Step 1: Identifying the Business Problem

Our client, GMPhotography, for this problem is a small photography who captures and produces pictures for families, weddings, graduations, and newborns. GMPhotography is a local business that has risen from a small business to a local powerhouse within the past 10 years.

At first, the business was for local customers; now, due to popular demand, she has nationally expanded her business. Because her business has dramatically increased in popularity, the owner of GMPhotography, has notices she needs an efficient system to query information and maintain data regarding her photos, events, and clients. As a close friend, I decided to help her out and begin organizing a system that best suits her needs.

After speaking with Gabby, we found that she wants information recorded about the following:

- The following information should be recorded as entities
  - Client
  - Album
  - Staff
  - Event
  - Camera

Step 2: Building the ER Model

Here are the entities and their attributes

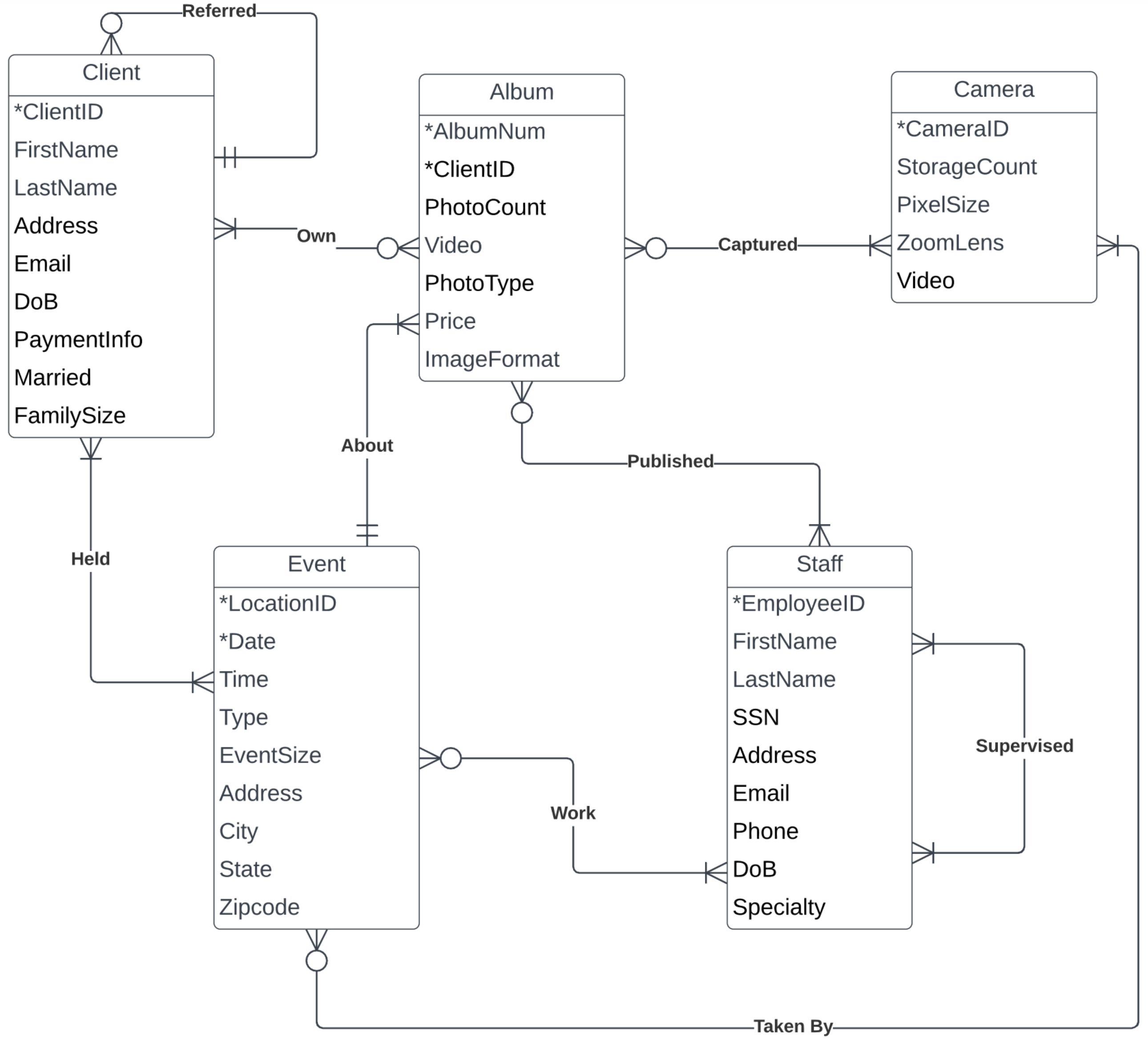
- Client
  - ClientID
    - The identifier
  - FirstName
  - LastName
  - Address
  - Email
  - DoB
  - PaymentInfo
  - Married
  - FamilySize
- Album
  - AlbumNum
    - Identifier
  - ClientID
    - Identifier
  - EventID
    - Identifier
  - PhotoCount
  - Video
  - PhotoType
  - Price

  - ImageFormat
- Staff
  - EmployeeID
    - Identifier
  - FirstName
  - LastName
  - SSN
  - Address
  - Email
  - Phone
  - DoB
  - Specialty
- Event
  - Location
    - Identifier
  - Date
    - Identifier
  - Time
  - Type
  - Event Size
- Camera
  - CameraID
    - Identifier
  - StorageCount
  - PixelSize
  - ZoomLens
  - Video

<u>Here are the Relationships</u>

- A client can have zero or more albums; an album must belong to one or more clients
- A client must have one or more events; an event must have one or more clients
- An album must have been created by one or more employees; an employee may have created one or more albums.
- An album must contain one and only one event; an event must have one or more albums
- An event must have been captured by one or more cameras; a camera may have been use for zero to many events
- An event must have one or more staff members; a staff member may be assigned to 0 or more events
- An album must have been authored by one or more staff members; a staff member may author zero or more albums
- A staff member must be supervised by one or more other staff members: a staff member may supervise one or more other staff members
- A client may refer the company to one or more other clients; a client may have been referred the company by one and only one other client

Step 3: Entity Relationship Diagram



Step 4: Convert the ERD to a Relational Model

- Client(ClientID, FirstName, LastName, Address, Email, DoB, PaymentInfo, Married, FamilySize, ReferredClient(fk))
- Album(AlbumNum, ClientID, PhotoCount, Video, PhotoType, Price, ImageFormat, Location(fk), Date(fk), EmployeeID(fk))
- Event(Location, Date, AlbumNum(fk), Time, Type, EventSize)
- Camera(CameraID, StorageCount, PixelSize, ZoomLens, Video)
- Staff(EmployeeID, FirstName, LastName, SSN, Address, Email, Phone, DoB, Specialty, SupervisorID(fk))
- Client_Album(ClientID(fk), AlbumNum(fk), ClientID(fk))
- Album_Camera(AlbumNum(fk), ClientID(fk), CameraID(fk))
- Album_Staff(AlbumID(fk), ClientID(fk), EmployeeID(fk))
- Camera_Event(CameraID(fk), Location(fk), Date(fk))
- Event_Staff(Location(fk), Date(fk), EmployeeID(fk))

Step 5: Normalize the Relational Model to 3NF

- Client(ClientID, FirstName, LastName, Address, Email, DoB, PaymentInfo, Married, FamilySize, ReferredClient(fk))
    - FD1: ClientID -> FirstName, LastName, Address, Email, DoB, PaymentInfo, Married, FamilySize, ReferredClient
- Album(AlbumNum, ClientID, PhotoCount, Video, PhotoType, Price, ImageFormat, Location(fk), Date(fk), EmployeeID(fk))
    - FD1: AlbumNum, ClientID -> PhotoCount, Video, PhotoType, Price, ImageFormat, Location(fk), Date(fk), EmployeeID(fk)
- Event(LocationID, Date, AlbumNum(fk), Time, Type, EventSize, Address, City, State, ZipCode)
    - FD1: LocationID, Date -> AlbumNum(fk), Time, Type, EventSize, Address, City, State, Zipcode
    - FD2: LocationID -> Address, City, State, Zipcode
- Camera(CameraID, StorageCount, PixelSize, ZoomLens, Video)
    - FD1: CameraID -> StorageCount, PixelSize, ZoomLens, Video
- Staff(EmployeeID, FirstName, LastName, SSN, Address, Email, Phone, DoB, Specialty, SupervisorID(fk))
    - FD1: Employee -> FirstName, LastName, SSN, Address, Email, Phone, DoB, Specialty, SupervisorID
- Client_Album(ClientID(fk), AlbumNum(fk), ClientID(fk))
    - There is no primary key attribute
- Album_Camera(AlbumNum(fk), ClientID(fk), CameraID(fk))
    - There is no primary key attribute
- Album_Staff(AlbumID(fk), ClientID(fk), EmployeeID(fk))

    - There is no primary key attribute
- Camera_Event(CameraID(fk), Location(fk), Date(fk))
    - There is no primary key attribute
- Event_Staff(Location(fk), Date(fk), EmployeeID(fk))
    - There is no primary key attribute

Overall, most of our dependencies are in 3NF. However, Our Event relation is currently in 2NF due to FD1 not being a full relational dependency. To fix this we can extraction Location and make it's own entity. We would get the following:

- Event(Location, Date, AlbumNum(fk), Time, Type, EventSize, Address, City, State, ZipCode)
    - FD1: LocationID, Date -> AlbumNum(fk), LocationID(fk) Time, Type, EventSize)
- Location(LocationID, Address, City, State, Zipcode)
    - FD1: LocationID -> Address, City, State, Zipcode

Step 6: Our Final Model

- Client(ClientID, FirstName, LastName, Address, Email, DoB, PaymentInfo, Married, FamilySize, ReferredClient(fk))
    - FD1: ClientID -> FirstName, LastName, Address, Email, DoB, PaymentInfo, Married, FamilySize, ReferredClient
- Album(AlbumNum, ClientID, PhotoCount, Video, PhotoType, Price, ImageFormat, Location(fk), Date(fk), EmployeeID(fk))
    - FD1: AlbumNum, ClientID -> PhotoCount, Video, PhotoType, Price, ImageFormat, Location(fk), Date(fk), EmployeeID(fk)
- Event(LocationID(fk), Date, AlbumNum(fk), Time, Type, EventSize)
    - FD1: Location, Date -> AlbumNum(fk), Time, Type, EventSize
- Location(LocationID, Address, City, State, Zipcode)
    - FD1: LocationID -> Address, City, State, Zipcode
- Camera(CameraID, StorageCount, PixelSize, ZoomLens, Video)
    - FD1: CameraID -> StorageCount, PixelSize, ZoomLens, Video
- Staff(EmployeeID, FirstName, LastName, SSN, Address, Email, Phone, DoB, Specialty, SupervisorID(fk))
    - FD1: Employee -> FirstName, LastName, SSN, Address, Email, Phone, DoB, Specialty, SupervisorID
- Client_Album(ClientID(fk), AlbumNum(fk), ClientID(fk))
    - There is no primary key attribute
- Album_Camera(AlbumNum(fk), ClientID(fk), CameraID(fk))
    - There is no primary key attribute
- Album_Staff(AlbumID(fk), ClientID(fk), EmployeeID(fk))
    - There is no primary key attribute
- Camera_Event(CameraID(fk), Location(fk), Date(fk))

    - There is no primary key attribute
- Event_Staff(Location(fk), Date(fk), EmployeeID(fk))