Lab 2 Section 3 - Art Guardian Product Specification

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CS 411W

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Collaborative Section 3

Version 2

3   Product Requirements

3.1   Functional Requirements

3.1.1   User Interface

3.1.1.1 Navigation Bar *(O: Diaz)*

- The navigation bar shall appear on all pages, except the sign-in and registration page

- The Art Guardian logo shall appear on the left side of the navigation bar

- The navigation bar shall have four buttons to direct to four different pages:

  - Home (3.1.1.3)

  - Profile (3.1.1.5)

  - Notifications (3.1.1.6)

  - Settings (3.1.1.8)

3.1.1.2 Account Creation *(O: Diaz, M1: Ihde, M2: Thompson)*

3.1.1.2.1 Sign-In

- The Sign-In page shall be the default page when the web application is loaded, if the user has not previously logged in

- The Art Guardian logo shall appear in the center of the page

- There shall be two text boxes at the center of the page

  - The user shall insert their sign in information to the text boxes labeled username and password

  - If the login credentials is invalid, the user will be notified that either their username or password is invalid in red text between the password text box and the login button.

○ The login credentials are invalid if either the information in any of the boxes are incorrect or if one of the boxes is left blank.

● There shall be a "Login" button under the password text field

○ This button shall perform the authentication

● There shall be a "Sign-up" button under the "Login" button

○ This button shall redirect the user to the registration page (3.1.1.2.2)

3.1.1.2.2 Registration *(O: Ihde, M1: Thompson)*

● The registration page shall require the following information from the user:

○ Email

○ First Name

○ Last Name

○ Password

○ Password Confirmation

○ Phone Number

○ Linked Art Account

● There shall be a submit button at the bottom of the page

● Users shall only be able to submit the information if all the information fields are filled.

● If the user attempts to submit without filling in all the information then the empty information fields shall be highlighted in red and

text will appear in between the Sign Up logo and the email text

box stating that the user must fill in all information.

3.1.1.3 Landing Page *(O: Kidd, M1: Thompson)*

3.1.1.3.1   Updates *(O: Kidd, M1: Thompson)*

- At the top of the page there shall be a welcome message for the

  user.

- There shall be a message notifying the user of new instances of art

  theft after the welcome message

- There shall be a hyperlink located below the art theft notification

  message to redirect the user to the notifications page if any

  instances of art theft are found for the user.

3.1.1.3.2   Guidelines *(O: Kidd)*

- Below the updates section there shall be a message that says 'Art

  Protection Guidelines'

- There shall be a description of the Art protection Guidelines under

  the 'Art Protection Guidelines' message

3.1.1.4 Art Upload *(O: Ihde, M1: Thompson)*

- This function shall allow users to upload images of their artwork to

  be stored in the database, which will then be available to view in

  the art library

- The Art Upload page will prompt the user to upload their art and

  will present them a textbox for title and an add file square that a

  user can click on to upload an image file.

- ○ Image files shall be in either JPEG or PNG format

- Once the art has been given a title and a file is uploaded, the user will be able to click on the upload button on the bottom of the page to upload the art to the database.

  - ○ The upload file will be grayed out until the user gives the art a title and they upload the file for the art. Once both have been done, the button will be highlighted blue to indicate that the user can upload their art.

3.1.1.5 Art Gallery (*O: Ihde, M1: Zheng*)

3.1.1.5.1 Profile *(O: Ihde)*

- At the top of the page, the user profile picture shall be displayed, along with the number of uploaded art pieces, and an art upload button which brings users to the art upload page (3.1.1.4).

3.1.1.5.2 Gallery View *(O: Ihde, M1: Zheng, M2: Thompson)*

- The art gallery view shall display all of the images uploaded by the user.

  - ○ The art gallery resides below the profile view.

- Images shall be displayed as cards in a rectangular grid format that adjusts its number of images per row based on the window size.

- Each card shall display a preview of the uploaded art and the following information shall be displayed under the image preview:

    - ○ Title

    - ○ Upload Date

- ○ Whitelist Status

- There shall be an edit button on each image card, which when clicked, a pop up window will appear to the right of the art, and users can edit the title, set whitelisting status, or delete the art piece, which will also remove it from the art database.

3.1.1.6 Notifications *(O: Diaz)*

3.1.1.6.1 Alerts *(O: Diaz, M1: Thompson)*

- Notifications shall be sent to the user on the web application.

- The alerts icon will appear in the navigation bar of Art Guardian.

- Alerts shall appear in a vertical list when the icon is clicked on, in which the user can scroll up or down to view more alerts.

- A single alert shall contain a preview of the NFT on the left side of the panel.

- A single alert shall have a brief description of the NFT, worded as: "Your art titled <Art Title> has been found on a(n) <NFT Marketplace Name> transaction. Click here for more information".

- A single alert shall contain:
  - ○ Information link
  - ○ NFT URL link

- The notification button on the navigation bar shall have a red dot to indicate/new notifications.

3.1.1.6.1.1 Information Link *(O: Diaz)*

- The information link shall be a hyperlink with the text "Click

  here".

- The information link shall redirect the user to the Art Confirmation

  page.

3.1.1.6.1.2 NFT Link *(O: Diaz)*

- The NFT link shall be a hyperlink with the text being the name of

  the NFT Marketplace.

- The NFT link shall redirect the user to a new tab with the URL of

  the NFT.

3.1.1.6.2 Art Confirmation *(O: Diaz)*

- The art confirmation page shall contain the NFT information and

  preview (3.1.1.6.2.1) on the left side of the page.

- The art confirmation page shall contain checkboxes (3.1.1.6.2.2) to

  ensure integrity by the user.

- The art confirmation page shall have a continue button at the

  bottom right of the page, underneath the checks.

  - The button shall be grayed out and non-clickable if either

    of the checkboxes are not checked.

  - The button shall be blue and clickable if both checkboxes

    are checked.

3.1.1.6.2.1 NFT Preview *(O: Diaz)*

- The NFT preview shall contain the information of the NFT

  detected:

- ○ An image preview of the NFT

- ○ The NFT marketplace found on

- ○ The NFT URL

- ○ The blockchain the NFT is on

- ○ The NFT token

- ○ The name of the person who owns the NFT

3.1.1.6.2.2 Check Boxes *(O: Diaz)*

- The check boxes on the art confirmation page shall ensure that:

  - ○ The user is the original artist of the art

  - ○ The user is looking to request a takedown of the NFT

- The check boxes shall appear on the right side of their respective descriptions.

- The checkboxes shall have a "required" text underneath it to indicate the user must check the boxes continue.

3.1.1.7 DMCA Takedown Page *(O: Kidd)*

3.1.1.7.1 DMCA Takedown Request Preview *(O: Kidd, M1: Diaz)*

- At the top of the page there shall be a header that says 'DMCA Takedown Request'.

- Below the 'DMCA Takedown Request' header there shall be a modal containing a preview of the generated email that will be sent to a NFT marketplace on the users behalf.

  - ○ The generated email shall contain auto-filled data where it is needed:

- NFT marketplace name

- NFT link

- NFT token

- User art name

- User email

- User address

- User phone number

    ○ This modal shall be vertically-scrollable if the screen size is
    too small.

3.1.1.7.2 E-Signature *(O:Kidd, M1: Thompson)*

- There shall be a box for the user to provide their signature below
  the email generation preview.

- There shall be a submit button to the right of the signature box for
  the user to submit the DMCA takedown request.

    ○ The Submit E-Signature button shall be grayed out until the
    user has put down their e-signature.

3.1.1.8 Settings *(O: Ihde, M1: Thompson)*

- The settings icon shall be located in the navigation bar of Art Guardian.

- When the settings icon is clicked on, the user shall be redirected to the
  settings page.

3.1.1.8.1 Account Information *(O: Ihde, M1: Thompson)*

- Users shall be able to edit personal information associated with
  their account. This information include:

- ○ First Name

- ○ Last Name

- ○ Email Address

- ○ Phone Number

- Users shall be able to add and delete art accounts associated with their account.

- Users shall be able to reset their password.

  - ○ If users choose to reset their password, then an email shall be sent to their account's email address which shall contain a link that takes them to change password page.

  - ○ The password reset link shall only last for 24 hours, after that the user needs to request another password reset link.

- Users shall be able to change their profile picture by uploading an image file in JPEG or PNG format.

3.1.1.8.2 Security Settings *(O: Ihde)*

- Users shall be able to add two-factor authentication to their account.

- Two-factor authentication shall be verified by a text message to the user or an alternative email address.

3.1.2 Algorithms

3.1.2.1 Flagging *(O: Zheng)*

- Flagging shall mark any specified TokenID or image ID within the database to be removed from the Image Batch Scheduler. (3.1.2.3.1).

3.1.2.2 Whitelisting (*O: Roberts, M1: Thompson, M2: Zheng*)

- Whitelisting shall allow users to choose specific NFTs to exclude from the Image Batch Scheduler. (3.1.2.3.1).

- Users shall input the Token ID for one specific NFT they wish to whitelist.
  - To input the Token ID, the user shall type the Token ID into a form field within a modal that shall be accessed by clicking on the "Whitelist" button on the Gallery View.

- The Token ID shall be passed on to the NFTPort API, which will search if the Token ID exists.
  - If the Token ID is found, the modal shall display the following statement: "Token ID has been successfully whitelisted!"
    - Afterwards, the Token ID shall be sent to the DynamoDB database and shall be flagged using the flagging algorithm. (3.1.2.2.1)
  - If the Token ID is not found, the modal shall display the following statement: "Token ID could not be found."
    - Afterwards, the user shall be prompted back to inputting a Token ID.

3.1.2.3 Marketplace Monitoring (*O: Roberts, M1: Diaz, M2: Zheng*)

- Marketplace monitoring shall allow the OpenSea NFT marketplace to be searched and monitored for counterfeit NFTs using the Image Batch Scheduler. (3.1.2.2.1)

3.1.2.3.1 Image Batch Searcher (*O: Zheng*)

- The Image Batch Searcher shall periodically batch 15 or fewer separate images within the user's art library and search for counterfeit NFTs with the NFTPort API using those images as queries.

    ■ The period between searches shall be two weeks long.

    ■ Only one batch shall be searched at a time.

    ■ The following pattern of batching shall be implemented:

        ○ The first 15 images shall be searched first.

        ○ The second 15 images shall be searched second.

        ○ Etc.

    ■ If there are less than 15 images within the user's art library, then those images shall be searched every period.

    ■ The Image Batch Searcher shall not batch or search any images that are flagged.

- The Image Batch Searcher shall return:

    ■ The top five NFTs that result from each image search.

    ■ The image used to query the NFTPort API.

3.1.2.4 Image Matcher (*O: Zheng, M1: Ihde, M2: Thompson*)

- The Image Matcher shall retrieve the returned items from the Image Batch Searcher. (3.1.2.2.1)

- The Image Matcher relies on the FAST feature-matching algorithm to compare each query image to the images of the corresponding top five NFTs.

- The Image Matcher will return a similarity score for each comparison.

  - Any comparison that returns a similarity score less than 0.9 will be ignored.

- The NFT and query image pair with the highest similarity score shall be part of the contents within a single alert. (3.1.1.6.1)

3.1.3   DMCA Takedown Processes

3.1.3.1 DMCA Generation (*O: Roberts, M1: Diaz*)

- This is a page that will automatically generate a DMCA take down for a user after the user confirms the stolen artwork is theirs and that they would like to pursue a take down. The take down will be generated using the preset DMCA Takedown Template as well as data collected from the NFT that was found to be stolen art and user data. This includes:
  - User artwork title
  - Marketplace name
  - Marketplace URL
  - email address of notice sender
  - A statement that the notifier has a good faith belief that the material is not authorized by the intellectual property or copyright owner, its agent, or the law.
  - Statement that Art Guardian has permission to send this notice on behalf of the copyright holder.

3.1.3.2 DMCA Filing (*O: Roberts, M1: Diaz*)

- This feature shall send the DMCA takedown request through email. This feature shall be partially implemented in the prototype, in which the DMCA takedown request will be sent to a testing email via the gmail API.

3.1.3.3 DMCA Cataloging (*O: Roberts, M1: Diaz*)

- This function tracks and catalogs information regarding generated DMCA takedown notices.

○ This includes:

○ Date and time of generation and issue

○ Parties involved

○ DMCA sent

● This catalog can later be accessed by the user via the user profile under "DMCA History".

3.2   Performance Requirements (*O: Diaz, M1: Thompson*)

3.2.1   Scanning Frequency (*O: Zheng, M1: Ihde*)

● The application shall scan the NFT marketplaces for stolen artwork every two weeks.

3.2.2   Web Application Performance

3.2.2.1 Web Pages (*O: Zheng, M1: Kidd*)

● All web pages shall load within five seconds.

3.2.2.2 Image Upload (*O: Zheng, M1: Kidd*)

● Uploading images shall not take more than one minute.

3.2.2.3 Image Loading (*O: Zheng, M1: Kidd*)

● All entries within the Image Library shall load within one minute.

3.2.2.4 Image Matcher (*O: Zheng, M1: Thompson*)

● Results will be returned from the Image Matcher within one minute.

3.2.2.5 DMCA Generator (*O: Zheng, M1: Thompson*)

● DMCA takedown notices will be generated within 30 seconds.

3.2.2.6 Network Performance (*O: Zheng, M1: Kidd*)

● Given that the user has a stable internet connection with a speed >700 mbps, all operations involving the transfer of data from a

non-UI component to the UI and vice versa will not require more than two minutes in completion time.

3.2.2.7 Concurrency Performance (*O: Ihde, M1: Zheng*)

- The server shall be able to handle at least 5 requests per second.

3.3   Assumptions and Constraints   (*O: Kidd, M1: Ihde)*

Condition	Type	Effect on Requirements
Users cannot occupy more than one profile.	Constraint	Bounds the problem of matching users to available profiles
Only valid data entries will be provided.	Assumption	Allows for minimal error checking for the purposes to developing and demonstrating the prototype
The desktop web application will be hosted through AWS services.	Dependency	The AWS Amplify platform must be simulated if AWS cloud services are not available

Table 2. Effects of Assumptions, Dependencies, and Constraints on Requirements.

3.4   Non-Functional Requirements

3.4.1   Security (*O: Kidd, M1: Roberts, M2: Ihde, M3: Diaz*)

3.4.1.1 Protocol (*O: Kidd, M1: Roberts, M2: Ihde, M3: Diaz*)

- The website shall use HTTPS to encrypt transferred data between client and server.

3.4.1.2 Database *(O: Kidd, M1: Roberts, M2: Ihde, M3: Diaz)*

- The database shall have access control using an MFA requirement and AWS IAM role policies.

- The data on the database shall be encrypted.

3.4.1.3 Authentication *(O: Kidd, M1: Roberts, M2: Ihde, M3: Diaz)*

- The prototype shall utilize two factor authentication via Google authenticator.

3.4.2 Maintainability (*O: Kidd, M1: Hite)*

3.4.2.1 AWS Amplify

- The prototype shall utilize AWS Amplify to host a frontend, backend, and database.

- The Amplify project shall be updated on a quarterly basis to provide the very latest updates for NFT monitoring and detection.

- The Amplify project shall undergo maintenance procedures for all other components, such as the database, semiannually.

- Maintenance and updates to the Amplify project shall be conducted by appropriately skilled personnel.

3.4.3 Reliability *(O: Roberts, M1: Diaz)*

- The prototype shall have a 90% reliability so theft does not go without notice and artists are able to act.

- The prototype shall have a 90% reliability so users may use Art Guardian's core features without interruption.

3.4.3.1 Availability *(O: Diaz)*

3.4.3.1.1 Art Upload Availability *(O: Diaz)*

- The art upload feature shall be available 24 hours a day, 7 days a week.

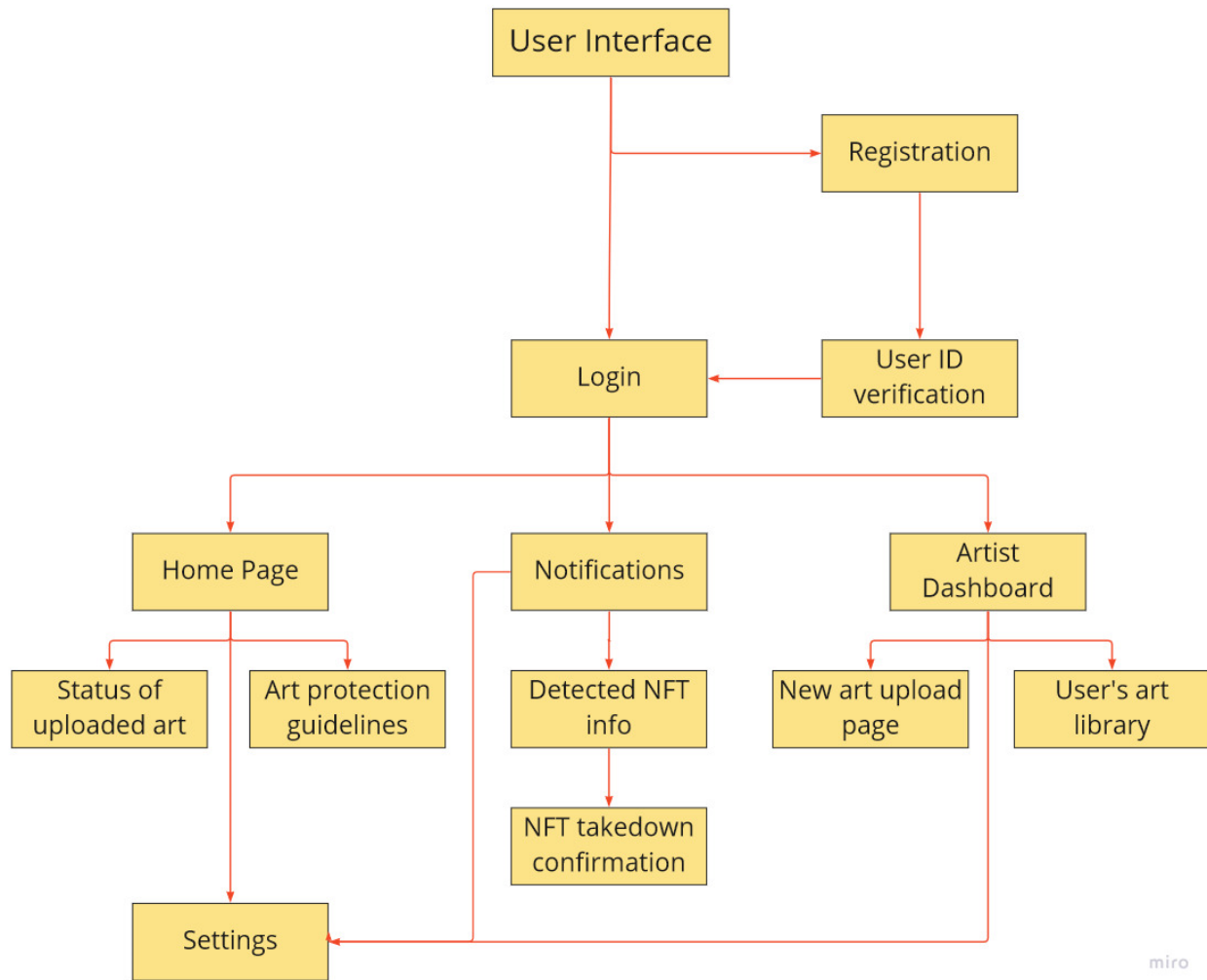- Users shall not experience any delays, difficulties, or restrictions when uploading artwork.

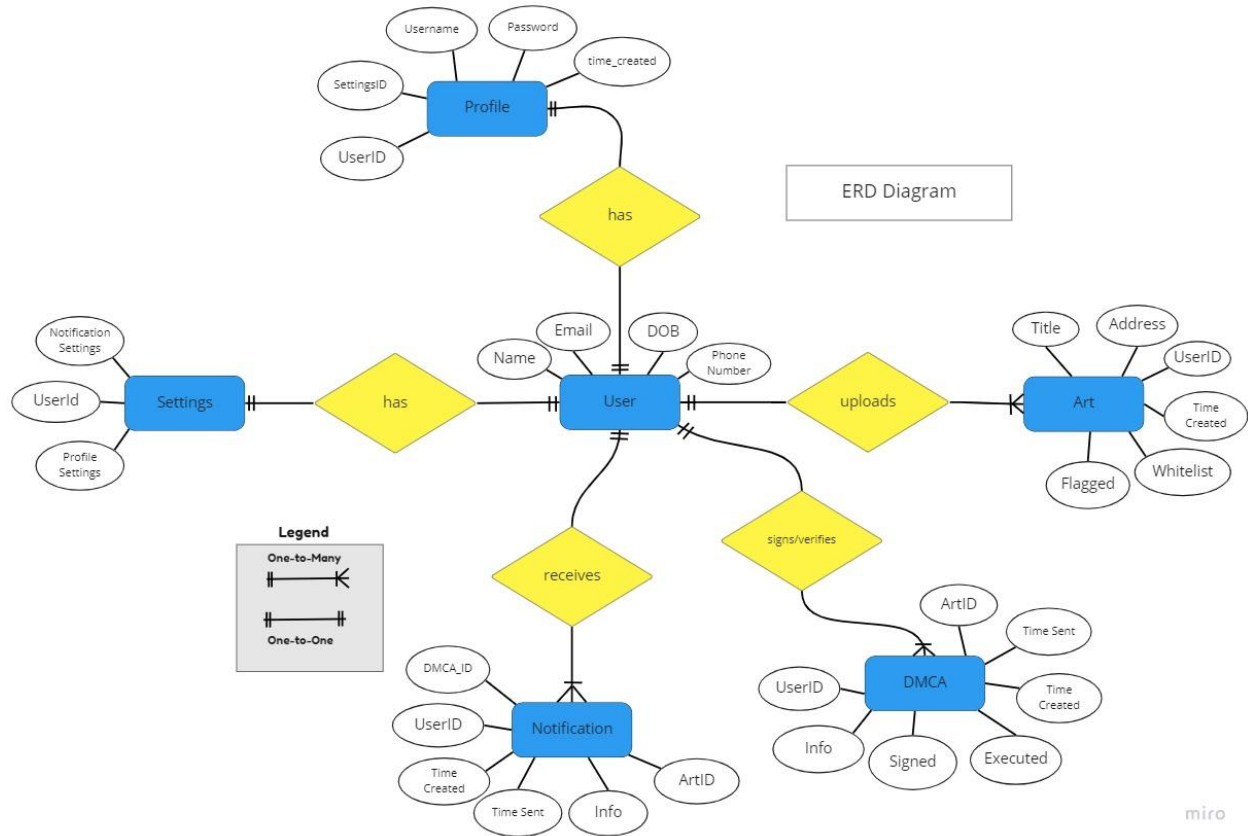**3.4.3.1.2 Marketplace Search Availability** *(O: Diaz)*

- A marketplace search shall occur the instant a piece of art is uploaded.

- A marketplace search shall be performed on a monthly basis.

- Marketplace searches shall happen in batches of at most 100 pieces during off-peak hours (12AM - 6AM EST).

- The prototype shall be able to complete at least 90% of its marketplace searches without error.

3.4.3.1.3 DMCA Generation Availability *(O: Diaz)*

- DMCA generation shall be available 24 hours a day, 7 days a week

- The prototype shall be able to complete at least 90% of its DMCA generation without error

Appendix A Site Map *(O: Ihde, M1: Diaz)***:**

Appendix B Database Schema *(O: Kidd)*:

ERD Diagram

Appendix C Database Tables *(O: Kidd)*:

Database Entities & Attributes

Settings

-ID

-Notification Settings

-Profile Settings

-User

User

-ID

-First Name

-Last Name

-DOB

-Email

-Phone Number

Art Info

-ID

-Art Name/Title

-Art Address

-Creation Time/Date

-Whitelist Art

-Flagged Art Detected

-User

DMCA Info

-ID

-DMCA Name/Title/#

-Description/Info

-Creation Time/Date

-Artist Confirmation to Send DMCA

-Date/Time DMCA is sent

-Marketplace Response to DMCA

-User

-ArtID

Notifications

-ID

-Creation Time/Date

-Description/Info

-Date/Time Notification is Sent

-UserID

-DMCA_ID

Profile

-ID

-SettingsID

-Username

-Password

-Time Created

-UserID

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