***Explanation***

*1️⃣ Implement Sample Selection Logic (Based on "Sample Selection Flowchart")*

*What Needs to be Implemented?*

*- Modify how Music Blocks selects which sample to play based on:*

*1. Pitch – Higher notes use higher-pitched samples, and lower notes use lower-pitched samples.*

*2. Articulation – If the note is short (staccato), use a short sample; if it's long (sustained), use a long sample.*

*3. Pitch Adjustment – If no exact sample is available, apply pitch-shifting using Tone.js.*

*🛠 How to Implement?*

*- Modify the note-playing function to:*

* *Check the available samples and find the best match.*
* *Use the correct sample based on pitch and articulation.*
* *If needed, apply small pitch shifts using Tone.js to match the required note.*

*2️⃣ Structure Sample Data Correctly (Based on "Multi-Sample Data Structure")*

*🔧 What Needs to be Implemented?*

* *Create a data structure that stores multiple samples per instrument.*
* *Each sample should have metadata (e.g., pitch, duration, articulation).*
* *When a note is played, Music Blocks should retrieve the correct sample from this structure.*

*🛠 How to Implement?*

*- Store samples in a JSON or database format, something like this:*

*```json*

*{*

*"instrument": "piano",*

*"samples": [*

*{ "pitch": "C4", "type": "sustained", "file": "piano\_C4\_sustained.wav" },*

*{ "pitch": "C4", "type": "staccato", "file": "piano\_C4\_staccato.wav" },*

*{ "pitch": "D4", "type": "sustained", "file": "piano\_D4\_sustained.wav" }*

*]*

*}*

*```*

*- Modify the Sampler Widget to:*

* *Load multiple samples per instrument.*
* *Store and retrieve samples based on pitch and articulation.*
* *Display available samples in the UI menu.*

*3️⃣ Implement User Sample Uploading (Based on "User Sample Upload Process")*

*🔧 What Needs to be Implemented?*

*- Allow users to upload or record their own instrument samples.*

*- Analyze the uploaded sample and assign it to the correct category (pitch, articulation, etc.).*

*- Store user-uploaded samples in the same structured format as system samples.*

*🛠 How to Implement?*

*1. Create a UI for sample uploads (drag & drop file, record from microphone).*

*2. Analyze the sample:*

* *Detect pitch (using Tone.js pitch detection).*
* *Detect duration (staccato vs sustained).*
* *Assign the sample to the correct instrument category.*

*3. Store the sample in the existing multi-sample structure.*

*4. Allow users to use their uploaded samples in compositions.*