, we will deploy the applications to the wall to observe the performance. With optimal execution times, the touch delay should not be very impactful. To improve the wall's touch performance, the team will attempt to recalibrate the wall in hopes for better accuracy. Good computational and execution performance in combination with increased accuracy should make up for the minimal touch delay that the main display provides.

Security Tests

Delivering any product that will be used by a large audience in public areas needs to undergo some security testing. The media wall will be viewable by everyone who enters Coover and ensuring that the content on the wall is authorized, honest and appropriate are very important aspects to be upheld. Before the wall can be fully utilized with the new updates, these tests must be done on the test station first to the best of the team's ability.

To ensure that all content on the wall is appropriate and authorized, thorough testing must be done to make sure that there is no way for users to interact with hotkeys. Access to hotkeys must be disabled on all forms of virtual keyboards as way to block navigation to unauthorized content.

To ensure that all content on wall is true to the best of the team's knowledge, all content on the wall will be able to be easily confirmed by another online source. The team will verify the wall's content with all the data sources such as the RSS Feed sources, the ISU directory search and the online lab info source, if applicable.

V. Conclusion

The applications and new page layout should increase user interest and usage of the CyRIS wall. This is because the team is adding interactive applications to entice users to interact on a regular basis, along with overhauling the overall page layout to be more appealing. As for the information that is constantly displayed on the page, the team is changing it to consist of topics that are more interesting and relevant for the everyday student. By having a combination of assets with different usage times (from a mere glance to multiple minutes) the wall should engage a wider variety of users. With thorough designs and testing consideration, the goal of this project can be met with utmost success.