

Course: DAMG 6210  
Project Module: 5  
Project Name: Vehicle Management System

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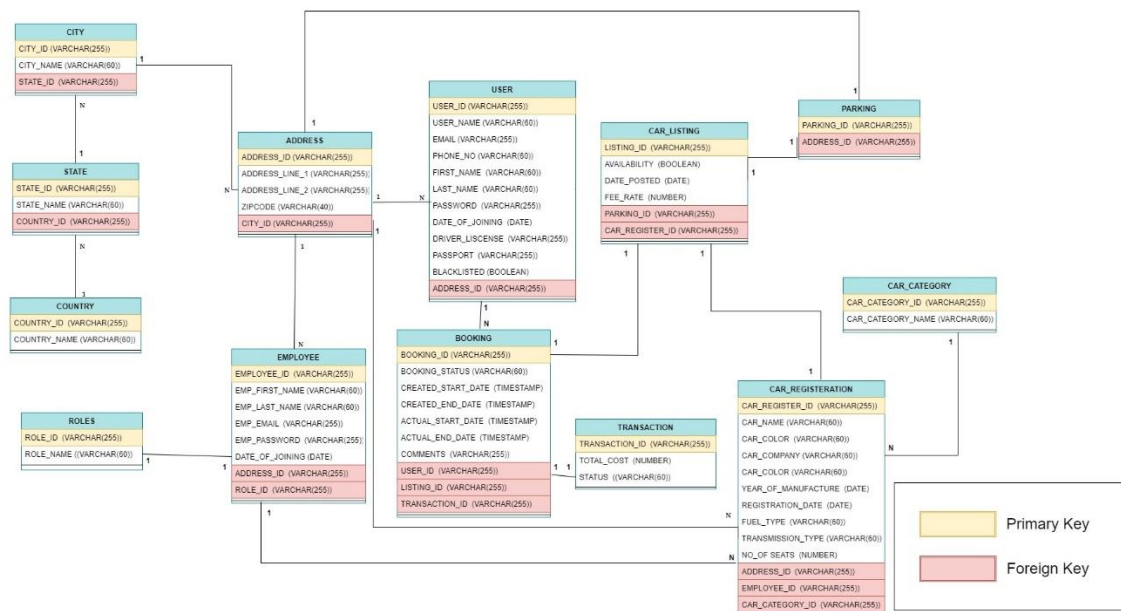
Business Assumptions:

We assume that,

1. Few Employers with roles and Customers are pre-existing in database.
2. Customers always have a home address.
3. Customer data with passport and driver's license is verified by backend
4. We have an application and customers can book their rental cars from the application
5. After customers login, he/she needs to specify start date, end date of the trip and location for picking up to see the list of available cars
6. Customer can select a car and book it as per the availability listing
7. Customer cannot overlap bookings
8. Customers need to return the car to the original pickup point (parking slot) at the end of the ride
9. Ride is complete once customer returns the car and payment is completed
10. The payment is based on the \$/day and will be penalized if exceeded the specified time.
11. The payment is handled by 3<sup>rd</sup> party service
12. After payment is made, the customer will get a feedback link on their registered email address which is handled by the backend

- 13.Cars are insured when we register by default (no separate insurance handling)
- 14.Fuel / gas is handled by organization
- 15.Customer could reach out to the Support team if any assistance is needed
- 16.If the vehicle is returned in bad shape, his account is banned
- 17.Customers sensitive information is not shared with any 3<sup>rd</sup> party vendors
- 18.Customer cannot book another ride if the payment of existing ride is not completed.

### E-R DIAGRAM:



### USER ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
USER_ID	VARCHAR (255)	PRIMARY KEY, AUTO GENERATED
USER_NAME	VARCHAR (60)	UNIQUE KEY, NOT NULL
EMAIL	VARCHAR (255)	UNIQUE KEY, NOT NULL
PHONE_NO	VARCHAR (60)	NOT NULL
FIRST_NAME	VARCHAR (60)	NOT NULL
LAST_NAME	VARCHAR (60)	NOT NULL
PASSWORD	VARCHAR (255)	NOT NULL, ENCRYPTED

ADDRESS_ID	VARCHAR (255)	A Foreign key which references ADDRESS_ID from the ADDRESS ENTITY. This is used to fetch the address of the user. NOT NULL
DATE_OF_JOINING	DATE	NOT NULL
DRIVER_LICESNSE	VARCHAR (255)	NOT NULL, ENCRYPTED
PASSPORT	VARCHAR (255)	NOT NULL, ENCRYPTED
BLACKLISTED	BOOLEAN	TRUE / FALSE

#### CAR REGISTRATION ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
CAR_REGISTER_ID	VARCHAR (255)	PRIMARY KEY
CAR_NAME	VARCHAR (60)	NOT NULL
CAR_COLOR	VARCHAR (60)	NOT NULL
CAR_COMPANY	VARCHAR (60)	NOT NULL
YEAR_OF_MANUFACTURE	DATE	NOT NULL
REGISTRATION_DATE	DATE	NOT NULL
FUEL_TYPE	VARCHAR (60)	NOT NULL
TRANSMISSION_TYPE	VARCHAR (60)	NOT NULL
NO_OF_SEATS	NUMBER	NOT NULL
ADDRESS_ID	VARCHAR (255)	A Foreign key which references ADDRESS_ID from the ADDRESS ENTITY. NOT NULL
EMPLOYEE_ID	VARCHAR (255)	A Foreign key which references EMPLOYEE_ID from EMPLOYEE ENTITY. This is used to fetch the details of an employee who registered the car. NOT NULL
CAR_CATEGORY_ID	VARCHAR (255)	A Foreign key which references CAR_CATEGORY_ID from CAR_CATEGORY ENTITY. NOT NULL

#### CAR CATEGORY ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
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CAR_CATEGORY_ID	VARCHAR (255)	PRIMARY KEY, UNIQUE, AUTO GENERATED
CAR_CATEGORY_NAME	VARCHAR (60)	NOT NULL

### CAR LISTINGS ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
LISTING_ID	VARCHAR (255)	PRIMARY KEY, AUTOGENERATED
AVAILABILITY	BOOLEAN	TRUE / FALSE
DATE_POSTED	DATE	NOT NULL
FEE_RATE	NUMBER	NOT NULL
CAR_REGISTER_ID	VARCHAR (255)	A Foreign key which references CAR_REGISTER_ID from CAR REGISTRATION ENTITY. NOT NULL
PARKING_ID	VARCHAR (255)	A Foreign key referencing the parking spot from PARKING ENTITY. NOT NULL

### BOOKINGS ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
BOOKING_ID	VARCHAR (255)	PRIMARY KEY, UNIQUE, AUTO GENERATED
BOOKING_STATUS	VARCHAR (60)	NOT NULL
CREATED_START_DATE	TIMESTAMP	NOT NULL
CREATED_END_DATE	TIMESTAMP	NOT NULL
ACTUAL_START_DATE	TIMESTAMP	NOT NULL
ACTUAL_END_DATE	TIMESTAMP	NOT NULL
COMMENTS	VARCHAR (255)	-
USER_ID	VARCHAR (255)	A Foreign key referencing the USER_ID from USER ENTITY. This can be used to filter the bookings of a particular user. NOT NULL
TRANSACTION_ID	VARCHAR (255)	A Foreign key referencing the TRANSACTION_ID from TRANSACTION ENTITY NOT NULL

LISTING_ID	VARCHAR (255)	A Foreign key referencing the LISTING_ID from CAR LISTINGS ENTITY. NOT NULL
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#### TRANSACTION ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
TRANSACTION_ID	VARCHAR (255)	PRIMARY KEY, UNIQUE, AUTO GEN
TOTAL_COST	NUMBER	NOT NULL
STATUS	VARCHAR (60)	NOT NULL

#### PARKING ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
PARKING_ID	VARCHAR (255)	PRIMARY KEY, UNIQUE, AUTO GENERATED
ADDRESS_ID	VARCHAR (255)	A Foreign key referencing the ADDRESS_ID from ADDRESS ENTITY. This can be used for identifying the address of the parking slot. NOT NULL

#### EMPLOYEE ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
EMPLOYEE_ID	VARCHAR (255)	PRIMARY KEY, AUTO GENERATED, UNIQUE
EMP_FIRST_NAME	VARCHAR (60)	NOT NULL
EMP_LAST_NAME	VARCHAR (60)	NOT NULL
EMP_EMAIL	VARCHAR (255)	NOT NULL
EMP_PASSWORD	VARCHAR (255)	NOT NULL, ENCRYPTED
DATE_OF_JOINING	DATE	NOT NULL
ADDRESS_ID	VARCHAR (255)	A Foreign key referencing the ADDRESS_ID from ADDRESS

		ENTITY. This can be used for identifying the address of the employee. NOT NULL
ROLE_ID	VARCHAR (255)	A Foreign key referencing the ROLE_ID from ROLES ENTITY. This can be used to filter the employees based on Role. NOT NULL

#### ADDRESS ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
ADDRESS_ID	VARCHAR (255)	PRIMARY KEY, AUTO GENERATED
ADDRESS_LINE_1	VARCHAR (255)	NOT NULL
ADDRESS_LINE_2	VARCHAR (255)	NOT NULL
ZIP_CODE	VARCHAR (40)	NOT NULL
CITY_ID	VARCHAR (255)	A Foreign key referencing CITY_ID from CITY ENTITY. This can be used to list addresses based on the city. NOT NULL

#### ROLES ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
ROLE_ID	VARCHAR (255)	PRIMARY KEY, AUTO GEN
ROLE_NAME	VARCHAR (60)	NOT NULL

#### CITY ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
CITY_ID	VARCHAR (255)	PRIMARY KEY, UNIQUE, AUTO GEN
CITY_NAME	VARCHAR (60)	NOT NULL
STATE_ID	VARCHAR (255)	A Foreign key referencing the STATE_ID form STATE

		ENTITY. This is used to list the cities belonging to a state. NOT NULL
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### STATE ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
STATE_ID	VARCHAR (255)	PRIMARY KEY, UNIQUE, AUTO GEN
STATE_NAME	VARCHAR (60)	NOT NULL
COUNTRY_ID	VARCHAR (255)	A Foreign key referencing the COUNTRY_ID from COUNTRY ENTITY. This is used for filtering States based on COUNTRY. NOT NULL

### COUNTRY ENTITY:

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
COUNTRY_ID	VARCHAR (255)	PRIMARY KEY, UNIQUE
COUNTRY_NAME	VARCHAR (60)	NOT NULL

## Business Rules:

### 1. Admin:

- Database Admin has the highest privilege and has the access to all the other databases.
- Access to **CONNECT, CREATE, INSERT, DELETE, DROP, UPDATE** and **SELECT** permissions on all the entity objects, procedures, packages in the database.
- Access to **GRANT, ALTER** and **REVOKE** permissions, and to define and **CREATE** roles and **DELETE** users.
- Admin is responsible to create database directory, package structure.
- Admin must manage the database lifecycle management like monitoring, performance, backups, recovery point and high availability.
- There could be one or more employees with Admin role.
- Privilege to create multiple database instances.
- Access to allocate resources for the users.

## 2. Owner:

- Owner has the highest privilege for the respective application.
- Access to **CONNECT, CREATE, INSERT, DELETE, UPDATE** and **SELECT** permissions on application-level entity objects, procedures, packages in the database.
- Application owner has the privilege to **GRANT, CONNECT** access to other application users.
- Application owner has the privilege to **CREATE, DELETE** application user and **GRANT, ALTER, and REVOKE** the user permissions.
- There could be one or more employees with Owner role.
- Access to allocate resources for the users.
- Access to Owner will be provided by Admin.

## 3. Developer:

- Access to **CONNECT, SELECT, INSERT, UPDATE** and **CREATE VIEW** permissions in all the application entities.
- Privilege to **CREATE, ALTER, and DROP** table permissions.
- Developer will analyse the customer's requirements and make changes in the existing environment.
- Access to packages, procedures, and functions.
- All the above permissions are limited to development environment only.

## 4. Tester:

- The tester will have the read only permissions to all the entities for the respective application.
- Access to only **CONNECT, SELECT, INSERT, UPDATE** and **DELETE** permissions.
- Their responsibility is to check whether all the test cases are passed and to figure out if any inconsistency in the data model.
- All the above permissions will be applicable to testing environments only.

## 5. Business Analyst:

- Responsible for analysing the revenue generated information, and to maintain dashboards based on it.
- Access to the **BUSINESS\_ANALYST\_VIEW**.
- They have only **CONNECT** and **SELECT** permissions.



## 6. Support Service:

- Responsible to make entire application work, and they have access to the procedures.
- Access to the packages and functions.
- **SUPPORT\_SERVICE\_VIEW** can be accessed via procedures, and all the Data Manipulation Language functions are performed through procedures.

### VIEWS:

Role	Entities
SUPPORT_SERVICE_VIEW	User, Booking, Transaction, and Car_Listing
BUSSINESS_ANALYST_VIEW	User, Booking, Transaction, and Car_Listing

### PERMISSION LEVELS:

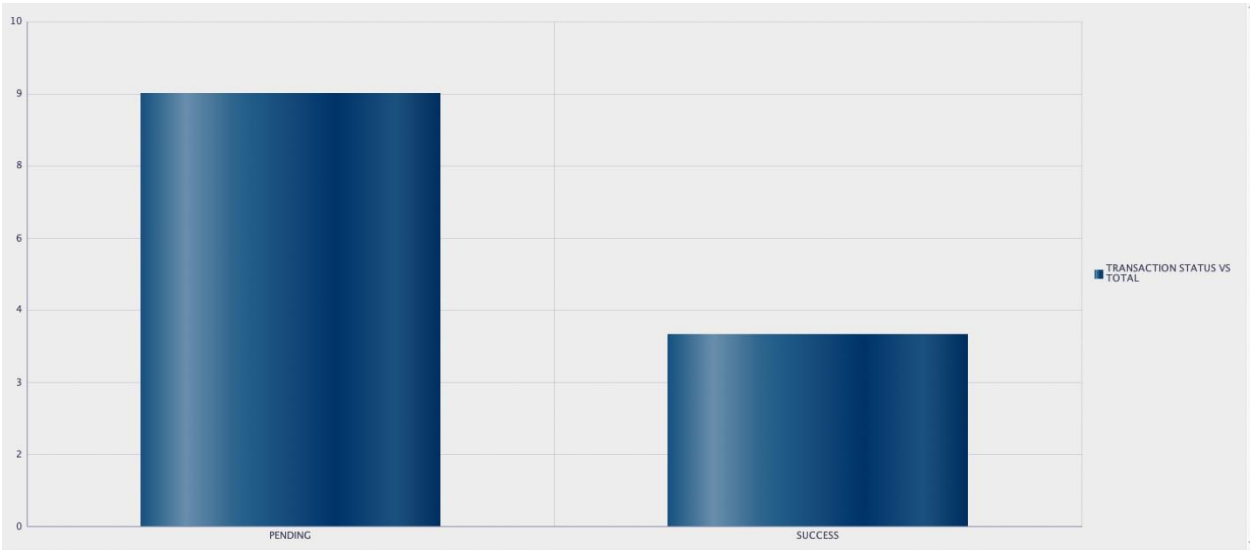
LEVEL 1	ENTITY /PACKAGES/ PROCEDURES/ VIEWS	CONNECT, CREATE, INSERT, UPDATE, DELETE, DROP, SELECT, CREATE VIEW, ALTER
	USER	CREATE, DELETE, GRANT, REVOKE
	SCHEMA	CREATE, DELETE, DROP, ALTER
	RESOURCE ALLOCATION	GRANT RESOURCE, ALTER
LEVEL 2	ENTITY /PACKAGES/ PROCEDURES/ VIEWS	CONNECT, CREATE, INSERT, UPDATE, DELETE, DROP, SELECT, CREATE VIEW, ALTER
	USER	CREATE, DELETE, GRANT, REVOKE
LEVEL 3	ENTITY /PACKAGES/ PROCEDURES/ VIEWS	CONNECT, INSERT, UPDATE, SELECT, DELETE, CREATE, DELETE, DROP, ALTER
LEVEL 4	ENTITY /PACKAGES/ PROCEDURES/ VIEWS	CONNECT, SELECT, INSERT, UPDATE, DELETE
LEVEL 5	ENTITY / VIEWS	CONNECT, SELECT

### ENTITY LEVEL ACCESS

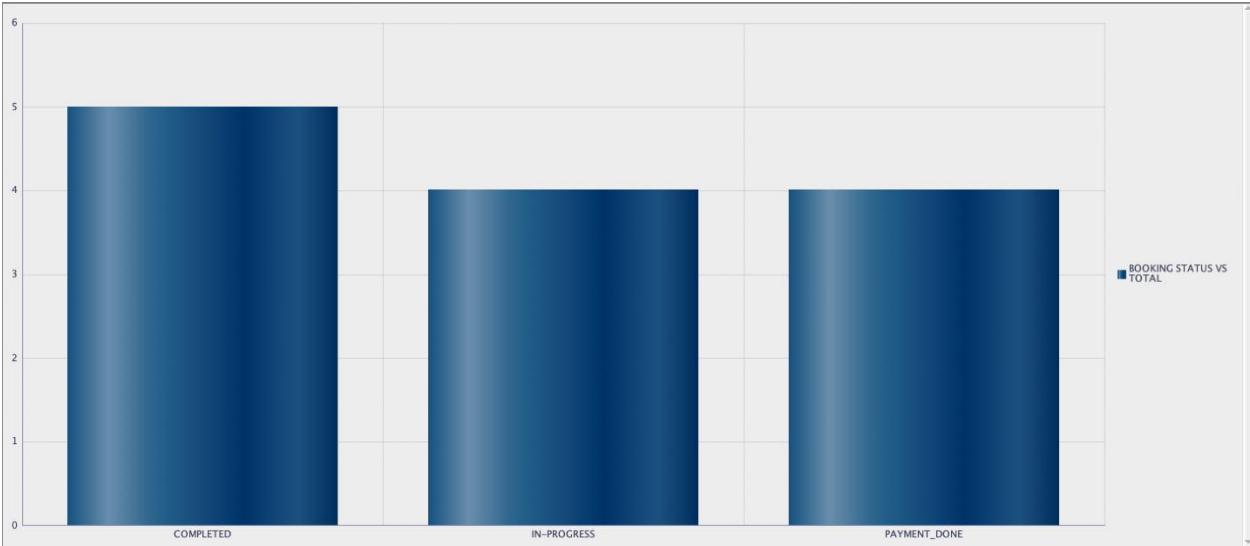
Entity / View	ROLES					
	ADMIN	OWNER	DEVELOPER	TESTER	ANALYST	SERVICE
<i>SCHEMAS</i>	Level 1	X	X	X	X	X
<i>PACKAGES</i>	Level 1	Level 2	Level 3	X	X	X
<i>PROCEDURES/ FUNCTIONS</i>	Level 1	Level 2	Level 3	X	X	Level 4
<i>USER</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>ADDRESS</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>CAR_REGISTRATION</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>CAR_LISTING</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>BOOKINGS</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>PARKING / PICKUP</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>TRANSACTION</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>ROLES</i>	Level 1	Level 2	Level 3	Level 4	X	X
<i>BUSINESS_ANALYST_ VIEW</i>	Level 1	Level 2	Level 5	Level 5	Level 5	X
<i>SUPPORT_SERVICE_V IEW</i>	Level 1	Level 2	Level 5	Level 5	X	X

**Reports:**

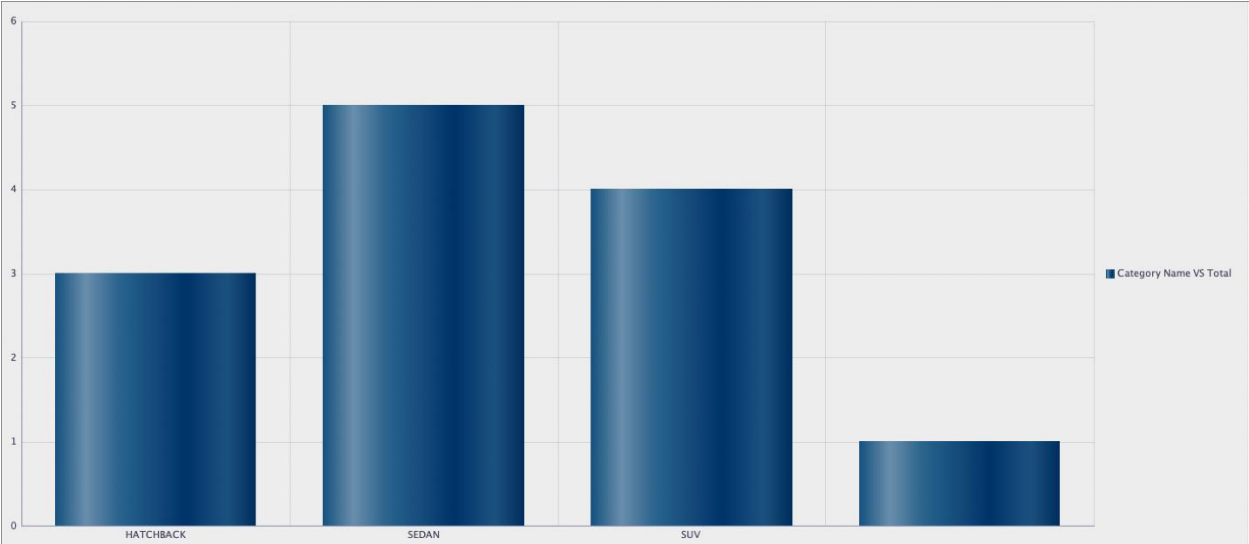
**Transaction status report**



**Booking status report**



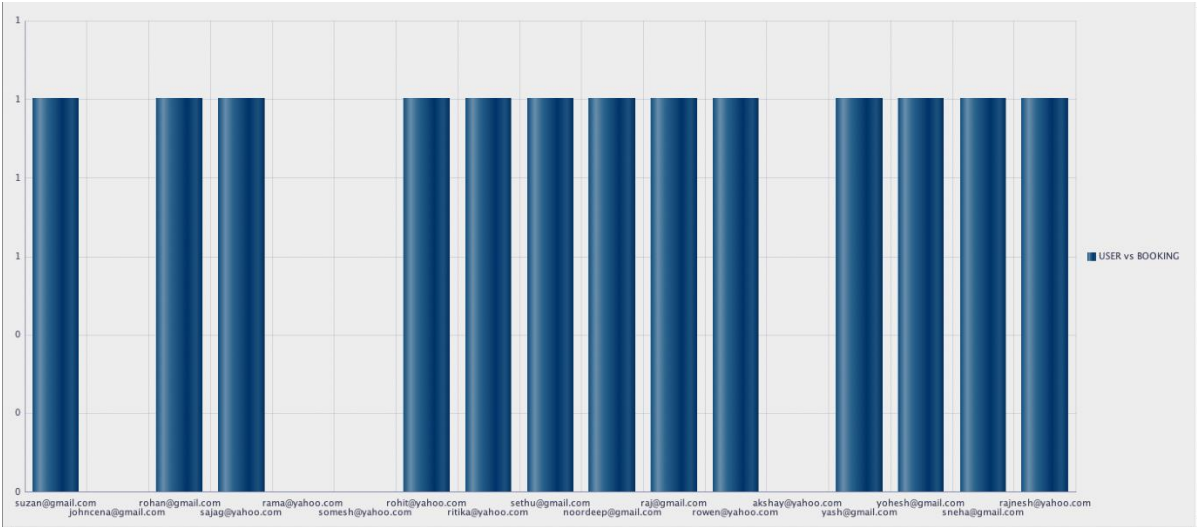
## Category wise booking report



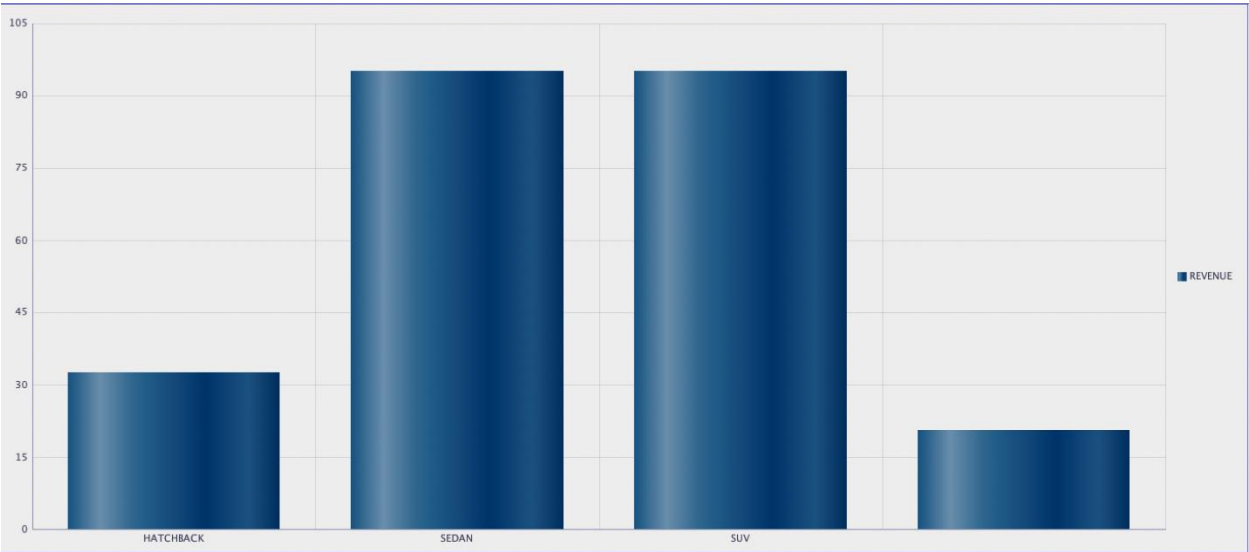
## Feedback report

	EMAIL	CAR_REGISTER_ID	CAR_NAME	CAR_COLOR	CAR_COMPANY	CAR_CATEGORY_NAME	ACTUAL_START_DATE	ACTUAL_END_DATE	FEEDBACKS
1	rohan@gmail.com	ARTYHBNJU123FTHYA0	A8	WHITE	AUDI	SEDAN	29-APR-22 11.21.42.589552000	PM 29-APR-22 11.21.43.597274000	PM COMMENT-1
2	yohesh@gmail.com	ARTYHBNJU123FTHYA1	07	BLACK	AUDI	SUV	29-APR-22 11.21.42.658115000	PM 29-APR-22 11.21.43.670987000	PM COMMENT-2
3	sneha@gmail.com	ARTYHBNJU123FTHYA2	Q5	RED	AUDI	SUV	29-APR-22 11.21.42.705082000	PM 29-APR-22 11.21.43.720191000	PM COMMENT-3
4	suzan@gmail.com	ARTYHBNJU123FTHYA3	X7	WHITE	BMW	SUV	29-APR-22 11.21.42.948495000	PM 29-APR-22 11.21.43.789212000	PM COMMENT-4
5	sajag@yahoo.com	ARTYHBNJU123FTHYA4	X5	BLACK	BMW	SUV	29-APR-22 11.21.43.044165000	PM 29-APR-22 11.21.43.979226000	PM COMMENT-5
6	rowen@yahoo.com	ARTYHBNJU123FTHYA5	330	RED	BMW	SEDAN	29-APR-22 11.21.43.094000000	PM 29-APR-22 11.21.44.507294000	PM COMMENT-6
7	rohit@yahoo.com	ARTYHBNJU123FTHYA7	FOCUS	BLACK	FORD	HATCHBACK	29-APR-22 11.21.43.160878000	PM 29-APR-22 11.21.44.555797000	PM COMMENT-7
8	rajnesh@yahoo.com	ARTYHBNJU123FTHYA8	MODEL 3	RED	TESLA	SEDAN	29-APR-22 11.21.43.293093000	PM 29-APR-22 11.21.44.621948000	PM COMMENT-8
9	ritika@yahoo.com	ARTYHBNJU123FTHYA9	WRANGLER	WHITE	JEEP	SUV	29-APR-22 11.21.43.343020000	PM 29-APR-22 11.21.44.693180000	PM COMMENT-9

## User bookings report



### Car-category revenue report



### User bookings report

	USER_ID	FIRST_NAME	LAST_NAME	LISTING_ID	CAR_REGISTER_ID	CAR_NAME	CAR_COMPANY	FEE_RATE
1	USER_1	SETHU	PAG	CAR_LISTING_1	ARTYHBNJU123FTHYG7	CITY	HONDA	10
2	USER_2	NOOR	GILL	CAR_LISTING_2	ARTYHBNJU123FTHYG8	CIVIC	HONDA	12.5
3	USER_3	YASH	JAIN	CAR_LISTING_3	ARTYHBNJU123FTHYG9	ACCORD	HONDA	14.5
4	USER_4	RAJ	RAMPAL	CAR_LISTING_4	ARTYHBNJU123FTHYG0	A7	AUDI	20.5
5	USER_5	ROHAN	JAIN	CAR_LISTING_5	ARTYHBNJU123FTHYA0	A8	AUDI	22
6	USER_6	YOGESH	MAHATO	CAR_LISTING_6	ARTYHBNJU123FTHYA1	Q7	AUDI	25.5
7	USER_7	SNEHA	VAIDYA	CAR_LISTING_7	ARTYHBNJU123FTHYA2	Q5	AUDI	22
8	USER_8	SUZAN	KUMAR	CAR_LISTING_8	ARTYHBNJU123FTHYA3	X7	BMW	25.5
9	USER_9	SAJAG	JAIN	CAR_LISTING_9	ARTYHBNJU123FTHYA4	X5	BMW	22
10	USER_10	ROWEN	RAM	CAR_LISTING_10	ARTYHBNJU123FTHYA5	330	BMW	20.5
11	USER_11	ROHIT	KUMAR	CAR_LISTING_11	ARTYHBNJU123FTHYA7	FOCUS	FORD	10
12	USER_12	RAJNESH	JAIN	CAR_LISTING_12	ARTYHBNJU123FTHYA8	MODEL 3	TESLA	17.5
13	USER_13	RITIKA	RAMPURI	CAR_LISTING_13	ARTYHBNJU123FTHYA9	WRANGLER	JEEP	20.5