

SOFTWARE REQUIREMENTS ANALYSIS FOR PhotoN WEBSITE

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1 Context Diagram

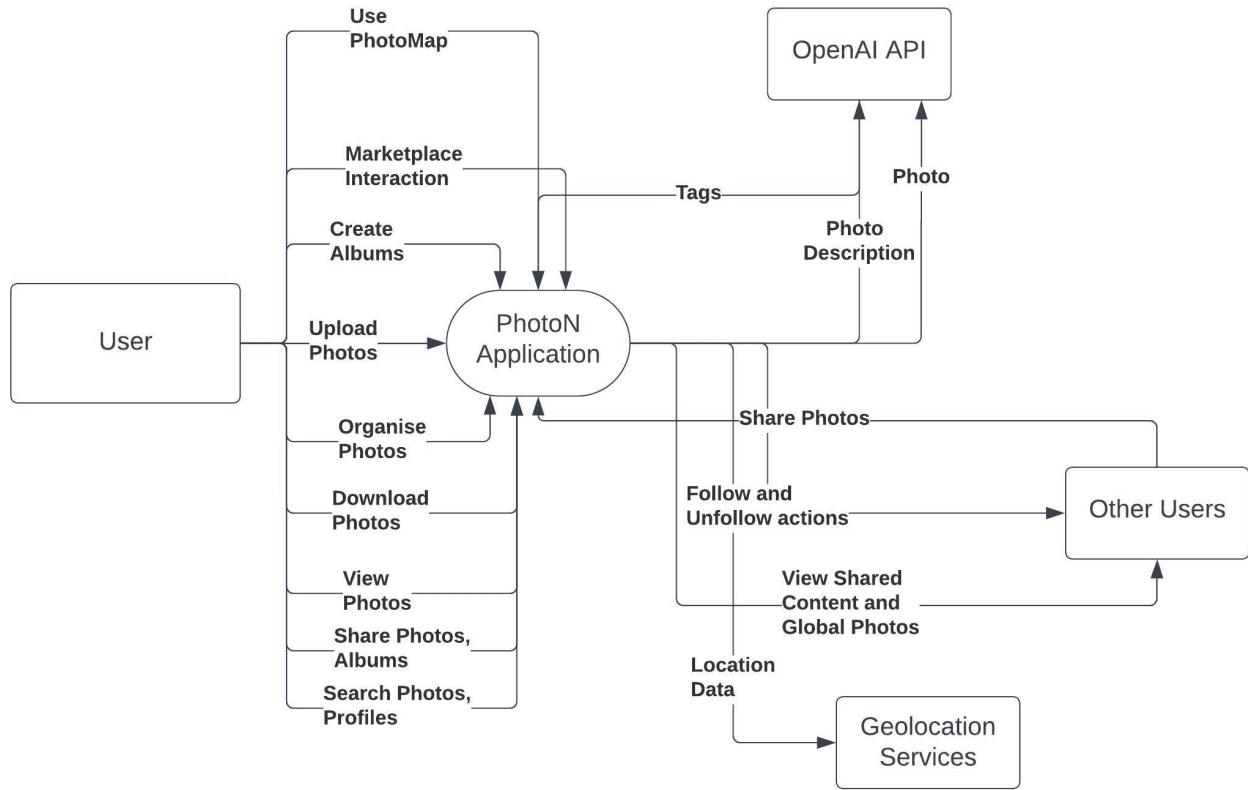
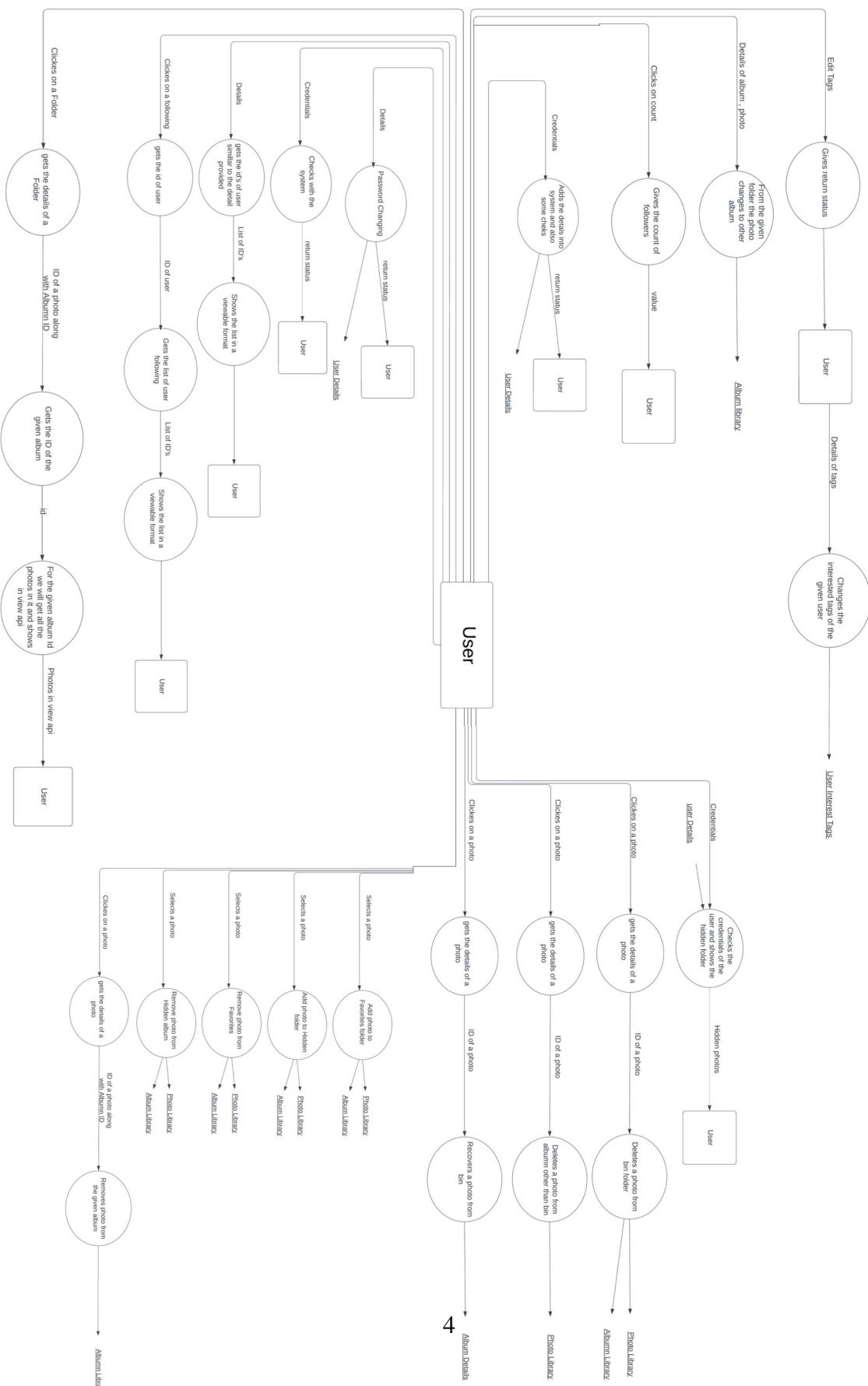
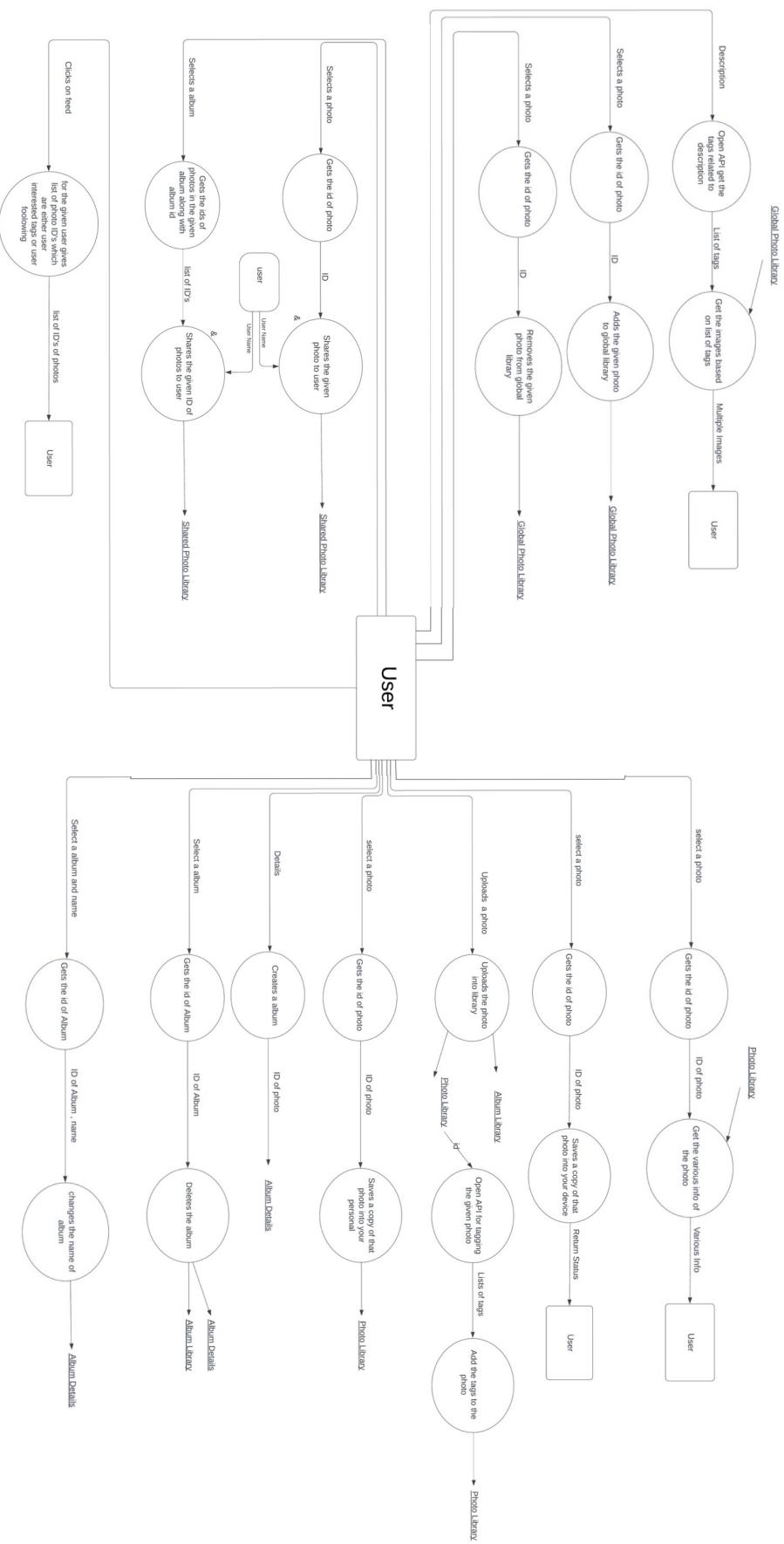


Figure 1: Context Diagram for PhotoN

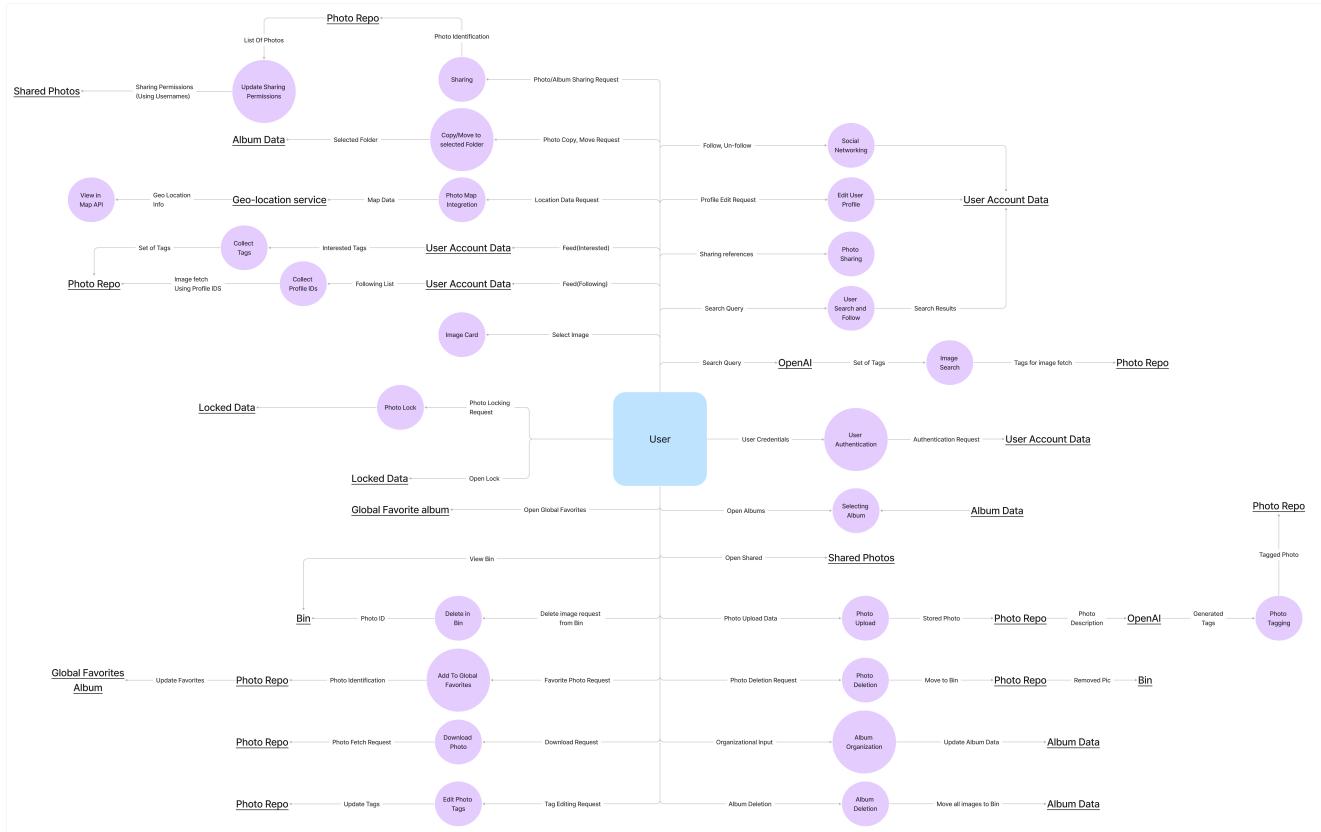
2 Data Flow Diagram

2.1 DFD - 1





2.2 DFD - 2



2.2.1 About the DFD

- The Data Flow Diagram (DFD) outlines about the working of the application, showcasing the systematic flow of information between users, processes, and data stores.
- **User Interaction:** The DFD highlights how users interact with the application, showing the actions like uploading, viewing, and sharing photos. It shows the steps involved in user authentication.
- **Photo Processing:** The DFD shows the processing of photo data, which includes uploading photos and auto tagging with help of OpenAI API, and organizing into albums.
- **Sharing Mechanisms:** A part of the DFD shows the mechanism for sharing photos. It shows the flow from selecting photos/albums to share.
- **Data Storage and Retrieval:** The DFD outlines how photos are stored in the data repos. It displays the interaction between user requests and the database, detailing how photos are fetched, how searches are done (e.g., by tag, and description).
- **External Integrations:** The DFD also shows the application's integration with external services, such as map APIs for geo-tagging and OpenAI API for auto tagging of the photos along with extracting tags for a given description.

3 Choice of DFD

- We are using DFD 2 for our application.
- Choosing DFD 2 instead of DFD 1 is because, DFD 2 gives us the right amount of detail without being too complicated.
- DFD 2 shows us how the system works in an easy way, without too much information. DFD 2 does a good job explaining parts like favorites, albums, and managing hidden items, giving enough information to help but not too much.
- DFD 2 also gives more detailed information about important parts like the feed, which is very important for how users enjoy using it.
- In DFD 2, the way of sharing things is stronger and makes sure the right permissions are in place. This attention to detail is really useful, especially in important areas, making sure the design works well and is easy for users. It fits what our app wants to do.

4 Function Point Analysis (FPA)

Function Point Analysis (FPA) is a method used to estimate the size and complexity of software systems. This technique assesses the system's functionality from the user's perspective, based on the inputs, outputs, user interactions, data files, and interfaces that are part of the software application. The primary goal of FPA is to measure the software development effort and cost, based on the system's functional requirements.

4.1 How Function Point Analysis Works

- Identifying Countable Components: The first step in FPA is to identify and classify the countable components of the software system. These components typically include:
 - External Inputs (EI): These are the elementary processes in which data is received from an external source.
 - External Outputs (EO): These processes produce data for external sources.
 - External Inquiries (EQ): These are elementary processes involving both input and output.
 - Internal Logical Files (ILF): These are user-identifiable groups of logically related data.
 - External Interface Files (EIF): These are files used for reference purposes, imported from outside the application.
- Weighting Factors: Each of these components is assigned a complexity weight (low, average, high) based on their characteristics. The complexity is determined by factors like the data structure, number of data elements, and processing logic complexity.
- Calculating Unadjusted Function Points (UFP): The total number of function points for each component is calculated by multiplying the number of each type of component by its respective weight. The sum of these products gives the Unadjusted Function Points.

- Adjustment for Technical Complexity: The UFP is then adjusted for technical complexity factors, which take into account the technical environment, user efficiency, performance objectives, and other relevant factors. This is done using a Value Adjustment Factor (VAF), which is derived from a set of 14 general system characteristics, each rated on a scale.
- Final Function Point Count: The final function point count is obtained by multiplying the UFP by the VAF. This count provides a quantifiable measure of the software's functionality.

4.2 List of Identifying Countable Components

- External Inputs(EIs):

1. Photo Locking Request

- DETs: Photo ID, Lock Status
- FTRs: Shared Photos, User Data

2. Global Favourite Request

- DETs: Photo ID, Favourite Status
- FTRs: Global Favourites, User Data

3. Tag Editing Request

- DETs: Photo ID, Tags
- FTRs: Photo Repository

4. User Credentials

- DETs: Username, Password
- FTRs: User Data

5. Photo Upload

- DETs: Photo File, Metadata
- FTRs: Photo Repository, User Data

6. Photo Deletion Request

- DETs: Photo ID
- FTRs: Photo Repository, Bin

7. Create/Rename Album

- DETs: Album ID, Album Name
- FTRs: Album Data, User Data

8. Album Deletion

- DETs: Album ID
- FTRs: Album Data, Bin

9. Profile Editing

- DETs: User ID, Profile Data
- FTRs: User Data

10. Sharing Preferences

- DETs: User ID, Sharing Settings
- FTRs: User Data

11. Follow and Unfollow Users

- DETs: User ID, Target User ID, Follow/Unfollow Action
- FTRs: User Data

12. Photo Copy and Move

- DETs: Photo ID, Destination Album ID
- FTRs: Photo Repository, Album Data

- External Query(EQs):

1. Search People

- DETs: Search Keyword(s)
- FTRs: User Data

2. Following Feed

- DETs: User ID
- FTRs: User Data, Shared Photos (from followed users)

3. Interested Feed

- DETs: User ID, Interest Tags
- FTRs: User Data, Shared Photos (tagged with user's interests)

4. Selecting Image

- DETs: Image ID
- FTRs: Photo Repository

5. View Global Favourite

- DETs: User ID (optional)
- FTRs: Global Favourites

6. View Albums

- DETs: User ID
- FTRs: Album Data

7. View Bin

- DETs: User ID
- FTRs: Bin

8. View Locked

- DETs: User ID
- FTRs: Locked Data

- External Output(EO):

1. Location Request

- DETs: User ID, Photo ID (for which location is requested)

- FTRs: Photo Repository (to retrieve the specific photo's geolocation data), User Data.

2. Search Photo

- DETs: Search Keywords/Tags
- FTRs: Photo Repository (to search photos based on keywords/tags),

- External Interface Files(ELFs):

1. View Map API

- DETs : Map Coordinates, Location Data
- RETs : Each unique location record that can be fetched or interacted with through the API.

2. OpenAPI

- DETs: API Endpoint Specifications, Data Schema
- RETs: Each distinct set of data or service provided by the API, such as user authentication, photo data retrieval, or album information access.

- Internal Logical Files (ILF):

1. Shared Photos

- DETs: Photo ID, User ID, Album ID, Tags, Permissions
- RETs: Each unique photo record, including metadata and sharing settings.

2. Locked Data

- DETs: Photo ID, Lock Status, User ID
- RETs: Each unique record of photos that have been locked for privacy.

3. Global Favourites

- DETs: Photo ID, Favourites Count, User ID
- RETs: Each unique record of photos marked as favourites globally.

4. Album Data

- DETs: Album ID, User ID, Album Name, Creation Date, Photo IDs
- RETs: Each unique album record containing metadata and associated photos.

5. Bin

- DETs: Deleted Photo ID, Deletion Date, User ID
- RETs: Each unique record of photos that have been deleted but are still in the bin.

6. Photo Repository

- DETs: Photo ID, Upload Date, User ID, File Size, Resolution, Tags
- RETs: Each unique photo record, including the file and its metadata.

7. User Data

- DETs: User ID, Username, Password, Email, Profile Settings, Preferences
- RETs: Each unique user record containing personal and preference data.

4.3 Unadjusted Function Points (UFP) Calculation

1. External Inputs (EIs):

- Total FTRs: 19
- Total DETs: 23

Weight(EI) = $19 \times 6 = 114$ (High).

2. External Inquiries (EQs):

- Total FTRs: 10
- Total DETs: 9

Weight(EQ) = $10 \times 6 = 60$ (High).

3. External Outputs (EOs):

- Total FTRs: 3
- Total DETs: 3

Weight(EO) = $3 \times 4 = 12$ (Low).

4. Internal Logical Files (ILFs):

- Total RETs: 7
- Total DETs: 31

Weight(ILF) = $7 \times 15 = 105$ (High).

5. External Interface Files (EIFs):

- Total RETs: 2
- Total DETs: 4

Weight(EIF) = $2 \times 5 = 10$ (Low).

UFP = 301.

4.4 Value Adjustment Factor (VAF) Calculation

- **Data Communications:** Moderately high importance (Score: 3).
- **Distributed Data Processing:** Moderate importance (Score: 3).
- **Performance:** Crucial importance (Score: 4).
- **Heavily Used Configuration:** Significant importance (Score: 3).
- **Transaction Rate:** High importance (Score: 4).
- **Online Data Entry:** Significant importance (Score: 4).

- **End-User Efficiency:** High importance (Score: 4).
- **Complex Processing:** High importance (Score: 4).
- **Reusability:** Moderate importance (Score: 3).
- **Installation Ease:** Less critical (Score: 2).
- **Operational Ease:** User-friendly and manageable (Score: 3).
- **Multiple Sites:** Moderate importance (Score: 3).
- **Facilitate Change:** Easily accommodate changes (Score: 4).
- **Special Security Features:** Advanced security features, especially for photo privacy (Score: 4).

Total Degree of Influence = 48.

4.5 Final Function Point Count

$$\begin{aligned}
 FFP &= UFP \cdot (0.65 + 0.01 \cdot VAF) \\
 &= 301 * (0.65 + 0.01 * 48) \\
 &= 301 * (1.13) \\
 &= 340.
 \end{aligned}$$

Average Expected Lines of Code = $70 * 340 = 23K$.