Project 2- Design & Implement a Relational Database
Database & Design
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Business Requirement:

Introduction:
This project aims to create a bike-sharing system that allows residences and tourists to access bicycles for short-trips across the Bay Area. This is important as it is a sustainable transportation solution, promotes healthy living and exercise, provides accessible and affordable transportation as well as provides valuable data on consumer patterns that can be used for urban planning and traffic management within the area.

Business Rules:
1) Each bike has a unique ID and belongs to a specific station.
2) Stations have unique identifiers and are located at distinct geographical points.
3) Reservations have a start and end time.
4) Stations must have name and location.
5) Stations must have a maximum number of bikes it can hold.
6) Stations have multiple bikes that can be rented and their status is reported.
7) Administrators can view usage analytics reports.

Nouns:
1) Users
2) Station
3) Administrations
4) Trips
5) Status
6) System

Verbs:
1) Register
2) Record
3) Reserve
4) View

For the data collected, I used 4 tables from SF Bay Area Bikeshare and created two tables 'users' and 'admins' from Mackaroo. I joined them together on db browser, created a zip then uploaded them into observable to complete my project.
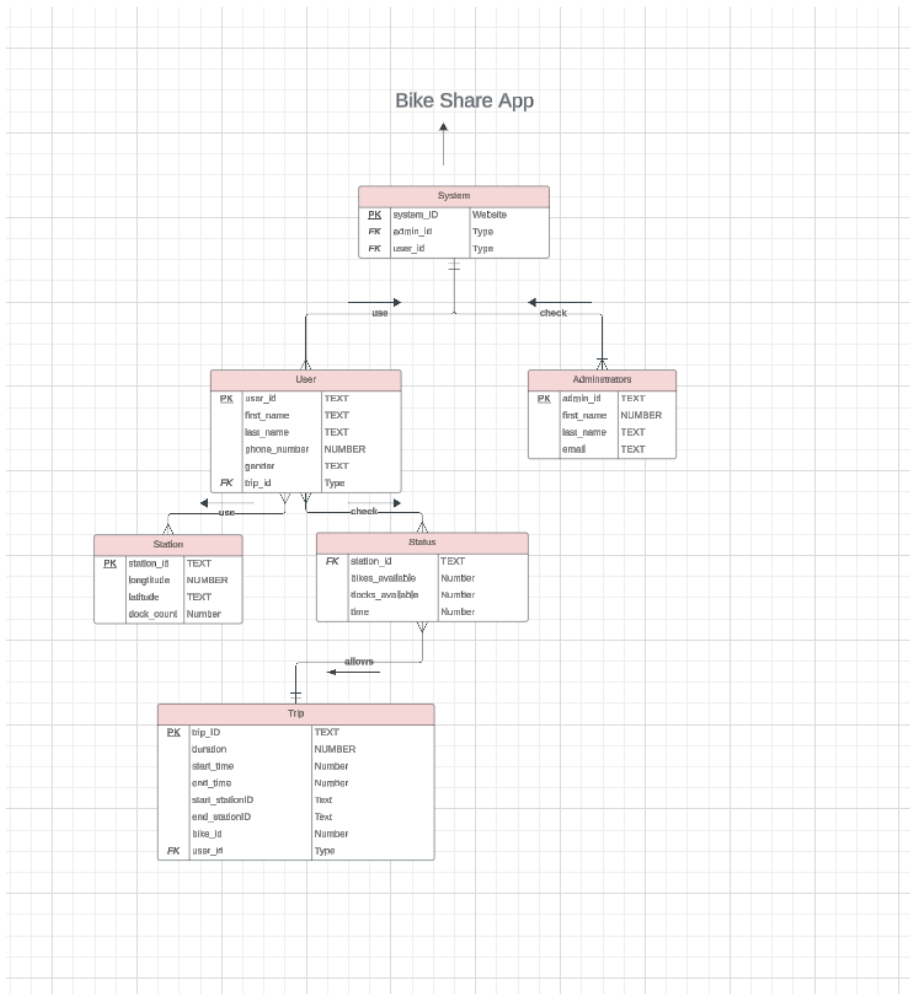
UML Class Diagram:

Link:https://lucid.app/lucidchart/invitations/accept/inv_8bb94a9e-7709-4259-889e-ade6e55ec3fb
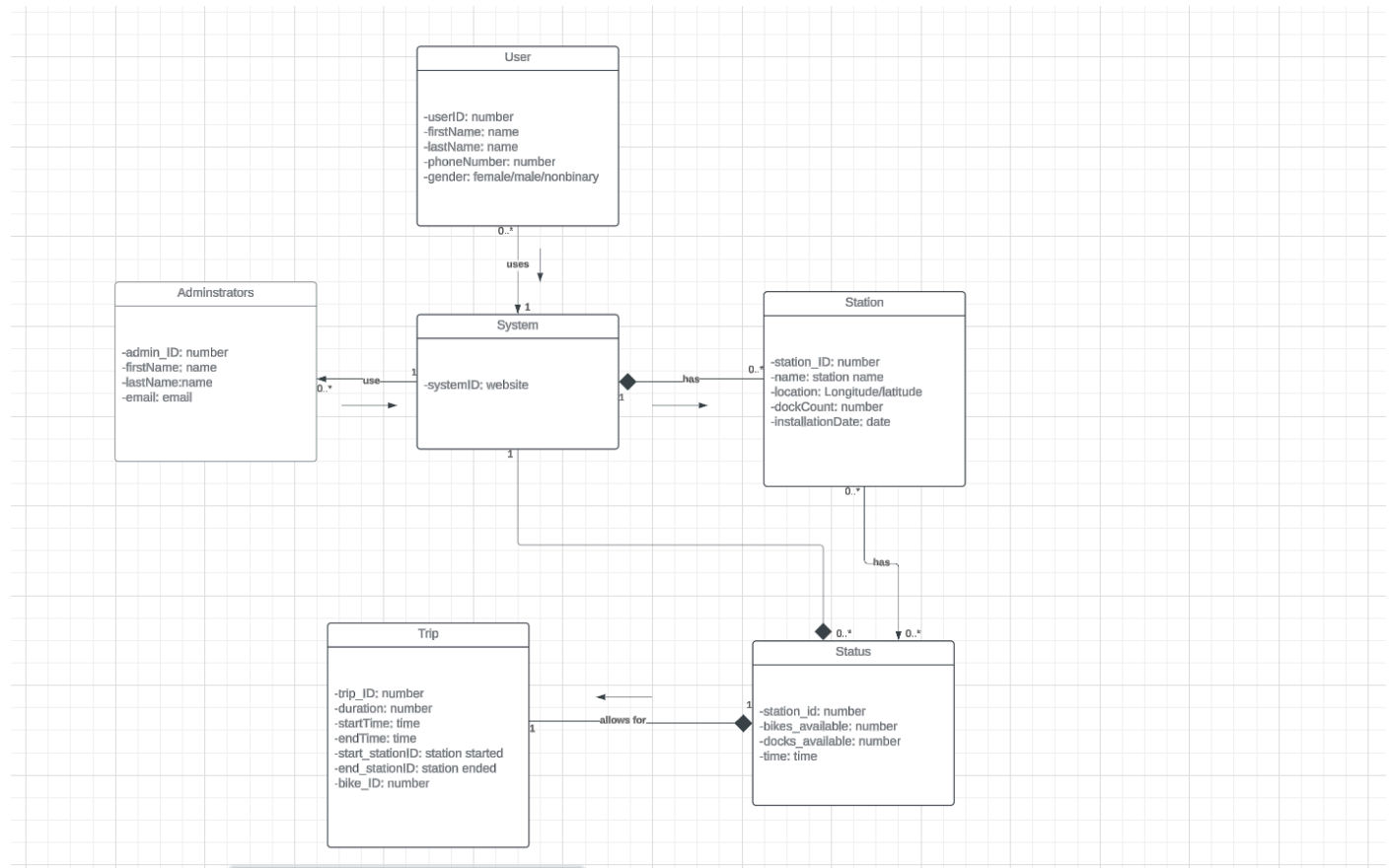
Logical Model: Hierarchy
Link:https://lucid.app/lucidchart/invitations/accept/inv_8bb94a9e-7709-4259-889e-ade6e55ec3fb

Relational Schema:
User(user_id, first_name, last_name, phone_number, gender, *trip_id*)
System (system_id, *admin_id, user_id*)
Administrators (admin_id, first_name, last_name, email)
Station (station_id, longitude, latitude, dock_count)
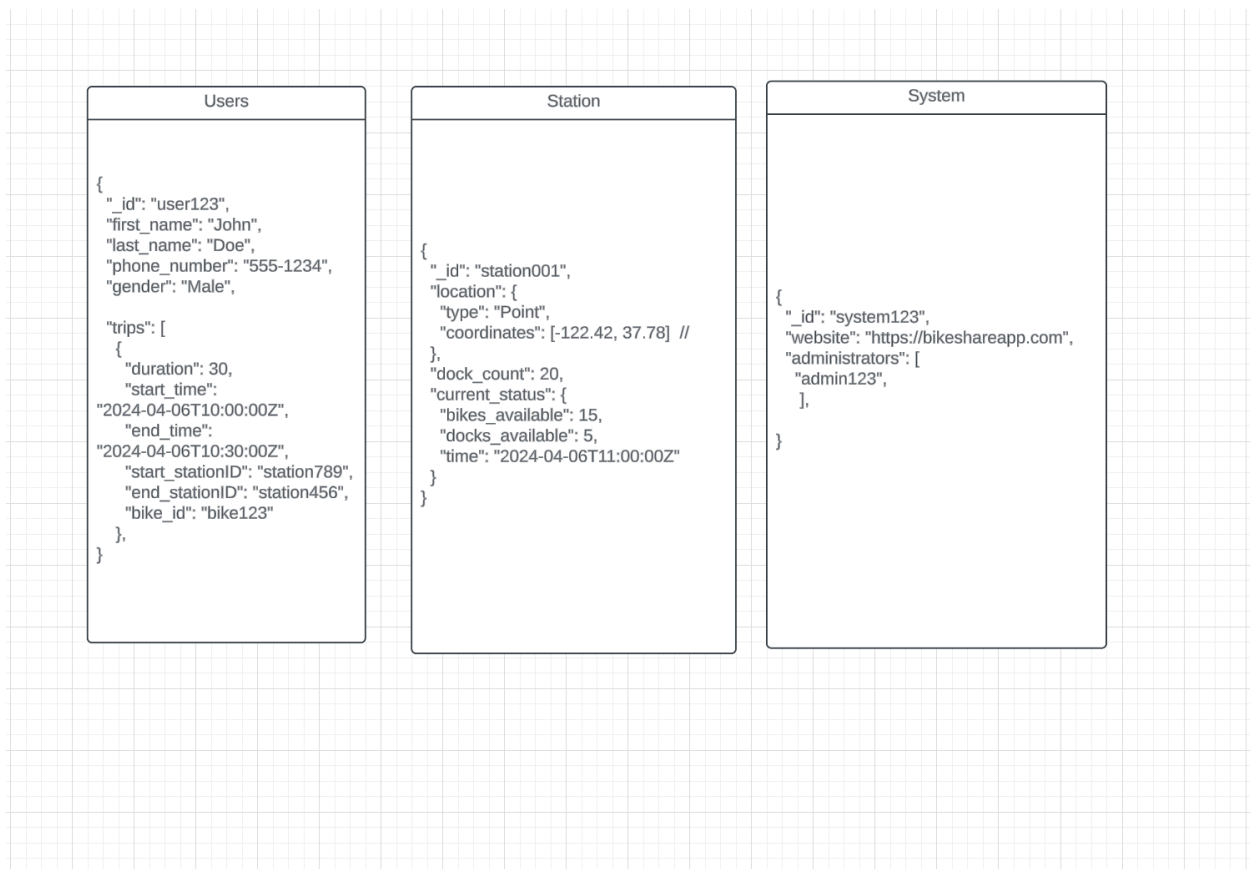Status (*station_id*, bikes_available, docks_available, time)
Trip (trip_id, duration, start_time, end_time, start_stationID, end_stationID, bike_id, *user_id*)

Proof that my Relational Schema is a BNF:
1) Each table has a superkey or has an attribute that is a superkey.
2) A superkey is a set of attributes that can uniquely identify each tuple in the table.

Main Collections (Documents/Tables):
Link:https://lucid.app/lucidchart/invitations/accept/inv_8bb94a9e-7709-4259-889e-ade6e55ec3fb

Users	Station	System

{
  "_id": "user123",
  "first_name": "John",
  "last_name": "Doe",
  "phone_number": "555-1234",
  "gender": "Male",
 	
  "trips": [
    {
      "duration": 30,
      "start_time":
"2024-04-06T10:00:00Z",
      "end_time":
"2024-04-06T10:30:00Z",
      "start_stationID": "station789",
      "end_stationID": "station456",
      "bike_id": "bike123"
    },
  }
}
	{
	  "_id": "station001",
	  "location": {
	    "type": "Point",
	    "coordinates": [-122.42, 37.78] //
	  },
	  "dock_count": 20,
	  "current_status": {
	    "bikes_available": 15,
	    "docks_available": 5,
	    "time": "2024-04-06T11:00:00Z"
	  }
	}
		{
		  "_id": "system123",
		  "website": "https://bikeshareapp.com",
		  "administrators": [
		    "admin123",
		    ],
		}

Users: This collection includes personal information about users and embeds their trips.
Stations: Represents the physical stations with current statuses. Status of bicycles in stations is embedded.
System: This collection holds overarching data for the bike-sharing system, including references or embedded documents for administrators.