**SVKM’s NMIMS**

**School of Technology Management & Engineering, Chandigarh**

A.Y. 2023 - 24

**Course: Database Management Systems**

**Project Report**

|  |  |  |
| --- | --- | --- |
| Program | MBA TECH (DATA SCIENCE) | |
| Semester | 4 | |
| Name of the Project: | Satellite Insights | |
|  | | |
| Details of Project Members |  |  |
| Batch | Roll No. | Name |
| J1 | S003 | Aditya Kumar |
| J1 | S006 | Anant Shukla |
| J1 | S012 | Avi Patel |
| Date of Submission: 2/4/24 | | |

**Contribution of each project Members:**

|  |  |  |
| --- | --- | --- |
| Roll No. | Name: | Contribution |
| S003 | Aditya Kumar | SQL Queries |
| S006 | Anant Shukla | Data Cleaning and helped in queries |
| S012 | Avi Patel | ER Daigram and assisted in queries |

**Github link of your project: https://github.com/ak50-ak3/Satellite**

**Project Report**

**Selected Topic**

**by**

**Aditya Kumar, S003**

**Anant Shukla, S006**

**Avi Patel, S012**

**Course: DBMS**

**AY: 2023-24**

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**I. Storyline**

We know countless satellites orbit the Earth, each with its own unique name, purpose, and operator.

Satellites possesses an official name,country of origin and serve a specific purpose.However satellites have a lifetime after which the closer satellites burn up in the atmosphere .Here we will explore the things that are taken into consideration when a satellite is launced.and also learn about which countries had send the most satellites in the year 2023.

**II. Components of Database Design**

Entity 1: Satellite

Attributes:-

* Sat\_Name(Char)
* Users(Char)
* Purpose(Char)
* SatID(int) -Primary Key-fk
* COSPAR\_Number-(int)foreign Key

Description:It gives us details about the satellite such as it’s name,it’s user in sectors like military,communication ,their purpose and their unique numbers.

Entity 2: Owner

Attributes:-

* Company\_Name(Char)
* Country\_of\_Operator(Char)
* COSPAR\_Number(int)(-Primary Key
* SatID(int) - Foreign key
* Country(Char)

Description:It gives us details about the country that sent the satellite.

Entity 3: Launch\_Details

Attributes:-

* Launch\_Vehicle(Char)
* Date\_of\_Launch(Char)
* COSPAR\_Number(int) -Primary Key
* Launch\_Site(Char)

Description:It gives us details the satellite that are related to it’s Launching.

Entity 4: Technical\_Details

Attributes:-

* Contractor(Char)
* Comments(Char)
* SatID(int) -Primary key
* Country\_of\_Contractor(Char)

Description:It gives us technical details about the satellite.

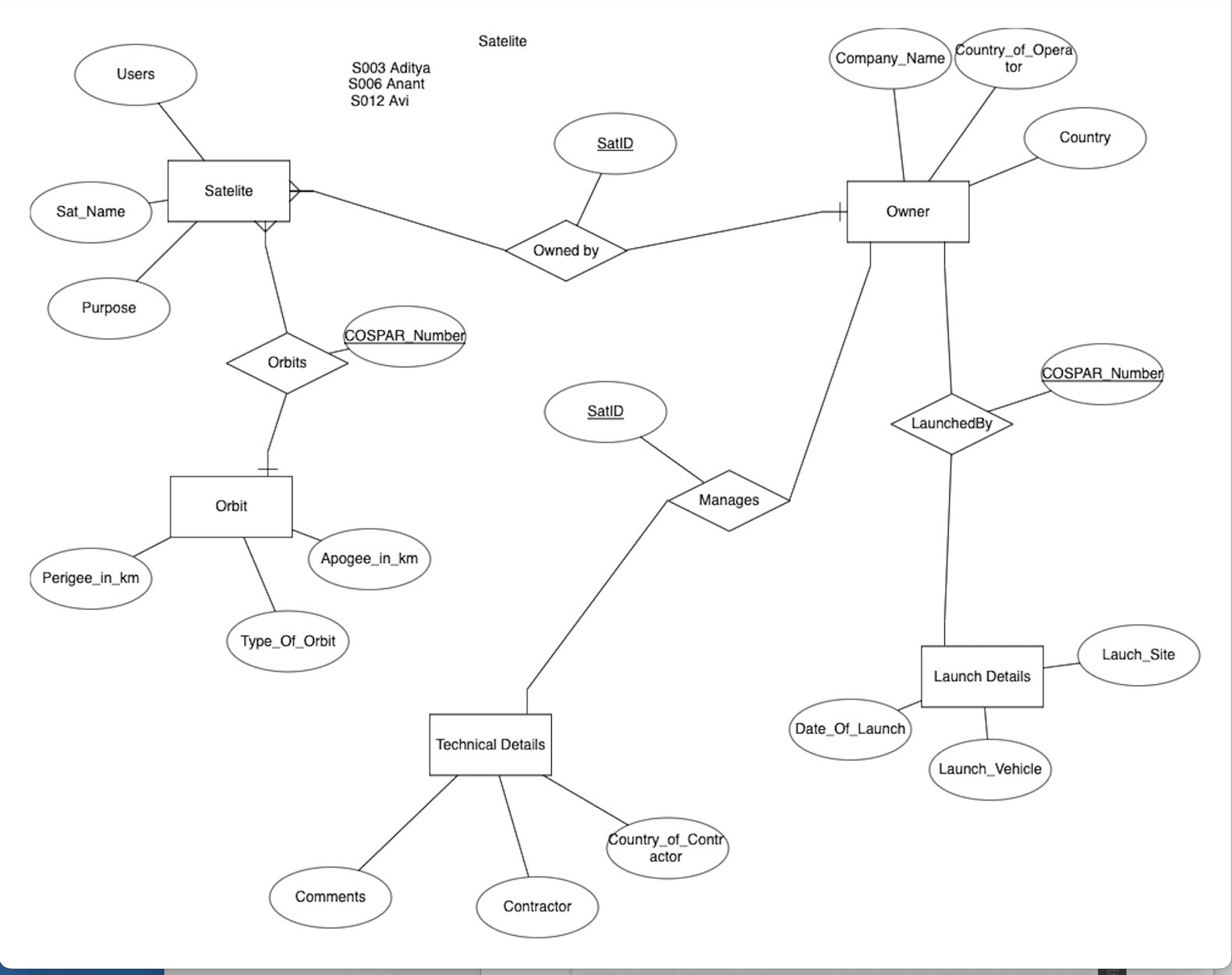
Entity 5: Orbit

Attributes:-

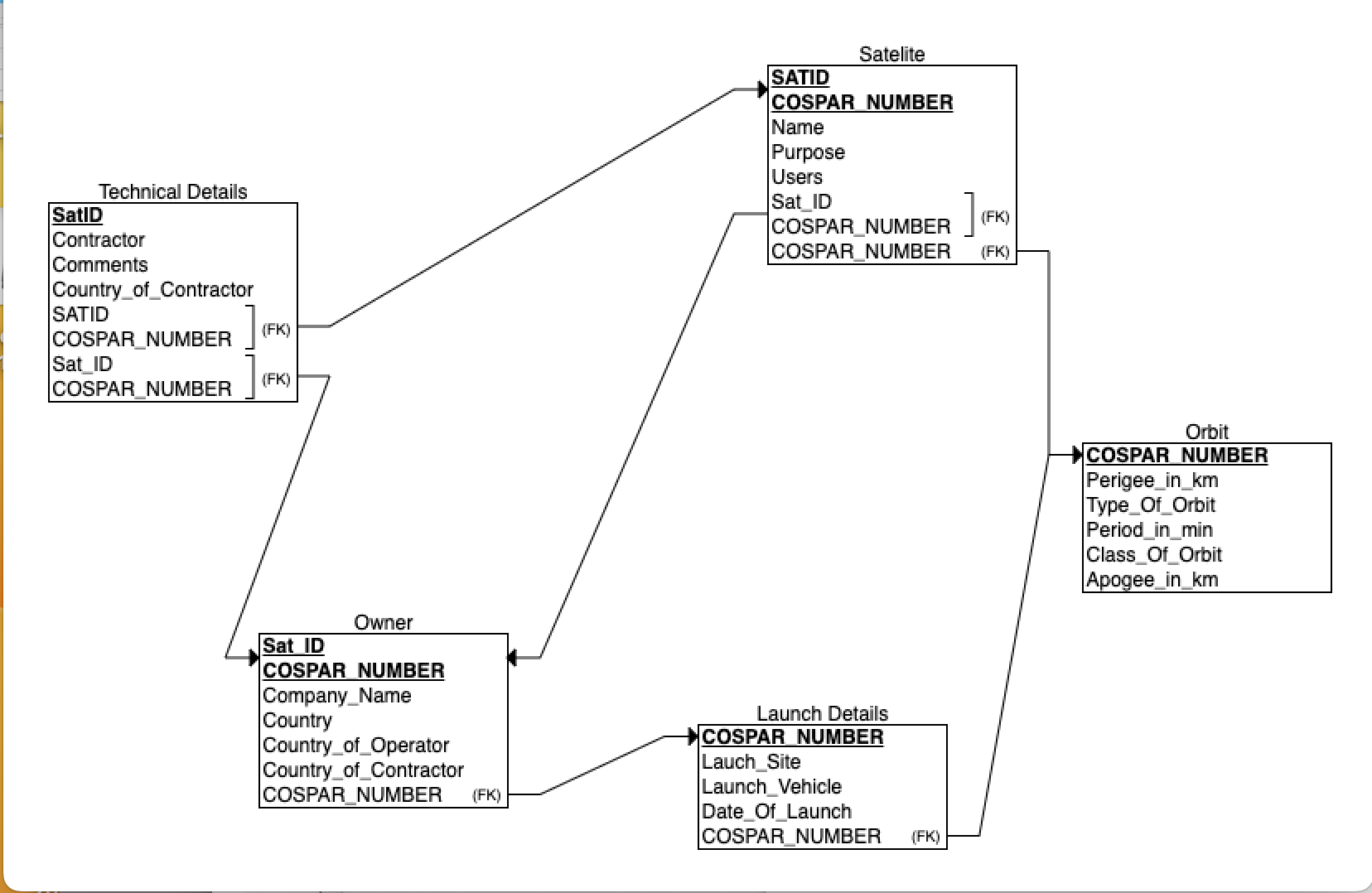
* Type\_Of\_Orbit(Char)
* Agopee\_in\_km(int)
* Perigree\_in\_km(int)
* COSPAR\_Number (int)-Primary key

Description:It gives us details about the satellite’s oirbi Apogee:farthest distance,Perigree:.closest distance)

**III. Entity Relationship Diagram**

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**IV. Relational Model**

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Tables obtained are Satellite,Owner,Technical\_Details,Launch\_Details,Orbit.

**V. Normalization**

We first drop all columns of database that had common values in their tuples and filtered them out.We also split some columns of Contractor and Country of Contractor.

In Satellite-

1NF

check for multivalued columns-There are no multivalued columns

All have atomic values.

Primary Key is SatID.

Hece,it is 1NF.

2NF

All non prime attributes depend on Sat!D.

Hence it is 2NF.

3NF

All non prime attributes do not depend on any other non prime attributes.

BCNF

SatID is a candidate key and for every (SatID->other attributes) it is a super key.

Hence Satellite table is Normalised.

Similarly for other tables Cospar\_Number and SatID satisfy all the conditions .

Hence the tables were already normalized.

**VI. SQL Queries**

**Creating Tables-**

SELECT \* FROM Satellite.s;

-- CREATE TABLE Satellite AS (SELECT SatID,Purpose,COSPAR\_Number FROM Satellite.s);

CREATE TABLE S AS (SELECT \* FROM Satellite.s);

Select \* from S ;

Alter table S rename column Owner to Company\_Name;

CREATE TABLE Satellite AS (SELECT SatID,Sat\_Name,Users,Purpose,COSPAR\_Number FROM S);

CREATE TABLE Orbit AS (SELECT Type\_Of\_Orbit,Perigee\_in\_km,Apogee\_in\_km,COSPAR\_Number FROM S);

CREATE TABLE Technical\_Details AS (SELECT SatID,Contractor,Country\_of\_Contractor,Comments FROM S);

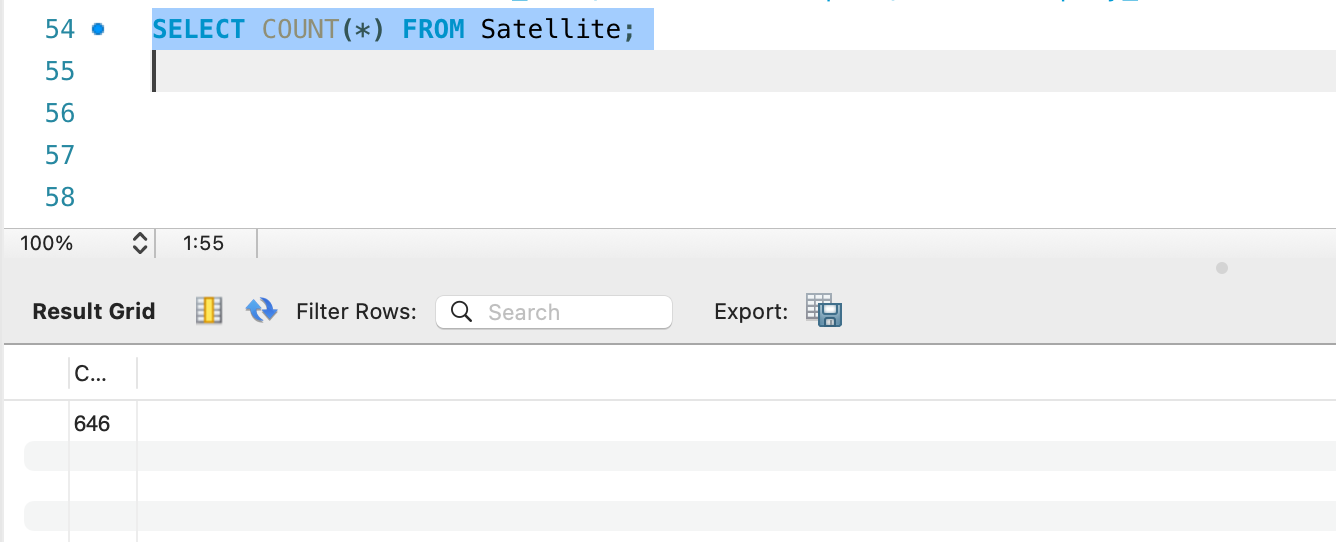
CREATE TABLE Launch\_Details AS (SELECT Date\_of\_Launch,Launch\_Vehicle,Launch\_Site,COSPAR\_Number FROM S);

CREATE TABLE Owner AS (SELECT SatID,Company\_Name,Country,Country\_of\_Operator,COSPAR\_Number FROM S);

**QUERIES**

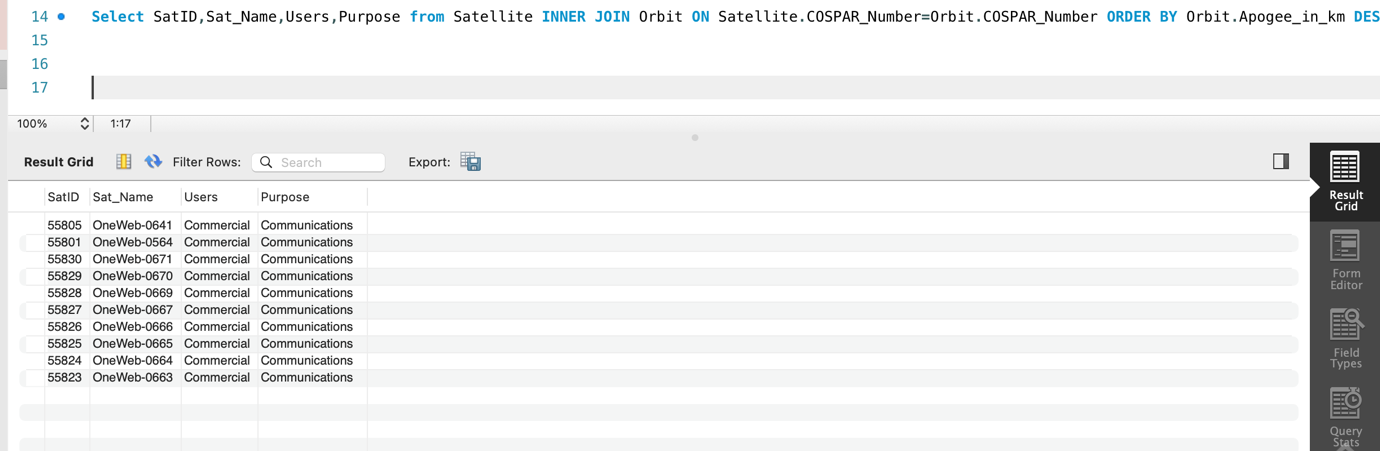
0.How many satellites were launced in 2023?

SELECT COUNT(\*) FROM Satellite;



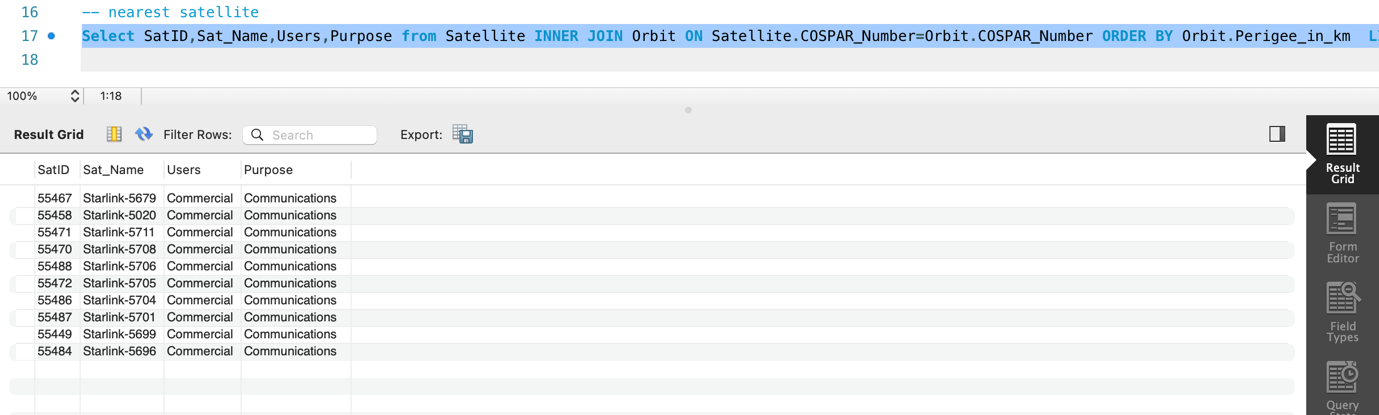
1.Show the list of furtest 10 satellites from earth.

Select SatID,Sat\_Name,Users,Purpose from Satellite INNER JOIN Orbit ON Satellite.COSPAR\_Number=Orbit.COSPAR\_Number ORDER BY Orbit.Apogee\_in\_km DESC LIMIT 10;



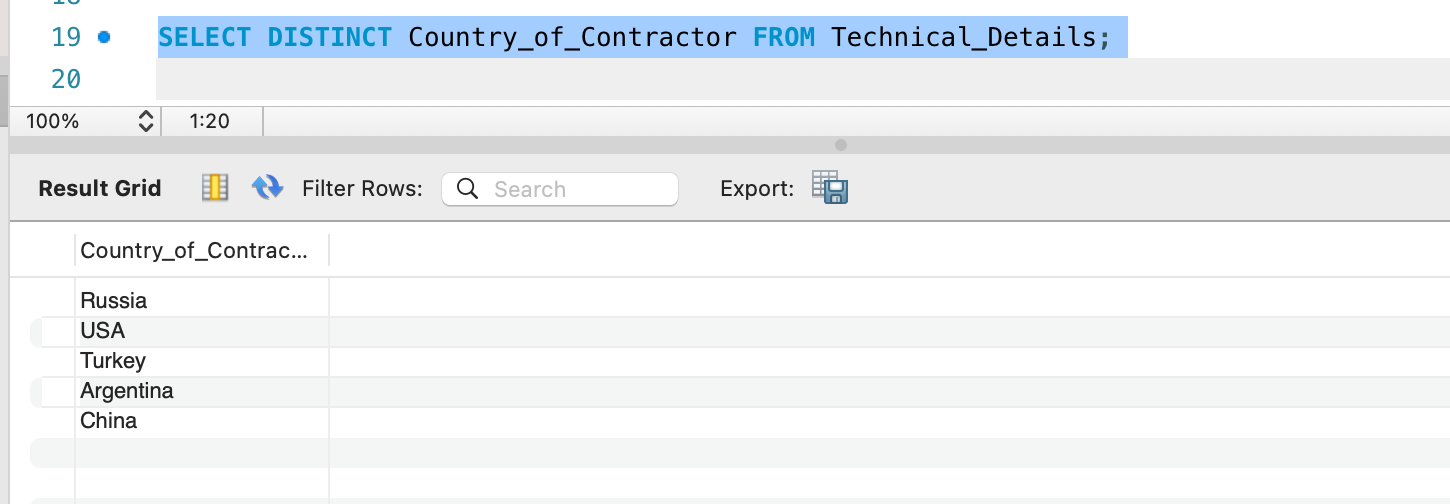
2.Show the list of nearest 10 satellites from earth.

Select SatID,Sat\_Name,Users,Purpose from Satellite INNER JOIN Orbit ON Satellite.COSPAR\_Number=Orbit.COSPAR\_Number ORDER BY Orbit.Perigee\_in\_km LIMIT 10;



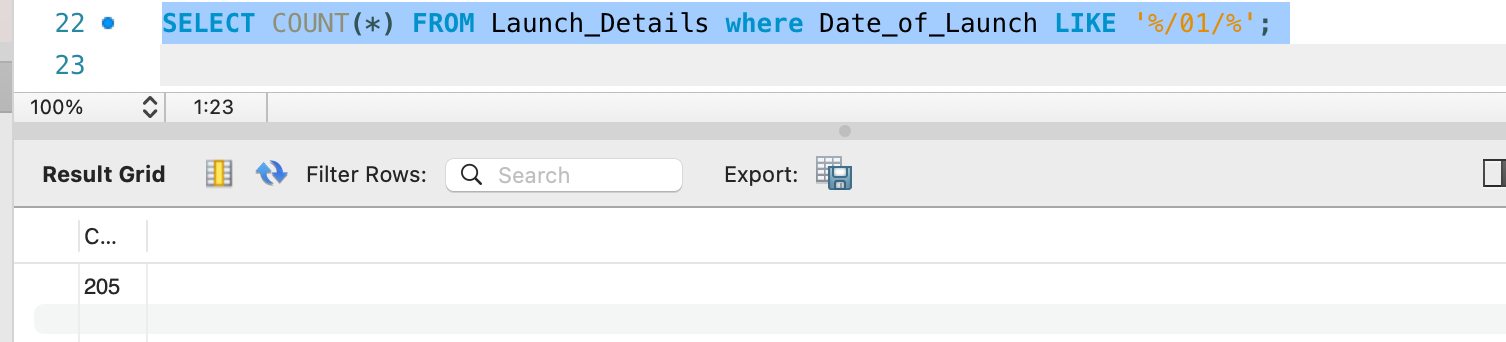
3. List the names of countries where satellite contractors are located.

Select DISTINCT Country\_of\_Contractor FROM Technical\_Details;



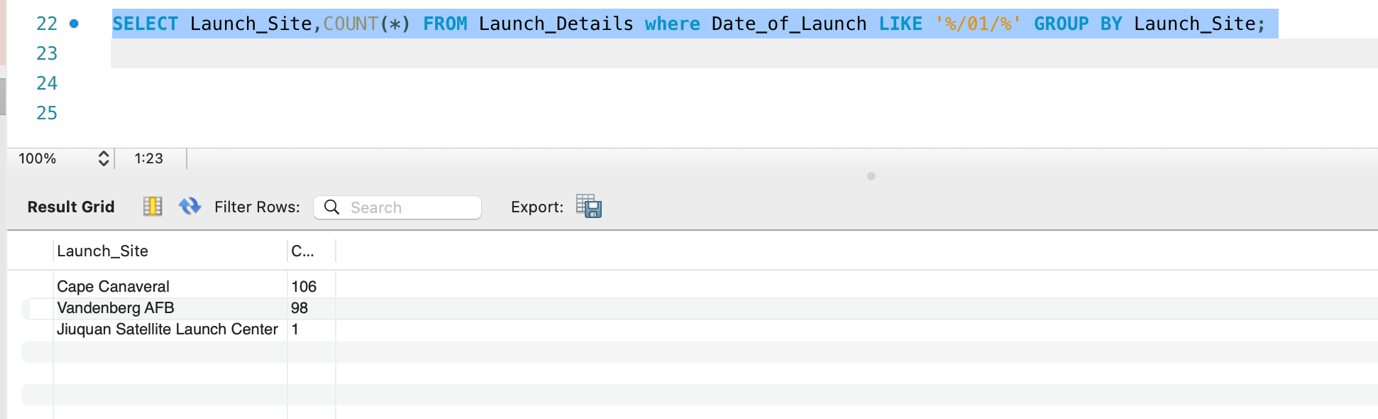
4. List the number of satellites Launced in January.

SELECT Launch\_Site,COUNT(\*) FROM Launch\_Details where Date\_of\_Launch LIKE '%/01/%' ;



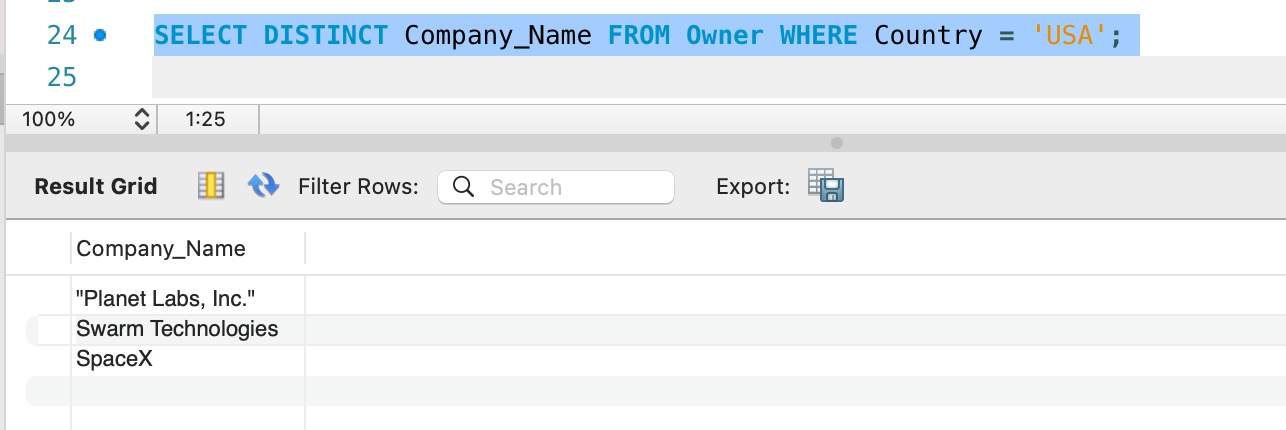
5. Count how many satellites were launced in jan ,2023 by the launch sites.

SELECT Launch\_Site,COUNT(\*) FROM Launch\_Details where Date\_of\_Launch LIKE '%/01/%' GROUP BY Launch\_Site;



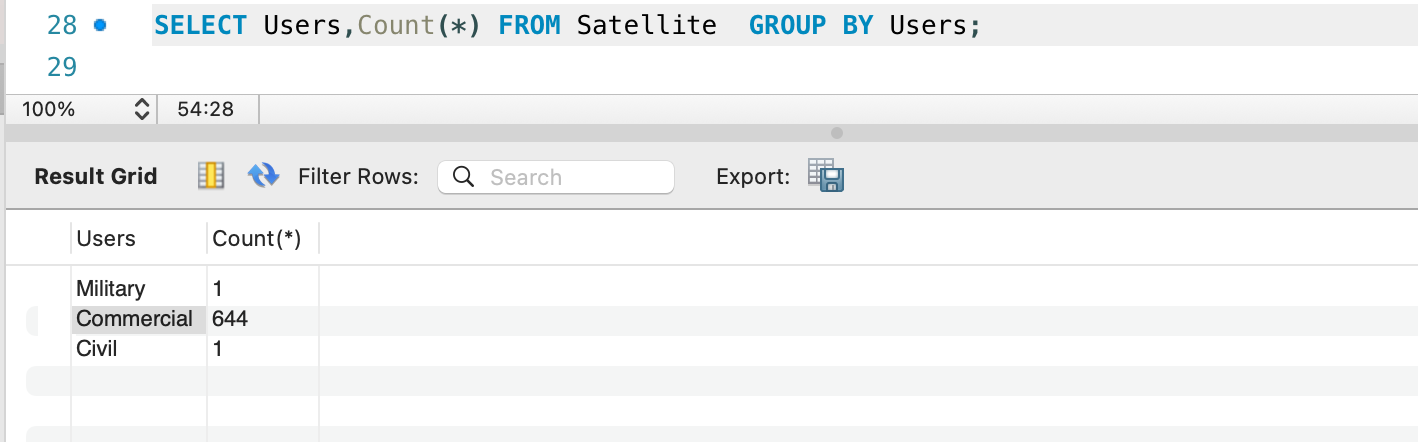
6.List the companies that launch satellites in USA.

SELECT DISTINCT Company\_Name FROM Owner WHERE Country = 'USA';



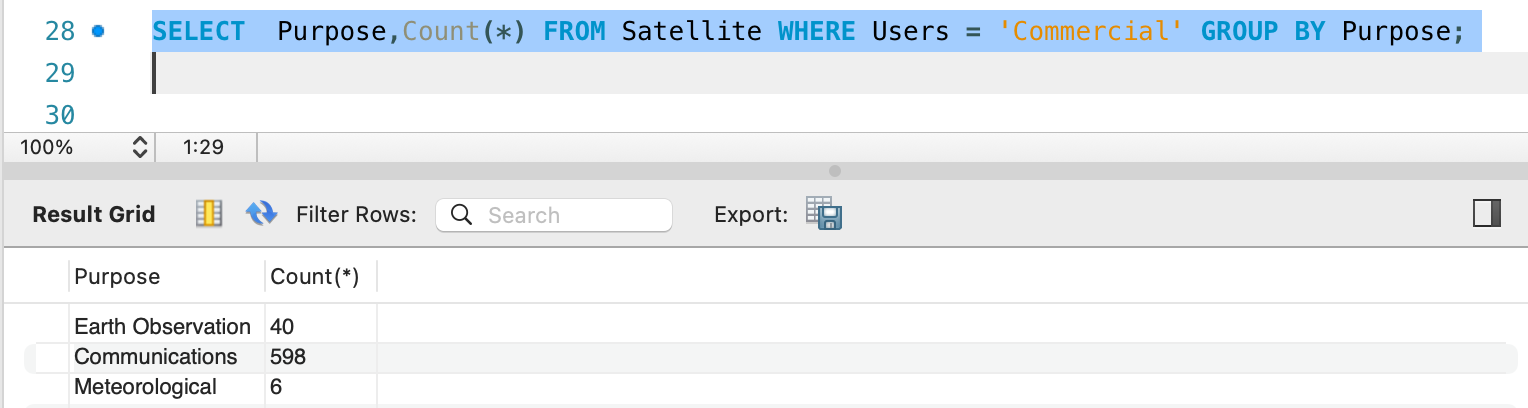
7.List the number of satellites that were sent for specific users.

SELECT Users,Count(\*) FROM Satellite GROUP BY Users;



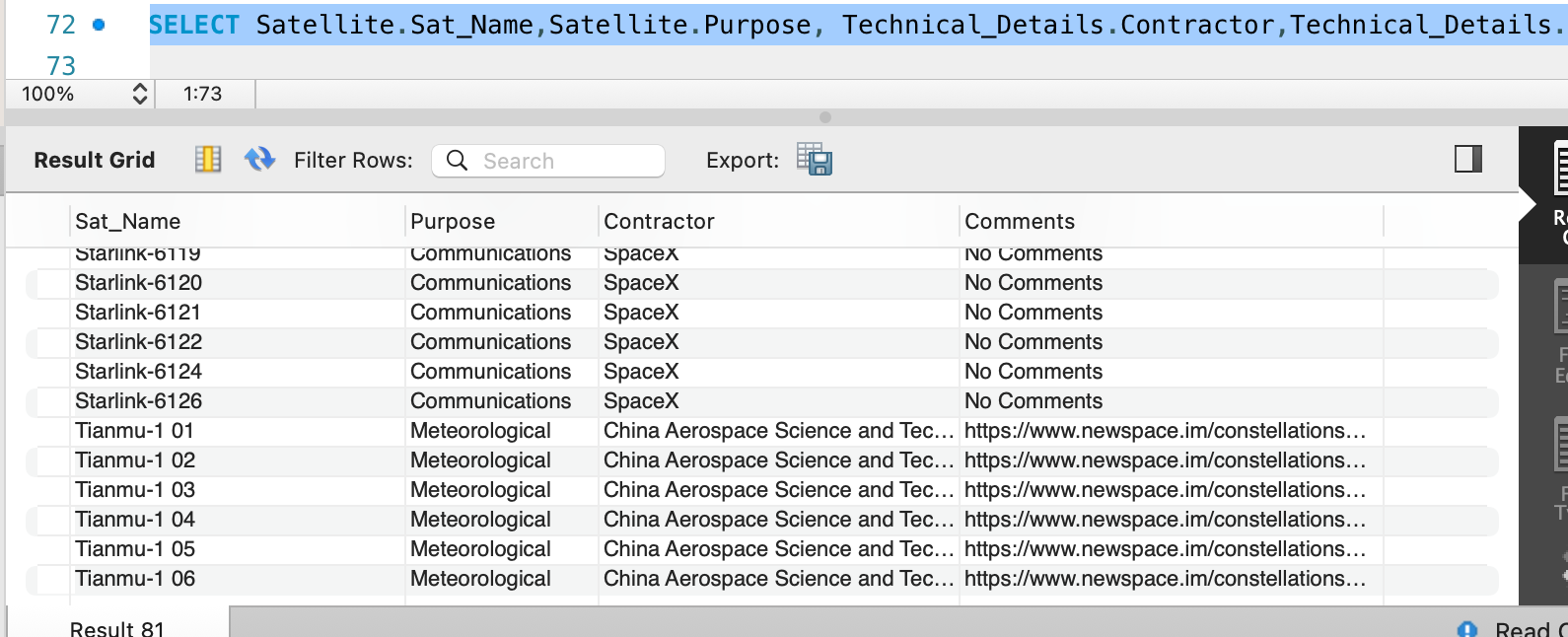
8.List the number of Satellites sent for a specific purpose.

SELECT Purpose,Count(\*) FROM Satellite WHERE Users = 'Commercial' GROUP BY Purpose;



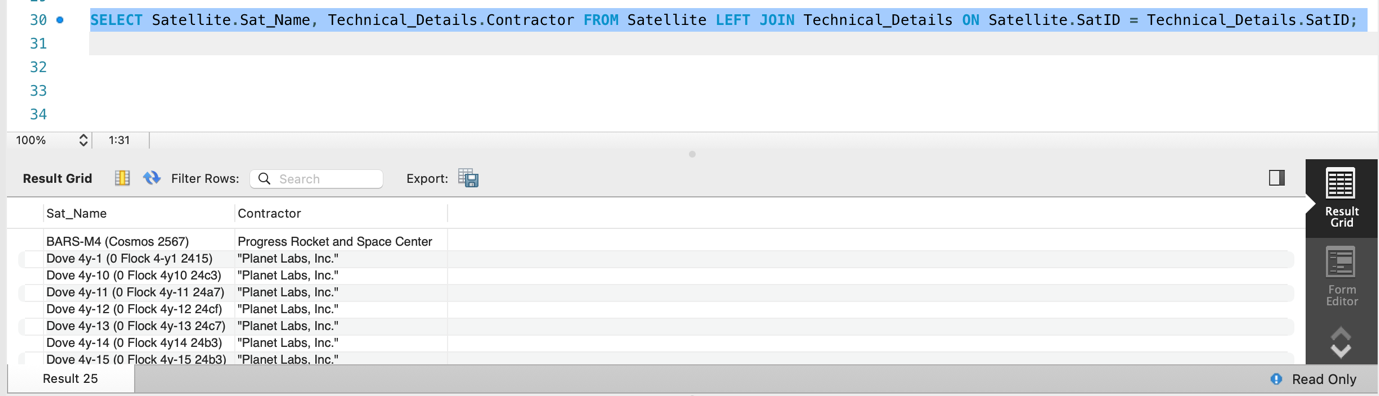
9 .What are the names of satellites and their respective contractors, including those with no technical details.Also List their purpose .

SELECT Satellite.Sat\_Name,Satellite.Purpose, Technical\_Details.Contractor FROM Satellite LEFT JOIN Technical\_Details ON Satellite.SatID = Technical\_Details.SatID;



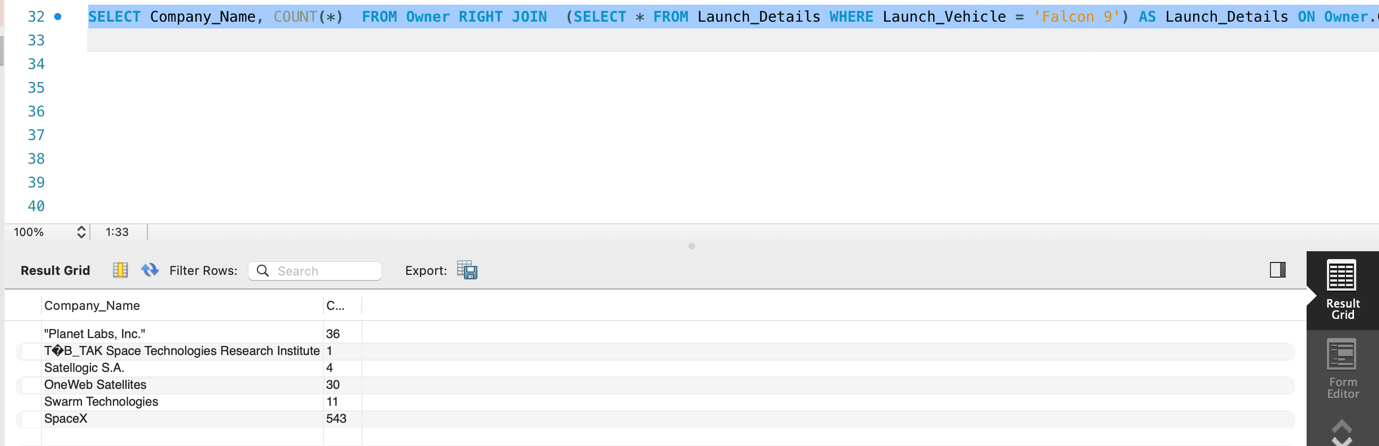
10. What are the names of satellites and their respective contractors, including those with no technical details

SELECT Satellite.Sat\_Name, Technical\_Details.Contractor FROM Satellite LEFT JOIN Technical\_Details ON Satellite.SatID = Technical\_Details.SatID;



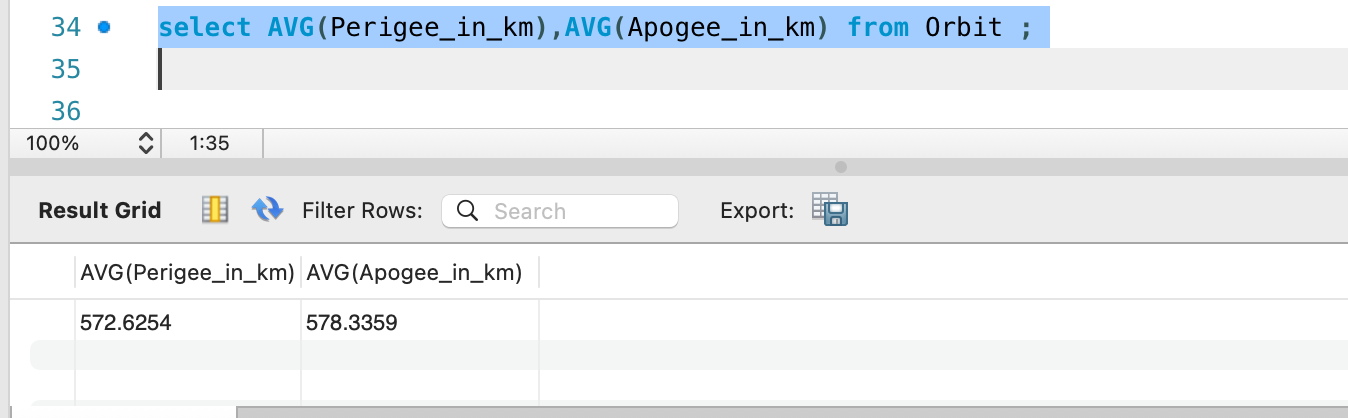
11. What is the distribution of Falcon 9 rocket launches among different companies in the satellite industry?

SELECT Company\_Name, COUNT(\*) FROM Owner RIGHT JOIN (SELECT \* FROM Launch\_Details WHERE Launch\_Vehicle = 'Falcon 9') AS Launch\_Details ON Owner.COSPAR\_Number = Launch\_Details.COSPAR\_Number GROUP BY Company\_Name;



12.Find the average closest and furthest distance of satellites.

select AVG(Perigee\_in\_km),AVG(Apogee\_in\_km) from Orbit ;

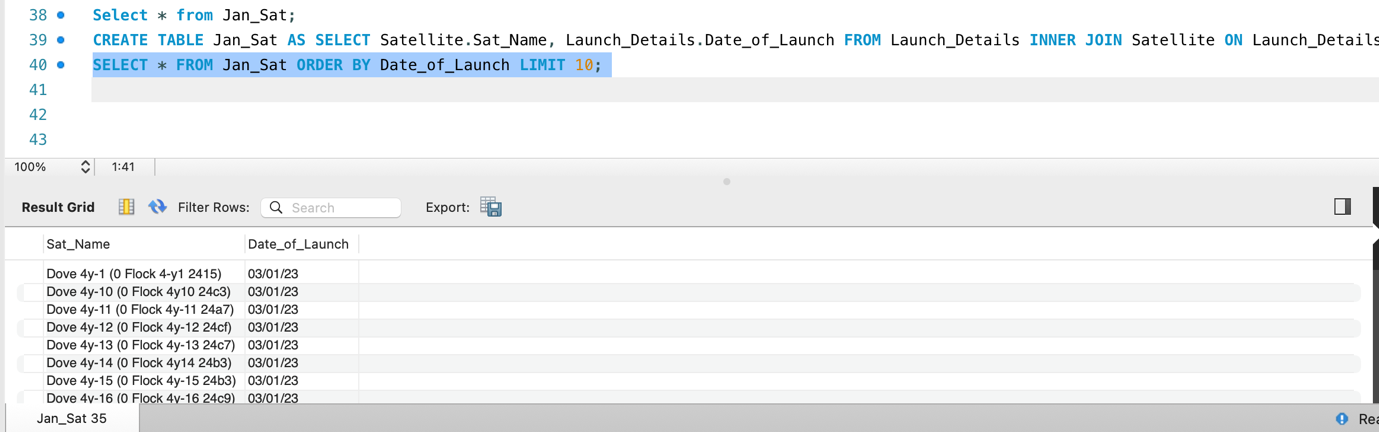


13 .Finding out the first 10 satellites Launced in 2023.

Select \* from Jan\_Sat;

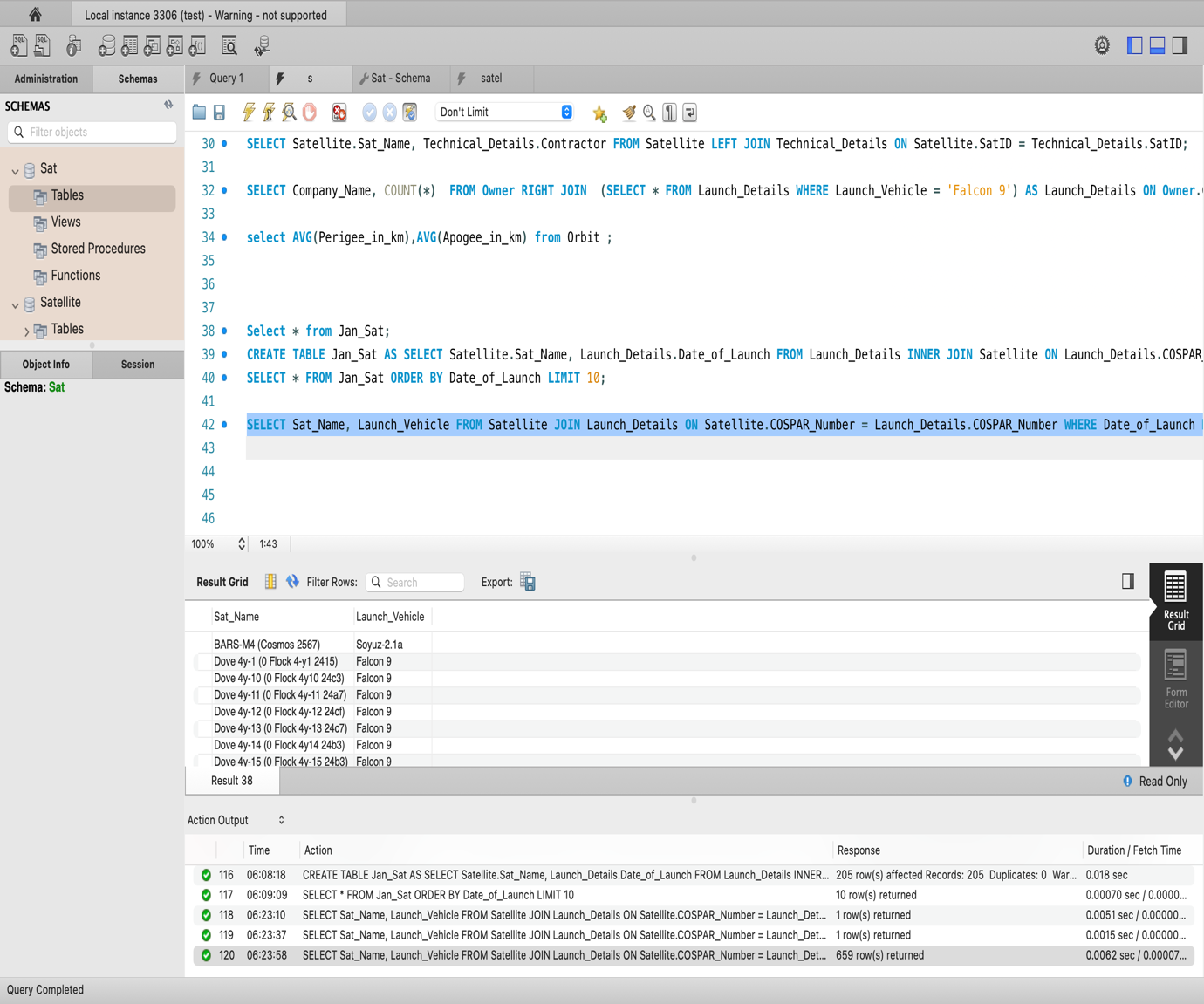
CREATE TABLE Jan\_Sat AS SELECT Satellite.Sat\_Name, Launch\_Details.Date\_of\_Launch FROM Launch\_Details INNER JOIN Satellite ON Launch\_Details.COSPAR\_Number = Satellite.COSPAR\_Number WHERE Launch\_Details.Date\_of\_Launch LIKE '%/01/%';

SELECT \* FROM Jan\_Sat ORDER BY Date\_of\_Launch LIMIT 10;



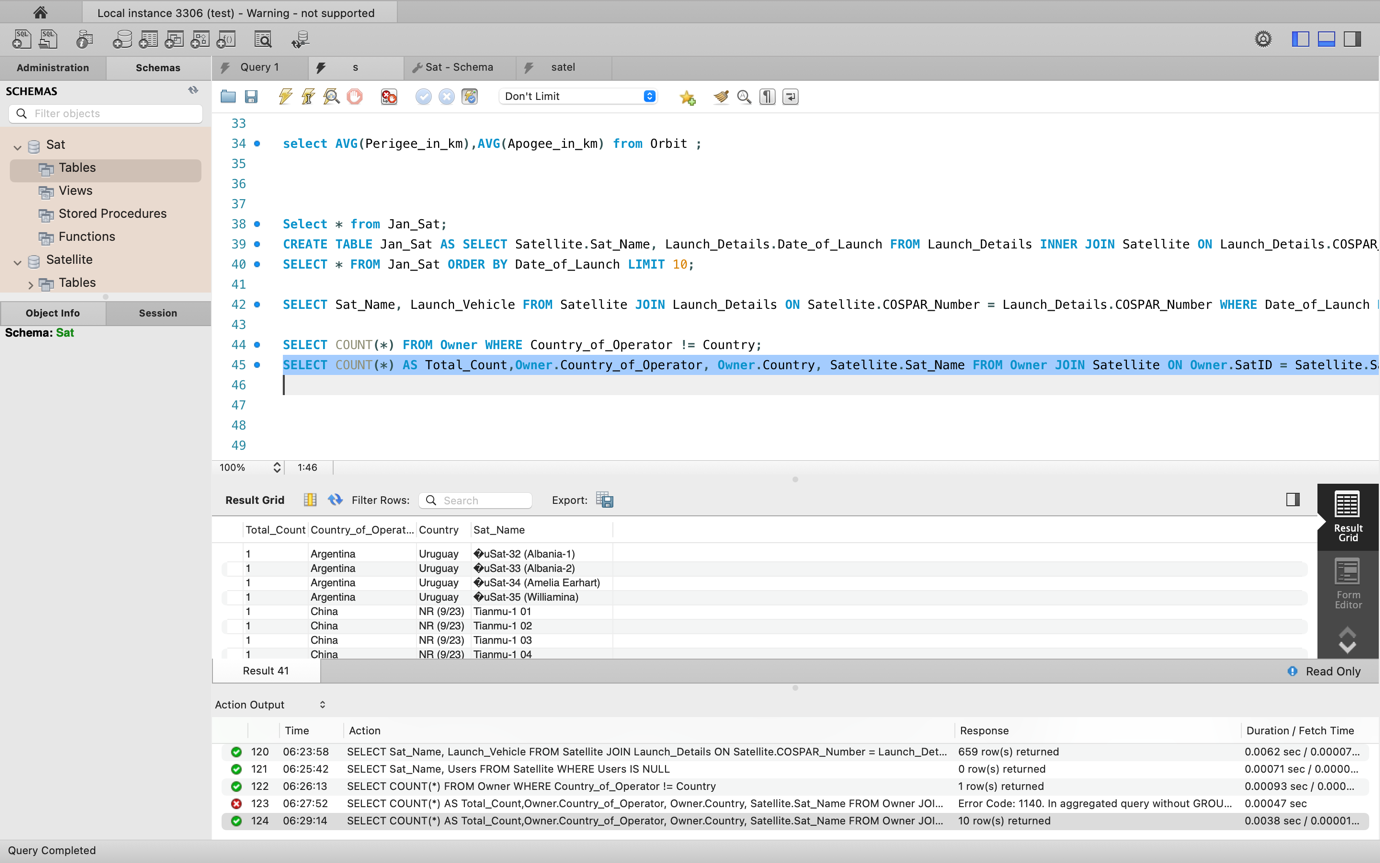
14.Which Satellites were Launced between start of February till End of March.

SELECT Sat\_Name, Launch\_Vehicle FROM Satellite JOIN Launch\_Details ON Satellite.COSPAR\_Number = Launch\_Details.COSPAR\_Number WHERE Date\_of\_Launch BETWEEN '01/2/23' AND '31/3/23';



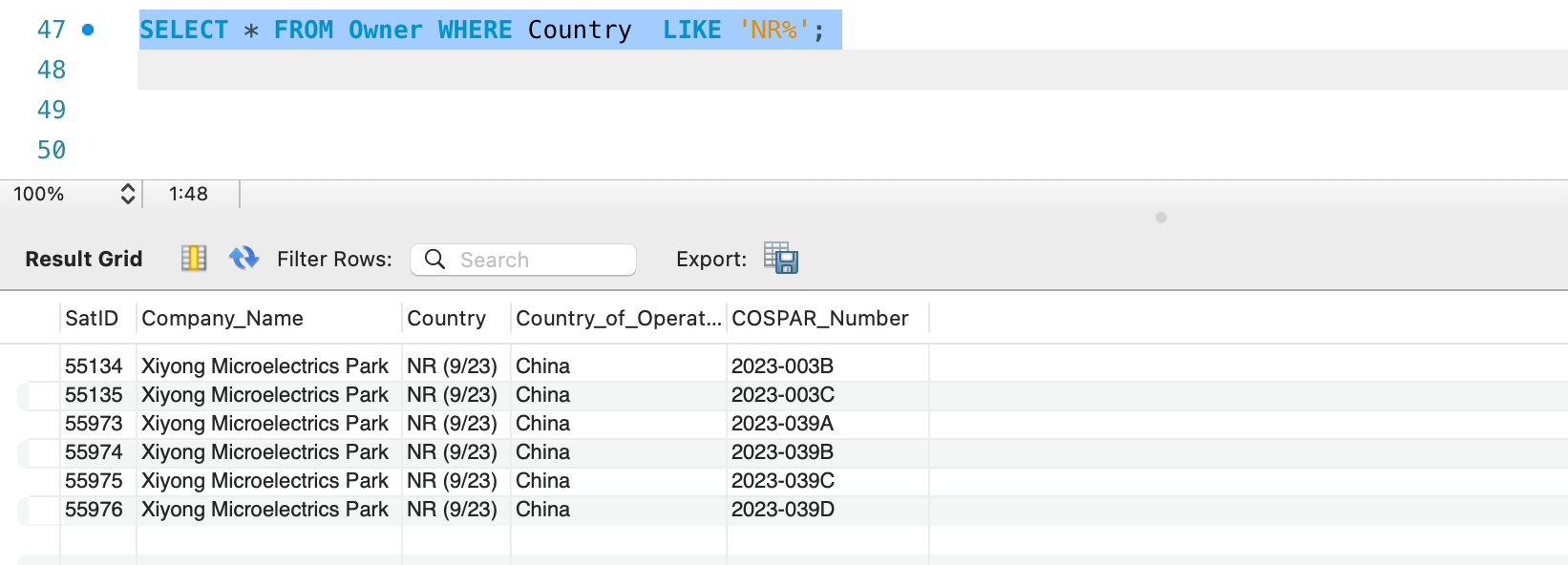
15 Which satellites are operated by companies from different countries than their registrated country .

SELECT COUNT(\*) AS Total\_Count,Owner.Country\_of\_Operator, Owner.Country, Satellite.Sat\_Name FROM Owner INNER JOIN Satellite ON Owner.SatID = Satellite.SatID WHERE Owner.Country\_of\_Operator != Owner.Country GROUP BY Owner.Country\_of\_Operator, Owner.Country, Satellite.Sat\_Name;



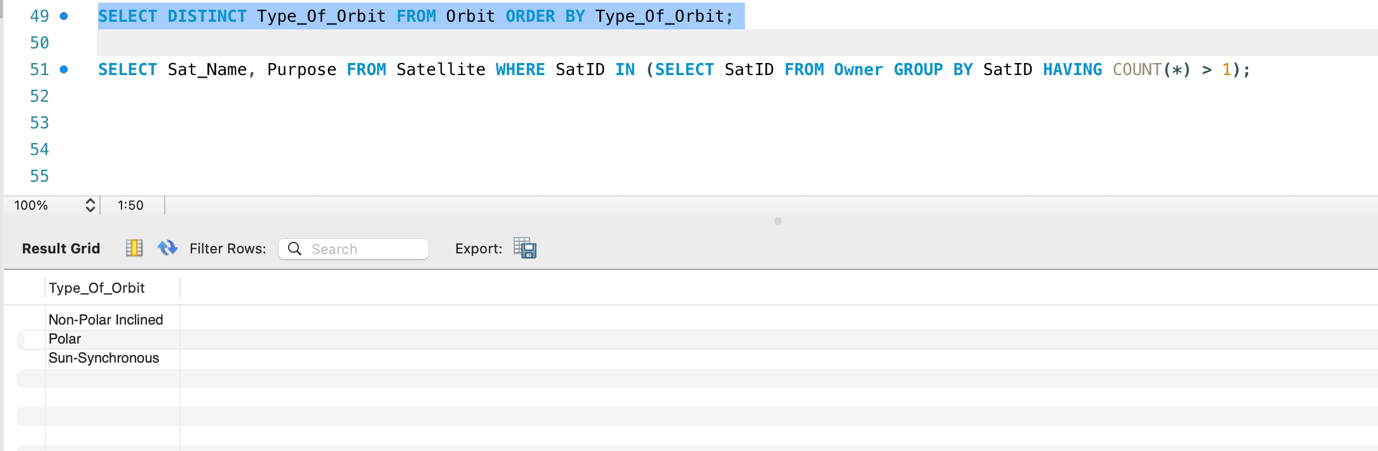
16.Which Countries have no records?

SELECT \* FROM Owner WHERE Country LIKE 'NR%';



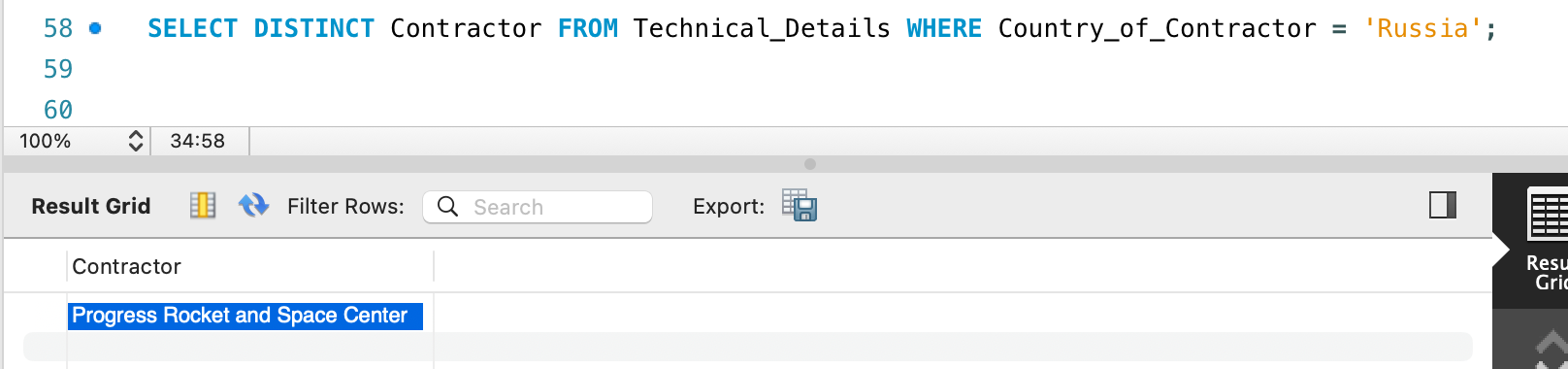
17 .Type of orbits

SELECT DISTINCT Type\_Of\_Orbit FROM Orbit ORDER BY Type\_Of\_Orbit;



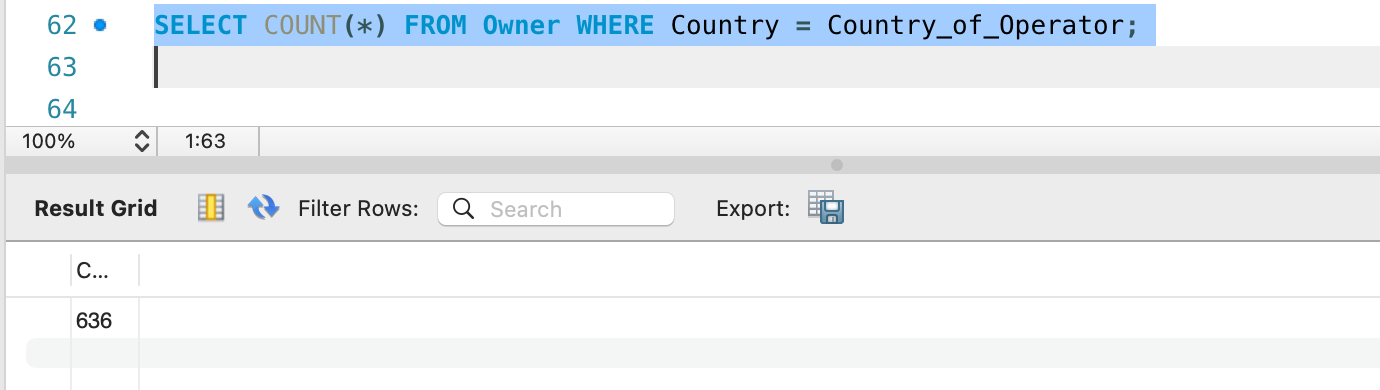
18 .What are the different contractors from Russia involved in satellite projects

SELECT DISTINCT Contractor FROM Technical\_Details WHERE Country\_of\_Contractor = 'Russia';



19 .How many satellites are operated by companies from the same country as their registration?

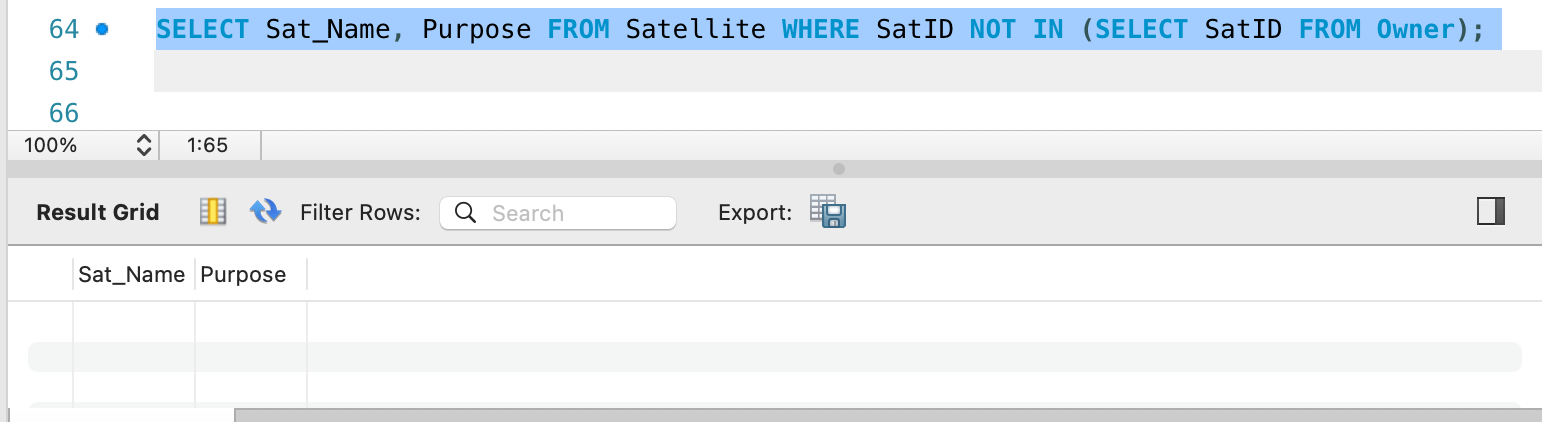
SELECT COUNT(\*) FROM Owner WHERE Country = Country\_of\_Operator;



20 .Which satellites are not owned by any company?

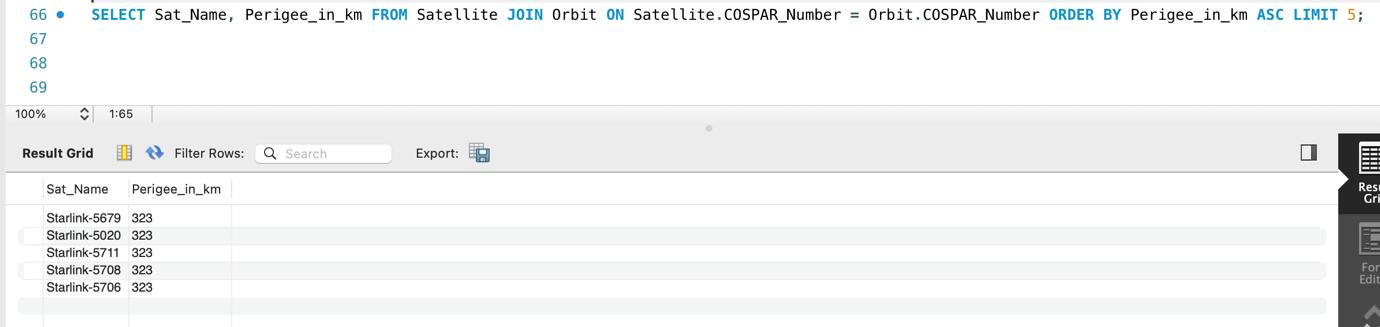
SELECT Sat\_Name, Purpose FROM Satellite WHERE SatID NOT IN (SELECT SatID FROM Owner);

Output-They are all owned by some company.



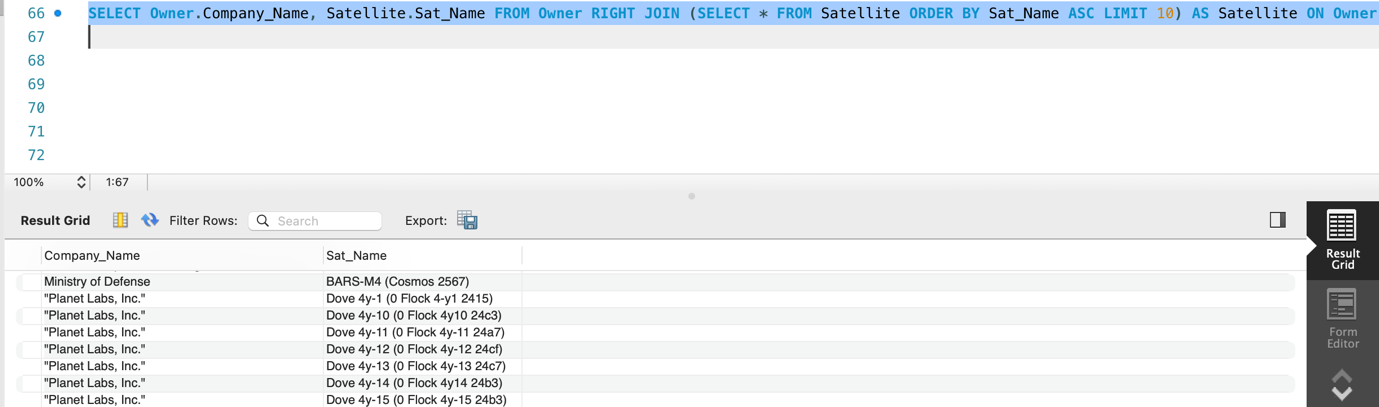
21 List the Top 5 closest Satellites that are Starlink.

SELECT Satellite.Sat\_Name, Orbit.Perigee\_in\_km FROM Satellite JOIN Orbit ON Satellite.COSPAR\_Number = Orbit.COSPAR\_Number WHERE Satellite.Sat\_Name LIKE 'starlink%' ORDER BY Orbit.Perigee\_in\_km ASC LIMIT 5;



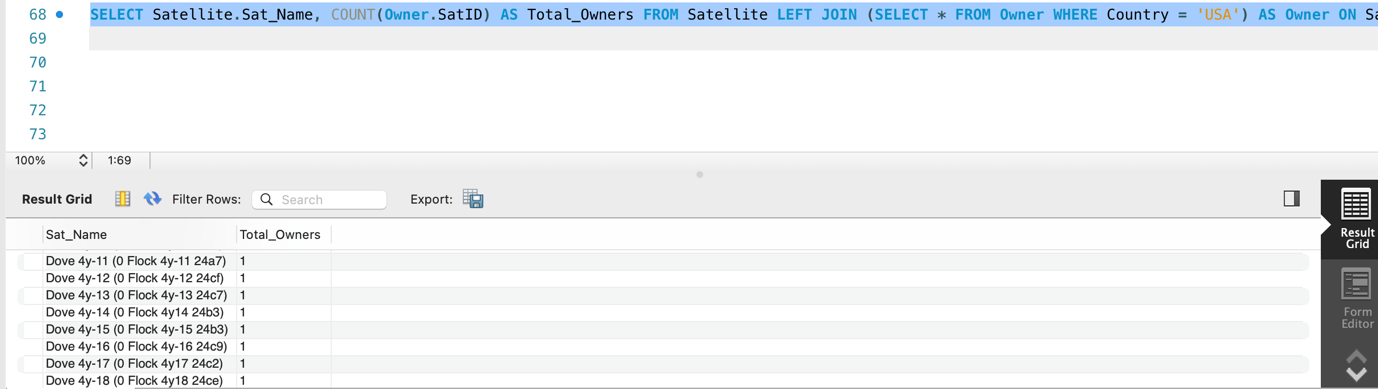
22 Which companies own the first 10 satellites in alphabetical order?

SELECT Owner.Company\_Name, Satellite.Sat\_Name FROM Owner RIGHT JOIN (SELECT \* FROM Satellite ORDER BY Sat\_Name ASC LIMIT 10) AS Satellite ON Owner.SatID = Satellite.SatID;



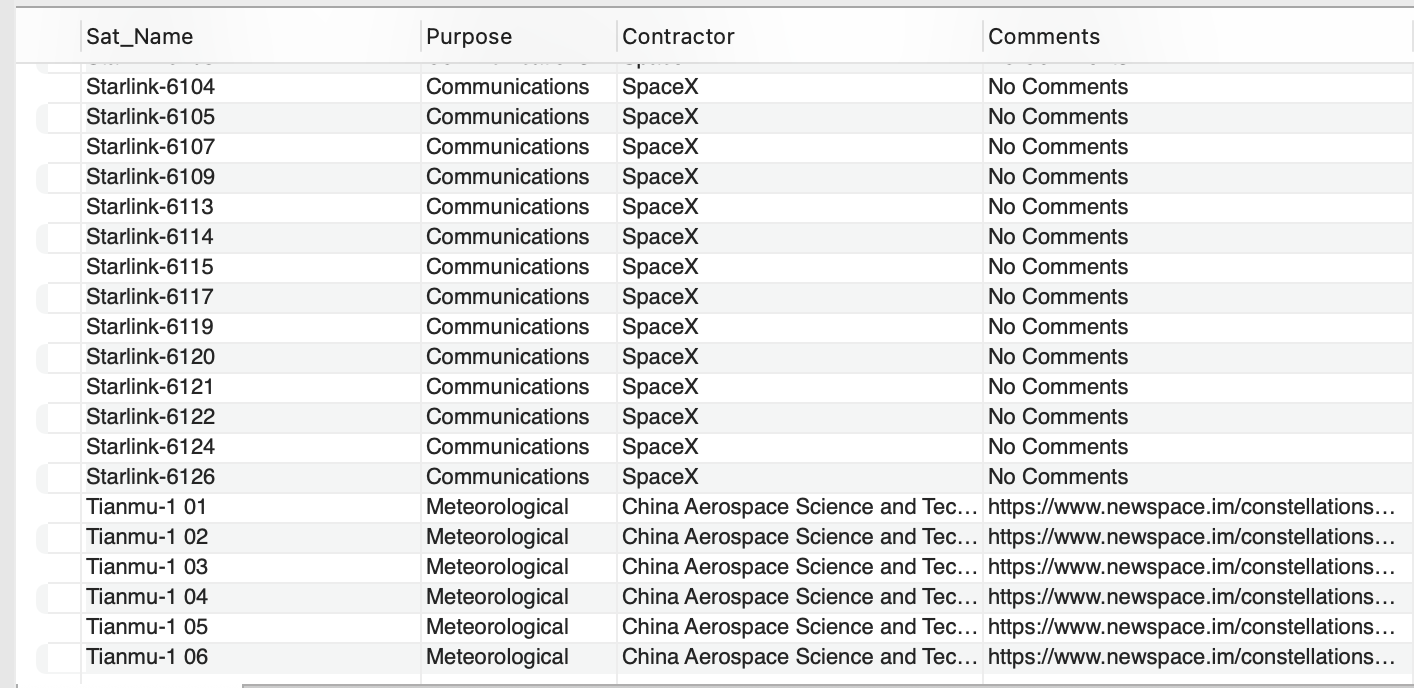
23 How many owners do each satellite from the USA have?

SELECT Satellite.Sat\_Name, COUNT(Owner.SatID) AS Total\_Owners FROM Satellite LEFT JOIN (SELECT \* FROM Owner WHERE Country = 'USA') AS Owner ON Satellite.SatID = Owner.SatID GROUP BY Satellite.Sat\_Name;



24. Names of satellites along with their respective owners and the types of orbits.

SELECT Satellite.Sat\_Name,Satellite.Purpose, Technical\_Details.Contractor,Technical\_Details.Comments FROM Satellite LEFT JOIN Technical\_Details ON Satellite.SatID = Technical\_Details.SatID;



**VI. Project demonstration**

* We used ERD+ to make the ERD+ diagram and Relational Model.
* We used MySQLWorkbench to load and perform queries on the dataset.

**VII. Self -Learning beyond classroom**

:

* We learnt how to load a dataset from an excel file by converting it into json.
* We also about satellites that have been send on different purposes.

**VIII. Learning from the Project**

* This project helped us to Learn New things like uploading data from excel when data is too large to add manually
* We learnt about SQL queries.
* We learnt how to store databases.
* We learnt how to replace null values with NoData.
* We learnt about the how a lot of steps and people are involved while launching a satellite to space.

**IX. Challenges Faced**

* Loading of the project-since database was large.
* Slow Performance as it took time to load.
* Syntax and approach Errors.

**X. Conclusion**

* We learnt how to import a database into sql and make it ready for fetching queries.
* We learnt about Satellites.
* We learnt how to analyse a database , gain insights through queries and draw our conclusions from it.