**Yifei Zhao & Tyler Krautkramer IS469 Final Project Submission**

## Initial Proposal: Soundsync NFT

*Our team discovered a need for music NFT traders, to find valuable potential purchases based on both personal preference and historical metrics from the market, in order to promote smarter investments and give a user a song they like as potential owning rights.*

*Thus, we want to create a tool using information system techniques, to push NFT recommendations closely matched to the user's music preference. These recommendations would be based on certain metrics such as genres, bpm's, and an overall user listening history. We aim to design an interface system that collects relevant information from OpenSea, music streaming services (Spotify/iTunes), and user opinions, to then integrate these key informations into one interface.*

## Updated Proposal: Soundsync NFT

*Our team discovered a need for music NFT traders, to find valuable potential purchases based on both personal preference and historical performance metrics from the market.*

*Our system pushes recommendations closely matched to user music preferences, which we pull from profile setup, our quiz, and music streaming platforms, in order to promote smarter investments and/or provide a user with songs they genuinely like for potential ownership rights.*

*OpenSea is a platform for customers to **perform** the trade, while our platform helps the customer **discover** the best options for them based on a highly customized searching experience.*

**Use Cases:**

**Primary Factors**

- User: An instance of an individual using the system to search for a potential match of NFT(Non-fungible token) and then if has willing to purchase, will request the system to generate a corresponsive link to the external trading platform.

**Supporting Factors**

- Open Sea: A trading platform with all the market and trading information of NFTs available for access, who also has the willingness to retrieve the user-relative information and metadata from the subjective platform.
- NFT: Non-refundable token, that holds potential property value recognized for trading. A collection is a composition of NFTs created by the same authors.
-Music streaming platform: A streaming service provider for the customer who can opt to disclose their past music listening histories to the subjective platform, as an extra metric to improve their search results' matching compatibility.

**Potential Use Cases**

- Consumer wants to find music NFT that they like, and is a good valued investment for them
- Consumer wants to find a non-music NFT that is a good valued investment
- Consumer finds a favorable NFT and would like to conduct further research/purchase on the marketplace (link generation)
- Consumer wants to realign their music preferences in the system for better search results
- Consumer wants to update their profile
- Consumer grants system access to music platform of their choice
- Consumer wants to create a profile and authenticate themselves on the system
- Soundsync wants to collect general NFT data from the Open Sea Marketplace
- Soundsync wants to collect user listening preferences from music platform
- Soundsync AI processes the Soundsync NFT data and add on new musical attributes, pass the
- OpenSea requests user research data from Soundsync

| **Use Case Name**<br>**Find music NFTs as a good valued investment** | **ID**<br>1 | **Priority**<br>High |
|---|---|---|
| **Actor** SoundSync NFT investor | | |
| **Description**: Investor searches for a selection of NFTs containing certain values that align with their investment agendas. | | |
| **Trigger**: The investor inputs criteria into the search box to come up with the ideal investment suggestions.<br>**Type** External | | |
| **Precondition**:<br>The user authentication is verified.<br>The most up-to-date market data is available on the platform. The user's preferences are defined.<br>The platform database and APIs are online and functional.<br>The user has defined his/her music preference during profile setting | | |
| **Normal course**:<br>1. The user sends a request to the server asking for the NFT's metadata based on any specified criteria typed in the search box.<br>2. The query information is analyzed in the system based on the filter properties.<br>3. The system analyzes the user's music preference.<br>4. The system uses the defined attributes alongside the predefined preference as the parameters to screen the wanted collection's information and generates a list of collection recommendations.<br>5. When a collection has been chosen, the user further refines the wanted NFT's data | Information for steps | |

| | |
|---|---|
| based on any specified criteria typed in the search box.<br>6. The system sends back the NFT information to the end user's interface.<br>7. More detailed metadata and statistics from the platform's database are pulled on the specific selected NFTs and generated on the user's home page. | |
| **Alternative course**:<br>1.a.If the user is not authenticated, then the login request is shown.<br>3.a.If the user takes a quiz, the system considers the quiz result as an additional searching attribute.<br>5.a.If the system has no associative data requested by the user, i.e. the NFT data is deleted or modified, returns"No Data Available". | |
| **Postconditions**:<br>1. The user's searching history is documented.<br>2. The user's browsing history is documented.<br>3. The recommendation history is documented. | |
| **Exceptions**:<br>5.b. The system displays "That NFT is no longer available."<br>1.b.The system displays "the system is currently under maintenance."<br>5.b.The data required is lost from the data warehouse.<br>6.a.The user clicks on the external link to exit the system<br>6.b.The system terminates a user request. | |
| **Summary** | |

| **Inputs** | **Source** | **Output** | **Destination** |
| --- | --- | --- | --- |
| Musical attribute<br>Preference<br>Market value | Open Sea's NFT datastore<br>SoundSync's NFT datastore<br>SoundSync's user datastore<br>SoundSync's searching AI<br>End user's computer | Data of the recommended NFT<br><br>External link to the NFT's original publication site | User's searching info datastore<br>User's browsing info datastore<br>Soundsync NFT datastore |

<table>
<tr><td colspan="2">Use Case Name<br>User generates a link of an NFT they like on the SoundSync interface</td><td>ID<br>2</td><td>Priority<br>Medium</td></tr>
<tr><td colspan="4">Actor Soundsync & Customer</td></tr>
<tr><td colspan="4">Description Investor searches and finds an NFT that best suits their preferences and wants more information/wants to act on it</td></tr>
<tr><td colspan="4">Trigger: Investor Clicks on an NFT they would like to purchase or research further<br>Type</td></tr>
<tr><td colspan="4">Precondition<br>The user authentication is verified.<br>The most up-to-date market data is available on the platform. The user’s preferences are defined.<br>The platform database and APIs are online and functional.<br>The user has conducted a filtered search on the platform and obtained potential recommendations.</td></tr>
<tr><td colspan="2">Normal course<br>1. The user sends a request to the server to retrieve a specific NFT link.<br>2. The system pulls the specific NFT ID from the temp data store and displays it on the platform for the end-user to externally conduct further research or purchases on the Open Sea marketplace.<br>3. When the user clicks on the link, the platform automatically updates the user’s link (recommendation) history to be quickly accessed by the user in the future</td><td colspan="2">Information for steps</td></tr>
<tr><td colspan="2">Alternative course<br>3.a. The NFT has been sold and is no longer available for purchase, the system returned “The NFT has already been sold. Do you still want to view it?”</td><td colspan="2"></td></tr>
</table>

| **Use Case Name**<br>**User generates a link of an NFT they like on the SoundSync interface** | **ID**<br>2 | **Priority**<br>**Medium** |
|---|---|---|
| **Actor** Soundsync & Customer | | |
| 3.b. If the following NFT has been removed from the OpenSea marketplace, then a link generation error will display. | | |
| **Postconditions**<br>1. The external link has been retrieved. The user clicks on the external link to exit the system.<br>2. The external link history has been successfully updated. | | |
| **Exceptions**<br>3.b. The system displays “That NFT is no longer available.”<br>3.c.The system displays “the system is currently under maintenance.”<br>4.a. The system terminates a user request. | | |
| **Summary** | | |

| **Inputs** | **Source** | **Output** | **Destination** |
|---|---|---|---|
| User’s NFT selection from recommendation list | Open Sea’s NFT datastore<br>SoundSync’s NFT datastore<br>SoundSync’s searching AI<br><br>End user’s computer | External link of the NFT on the Open Sea Marketplace<br><br>Updates to user’s external link history | OpenSea marketplace NFT data store<br><br>Soundsync link data store<br><br>User profile |

| **Use Case Name**<br>**OpenSea gains music NFT searching popularity and identifies user searching patterns on SoundSync** | **ID**<br>**3** | **Priority**<br>**Low** |
|---|---|---|
| **Actor** OpenSea operating system | | |
| **Description** SoundSync is conducting research/analysis on user's link view history | | |
| **Trigger** OpenSea operating system makes an API call to be connected to the Soundsync system<br>**Type** External | | |
| **Precondition**<br>OpenSea's API sends a request to gain access to SoundSync's user datastore.<br>OpenSea asked for a query result of Soundsync's user browsing history based on demanded criteria.<br>The most up-to-date user metadata is available on the platform.<br>The platform database and APIs are online and functional. | | |
| **Normal course**<br>1. The Soundsync system pulls in the user's data required by the rule of OpenSea's API.<br>2. The data is reorganized into a formatted file(CSV, JSON, etc.) and sent to the OpenSea's server.<br>3. The API is safely disconnected. | **Information for steps** | |
| **Alternative course**<br>1.a. When the API outbreaks, notify openSea's server that "Connection is lost".<br>If the defined criteria have no user identified, then returns "No result".<br>3.a. If OpenSea's server rejects the file, then the API is turned off.<br>3.b. If the file is misformatted, the system denies sending the file. | | |

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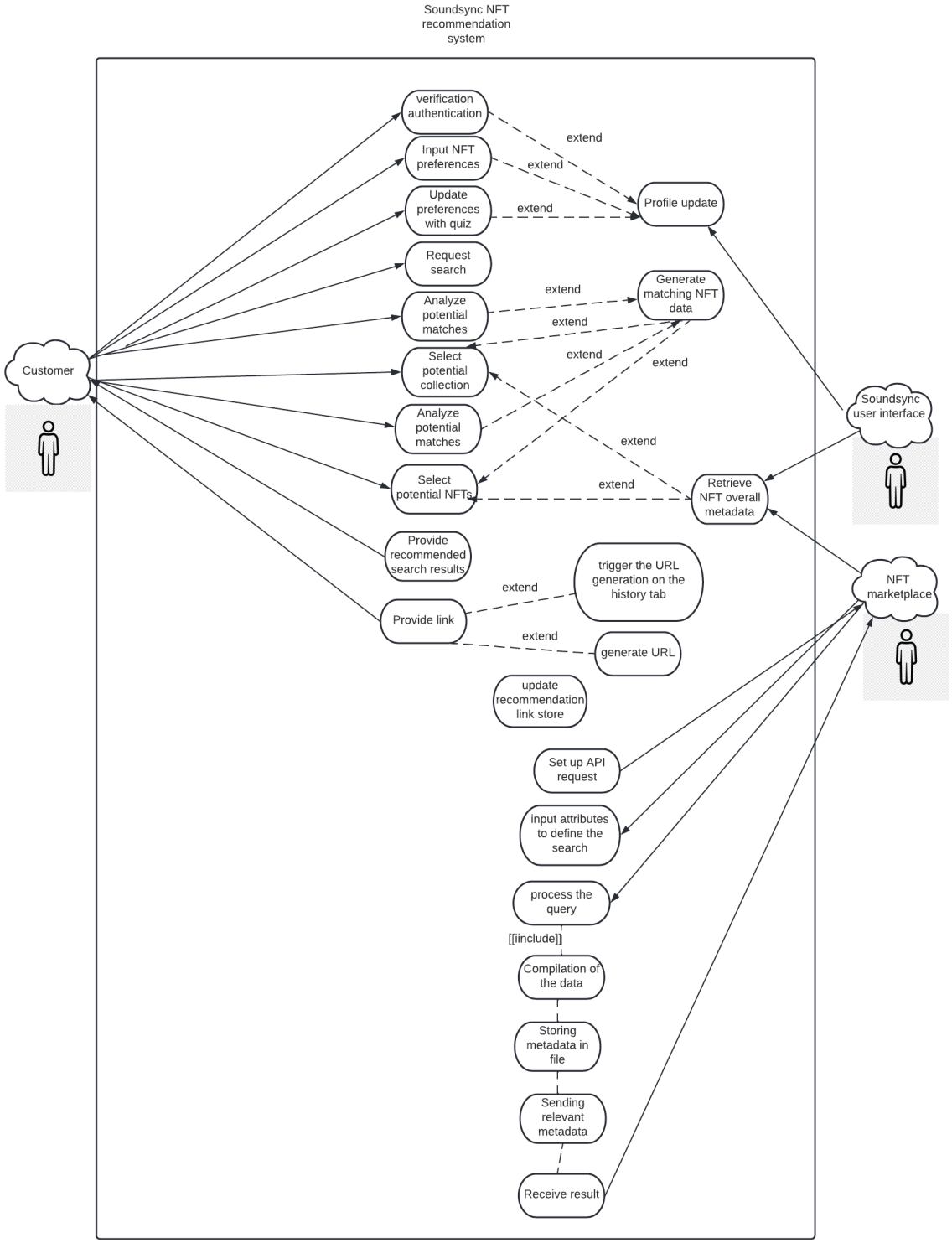
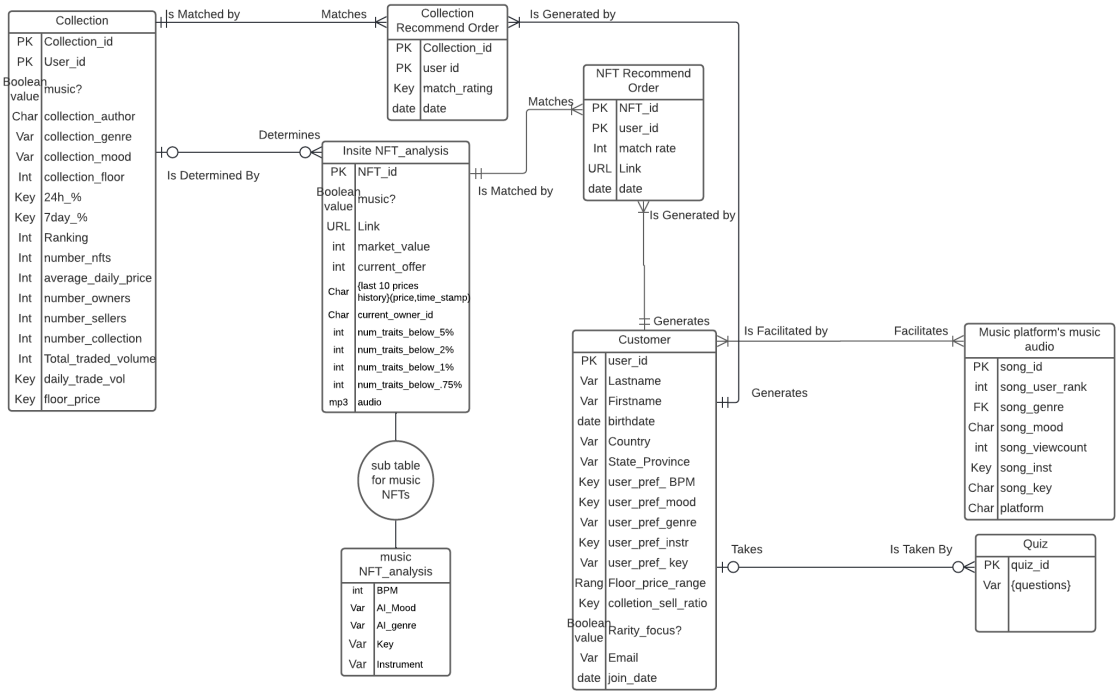
| **Postconditions**<br>The query result is documented/deleted. | | | |
| **Exceptions**<br>2.a. The data asked is insignificant and not documented.<br>2.b. The data point/documentation is lost from the data warehouse | | | |
| **Summary** | | | |
| **Inputs**<br>API request | **Source**<br>SoundSync's user datastore | **Output**<br>Data file of user's search history | **Destination**<br>OpenSea's end server |

## Use Case Diagram



## Entity-Relationship Diagram

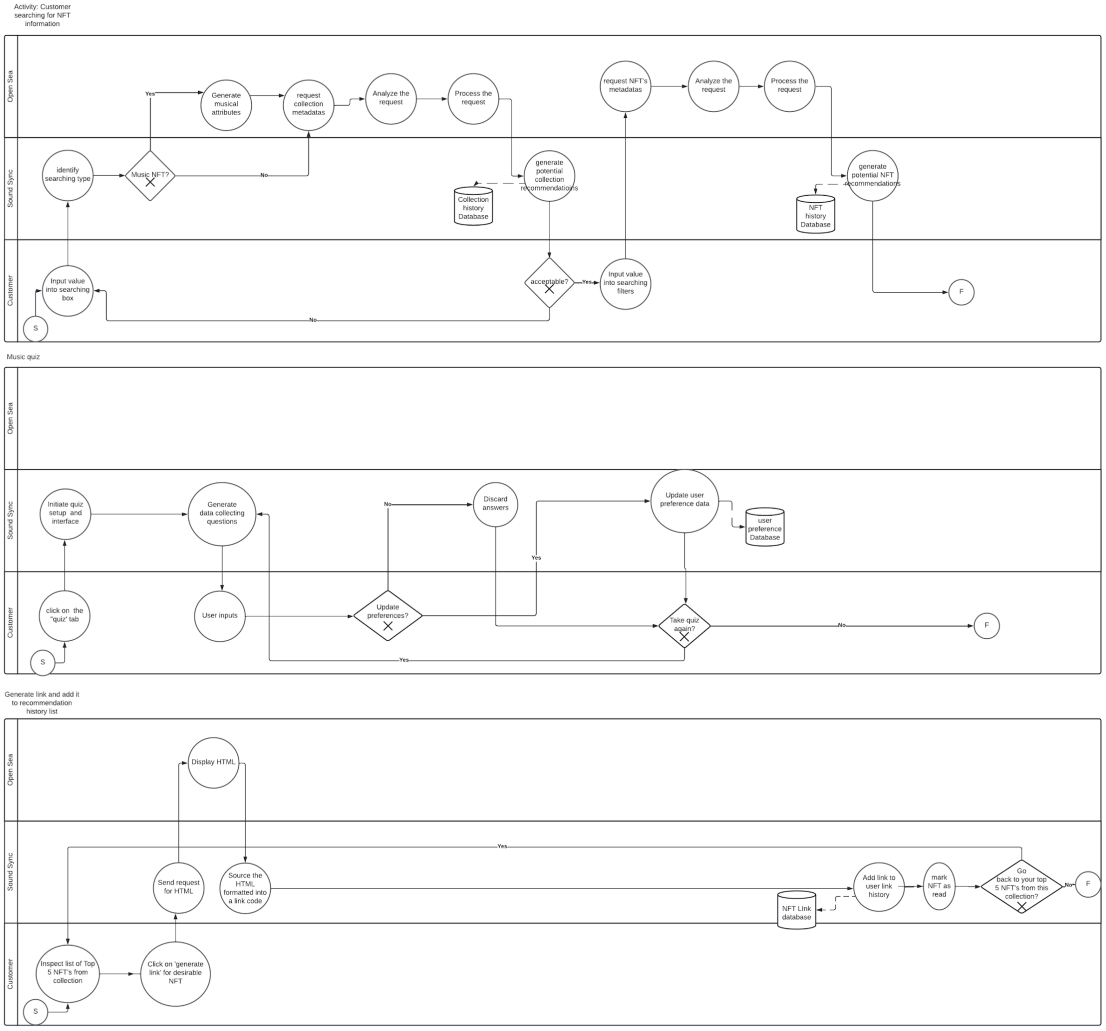



**For the ERD, there are multiple moods and genre values.**

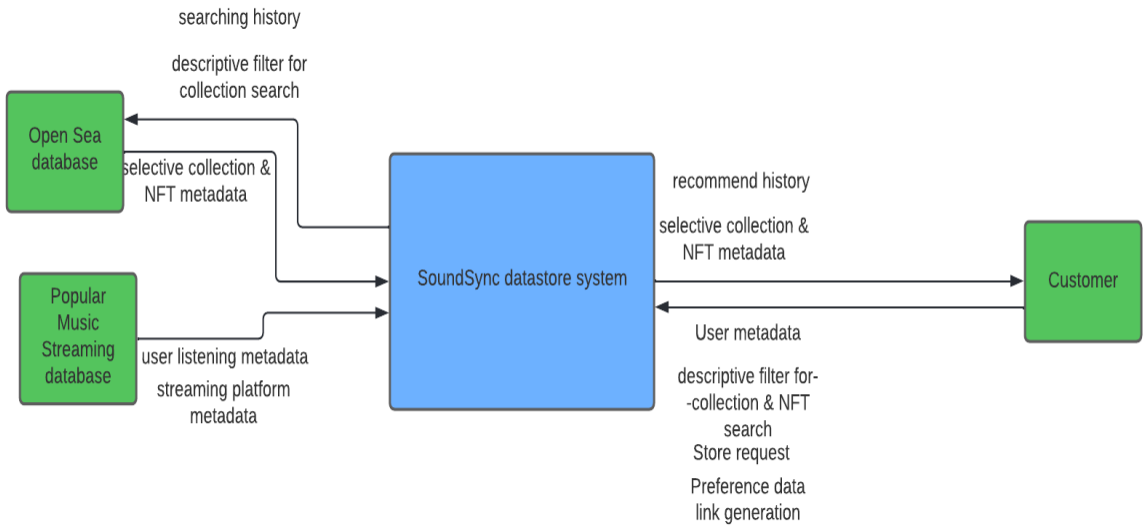
The song_genre and song_mood seen on the right-hand side of the diagram, as well as the quiz questions, help facilitate and determine the values for the user preferences that SoundSync matches the collections and NFTs with. These are titled user_pref_mood, user_pref_genre, etc. within the Customer entity.

Collections do not have predefined genres or moods, and neither do NFTs, so our AI will generate these values for us. First looking at the collection as a whole, the AI generator takes a sample of NFTs from top-performing collections, then analyzes the musical properties of the NFT pieces chosen to generate the general theme of collection_mood and collection_genre (for the collection entity). If an instance of the collection doesn't contain any musical NFTs in it, the collection_genre and collection_mood will appear to be NULL. If a user shows interest in a collection, the entire collection will have its NFTs scanned and assigned BPM, mood, genre, and other musical attributes as described in the music NFT_analysis entity, described as AI_mood and AI_genre. Now that all of these values are established, this sets the stage for the collection recommendation order entity and the NFT recommendation order entity, which uses a match rating system to generate top recommendations for the user, by tying our AI generated attributes for NFTs and collections, with the pulled music data from streaming services, the quiz, and user input.

# Activity BPMN Diagram

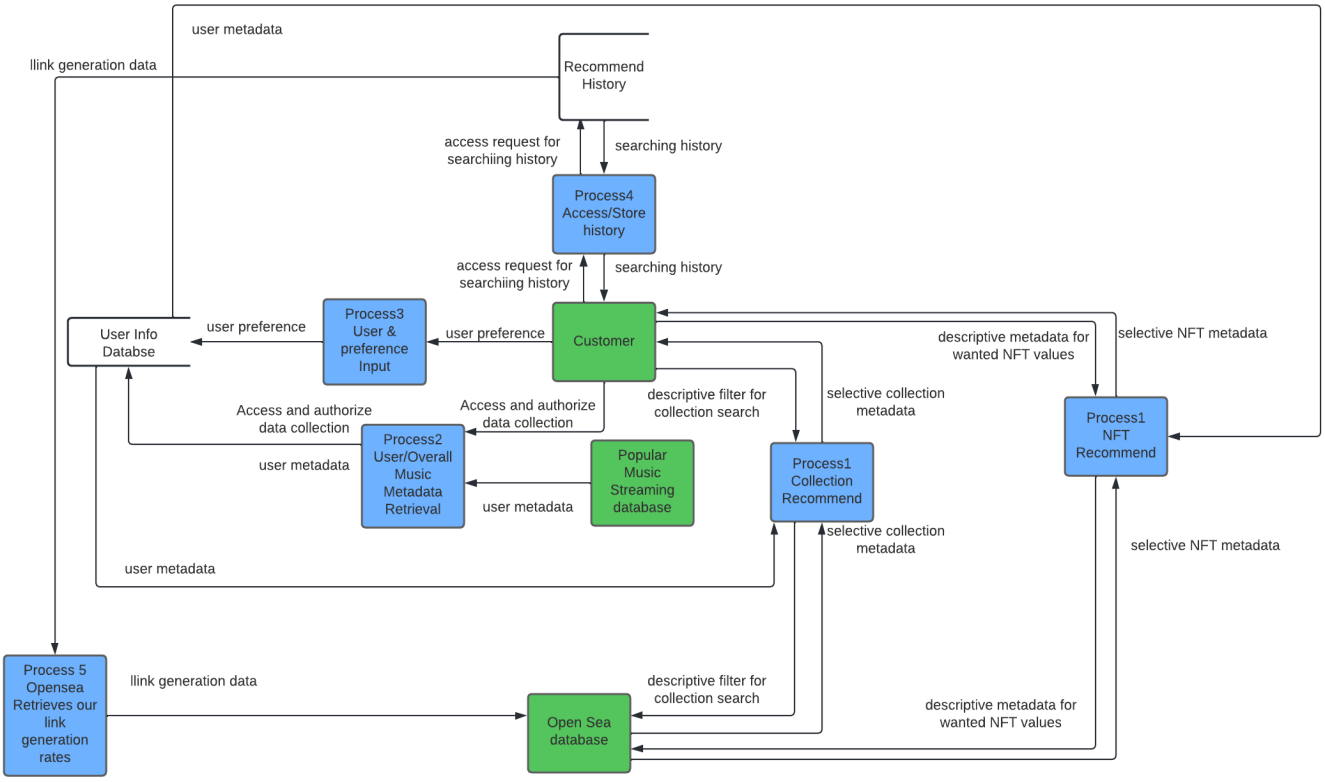


## Context Diagram:



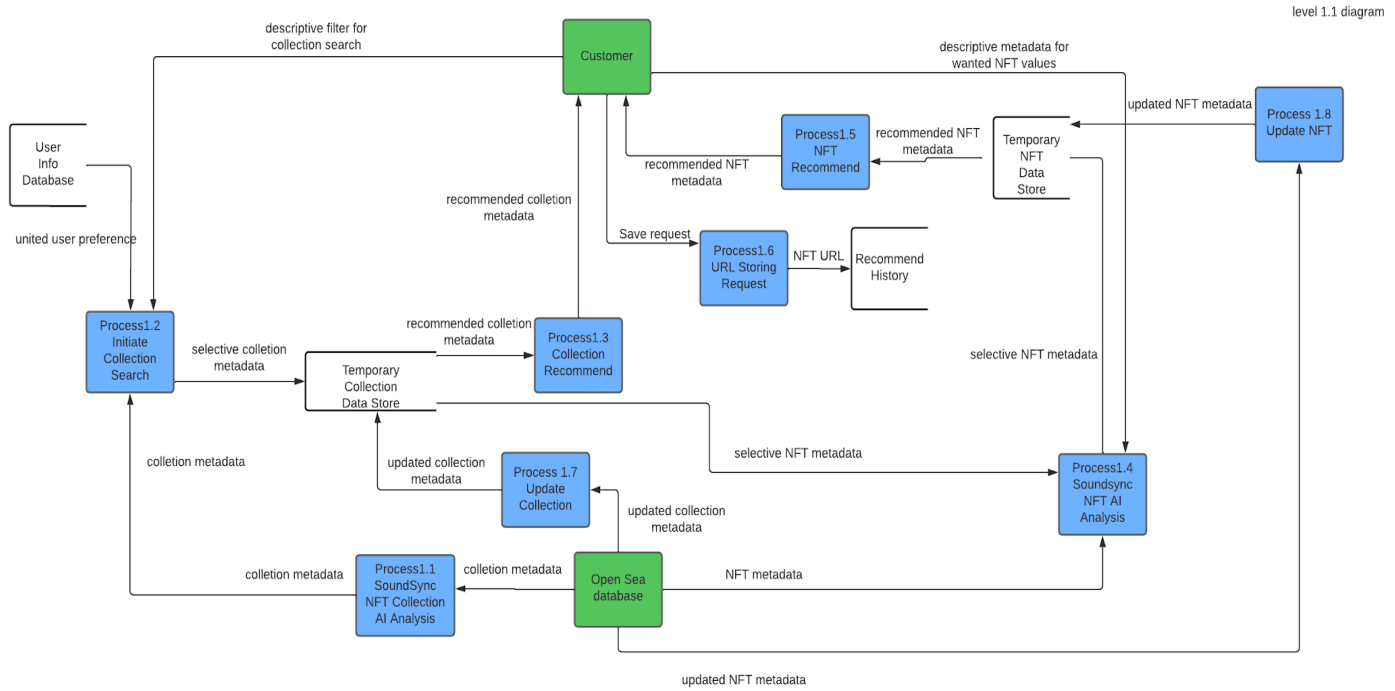
**Level 0 DFD:**

**Process 5:** Opensea will analyze our link generation rates for certain NFTs in our third fully dressed use case, and we pull this data from the recommended history data store instead of the user info database. The main reason for this is because of cyber security, we believe that OpenSea does not need access to personal user information to see which NFTs are generated the most by users. The recommended history data store only contains the URLs that reference the NFT. It is not necessary to break down Process 5 any further for our system, but it was one of our fully dressed use cases because of the complex interaction between us and OpenSea.

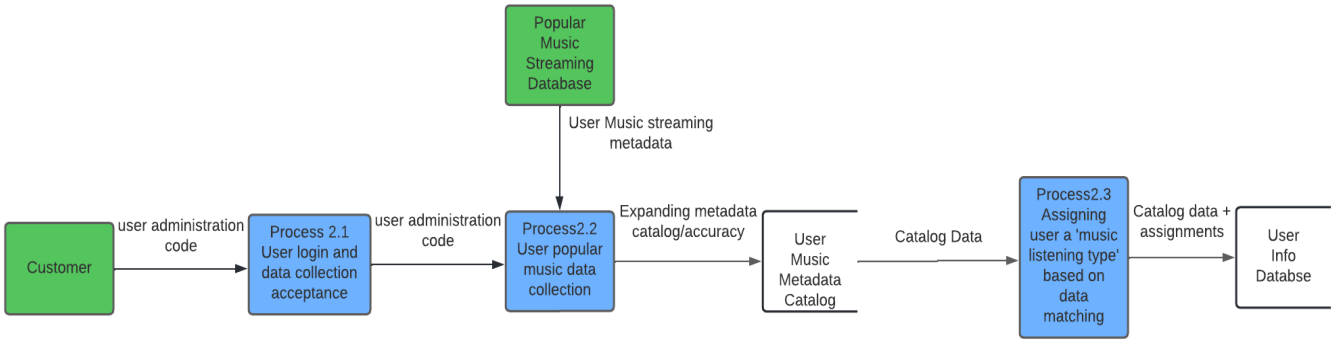


**Level 1 Process 1 DFD (The Searching Process):**

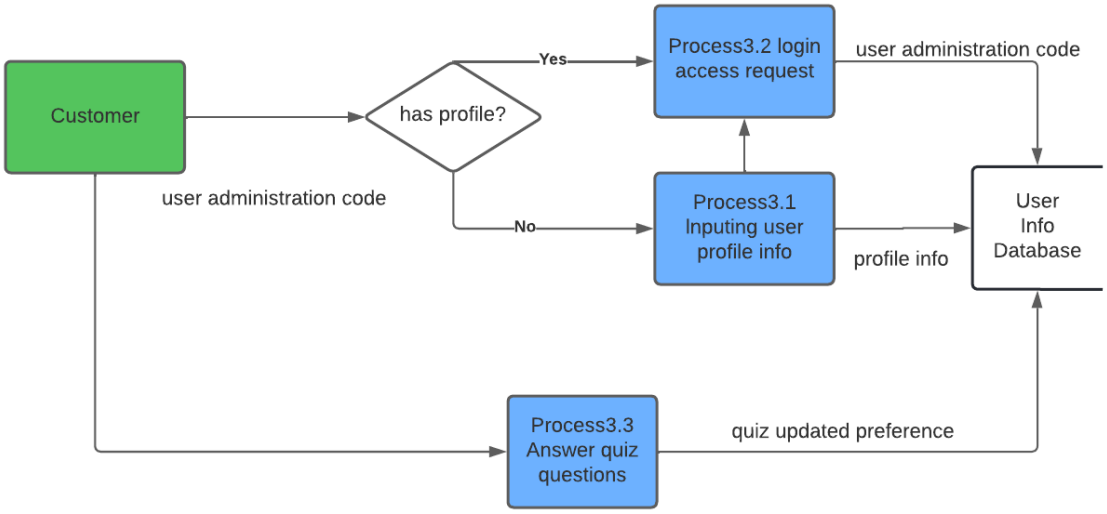
The temporary datastores within this process will store 5 collections, each composed of 5 NFTs. The temporary datastores do not reset over a time interval. Instead we have a system where a new searched collection will replace the oldest one, so there will always be 5 on the user's home page. If the user activates the link for an NFT they are interested in, the NFT's link metadata will be permanently stored in the recommendation database that can be accessed whenever needed by the user, and will facilitate Process 5.



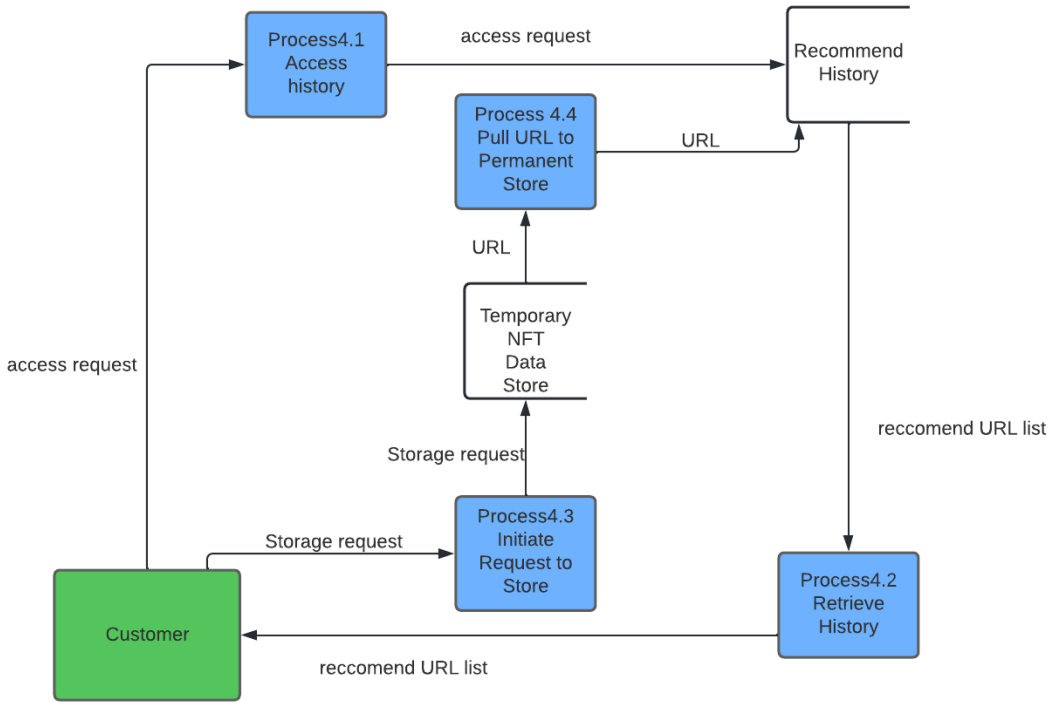

**Level 1 Process 2 DFD (Streaming Platform Data Retrieval):**



## Level 1 Process 3 DFD (Customer Account Setup & Quiz):




## Level 1 Process 4 DFD (URL Storage & Retrieval):



**Wireframe designs:**

The navigation buttons on the top of the web page (left arrow, right arrow, refresh arrow, 3 bar symbol) are simply used for decoration. The wireframes can be successfully navigated without them. The three main tabs at the top (home, market, history) are the key navigation functions for our wireframes, and the searching process will eventually return the user to the home tab, which will display the recently selected Collections and NFTs.

**In order to maintain the functionality of our wireframes, we have decided not to combine them with this document and have submitted the wireframes in a separate PDF(‘*Wireframe design DEMO’*). Unfortunately, the PDF combination tool we utilized eliminated all of the links between the wireframes that we created, so we have submitted two PDFs (one is this deliverable and the other is our functional wireframes).**

**Executive Summary**

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| **Project Background Information**<br>**Internal Name:** Non-Fungible Token Market<br>**Project Sponsor:** Professor Stephanie Watts<br>**Project Manager:** Yifei Zhao, Tyler KrautKramer |
| **Problem/Opportunity Statement:**<br>The rising need for recommendations on NFT investment is growing rapidly, yet there is no existing platform on the market. Customers need assistance finding the ideal NFT based on their personal preferences that also align with their investment requirements. Individual traders tend to misperceive the intrinsic (investment) value of an NFT based on gut feeling, and that can lead to bad investment decisions. A new platform is essential for pushing NFT recommendations that are both closely matched to the user's music preference and investment vision based on predefined criteria the user can willingly provide. |
| **Project Objectives:**<br>To promote smarter investments and/or provide a user with songs they genuinely like for potential ownership rights. The system will also present OpenSea market data to the user as well as disclose the user browsing data to the Open Sea platform. |
| **Project Description:**<br>OpenSea is a platform for customers to perform the trade, while our platform helps the customer *discover* the best options for them based on a highly customized searching experience. |
| **Business Benefits:**<br>Improved user value and investment value prioritization for NFT trading decisions<br>Better understanding of user preferences<br>Unique music NFT discovery services not established yet |
| **Future Plans:**<br>Discover potential revenue model(apply freemium most likely)<br>Estimate system maintenance and development cost<br>Develop AI training algorithm<br>Alpha/Beta tests with real user feedbacks<br>Add rooted interactive functionality between the website and the user browser's menu buttons. |
| **Unsolved Issues:**<br>In what way the AI generator should be trained to yield the most accurate musical attributes' result?<br>How is the UI supposed to be designed to make the searching process more self-explanatory?<br>What are the legal considerations for creating a marketplace? |