**Synquencer**

**Sprint 1 Planning Document**

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

**Sprint Overview**

In this sprint, we aim to create the basic functionality of our application so that a user could use our app as a basic MIDI sequencer for their own personal use. We plan to have basic note placement, editing, and moving functionality. We also are aiming for rudimentary audio playback, MIDI export, and basic database storage completed by the end of this sprint. We plan to make syncing functionality and more advanced sequencing and playback features in sprints 2 and 3.

**Scrum Master:** Aidan McDonnell

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

**Risks and Challenges**

One of the biggest risks associated with this sprint is our collective lack of experience with TypeScript, meaning that we are all learning as the project moves along. This poses a number of challenges, including making sure our time researching and learning TypeScript does not detract from contributing to the user stories, and ensuring that our code is usable going forward.

**Current Sprint Detail**

**User Story #1**

As a user, I would like to be able to create a new, empty sequence

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create a homepage | 2 hrs | Aidan |
| 2 | Create a system for generating unique URLs corresponding to new sequences | 2 hrs | Aidan |
| 3 | Create a data structure for new sequences | 4 hrs | Mohini |
| 4 | Create the top bar interface for the sequencer view | 4 hrs | Aidan |
| 5 | Create the piano roll interface which renders notes in the sequence data structure | 4 hrs | Aidan |

Acceptance Criteria:

* Given that the homepage is implemented correctly, a user should be able to click a button that takes them to a newly created sequence, as well as click a button that takes them to the about page.
* Given that the unique URL system is implemented correctly, users should be able to navigate back to a sequence with the same ID as a previous sequence with a unique URL. (Stored data within that sequence in separate story)
* Given that the data structure for sequences is implemented correctly, we should be able to use a sequence data structure to fill in relevant information in the GUI (tempo, notes placements, etc.)

**User Story #2**

As a user, I would like to add a note to the sequence by clicking an empty spot

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create a data structure for an individual note | 4 hrs | Mohini |
| 2 | Create a function that creates a note at the desired cursor position, also given a desired pitch. | 3 hrs | Aidan |
| 3 | Create a function to add the created note to the data structure | 2 hrs | Mohini |
| 4 | Create unit tests to ensure functionality of note creation functions | 1 hr | Mohini |

Acceptance Criteria:

* Given that the data structure for notes is implemented correctly, we should be able to use a note data structure to fill in relevant information in the GUI (duration, pitch, etc.)
* Given that the note adding feature is implemented properly, a user should be able to create a note at the current cursor position with the correct corresponding pitch.
* Given that the note adding feature is implemented properly, that note should be added into the sequence data structure.

**User Story #3**

As a user, I would like to edit or remove a note from the sequence.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Given a position, create a function that returns any notes at that position. | 2 hrs | Mitchell |
| 2 | Create a function that deletes a given note | 2 hr | Mitchell |
| 3 | Create a function that updates or removes the stored note in the sequence data structure | 3 hrs | Mohini |
| 4 | Allow the user to right click an existing note to delete it | 1 hr | Aidan |
| 5 | Create unit tests to ensure functionality of note deletion functions | 1 hr | Mohini |

Acceptance Criteria:

* Given that the note fetching function is implemented correctly, a developer should be able to specify a time and pitch and get access to the note at that location (if it exists).
* Given that the pitch changing function is implemented correctly, a user should be able to specify a new pitch for a given note and have it be reflected in the UI. This should also be represented in the corresponding data structure.
* Given that the deletion function is implemented correctly, a user should be able to remove a note from the sequence and have it be reflected in the UI. This should also be represented in the corresponding data structure.

**User Story #4**

As a user, I would like to change the velocity of a note.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create a function that updates the velocity of the given note in the sequence data structure | 4 hrs | Mohini |
| 2 | Allow the user to edit a note's velocity by selecting it and editing a value in the top bar | 2 hr | Aidan |
| 3 | Create unit tests to check the functionality of velocity changing methods | 1 hr | Mitchell |

Acceptance Criteria:

* Given that the velocity changing function is implemented correctly, a user should be able to specify a new velocity for a given note and have it be reflected in the UI.
* Given that the velocity changing function is implemented correctly, a user should have a velocity change be reflected in the UI.
* Given that the velocity changing function is implemented correctly, this should also be represented in the corresponding data structure.

**User Story #5**

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

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create text-field for tempo change | 2 hour | Mitchell |
| 2 | Take data from text field and use it for the tempo of the sequence | 2 hours | Mitchell |
| 3 | Create unit tests to check the functionality of tempo changing methods | 1 hr | Mitchell |

Acceptance Criteria:

* Given that the tempo changing function is implemented correctly, a user should be able to specify a new temp for the sequence using a text box and have it be reflected in the UI.
* Given that the tempo changing function is implemented correctly, this should also be represented in the corresponding data structure.
* Given that the tempo changing function is implemented correctly this should be reflected in audio playback

**User Story #6**

As a user, I would like to lengthen or shorten the duration of a note.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Allow the user to click and drag the ends of notes to adjust their length and position | 2 hrs | Aidan |
| 2 | Create function to adjust the duration of a note | 4 hr | Mitchell |
| 3 | Create unit tests to check the functionality of note length change method | 1 hr | Mitchell |

Acceptance Criteria:

* Given that lengthening or shortening a note is implemented correctly, a user should be able to adjust the length and position of any note in the UI.
* Given that lengthening or shortening a note is implemented correctly, the lengthening or shortening of a note should be represented in its data structure.
* Given that lengthening or shortening a note is implemented correctly, these changes should be reflected in the playback of the note.

**User Story #7**

As a user, I would like to move or copy a note somewhere else.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create function to change the time position of a note | 1 hr | Mitchell |
| 2 | Create copy function to store a current note | 2 hr | Mitchell |
| 3 | Create paste function to paste saved note | 3 hr | Mitchell |
| 4 | Update or add note into sequence data structure | 4 hrs | Mohini |
| 5 | Allow the user to click and drag a note to change its position or pitch | 3 hrs | Aidan |
| 6 | Create a function to the pitch of a given note | 1 hr | Mitchell |
| 7 | Create unit tests to check the functionality of time and pitch change methods | 1 hr | Mitchell |

Acceptance Criteria:

* Given that the move functionality is implemented correctly, a user should be able to click and drag a note somewhere else in the sequence. This move should be reflected in the sequence data structure.
* Given that the copy function is implemented correctly, a user should be able to copy a note to their clipboard, and that data be saved within the client.
* Given the paste function is implemented correctly, a user should be able to paste a note in their clipboard and have that note show up in the UI where their cursor is. This should also be reflected in the sequence data structure.

**User Story #8**

As a user, I would like to store my sequences on the server and access them later

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create a database to store new sequences | 4 hours | Zach |
| 2 | Create a server that can access the database | 6 hours | Zach |
| 3 | Allow the client to request a given sequence from the database and receive the sequence from the server | 10 hours | Zach |
| 4 | Allow the client to save the current sequence in the database | 10 hours | Zach |

Acceptance Criteria:

* Given that the database is implemented correctly, a developer should be able to access the MongoDB database and see what is in it.
* Given the server with database access is implemented correctly, a developer should be able to request and store data in the database from the server.
* Given that the client request system is implemented correctly, a user should be able to request an existing sequence within the database with its given URL and have a copy of that sequence show up in the GUI.
* Given that the client saving system is implemented correctly, a user should be able to have a copy of their sequence get saved to the database with its corresponding ID.

**User Story #9**

As a user, I would like to enter notes using only my keyboard.

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create system of keyboard shortcuts that correspond to different notes | 3 hours | Mitchell |
| 2 | Create a system to navigate position and pitch using the keyboard within the application. | 2 hours | Mitchell |

Acceptance Criteria:

* Given that the system of keyboard shortcuts is implemented properly, several keyboard shortcuts should exist that add a note to a place in the sequence.
* Given that the system of keyboard shortcuts is implemented properly, these keyboard shortcuts should also add notes in the relevant data structure.
* Given that the system of navigating the position and pitch with the keyboard is implemented properly, a user should be able to use only their keyboard to select a position within the sequence.

**User Story #10**

As a user, I would like to export my sequences to MIDI files and store them locally

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Take in sequence data and convert to MIDI with midi-writer-js | 5 hrs | Mohini |
| 2 | Create a system to allow the users to download the converted media | 6 hrs | Mohini |
| 3 | Allow the user to download MIDI sequences through the UI | 2 hr | Aidan |

Acceptance Criteria:

* Given that the MIDI conversion system is implemented correctly, the client should be able to take in the sequence data structure and use a function implementing midi-writer-js to output MIDI data.
* Given the MIDI file system is implemented correctly, the client should be able to take converted MIDI data and translate that into a file.
* Given that the MIDI download system is implemented correctly, the user should be prompted to download the MIDI file.

**User Story #11**

As a user, I can play back and listen to my project in the editor

| # | Description | Estimated Time | Owner |
| --- | --- | --- | --- |
| 1 | Create buttons for controlling playback | 3 hr | Aidan |
| 2 | Take in MIDI data and play within the editor | 8 hr | Mitchell |
| 3 | Make playhead move in time with audio | 2 hr | Aidan |

Acceptance Criteria:

* Given the playback functionality is implemented correctly, a user should be able to press the play button.
* Given the playback functionality is implemented correctly, the user should be able to hear their sequence played back.
* Given the playback functionality is implemented correctly, the play head should move in time with where in the sequence the audio player is at.

**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 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 can 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 to enter notes using only my keyboard.~~
* 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.