**Synquencer**

**Sprint 2 Planning Document**

Team 37: Mitchell Bridwell, Zach Heskett, Aidan McDonnell, and Mohini Roplekar

## Sprint Overview

In this sprint, we plan to fully implement a number of features which we laid the groundwork for in the last sprint but did not end up finishing. Primary among these is sequence playback, which we set up with a number of user stories during the last sprint but did not finish fully implementing. We are also aiming to implement synchronous collaboration between different clients on the same sequence during this sprint.

**Scrum Master:** Mohini Roplekar

**Meeting Plan:** Tuesdays and Thursdays at 12:30 PM

## Risks and Challenges

Most of the primary components of this project have taken shape and have been integrated together, but we have yet to rigorously test these components beyond a basic level. Doing so will be vital as we continue to build upon these components and implement more and more functionality. In addition, it will be more important going forward to make sure the synchronized data structures are properly implemented with

## Current Sprint Detail

**User Story #1**

As a user, I would like to use multiple different instruments in my sequence.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Allow the user to change instruments in the UI | 3 hrs | Aidan |
| 2 | Update the UI to reflect the new instrument | 1 hr | Aidan |
| 3 | Develop set of instruments for use in the program | 3 hr | Mohini |
| 4 | Update the data within a note based on the instrument | 2 hr | Mohini |
| 5 | Write testing procedure for changing instruments in the UI | 30 mins | Aidan |

Acceptance Criteria:

* Given that the instrument changing is implemented, when changing to another instrument, then the new instrument should be reflected within the UI.
* Given that the instrument changing is implemented, when changing to another instrument, then the new instrument should remain changed if I leave and come back to the sequence.
* Given that the instrument changing is implemented, when changing to another instrument, then the new instrument should be reflected during audio playback.
* Given that the instrument changing is implemented, when changing to another instrument, then the new instrument should be reflected in MIDI export.

**User Story #2**

As a user, I would like to change the time signature of the pattern

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Allow the user to change time signature in the UI | 2 hrs | Aidan |
| 2 | Update the UI to reflect the new time signature | 2 hrs | Aidan |
| 3 | Update the data within the sequence based on the new time signature | 1 hr | Zach |
| 4 | Write testing procedure for changing time signature in the UI | 30 mins | Aidan |

Acceptance Criteria:

* Given time signature changing is implemented correctly, when I change the value of the time signature, then it should update in the top bar
* Given time signature changing is implemented correctly, when I change the value of the time signature, then it should remain changed if I leave and come back to the sequence
* Given time signature changing is implemented correctly, when I change the value of the time signature, then it should change the output of the MIDI file based on this change
* Given time signature changing is implemented correctly, when I change the value of the time signature, then it should change the playback of the sequence based on this change

**User Story #3**

As a user, I would like to change the length of the sequence

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Allow the user to change the length of the sequence in the UI | 2 hrs | Aidan |
| 2 | Update the length of the track(s) within the UI to reflect the updated change in length | 2 hrs | Aidan |
| 3 | Update the data within the sequence based on the new length | 1 hr | Zach |
| 4 | Write testing procedure for changing sequence length | 30 mins | Aidan |

Acceptance Criteria:

* Given length changing is implemented correctly, when I change the length of the sequence, then it should update in the piano roll
* Given length changing is implemented correctly, when I increase the length of the sequence, then it should allow me to place notes further into the sequence than previously possible
* Given length changing is implemented correctly, when I change the value of the time signature, then it should remain changed if I leave and come back to the sequence
* Given length changing is implemented correctly, when I change the value of the time signature, then it should change the playback of the sequence based on this change

**User Story #4**

As a user, I would like to scroll up, down, left, and right in the sequence.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Allow the user to scroll up and down in the UI | 2 hrs | Aidan |
| 2 | Allow the user to scroll left and right in the UI | 2 hrs | Aidan |
| 3 | Write testing procedure for scrolling in the UI | 30 mins | Aidan |

Acceptance Criteria:

* Given scrolling is implemented correctly, when I use the mouse wheel outside of the piano roll, then I can scroll up and down the sequence
* Given scrolling is implemented correctly, when I use the scroll bar, then I can scroll up and down in the sequence
* Given scrolling is implemented correctly, when I use the scroll bar, then I can scroll left and right in the sequence

**User Story #5**

As a user, I would like all parts of the UI to be screen reader accessible.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Ensure that all UI elements have clear and concise labels for screen readers | 5 hours | Mitchell |
| 2 | Make sure that the user is properly notified of all changes to UI elements | 5 hours | Mitchell |
| 3 | Change the length of the sequence using only the keyboard. | 4 hours | Mitchell |
| 4 | Implement a virtual cursor for navigating the sequence using a screen reader | 4 hours | Mitchell |
| 5 | Ensuring that notes in the sequence are read clearly and concisely for screen readers as the user navigates using the virtual cursor | 5 hours | Mitchell |
| 6 | Ensure that users using screen readers are notified of all synchronous edits by other users without overwhelming them | 7 hours | Mitchell |
| 7 | Create testing procedure for keyboard usage | 1 hours | Zach |

Acceptance Criteria:

* Given that all elements of the UI are screen reader accessible, when I use the application, then it should give me information about what I’m doing in the UI with a screen reader.
* Given that all elements of the UI are screen reader accessible, when I use the application, then it should update me when something in the sequence changes.
* Given that the settings changing functionality is implemented correctly, when I want to change the length of the sequence, I should be able to only use my keyboard.

**User Story #6**

As a user, I would like to play back and listen to my project in the editor.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Show the playhead moving in the UI | 2 hrs | Aidan |
| 2 | Create audio engine used to play back notes | 7 hrs | Zach |
| 3 | Create functionality for stopping playback | 3 hrs | Zach |
| 4 | Hook audio engine to internal data structures | 1 hrs | Zach |
| 5 | Hook UI buttons to audio engine | 2 hrs | Aidan |
| 6 | Create tests for functionality of playback | 1.5 hr | Zach |

Acceptance Criteria:

* Given the playback functionality is implemented correctly, when I press play on the top bar, then my sequence audio should start playing in the browser
* Given the playback functionality is implemented correctly, when I press play on the top bar, then the playhead should move in time with the audio
* Given the playback functionality is implemented correctly, when the sequence is done playing, then the playhead should disappear
* Given the playback functionality is implemented correctly, when I press stop on the top bar while audio is playing, then the audio should stop
* Given the playback functionality is implemented correctly, when I press stop on the top bar while audio is playing, then the playhead should disappear

**User Story #7**

As a user, I would like to be able to see a note placed by another user in the same project.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Show notes placed by other users in the UI | 2 hrs | Aidan |
| 2 | Refactor database storage for notes to allow integration with Fluid Framework | 5 hours | Zach |
| 3 | Implement database I/O for Fluid Framework | 5 hours | Mohini |
| 4 | Develop Testing Procedure | 1 hour | Mohini |

Acceptance Criteria:

* Given the asynchronous note placement is implemented properly, when I exit a project and another user places a note while I'm not there, then that note should be there when I reopen the project
* Given the synchronous note placement is implemented properly, when another user places a note while I’m there, then that note should appear on my screen
* Given the synchronous note placement is implemented properly, when another user places a note while I’m there, then I should be able to interact with that note
* Given the synchronous note placement is implemented properly, when I place a note, that note should appear on all users’ screens who have the project open (at least 2 others)

**User Story #8**

As a user, I would like to be able to see a note edited by another user in the same project.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Show changes to notes by other users in the UI | 2 hrs | Aidan |
| 2 | Refactor database API for notes to allow integration with Fluid Framework | 3 hours | Zach |
| 3 | Implement Fluid Framework on client to fetch note edits from server | 5 hours | Mohini |
| 4 | Develop Testing Procedure | 1 hour | Mohini |

Acceptance Criteria:

* Given the asynchronous note editing is implemented properly, when I exit a project and another user edits a note while I'm not there, then that note should be edited when I reopen the project
* Given the synchronous note editing is implemented properly, when another user edits a note while I’m there, then that note should be edited on my screen
* Given the synchronous note editing is implemented properly, when another user edits a note while I’m there, then I should be able to interact with that note
* Given the synchronous note editing is implemented properly, when I edit a note, that note should be edited on all users’ screens who have the project open (at least 2 others)

**User Story #9**

As a user, I would like to edit a sequence alongside other users asynchronously.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Show changes to sequence information by other users in the UI | 2 hrs | Aidan |
| 2 | Refactor database storage for sequences to allow integration with Fluid Framework | 4 hours | Zach |
| 3 | Implement Fluid Framework on client to fetch note edits from server | 5 hours | Mohini |
| 4 | Develop Testing Procedure | 1 hour | Mohini |

Acceptance Criteria:

* Given the asynchronous sequence editing is implemented properly, when I exit a project and another user edits the length of the sequence while I'm not there, then the length of the sequence should be edited when I reopen the project
* Given the asynchronous sequence editing is implemented properly, when I exit a project and another user edits the BPM of the sequence while I'm not there, then the BPM of the sequence should be edited when I reopen the project
* Given the asynchronous sequence editing is implemented properly, when I exit a project and another user edits the time signature of the sequence while I'm not there, then the time signature of the sequence should be edited when I reopen the project

**User Story #10**

As a user, I would like to edit a sequence alongside other users synchronously.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Refactor database API for sequences to allow integration with Fluid Framework | 2 hours | Zach |
| 2 | Implement communication between clients and server using Fluid Framework | 5 hours | Mohini |
| 3 | Develop Testing Procedure | 1 hour | Mohini |

Acceptance Criteria:

* Given the synchronous sequence editing is implemented properly, when another user edits the length of the sequence while I'm there, then the length of the sequence should be updated on my screen.
* Given the synchronous sequence editing is implemented properly, when another user edits the BPM of the sequence while I'm there, then the BPM of the sequence should be updated on my screen.
* Given the synchronous sequence editing is implemented properly, when another user edits the time signature of the sequence while I'm there, then the time signature of the sequence should be updated on my screen.
* Given the synchronous sequence editing is implemented properly, when I edit a value in the sequence, then that value of the sequence should be updated on all users’ screens who have the project open (at least 2).

**User Story #11**

As a user, I would like to preview notes by clicking piano keys on the side of the piano roll.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Render piano keys next to the piano roll | 2 hrs | Aidan |
| 2 | Link piano keys to audio engine to produce sound | 2 hrs | Aidan |
| 3 | Write testing procedure for piano keys | 30 mins | Aidan |

Acceptance Criteria:

* When I visit the sequencer page, a preview piano should be visible along the left side of the piano roll.
* Given that the preview piano is implemented, the piano should move along with the rest of the piano roll when I scroll vertically.
* Given that the preview piano and audio engine are implemented, the application should play the appropriate note when I click a note on the piano roll.

# Remaining Backlog

## Functional

**Sequence Editing**

As a user,

* ~~I would like to be able to create a new, empty sequence~~
* ~~I would like to add a note to the sequence by clicking an empty point in the sequence.~~
* ~~I would like to edit or remove a note from the sequence.~~
* ~~I would like to move or copy a note somewhere else.~~
* I would like to undo an action.
* I would like to redo an action after undoing twice.
* ~~I would like to lengthen or shorten the duration of a note.~~
* I would like to select multiple notes and move them all at once
* ~~I would like to change the tempo of the sequence~~
* I would like to loop a specific section of the sequence (cycle) to work on
* ~~I would like to change the time signature of the pattern~~
* ~~I would like to change the length of the pattern~~
* ~~I would like to change the grid resolution of the piano roll~~
* ~~I would like to change the velocity of a note~~
* I would like to zoom in and out of the sequence
* ~~I would like to scroll up, down, left, and right in the sequence.~~
* ~~I would like to preview notes by clicking piano keys on the side of the piano roll~~
* I would like to import MIDI files stored on my computer and edit them (if time allows)

**Sequence Playback**

As a user,

* ~~I would like to use multiple different instruments in my sequence~~
* ~~I would like to play back and listen to my project in the editor~~
* ~~I would like to export my sequences to MIDI files and store them locally~~
* I would like to configure the sounds that the software uses to play back sequences (if time allows)

**Accessibility**

As a user,

* ~~I would like all parts of the UI to be screen reader accessible.~~
* ~~I would like to be able to change instruments and other settings using only my keyboard.~~
* I would like to use my computer keyboard to play the currently selected instrument.
* I would like to choose between multiple color schemes for the application.

**Collaboration**

As a user,

* I would like to see who is working on the same project as me
* ~~I would like to be able to see a note placed by another user in the same project~~
* ~~I would like to be able to see a note edited by another user in the same project~~
* I can play the sequence in time with another user
* ~~I would like to edit a sequence alongside other users asynchronously~~
* ~~I would like to edit a sequence alongside other users synchronously~~
* ~~I would like to store my sequences on the server and access them later~~
* I would like to share my sequences with other users
* I would like to only allow specific people to edit and/or view my sequence (if time allows)

## Non-Functional Requirements

**Client**

As a developer,

* ~~I would like the frontend to be written using React and Next.js.~~
* ~~I would like to use the MidiWriterJS library to export Synquencer sequences to MIDI files.~~

**Server**

As a developer,

* ~~I would like the backend to be written using React and Next.js.~~
* ~~I would like all sequences to be stored internally on the server as JSON files.~~

**Design**

As a developer,

* ~~I would like the entire project to be written in TypeScript, a variant of Javascript.~~
* I would like to use a queue system for all user operations, to ensure that the server handles incoming operations from clients in the proper order.
* I would like to ensure that this website conforms to WCAG (Web Content Accessibility Guidelines) 2.0, which is the standard for accessible design.

**Performance**

As a developer,

* I would like to minimize latency between client and server as much as possible.
* I would like to make sure that, when working together on the same sequence, all clients agree with each other on the state of the sequence at any given time.
* I would like to minimize the data that needs to be transferred between server and client, to make sure that the amount of time spent transferring data remains small.