Use cases:

- Open the application. User opens the application by double clicking the icon and is presented with the GUI. No sample is loaded; buttons and settings are changeable/pressable. Changing settings does affect the output. (describe more about the state of the application at this point).

- Search for sample. User searches for a sample file in the search module or search bar by entering text in a field. The sample library is located in a specific directory on the host. The application searches its sample file library and presents relevant matches to the User.

-Upload a sample to the sample library. User clicks the upload sample icon and the application opens the sample upload interface. User drags and drops the sample file into the interface or selects the sample file from a directory on their machine and uses the upload interface to drop the file into the upload area. The application adds the sample to the sample library directory.

- Load a sample from the library to the sampler. The user loads a sample file into the application from the application's sample library. The user opens the sample library and all of the relevant sample files are displayed to the user. Or, the user has searched for sample files with the search function and has been presented relevant matches. The user clicks the desired sample file and the system loads the selected file into the application where it is now playable.

- Play sample. User plays the sample by pressing a key on their computer keyboard or on a midi device. The sampler receives a ‘note-on’ message from this key press and plays the sample at the pitch specified by the key that was pressed. Audio output of the sample is generated from the host machine.

- Listen for midi input. Application listens for midi note input from a connection on the host machine.

- View effects library. User opens the effects library in the application. The application presents icons representing different available effects displayed as clickable names or icons.

- Load an effect. User loads an effect into the sampler’s processing chain by clicking on the respective effect icon. The application adds the loaded effect's processing algorithm to the audio output signal of the sampler.

- Change global volume and root note pitch settings: User opens application and default Global Settings are loaded. Global volume and root note pitch UI components are present on the main UI and are changeable at any point if there is no dialogue open with the application. The global volume and root note pitch values are also displayed in the main UI. The user moves the global volume slider up to raise the volume and drag it down to lower the volume. As the user moves the global volume slider, the value of the global volume displayed in the UI changes accordingly. As the user moves the root note pitch wheel, the global root note pitch value displayed in the UI changes accordingly.

- Change static global settings: User must open the Global Settings menu from a drop-down menu in a ribbon in the UI to access and change static global settings - MIDI source(s), sample library directory, audio output format.

- Save preset: (Memento design pattern). User presses the ‘Save Preset’ button on the main UI. The application presents a ‘save file’ dialogue box where the user can enter a name for the preset. If the user tries to save without entering a valid file name (including file names that are already in use) the system will alert the user to the error. If the user enters a valid file name and clicks ‘Save,’ all system settings and sample file information is saved as a preset in the Preset Folder.

- Load preset: User opens the preset folder and loads a preset. (Memento design pattern).

-User triggers note output from the midi device. The application is listening for midi input from the connection; when note input is received the application plays the file at the corresponding pitch/playback speed.

-User connects a midi device to the computer and the application listens for midi input from the device.

Revised Use Cases

Open the Application:

The user opens the application by double-clicking the icon. The GUI is displayed, showing the default state: no sample is loaded, and the sampler is silent, default settings for volume and pitch and others are set. Buttons and settings are visible and interactable but have no effect on playback. Visual indicators (e.g., "No Sample Loaded") and a disabled "Play" button indicate the current state. MIDI devices are not yet initialized.

Search for Sample and Load Sample

The user enters a keyword or phrase into the search bar. The application searches the sample library directory on the host machine for relevant matches, filtering results based on filename, metadata (e.g., tags, categories), or both. The search results are presented in a scrollable list with preview and information (e.g., file name, duration). Once a file is selected by double-clicking its icon or filename, the system loads it into the sampler, preparing it for playback. A confirmation message ("Sample loaded: filename") is displayed.

Upload a Sample to the Library

The user clicks the "Upload Sample" button to open the upload interface. The user can drag-and-drop files or browse their directory to select files. The application validates file format and adds the file to the sample library directory. Optionally, the user can tag the sample for easier searching.

Play Sample

The user presses a key on their computer keyboard or a MIDI device. The sampler receives a "note-on" message with pitch and velocity data and plays the sample at the corresponding pitch. The sample's audio output is routed to the host machine's default audio device.

Listen for MIDI Input

The application automatically detects connected MIDI devices on startup or when prompted. The user can verify active MIDI connections in a settings menu. When a MIDI note is received, the sampler plays the assigned sample according to the note's pitch and velocity.

View Effects and Load Effect

The user opens the effects library to browse available effects. Effects are presented as icons or names, each with a brief description (e.g., "Reverb: Simulates spatial depth"). The user clicks on an effect from the library to add it to the sampler's processing chain. The effect appears in a visual chain (e.g., "Reverb → EQ → Compressor") that can be reordered or removed. The changes affect the sample's audio output in real-time.

Change Global Volume

The user opens the application, and the default global settings are loaded. The global volume setting is displayed as an interactive UI components on the main interface. The value is immediately visible to the user and is adjustable at any time unless a dialogue or modal window is open. To change the global volume, the user moves the global volume slider UI component up to increase the volume or down to decrease it. As the user adjusts the slider, the value of the global volume is updated in real-time on the UI, and the overall audio output is scaled accordingly. The changes are applied instantly without needing the user to confirm them, and the new global volume remains in effect until the user decides to modify it again. The global volume value is persisted in the system, reflecting the user’s preferences for the duration of the session, and can be adjusted at any time.

Change Root Note Pitch Settings

The user opens the application, and the default global settings are loaded. The global root note pitch setting is displayed as an interactive UI component on the main interface. The value is immediately visible to the user and is adjustable at any time unless a dialogue or modal window is open. When the user adjusts the root note pitch using the pitch wheel UI component, the value displayed in the UI changes in real-time to reflect the new pitch setting. As the root note pitch is adjusted, the system applies the new value, which modifies the pitch of the audio samples played by the sampler. The changes are applied instantly without needing the user to confirm them, and the new root note pitch value remains in effect until the user decides to modify it again. The root note pitch setting is persisted in the system, reflecting the user’s preferences for the duration of the session, and can be adjusted at any time.

Adjust Global Volume

The GUI displays a global volume slider. The user clicks and drags the global volume slider up or down; dragging the slider up increases the volume up to the maximum potential output limit and dragging the slider down lowers or completely silences the audio output signal.