



---

# CAR RENTALS AGENCY SYSTEM

---

Introduction to Database



- 1 - فراس بخاري 2140472
- 2 - عبدالرحمن الغامدي 2140786
- 3 - عبدالجليل خاشقجي 2142499

Section: (15689) (RT)

## Table of Contents

<b>1 – System Analysis .....</b>	<b>2</b>
<b>2 – The EER Model .....</b>	<b>4</b>
<b>3 – The Relational Schema and Normalization .....</b>	<b>5</b>
<b>4 – Physical Database implementation CODE .....</b>	<b>6</b>
<b>5 – Physical Database implementation SCREENSHOTS .....</b>	<b>11</b>

## **Abstract:**

A car rentals agency system is concerned with providing an easy and organized way to rent a car. Where a customer can rent a car from different companies and models and makes. Moreover, with the help of database systems renting a car can be made so much easier and safer and more accurate by letting each client make their own account and ID so mix-ups can be prevented.

## **Scenario for the Car Rentals Agency System:**

A customer comes to a branch of the Car Rentals Agency to rent a car and goes to one of the employees to register an account in the system to be able to rent a car from the available cars through the database and register it to the customer with his information to prevent mix-ups then the customer takes the car and the start and end dates of rent the gets registered in the database.

## **Entity description:**

### **1 - Branch:**

The Branch is where the cars(vehicles) are stored in and can be rented from.

### **2 – Customers:**

The customer entity is where the customer can register his information like name, phone number, email; and be assigned to an employee to help him.

### **3 – Employee:**

The employee entity is where an employee's information are stored such as his name and branch location.

#### 4 – Rent:

The Rent entity is where the information of the rent of a vehicle is stored like the customer that will rent a vehicle and the employee who will register it for him and the branch that the vehicle will be rented from and the start and end dates of the rent.

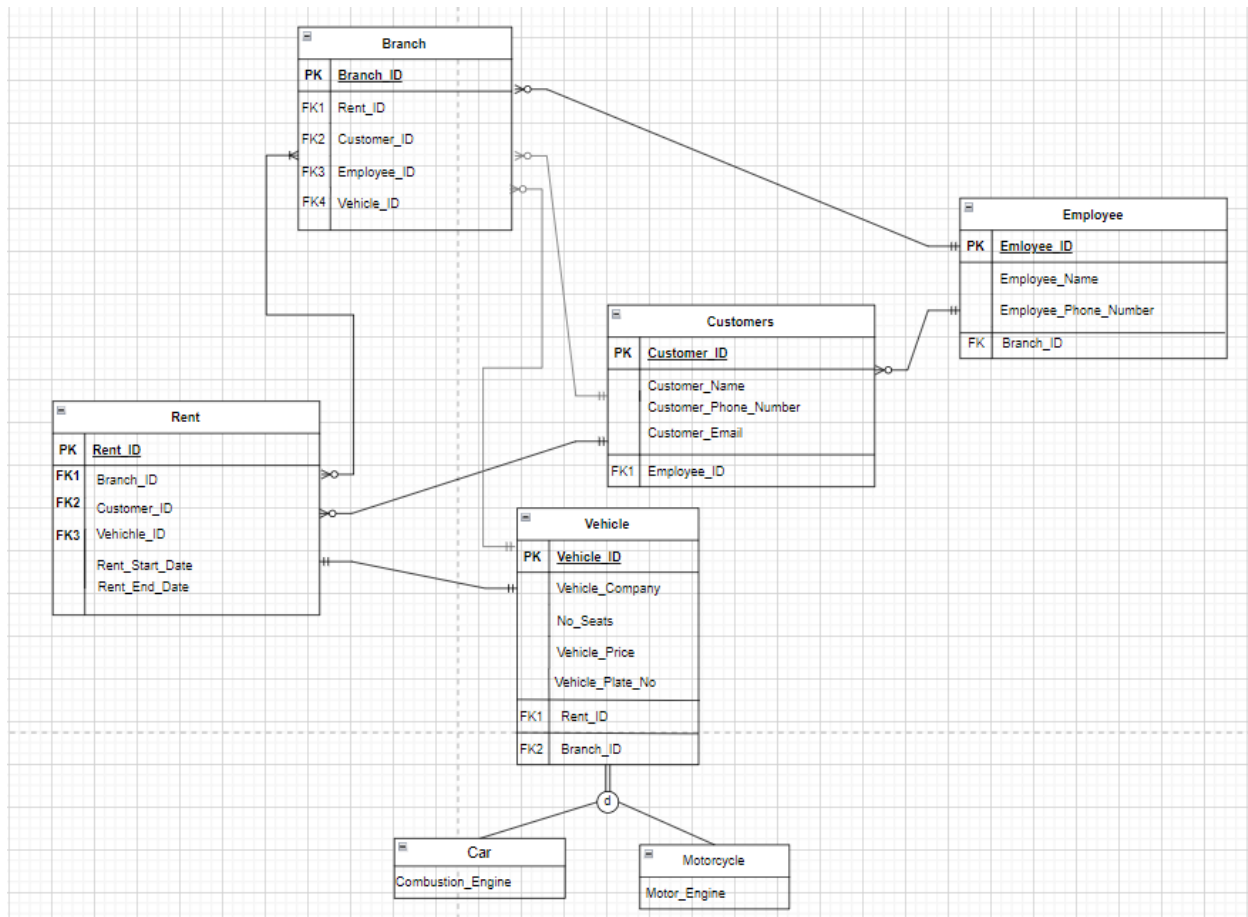
#### 5 – Vehicles (Super Type):

The vehicles entity is where cars(vehicles) can be organized as rented or available for rent and number of seats and it's the Super Type for Car & Motorcycle.

#### 6 – Car & Motorcycle (Sub Type):

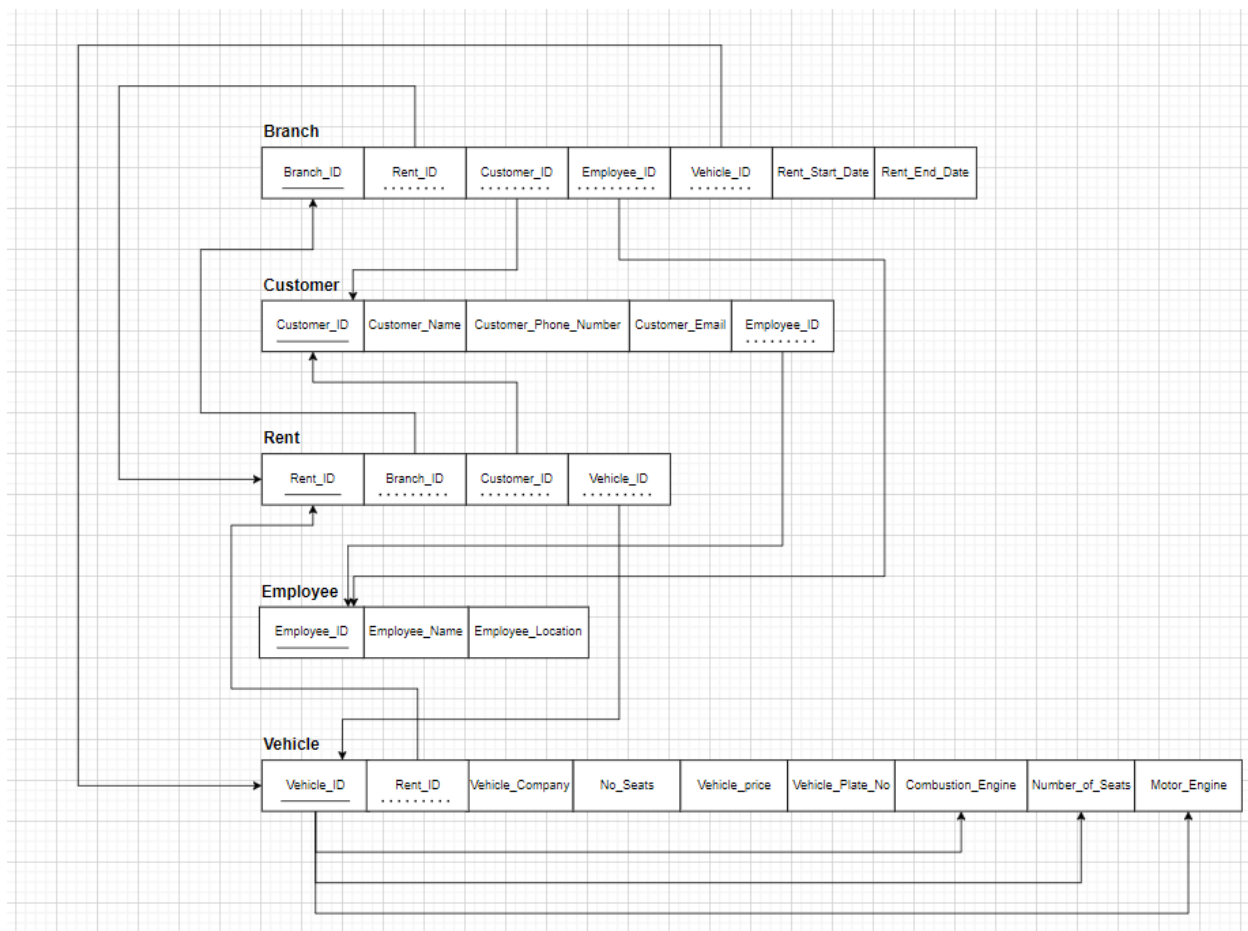
Are Sub Types of Vehicles and they contain the engine type either Combustion Engine or Motor Engine.

## The EER-Model:



## Relational Schema

The Relations are Already in 1NF & 2NF & 3NF Because There are no Multivalued Attributes and All Non-key Attributes are Fully Dependent on The PK and There are no Non-key Attributes That are Dependent on other Non-key Attributes.



## Physical Database implementation

### CODE:

```
create table customer (  
customer_id varchar2(7) primary key,  
customer_name varchar2(20) not null,  
customer_phone_number number(10),  
customer_email varchar2(30),  
employee_id varchar2(5)  
);
```

```
create table employee (  
employee_id varchar2(5) primary key,  
employee_name varchar2(20),  
employee_phone_number number(10),  
branch_id varchar2(5)  
);
```

```
alter table customer add foreign key(employee_id) references employee(employee_id) on delete set null;
```

```
create table rent (  
rent_id varchar2(5) primary key,  
customer_id varchar2(7),  
vehicle_id varchar2(5),  
branch_id varchar2(5),  
rent_start_date date,  
rent_end_date date  
);
```

```
alter table rent add foreign key(customer_id) references customer(customer_id) on delete set null;
```

```
create table vehicle (  
vehicle_id varchar2(5) primary key,  
vehicle_company varchar2(15),  
No_Seats number(1),  
vehicle_price varchar2(7),  
vehicle_plate_no varchar2(7),  
rent_id varchar2(5),  
branch_id varchar2(5)  
);
```

```
alter table vehicle add foreign key(rent_id) references rent(rent_id) on delete set null;
```

```
create table car (  
combustion_engine varchar2(5),  
CHECK (Combustion_Engine IN ('V2','V3','V4','V6','V8')),  
vehicle_id varchar2(5)  
);
```

```
alter table car add foreign key(vehicle_id) references vehicle(vehicle_id) on delete set null;
```

```
create table motorcycle (  

```

```
motor_engine varchar2(8),
CHECK (Motor_Engine IN ('L Twin','V Twin','Electric','Rotary','Inline')),
vehicle_id varchar2(5)
);
```

```
alter table motorcycle add foreign key(vehicle_id) references vehicle(vehicle_id) on delete set null;
```

```
create table branch (
branch_id varchar2(5) primary key,
rent_id varchar2(5),
customer_id varchar2(7),
employee_id varchar2(5),
vehicle_id varchar2(5),
foreign key (rent_id) references rent(rent_id) on delete set null,
foreign key (customer_id) references customer(customer_id) on delete set null,
foreign key (employee_id) references employee(employee_id) on delete set null,
foreign key (vehicle_id) references vehicle(vehicle_id) on delete set null
);
```

```
alter table employee add foreign key(branch_id) references branch(branch_id) on delete set null;
alter table rent add foreign key(branch_id) references branch(branch_id) on delete set null;
```

```
insert into customer values('1234567', 'Abdulrahman','0561234567', 'abdulrhman@hotmail.com', null);
insert into customer values('7654321', 'Firas','0561234566', 'firas@hotmail.com', null);
insert into customer values('3214567', 'Abduljalel','0567886678', 'AJ@hotmail.com', null);
insert into customer values('12345', 'Son Goku','123456789', 'earthlingsaiyan@hotmail.com', null);
insert into customer values('232453', 'Light yagami','5539535', 'lightisbetter@hotmail.com', null);
```

```
insert into employee values(100, 'Saitama','987654321', null);
insert into employee values(101, 'Genos','43359353', null);
insert into employee values(102, 'Dj Khaled','34244', null);
insert into employee values(103, 'Ariana','987654321', null);
insert into employee values(104, 'Doja cat','34313152', null);
```

```
insert into rent values(32012, null, null, null, DATE '2001-09-11', DATE '2002-09-11');
insert into rent values(32324, null, null, null, DATE '2004-10-16', DATE '2005-10-16');
insert into rent values(32424, null, null, null, DATE '2003-09-11', DATE '2006-09-14');
insert into rent values(52456, null, null, null, DATE '2100-05-12', DATE '2102-05-11');
insert into rent values(14534, null, null, null, DATE '3200-05-30', DATE '3205-05-23');
```

```
insert into vehicle values(12345, 'Toyota', 5, '$4250', 'KYS 902', null, null);
insert into vehicle values(53945, 'Nissan', 5, '$12049', 'MSD 321', null, null);
insert into vehicle values(23495, 'Cheverolt', 6, '$60120', 'LMS 420', null, null);
insert into vehicle values(75453, 'Hyunda', 8, '$43103', 'TUO 069', null, null);
insert into vehicle values(35674, 'GMC', 8, '$120000', 'UJD 234', null, null);
```

```
insert into car values('V2', null);
insert into car values('V3', null);
insert into car values('V4', null);
insert into car values('V6', null);
insert into car values('V8', null);
```

```
insert into motorcycle values('L Twin', null);
```



```
insert into motorcycle values('V Twin', null);
insert into motorcycle values('Electric', null);
insert into motorcycle values('Rotary', null);
insert into motorcycle values('Inline', null);
```

```
insert into branch values( 12045, null, null, null, null);
insert into branch values( 64645, null, null, null, null);
insert into branch values( 76866, null, null, null, null);
insert into branch values( 85656, null, null, null, null);
insert into branch values( 22222, null, null, null, null);
```

```
update customer set employee_id = 100 where customer_id = '1234567';
update customer set employee_id = 101 where customer_id = '7654321';
update customer set employee_id = 102 where customer_id = '3214567';
update customer set employee_id = 103 where customer_id = '12345';
update customer set employee_id = 104 where customer_id = '232453';
```

```
update employee set branch_id = 12045 where employee_id = 100;
update employee set branch_id = 64645 where employee_id = 101;
update employee set branch_id = 76866 where employee_id = 102;
update employee set branch_id = 85656 where employee_id = 103;
update employee set branch_id = 22222 where employee_id = 104;
```

```
update rent set customer_id = '1234567' where rent_id = 32012;
update rent set customer_id = '7654321' where rent_id = 32324;
update rent set customer_id = '3214567' where rent_id = 32424;
update rent set customer_id = '12345' where rent_id = 52456;
update rent set customer_id = '232453' where rent_id = 14534;
```

```
update rent set vehicle_id = '12345' where rent_id = 32012;
update rent set vehicle_id = '53945' where rent_id = 32324;
update rent set vehicle_id = '23495' where rent_id = 32424;
update rent set vehicle_id = '75453' where rent_id = 52456;
update rent set vehicle_id = '35674' where rent_id = 14534;
```

```
update rent set branch_id = '12045' where rent_id = 32012;
update rent set branch_id = '64645' where rent_id = 32324;
update rent set branch_id = '76866' where rent_id = 32424;
update rent set branch_id = '85656' where rent_id = 52456;
update rent set branch_id = '22222' where rent_id = 14534;
```

```
update vehicle set rent_id = 32012 where vehicle_id = 12345;
update vehicle set rent_id = 32324 where vehicle_id = 53945;
update vehicle set rent_id = 32424 where vehicle_id = 23495;
update vehicle set rent_id = 52456 where vehicle_id = 75453;
update vehicle set rent_id = 14534 where vehicle_id = 35674;
```

```
update vehicle set branch_id = 12045 where vehicle_id = 12345;
update vehicle set branch_id = 64645 where vehicle_id = 53945;
update vehicle set branch_id = 76866 where vehicle_id = 23495;
update vehicle set branch_id = 85656 where vehicle_id = 75453;
update vehicle set branch_id = 22222 where vehicle_id = 35674;
```

```
update car set vehicle_id = 12345 where combustion_engine = 'V2';
update car set vehicle_id = 53945 where combustion_engine = 'V3';
update car set vehicle_id = 23495 where combustion_engine = 'V4';
update car set vehicle_id = 75453 where combustion_engine = 'V6';
update car set vehicle_id = 35674 where combustion_engine = 'V8';
```

```
update motorcycle set vehicle_id = 12345 where motor_engine = 'L Twin';
update motorcycle set vehicle_id = 53945 where motor_engine = 'V Twin';
update motorcycle set vehicle_id = 23495 where motor_engine = 'Rotary';
update motorcycle set vehicle_id = 75453 where motor_engine = 'Electric';
update motorcycle set vehicle_id = 35674 where motor_engine = 'Inline';
```

```
update branch set rent_id = 32012 where branch_id = 12045;
update branch set rent_id = 32324 where branch_id = 64645;
update branch set rent_id = 32424 where branch_id = 76866;
update branch set rent_id = 52456 where branch_id = 85656;
update branch set rent_id = 14534 where branch_id = 22222;
```

```
update branch set customer_id = 1234567 where branch_id = 12045;
update branch set customer_id = 7654321 where branch_id = 64645;
update branch set customer_id = 3214567 where branch_id = 76866;
update branch set customer_id = 12345 where branch_id = 85656;
update branch set customer_id = 232453 where branch_id = 22222;
```

```
update branch set employee_id = 100 where branch_id = 12045;
update branch set employee_id = 101 where branch_id = 64645;
update branch set employee_id = 102 where branch_id = 76866;
update branch set employee_id = 103 where branch_id = 85656;
update branch set employee_id = 104 where branch_id = 22222;
```

```
update branch set vehicle_id = 12345 where branch_id = 12045;
update branch set vehicle_id = 53945 where branch_id = 64645;
update branch set vehicle_id = 23495 where branch_id = 76866;
update branch set vehicle_id = 75453 where branch_id = 85656;
update branch set vehicle_id = 35674 where branch_id = 22222;
```

```
select CUSTOMER_ID, CUSTOMER_NAME, CUSTOMER_PHONE_NUMBER, CUSTOMER_EMAIL, EMPLOYEE_ID
from customer;
select EMPLOYEE_ID, EMPLOYEE_NAME, EMPLOYEE_PHONE_NUMBER, BRANCH_ID from employee;
select RENT_ID, CUSTOMER_ID, VEHICLE_ID, BRANCH_ID, RENT_START_DATE, RENT_END_DATE from rent;
select VEHICLE_ID, VEHICLE_COMPANY, NO_SEATS, VEHICLE_PRICE, VEHICLE_PLATE_NO, RENT_ID,
BRANCH_ID from vehicle;
select COMBUSTION_ENGINE, VEHICLE_ID from car;
select MOTOR_ENGINE, VEHICLE_ID from motorcycle;
select BRANCH_ID, RENT_ID, CUSTOMER_ID, EMPLOYEE_ID, VEHICLE_ID from branch;
```

```
select count(No_Seats) as seatCount, sum(No_Seats) as seatSum, min(No_Seats) as seatMin, max(No_Seats) as
seatMax, Avg(No_Seats) as seatAvg from vehicle;
```

```
SELECT customer.customer_name, employee.employee_name
```

FROM customer

FULL OUTER JOIN employee ON customer.employee\_id= employee.employee\_id

ORDER BY customer.customer\_name;

select customer\_id from customer

union

select employee\_id from employee;

select employee\_id from customer

intersect

select employee\_id from employee;

select customer\_id,customer\_name,customer\_phone\_number

from customer

Where employee\_id IN (select employee\_id from employee Where employee\_name = 'Doja cat');

select customer\_name

from customer

where customer\_id >= 20000

group by customer\_name;

## SCREENSHOTS:

The screenshot shows the Live SQL interface with a sidebar on the left containing navigation links: Home, SQL Worksheet (selected), My Session, Schema, Quick SQL, My Scripts, My Tutorials, and Code Library. The main area displays a SQL Worksheet titled "SQL Worksheet" with a toolbar (Clear, Find, Actions, Save, Run). The worksheet contains two tables:

CUSTOMER_ID	CUSTOMER_NAME	CUSTOMER_PHONE_NUMBER	CUSTOMER_EMAIL	EMPLOYEE_ID
1234567	Abdulrahman	561234567	abdulrman@hotmail.com	100
7654321	Firas	561234566	firas@hotmail.com	101
3214567	Abduljalel	567886678	AJ@hotmail.com	102
12345	Son Goku	123456789	earthlingsaiyan@hotmail.com	103
232453	Light yagami	5539535	lightsbetter@hotmail.com	104

Download CSV  
5 rows selected.

EMPLOYEE_ID	EMPLOYEE_NAME	EMPLOYEE_PHONE_NUMBER	BRANCH_ID
100	Saltama	987654321	12045
101	Genos	43359353	64645
102	Dj Khaled	34244	76866
103	Ariana	987654321	85656
104	Doja cat	34313152	22222

Download CSV  
5 rows selected.

RENT_ID	CUSTOMER_ID	VEHICLE_ID	BRANCH_ID	RENT_START_DATE	RENT_END_DATE
32012	1234567	12345	12045	11-SEP-01	11-SEP-02
32324	7654321	53945	64645	16-OCT-04	16-OCT-05

© 2022 Oracle - Live SQL 22.3.1, running Oracle Database 19c Enterprise Edition - 19.14.0.0.0 - Database Documentation - Ask Tom - Dev Gym  
Built with ♥ using Oracle APEX - Privacy - Terms of Use

The screenshot shows the Live SQL interface with a sidebar on the left containing navigation links: Home, SQL Worksheet (selected), My Session, Schema, Quick SQL, My Scripts, My Tutorials, and Code Library. The main area displays a SQL Worksheet titled "SQL Worksheet" with a toolbar (Clear, Find, Actions, Save, Run). The worksheet contains two tables:

RENT_ID	CUSTOMER_ID	VEHICLE_ID	BRANCH_ID	RENT_START_DATE	RENT_END_DATE
32012	1234567	12345	12045	11-SEP-01	11-SEP-02
32324	7654321	53945	64645	16-OCT-04	16-OCT-05
32424	3214567	23495	76866	11-SEP-03	14-SEP-06
52456	12345	75453	85656	12-MAY-00	11-MAY-02
14534	232453	35674	22222	30-MAY-00	23-MAY-05

Download CSV  
5 rows selected.

VEHICLE_ID	VEHICLE_COMPANY	NO_SEATS	VEHICLE_PRICE	VEHICLE_PLATE_NO	RENT_ID	BRANCH_ID
12345	Toyota	5	\$4250	KYS 902	32012	12045
53945	Nissan	5	\$12040	MSD 321	32324	64645
23495	Chevrolet	6	\$60120	LMS 420	32424	76866
75453	Hyunda	8	\$43103	TUD 009	52456	85656
35674	GMC	8	\$120000	UDJ 234	14534	22222

Download CSV  
5 rows selected.

COMBUSTION_ENGINE	VEHICLE_ID
V2	12345
V3	53945

© 2022 Oracle - Live SQL 22.3.1, running Oracle Database 19c Enterprise Edition - 19.14.0.0.0 - Database Documentation - Ask Tom - Dev Gym  
Built with ♥ using Oracle APEX - Privacy - Terms of Use

Live SQL

Home SQL Worksheet My Session Schema Quick SQL My Scripts My Tutorials Code Library

SQL Worksheet

COMBUSTION\_ENGINE VEHICLE\_ID

V2	12345
V3	53945
V4	23495
V6	75453
V8	35674

Download CSV  
5 rows selected.

MOTOR\_ENGINE VEHICLE\_ID

L Twin	12345
V Twin	53945
Electric	75453
Rotary	23495
Inline	35674

Download CSV  
5 rows selected.

BRANCH_ID	RENT_ID	CUSTOMER_ID	EMPLOYEE_ID	VEHICLE_ID
12045	32012	1234567	100	12345
64645	32324	7654321	101	53945
76866	32424	3214567	102	23495
85656	52456	12345	103	75453
22222	14534	232453	104	35674

© 2022 Oracle - Live SQL 22.3.1, running Oracle Database 19c Enterprise Edition - 19.14.0.0.0 - Database Documentation - Ask Tom - Dev Gym  
Built with ♥ using Oracle APEX - Privacy - Terms of Use

Live SQL

Home SQL Worksheet My Session Schema Quick SQL My Scripts My Tutorials Code Library

SQL Worksheet

BRANCH_ID	RENT_ID	CUSTOMER_ID	EMPLOYEE_ID	VEHICLE_ID
12045	32012	1234567	100	12345
64645	32324	7654321	101	53945
76866	32424	3214567	102	23495
85656	52456	12345	103	75453
22222	14534	232453	104	35674

Download CSV  
5 rows selected.

SEATCOUNT	SEATSUM	SEATMIN	SEATMAX	SEATAVG
5	32	5	8	6.4

Download CSV

CUSTOMER_NAME	EMPLOYEE_NAME
Abduljaleel	Oj Khaled
Abdulrahman	Saitama
Firas	Genos
Light yagami	Doja cat
Son Goku	Arlana

Download CSV  
5 rows selected.

© 2022 Oracle - Live SQL 22.3.1, running Oracle Database 19c Enterprise Edition - 19.14.0.0.0 - Database Documentation - Ask Tom - Dev Gym  
Built with ♥ using Oracle APEX - Privacy - Terms of Use

I have included screenshots of all tables before and after using queries