# – CAR321 –

## Database Management System

by:
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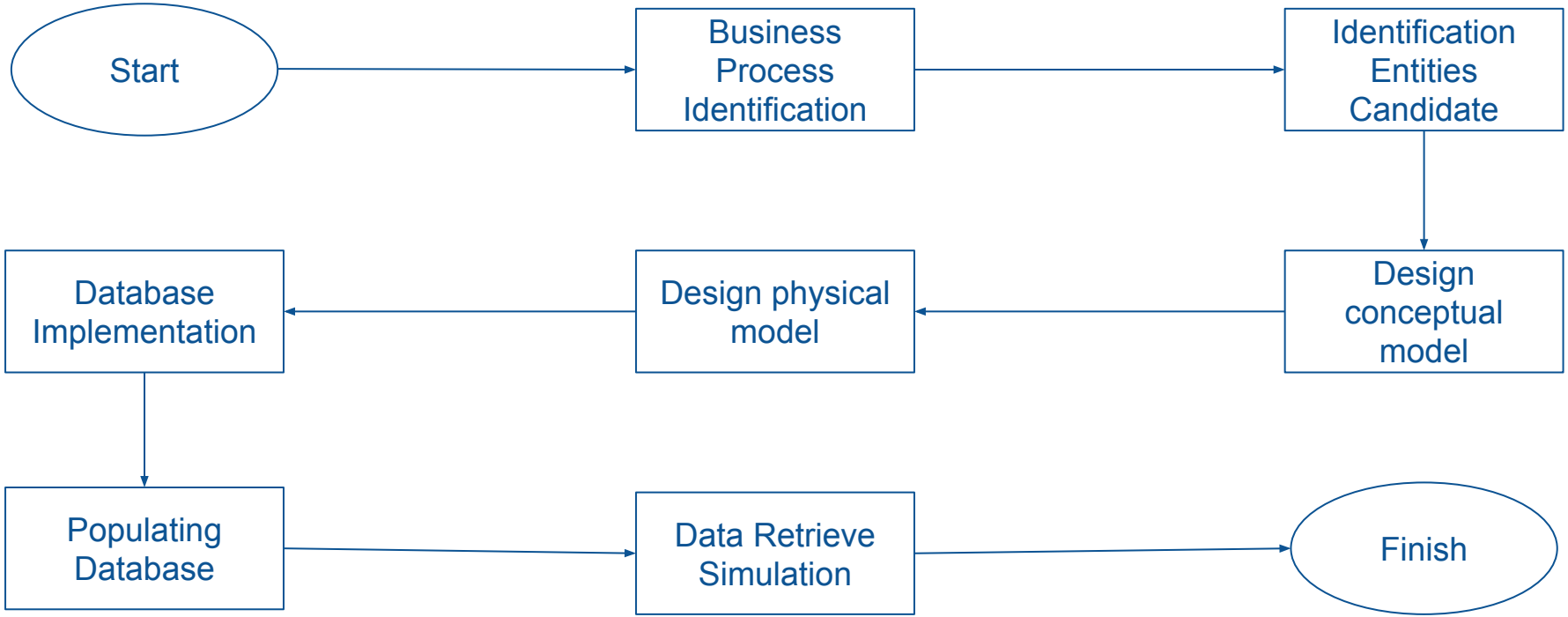
Final Project
Software and Data Engineer Class
PACMANN

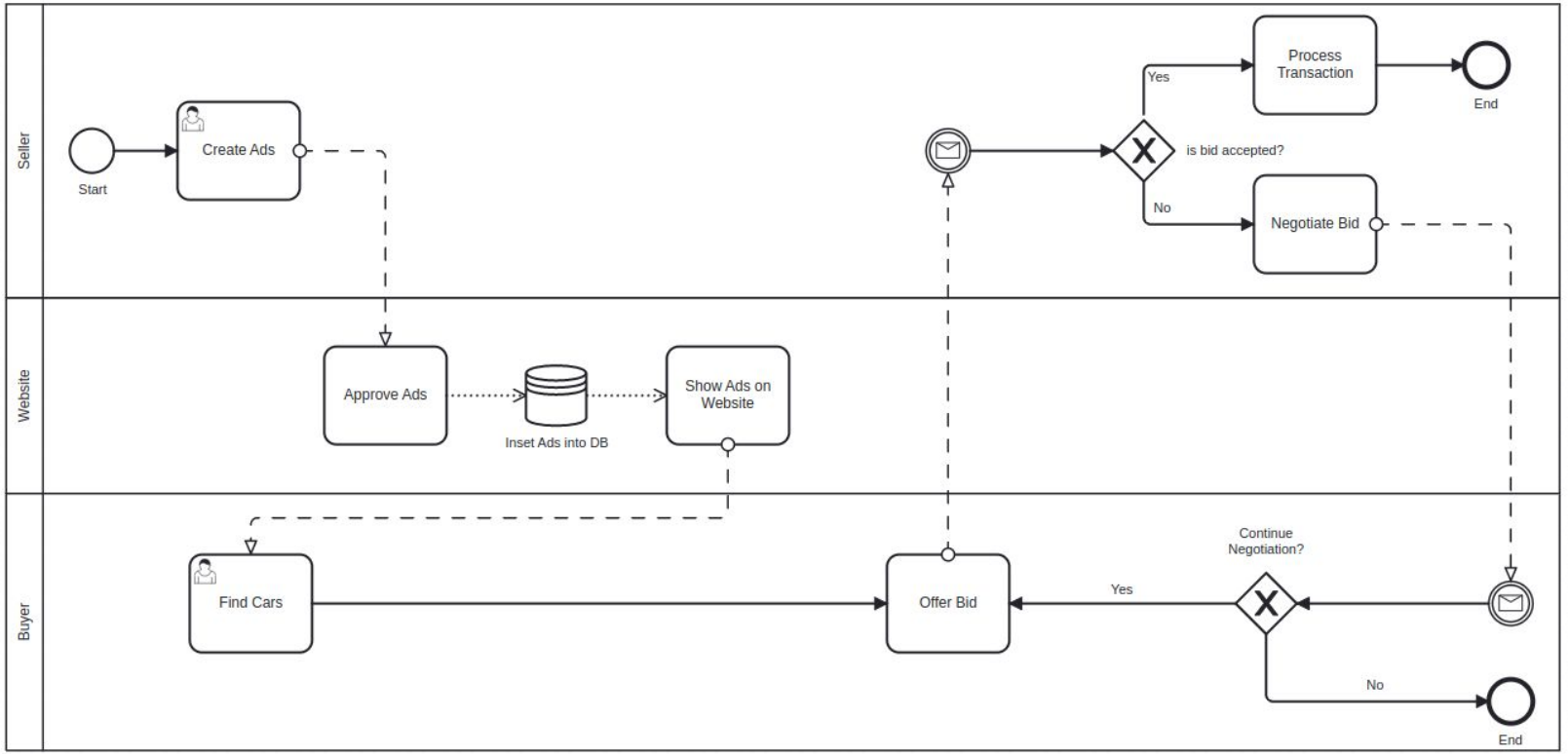
# Objective

Building a Relationship Database Management System (RDBMS) for selling used cars that allow users to offer their used cars and potential buyers to search and buy them.

# Project Flowchart



# Business Process Identification



# Business Process Identification

| No. | Activity | Candidate Entities |
|---|---|---|
| 1 | User Create Account | User |
| 2 | User create ads and sell used cars | User, Ads, Location |
| 3 | User find used cars | Ads, Location |
| 4 | User offer bid | User, Ads |

# Identification Candidate Entities

| No. | Entities | Desc |
|---|---|---|
| 1 | User | Website user that allow to sell and buy used cars. |
| 2 | Car | Used car products offered by users |
| 3 | Advertisement | Information about used cars offered by users in the form of advertisements |
| 4 | Location | Information about the user's location |
| 5 | Bid | Bid offered by buyer to seller |

# Identification Candidate Entities

| No. | Entities | Attributes |
|---|---|---|
| 1 | User | [user_id, name, contact, address, location_id] |
| 3 | Advertisement | [ads_id, user_id, title, brand, model, body_type, engine_capacity, manufacturing_year, mileage, transmission_type, color, price, date_post, date_update, is_bid_allow, ads_status, location_id] |
| 4 | Location | [location_id, city, region, location_code, latitude, longitude] |
| 5 | Bid | [bid_id, bid_status, bid_price, date_bid, ads_id, user_id] |

# Identification Candidate Entities

| Table Users | | | |
|---|---|---|---|
| **Field** | **Type** | **Null** | **Unique** |
| user_id [PK] | bigint | No | Yes |
| name | varchar(100) | No | No |
| contact | int | No | Yes |
| email | varchar(60) | No | Yes |
| address | varchar(100) | No | No |
| location_id [FK] | bigint | No | No |

# Identification Candidate Entities

| Table Advertisements | | | |
|---|---|---|---|
| **Field** | **Type** | **Null** | **Unique** |
| ads_id [PK] | bigint | No | Yes |
| title | varchar(100) | No | Yes |
| brand | varchar(30) | No | No |
| model | varchar(30) | No | No |
| body_type | varchar(30) | No | No |
| engine_capacity | int | No | No |

# Identification Candidate Entities

| Table Advertisements | | | |
|---|---|---|---|
| **Field** | **Type** | **Null** | **Unique** |
| manufacturing_year | int | No | |
| mileage | int | Yes | No |
| transmission_type | varchar(10) | No | No |
| color | varchar(30) | Yes | No |
| price | int | No | No |
| date_post | datetime | No | No |

# Identification Candidate Entities

| Table Advertisements | | | |
|---|---|---|---|
| **Field** | **Type** | **Null** | **Unique** |
| date_update | datetime | No | No |
| is_bid_allow | bool | No | No |
| ads_status | varchar(10) | No | No |
| user_id [FK] | bigint | No | No |
| location_id [FK] | bigint | No | No |

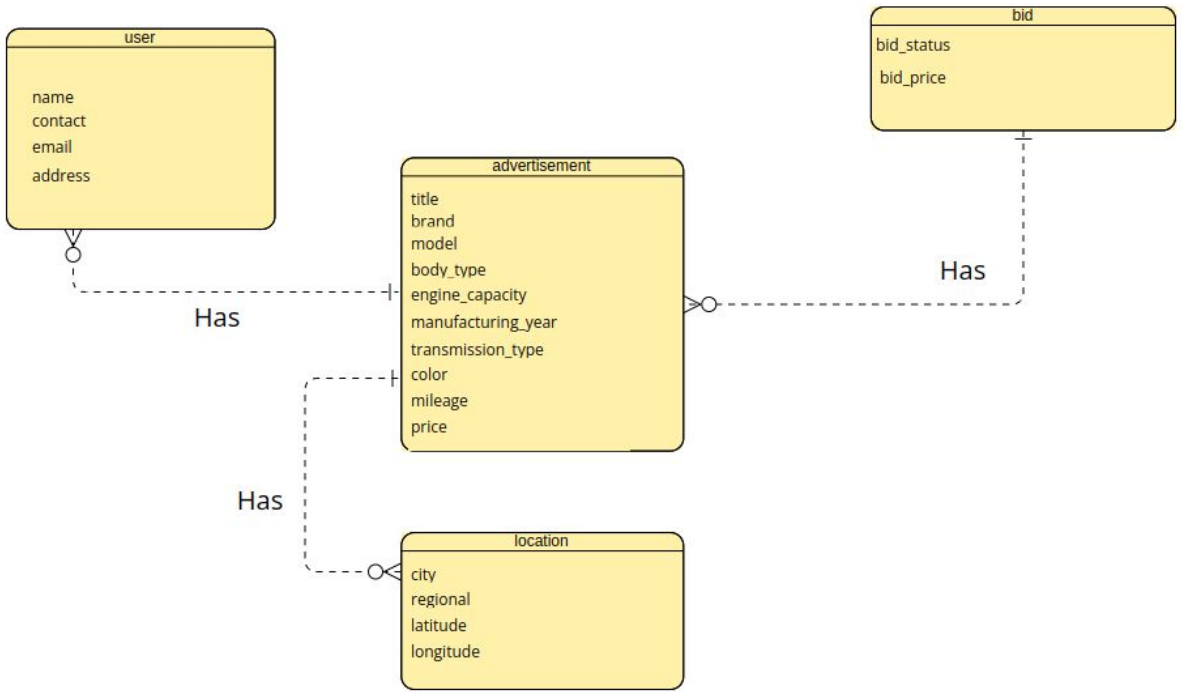
# Identification Candidate Entities

| Table Locations | | | |
|---|---|---|---|
| **Field** | **Type** | **Null** | **Unique** |
| location_id [PK] | bigint | No | Yes |
| region | varchar(60) | No | No |
| city | varchar(60) | No | No |
| latitude | decimal(10,8) | No | Yes |
| longitude | decimal(11,8) | No | Yes |

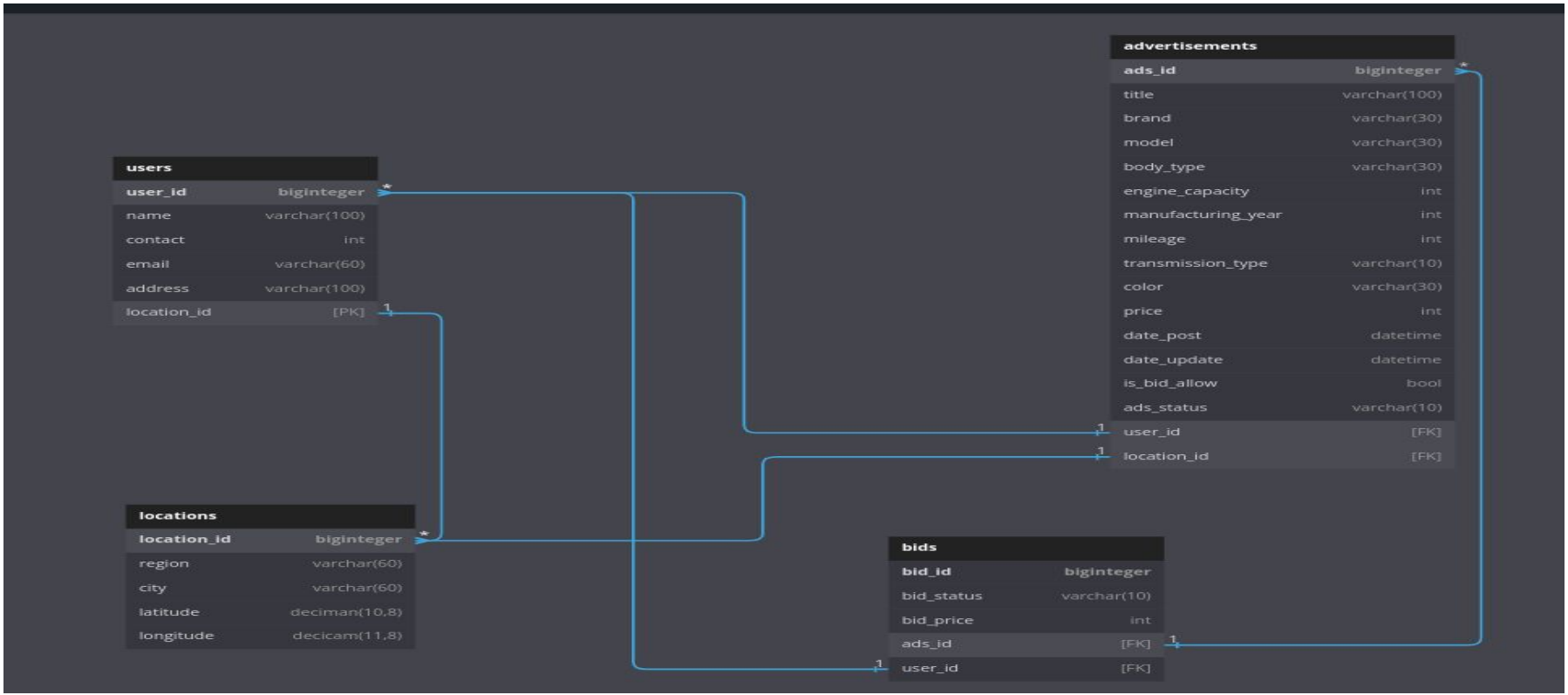
# Identification Candidate Entities

| Table Bids | | | |
|---|---|---|---|
| **Field** | **Type** | **Null** | **Unique** |
| bids_id [PK] | bigint | No | Yes |
| bid_status | varchar(10) | No | No |
| bid_price | int | No | No |
| ads_id | bigint | No | No |
| user_id | bigint | No | No |

# Design Conceptual Model



# Design Physical Diagram Model



# Database Implementation

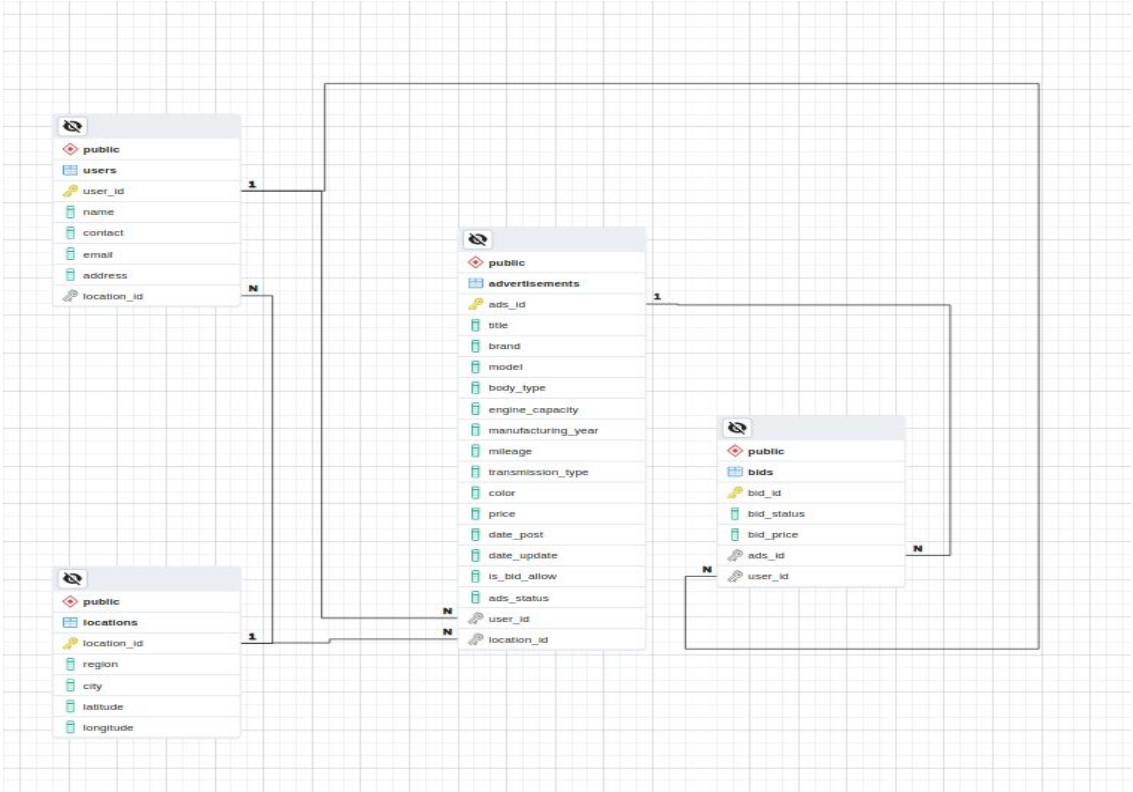
```
CREATE TABLE "locations" (
  "location_id" bigin PRIMARY KEY,
  "region" varchar(60),
  "city" varchar(60),
  "latitude" numeric(10,8),
  "longitude" numeric(11,8)
);
```

```
CREATE TABLE "users" (
  "user_id" bigserial PRIMARY KEY,
  "name" varchar(100),
  "contact" int,
  "email" varchar(60),
  "address" varchar(100),
  "location_id" bigint REFERENCES "locations" ("location_id")
);
```

```
CREATE TABLE "advertisements" (
  "ads_id" bigserial PRIMARY KEY,
  "title" varchar(100),
  "brand" varchar(30),
  "model" varchar(30),
  "body_type" varchar(30),
  "engine_capacity" int,
  "manufacturing_year" int,
  "mileage" int,
  "transmission_type" varchar(10),
  "color" varchar(30),
  "price" int,
  "date_post" timestamp,
  "date_update" timestamp,
  "is_bid_allow" bool,
  "ads_status" varchar(10),
  "user_id" bigint REFERENCES "users" ("user_id"),
  "location_id" bigint REFERENCES "locations" ("location_id")
);
```

```
CREATE TABLE "bids" (
  "bid_id" bigserial PRIMARY KEY,
  "bid_status" varchar(10),
  "bid_price" int,
  "ads_id" bigint REFERENCES "advertisements" ("ads_id"),
  "user_id" bigint REFERENCES "users" ("user_id")
);
```

# Database Implementation



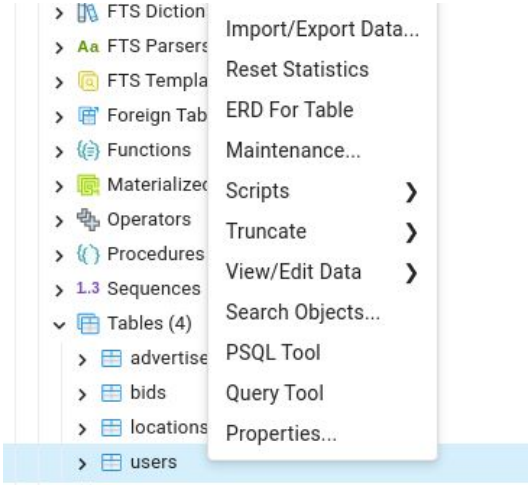
# Populating Database

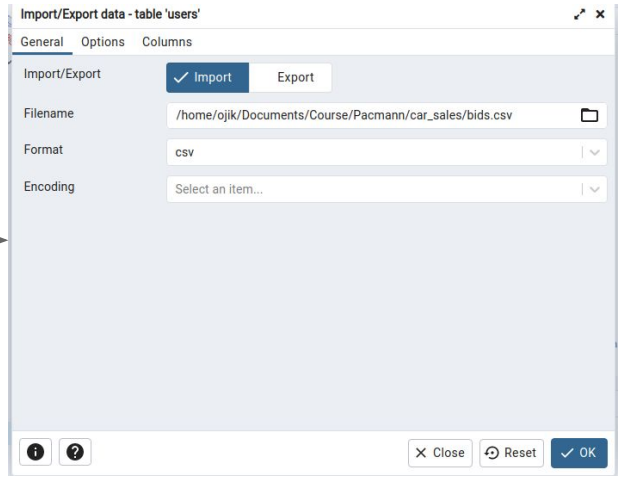
**Populating Database Technique:**

1. Create Dummy Data Using Python.
2. Scrapping Location  Data (City, latitude, longitude) from OLX.
3. Scrapping Cars product from Moladin.

# Populating Database

## Insert CSV file (dummy data) to PgAdmin:




Right Click On Specific Table and choose **'Import/Export Data'**

Choose csv file path and click **"OK"**

# Populating Database

**Populating Database Technique:**

1. Create Dummy Data Using Python.
2. Scrapping Location  Data (City, latitude, longitude) from OLX.
3. Scrapping Cars product from Moladin.

# Populating Database

**Table users**

| | user_id [PK] bigint | name character varying (100) | contact bigint | email character varying (60) | address character varying (100) | location_id bigint |
|---|---|---|---|---|---|---|
| 1 | 1001 | Kania Mustofa | 82459854781 | kania.mustofa@mail.com | Jalan Garuda No. 53 | 4000016 |
| 2 | 1002 | Hadi Kusuma | 89690435728 | hadi.kusuma@mail.com | Jalan Adiyaksa No. 95 | 4000076 |
| 3 | 1003 | Joko Adnan | 87041150121 | joko.adnan@mail.com | Jalan Mangga No. 11 | 4000036 |
| 4 | 1004 | Dharma Mulyana | 89234562436 | dharma.mulyana@mail.com | Jalan Pahlawan No. 86 | 4000069 |
| 5 | 1005 | Nadia Siregar | 88499171514 | nadia.siregar@mail.com | Jalan Garuda No. 9 | 4000064 |
| 6 | 1006 | Kania Siregar | 85254529238 | kania.siregar@mail.com | Jalan Sudirman No. 78 | 4000018 |
| 7 | 1007 | Mega Agustina | 80167772321 | mega.agustina@mail.com | Jalan Raya No. 74 | 4000005 |
| 8 | 1008 | Fadil Surya | 80832790472 | fadil.surya@mail.com | Jalan Garuda No. 55 | 4000077 |
| 9 | 1009 | Nina Wibowo | 85297848802 | nina.wibowo@mail.com | Jalan Sudirman No. 29 | 4000059 |
| 10 | 1010 | Hana Wibowo | 80437622708 | hana.wibowo@mail.com | Jalan Merdeka No. 66 | 4000029 |

Total rows: 100 of 100 Query complete 00:00:00.113

# Populating Database

## Table advertisements

| | ads_id [PK] bigint | title character varying (100) | brand character varying (30) | model character varying (30) | body_type character varying (30) | engine_capacity numeric (10,8) | manufacturing_year integer | mileage integer | transmission_ty character varyin |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 126347107 | Mitsubishi Xpander Cross No Variant 1.5 MT Bensin 2019 | mitsubishi | Xpander | MPV | 1.50000000 | 2019 | 92253 | Manual |
| 2 | 126349978 | Toyota All New Rush TRD Sportivo 1,5 AT Bensin 2018 | toyota | Rush | SUV | 1.50000000 | 2018 | 58854 | Automatic |
| 3 | 126323245 | Honda Brio IVTEC E 1,3 MT Bensin 2017 | honda | Brio | Hatchback | 1.30000000 | 2017 | 90000 | Manual |
| 4 | 126352363 | Honda BR-V ES Prestige 1,5 AT Bensin 2020 | honda | BR-V | MPV | 1.50000000 | 2020 | 13891 | Automatic |
| 5 | 126351554 | Toyota Land Cruiser Hard Top Hardtop Jeep 4.2 MT Bensin 1981 | toyota | Land Cruiser | SUV | 4.20000000 | 1981 | 417222 | Manual |
| 6 | 126350640 | Honda Elysion RD5 2WD 2.4 AT Bensin 2005 | honda | Elysion | SUV | 2.40000000 | 2005 | 170867 | Automatic |
| 7 | 126351777 | Mitsubishi Pajero PAJERO SPR2.4L DAKAR 4X2 8AT 2442 AT solar 2016 | mitsubishi | Pajero | SUV | 2.50000000 | 2016 | 66292 | Automatic |
| 8 | 126353009 | Toyota Calya Satya E 1,2 MT Bensin 2017 | toyota | Calya | MPV | 1.20000000 | 2017 | 130000 | Manual |
| 9 | 126351636 | Honda All New CR-V Prestige 2,4 AT Bensin 2013 | honda | Civic Turbo | Sedan | 2.40000000 | 2013 | 158519 | Automatic |

Total rows: 100 of 100 | Query complete 00:00:00.199 | Ln 3, Col 1

# Populating Database

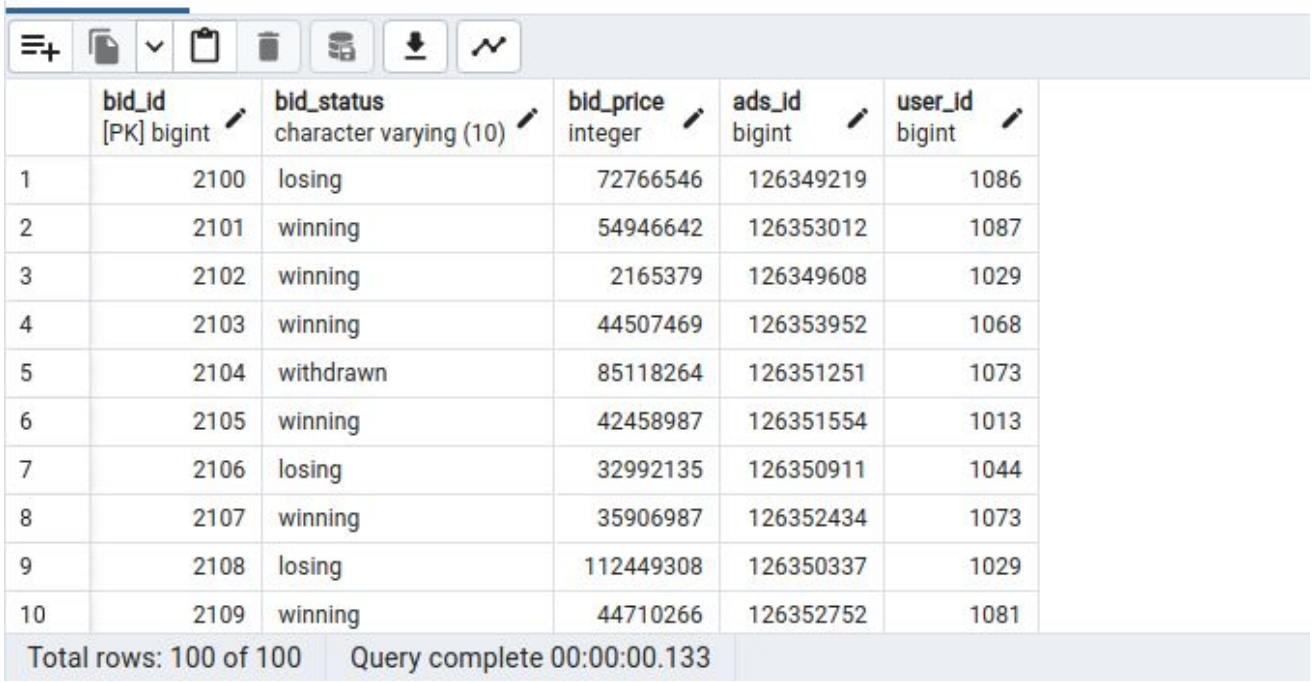
**Table locations**

| | location_id [PK] bigint | city character varying (60) | latitude numeric (10,8) | longitude numeric (11,8) |
|---|---|---|---|---|
| 1 | 4000082 | Aceh Barat Daya Kab. | 3.73958000 | 96.85232000 |
| 2 | 4000081 | Aceh Barat Kab. | 4.15064000 | 96.13242000 |
| 3 | 4000083 | Aceh Besar Kab. | 5.17041000 | 95.69556000 |
| 4 | 4000084 | Aceh Jaya Kab. | 5.04561000 | 95.35703000 |
| 5 | 4000085 | Aceh Selatan Kab. | 3.31803000 | 97.20560000 |
| 6 | 4000086 | Aceh Singkil Kab. | 2.28368000 | 97.79916000 |
| 7 | 4000087 | Aceh Tamiang Kab. | 4.28740000 | 98.05862000 |
| 8 | 4000088 | Aceh Tengah Kab. | 4.58882000 | 96.81311000 |
| 9 | 4000089 | Aceh Tenggara Kab. | 3.50826000 | 97.80853000 |
| 10 | 4000090 | Aceh Timur Kab. | 4.94757000 | 97.77356000 |

Total rows: 503 of 503 Query complete 00:00:00.139

# Populating Database

**Table bids**



| | bid_id [PK] bigint | bid_status character varying (10) | bid_price integer | ads_id bigint | user_id bigint |
|---|---|---|---|---|---|
| 1 | 2100 | losing | 72766546 | 126349219 | 1086 |
| 2 | 2101 | winning | 54946642 | 126353012 | 1087 |
| 3 | 2102 | winning | 2165379 | 126349608 | 1029 |
| 4 | 2103 | winning | 44507469 | 126353952 | 1068 |
| 5 | 2104 | withdrawn | 85118264 | 126351251 | 1073 |
| 6 | 2105 | winning | 42458987 | 126351554 | 1013 |
| 7 | 2106 | losing | 32992135 | 126350911 | 1044 |
| 8 | 2107 | winning | 35906987 | 126352434 | 1073 |
| 9 | 2108 | losing | 112449308 | 126350337 | 1029 |
| 10 | 2109 | winning | 44710266 | 126352752 | 1081 |

Total rows: 100 of 100 Query complete 00:00:00.133

# Data Retrieve Simulation

```sql
SELECT
    a.ads_id AS product_id,
    a.brand AS merk,
    a.model,
    a.manufacturing_year AS year,
    a.price
FROM advertisements a
WHERE a.manufacturing_year > 2015;
```

Data Output | Messages | Notifications

| | product_id bigint | merk character varying (30) | model character varying (30) | year integer | price integer |
|---|---|---|---|---|---|
| 1 | 126347107 | mitsubishi | Xpander | 2019 | 203400000 |
| 2 | 126349978 | toyota | Rush | 2018 | 170600000 |
| 3 | 126323245 | honda | Brio | 2017 | 112800000 |
| 4 | 126352363 | honda | BR-V | 2020 | 196500000 |
| 5 | 126351777 | mitsubishi | Pajero | 2016 | 250000000 |
| 6 | 126353009 | toyota | Calya | 2017 | 100000000 |
| 7 | 126351383 | mitsubishi | Xpander | 2018 | 152100000 |
| 8 | 126352716 | mitsubishi | Strada | 2018 | 200000000 |
| 9 | 126351556 | honda | Jazz | 2019 | 195200000 |
| 10 | 126350407 | toyota | Calya | 2017 | 100300000 |

Total rows: 48 of 48 | Query complete 00:00:00.116 | Ln 11, Col 1

**Transactional Query:**
Mencari mobil keluaran 2015 ke atas

# Data Retrieve Simulation

Sebelum Input:

| | | | | | |
|---|---|---|---|---|---|
| 96 | 2195 | winning | 59050226 | 126353553 | 1024 |
| 97 | 2196 | winning | 20666336 | 126352772 | 1038 |
| 98 | 2197 | losing | 20376210 | 126350743 | 1065 |
| 99 | 2198 | winning | 7097058 | 126354051 | 1014 |
| 100 | 2199 | withdrawn | 63010281 | 126350935 | 1089 |

**Transactional Query:**
Tambah data baru di table bids

```
INSERT INTO bids
    (bid_id,
     bid_status,
     bid_price,
     ads_id, user_id)
VALUES
    (2200, 'winning',
     93000000, 1
     26353358, 1024);
```

Setelah Input:

| | | | | | |
|---|---|---|---|---|---|
| 97 | 2196 | winning | 20666336 | 126352772 | 1038 |
| 98 | 2197 | losing | 20376210 | 126350743 | 1065 |
| 99 | 2198 | winning | 7097058 | 126354051 | 1014 |
| 100 | 2199 | withdrawn | 63010281 | 126350935 | 1089 |
| 101 | 2200 | winning | 93000000 | 126353358 | 1024 |

# Data Retrieve Simulation

## Transactional Query:

Melihat semua mobil yg dijual

1 akun dari yg paling baru

Ex: user “Rina Asmara”

```sql
SELECT
    a.ads_id AS product_id,
    a.brand AS merk,
    a.model,
    a.manufacturing_year AS year,
    a.price,
    a.date_post,
    u.name
FROM advertisements a
JOIN users u ON u.user_id = a.user_id
WHERE a.user_id = 1078;
```

| product_id bigint | merk character varying (30) | model character varying (30) | year integer | price integer | date_post date | name character varying (100) |
|---|---|---|---|---|---|---|
| 126352363 | honda | BR-V | 2020 | 196500000 | 2023-02-09 | Rina Asmara |
| 126352465 | toyota | Grand | 2018 | 150000000 | 2023-04-01 | Rina Asmara |
| 126352813 | isuzu | Panther | 2012 | 140000000 | 2023-02-28 | Rina Asmara |
| 126352073 | honda | Brio | 2018 | 140000000 | 2023-02-17 | Rina Asmara |

# Data Retrieve Simulation

**Transactional Query:**

Mencari Mobil Berdasarkan Keyword.

Ex: Innova

```
SELECT
    a.ads_id AS product_id,
    a.brand AS merk,
    a.model,
    a.manufacturing_year AS year,
    a.price
FROM advertisements a
WHERE a.model = 'Innova';
```

| product_id bigint | merk character varying (30) | model character varying (30) | year integer | price integer |
|---|---|---|---|---|
| 126354179 | toyota | Innova | 2008 | 105000000 |
| 126351050 | toyota | Innova | 2012 | 171500000 |
| 126349130 | toyota | Innova | 2010 | 245000000 |
| 126352123 | toyota | Innova | 2019 | 340000000 |

# Data Retrieve Simulation

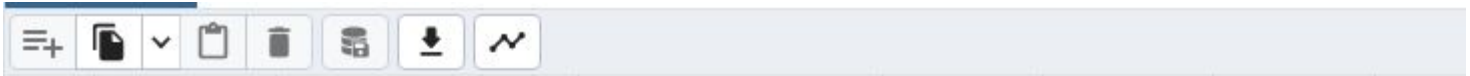
## Transactional Query:

Mencari Mobil Terdekat berdasarkan id kota, jarak dihitung menggunakan euclidiance distance

Ex: Kota Bandung

location_id = 4000018

```sql
SELECT
    ads.ads_id as product_id,
    ads.brand as merk,
    ads.model,
    ads.manufacturing_year as year,
    ads.price,
    ROUND(sqrt(power(ads_loc.latitude - target_loc.latitude, 2)
            + power(ads_loc.longitude - target_loc.longitude, 2))) as distance
FROM
    advertisements ads
    JOIN locations ads_loc ON ads.location_id = ads_loc.location_id
    JOIN locations target_loc ON target_loc.location_id = 4000018
ORDER BY
    distance ASC
LIMIT 3;
```



| | product_id bigint | merk character varying (30) | model character varying (30) | year integer | price integer | distance numeric |
|---|---|---|---|---|---|---|
| 1 | 126353529 | honda | Brio | 2017 | 145000000 | 0 |
| 2 | 126351483 | daihatsu | Xenia | 2016 | 125000000 | 0 |
| 3 | 126350620 | honda | Mobilio | 2016 | 121700000 | 0 |

# Data Retrieve Simulation

**Analytical Query:**
Ranking Popularitas model mobil berdasarkan jumlah bid.

| model<br>character varying (30) | count_product<br>bigint | count_bid<br>bigint |
|---|---|---|
| Avanza | 10 | 13 |
| Xpander | 4 | 8 |
| Pajero | 3 | 6 |
| Brio | 4 | 4 |
| Mobilio | 2 | 4 |

```
SELECT model, COUNT(DISTINCT bids.ads_id) AS count_product, COUNT(*) AS count_bid
FROM advertisements
INNER JOIN bids ON advertisements.ads_id = bids.ads_id
GROUP BY model
ORDER BY count_bid DESC
LIMIT 5;
```

# Data Retrieve Simulation

## Analytical Query:

Membandingkan harga mobil berdasarkan harga rata-rata per kota

```sql
SELECT
    l.city AS "nama kota",
    a.brand AS "merk",
    a.model,
    a.manufacturing_year AS "tahun",
    a.price AS "price",
    ROUND(AVG(a.price) OVER (PARTITION BY l.location_id)) AS "avrg_price"
FROM
    advertisements a
    JOIN locations l ON a.location_id = l.location_id
ORDER BY
    l.city ASC, a.brand ASC, a.model ASC, a.manufacturing_year ASC;
```

| | | | | | |
|---|---|---|---|---|---|
| Aceh Timur Kab. | mazda | Mazda 3 | 2018 | 251700000 | 168716667 |
| Aceh Timur Kab. | toyota | Calya | 2017 | 100300000 | 168716667 |
| Aceh Utara Kab. | mitsubishi | Xpander | 2019 | 190000000 | 190000000 |
| Banda Aceh Kota | mitsubishi | Xpander | 2020 | 221200000 | 221200000 |
| Bandung Kota | nissan | Xtrail | 2013 | 95800000 | 101966667 |
| Bandung Kota | suzuki | Ertiga | 2013 | 100100000 | 101966667 |
| Bandung Kota | toyota | Rush | 2007 | 110000000 | 101966667 |

# Car321-RDBMS PROJECT

Thank You!