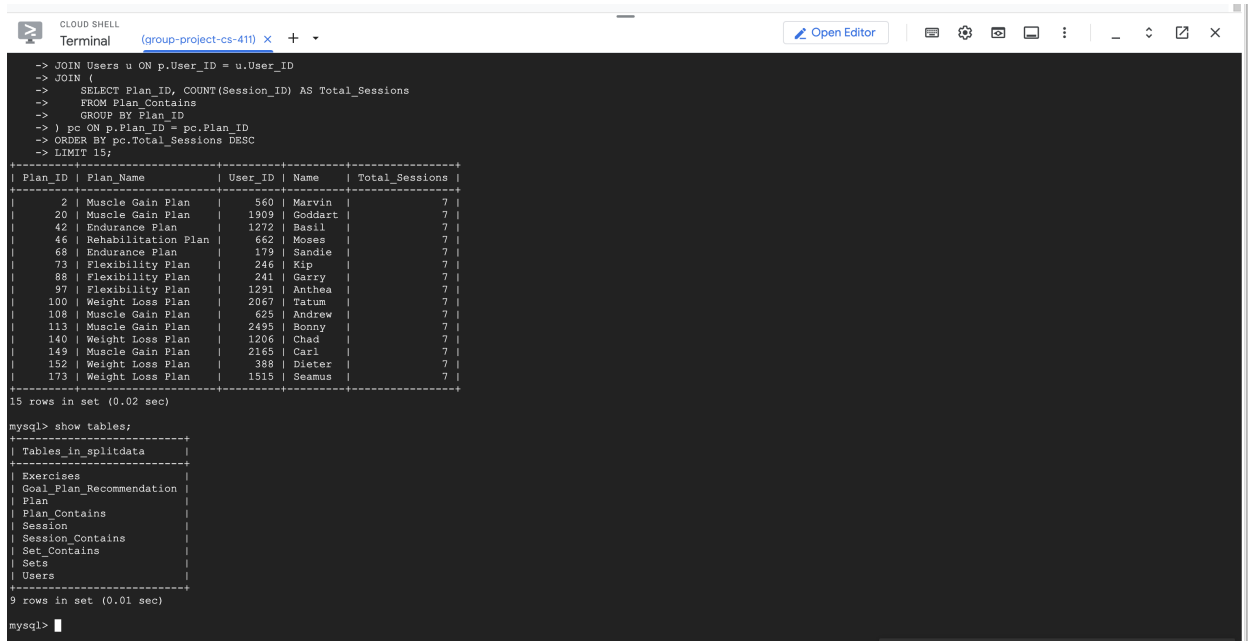


Stage 3 Part 1: FINAL

Cloud Connection Screenshot



The screenshot shows a Cloud Shell terminal window with a MySQL query and its results. The query is a JOIN of Users and Plan tables, grouped by Plan_ID and ordered by Total_Sessions in descending order, limited to 15 rows. The results show 15 rows of data with columns: Plan_ID, Plan_Name, User_ID, Name, and Total_Sessions. Below the results, the command 'show tables;' is executed, showing a list of tables in the database.

```
--> JOIN Users u ON p.User_ID = u.User_ID
--> JOIN (
-->   SELECT Plan_ID, COUNT(Session_ID) AS Total_Sessions
-->   FROM Plan_Contains
-->   GROUP BY Plan_ID
--> ) pc ON p.Plan_ID = pc.Plan_ID
--> ORDER BY pc.Total_Sessions DESC
--> LIMIT 15;
+-----+-----+-----+-----+-----+
| Plan_ID | Plan_Name | User_ID | Name | Total_Sessions |
+-----+-----+-----+-----+-----+
| 2 | Muscle Gain Plan | 560 | Marvin | 7 |
| 20 | Muscle Gain Plan | 1909 | Goddard | 7 |
| 42 | Endurance Plan | 1272 | Basil | 7 |
| 46 | Rehabilitation Plan | 662 | Moses | 7 |
| 68 | Endurance Plan | 179 | Sandie | 7 |
| 73 | Flexibility Plan | 246 | Kip | 7 |
| 88 | Flexibility Plan | 241 | Gary | 7 |
| 97 | Flexibility Plan | 1291 | Anthea | 7 |
| 100 | Weight Loss Plan | 2067 | Tatum | 7 |
| 108 | Muscle Gain Plan | 625 | Andrew | 7 |
| 113 | Muscle Gain Plan | 2485 | Bonny | 7 |
| 140 | Weight Loss Plan | 1206 | Chad | 7 |
| 149 | Muscle Gain Plan | 2165 | Carl | 7 |
| 152 | Weight Loss Plan | 388 | Dieter | 7 |
| 173 | Weight Loss Plan | 1515 | Seamus | 7 |
+-----+-----+-----+-----+-----+
15 rows in set (0.02 sec)

mysql> show tables;
+-----+
| Tables_in_splitdata |
+-----+
| Exercises |
| Goal_Plan_Recommendation |
| Plan |
| Plan_Contains |
| Session |
| Session_Contains |
| Set_Contains |
| Sets |
| Users |
+-----+
9 rows in set (0.01 sec)

mysql>
```

DDL Commands for each table creation

```
CREATE TABLE Users (
    User_ID INT PRIMARY KEY,
    Name VARCHAR(100),
    Age INT,
    Gender VARCHAR(10),
    Height DECIMAL(4,1),
    Weight DECIMAL(5,1),
    Fitness_Level VARCHAR(15),
    Goal VARCHAR(255)
);
```

```
CREATE TABLE Plan (
```

```

    Plan_ID INT PRIMARY KEY,
    Plan_Name VARCHAR(255),
    User_ID INT,
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID)
);

CREATE TABLE Session (
    Session_ID INT PRIMARY KEY,
    Session_Name VARCHAR(100),
    User_ID INT,
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID)
);

CREATE TABLE Sets (
    Set_ID INT PRIMARY KEY,
    Set_Name VARCHAR(255),
    User_ID INT,
    FOREIGN KEY (User_ID) REFERENCES Users(User_ID)
);

CREATE TABLE Exercises (
    Exercise_ID INT PRIMARY KEY,
    Exercise_Name VARCHAR(255),
    Muscle_Group VARCHAR(100),
    Difficulty VARCHAR(15)
);

CREATE TABLE Plan_Contains (
    Plan_ID INT,
    Session_ID INT,
    Day_of_Week VARCHAR(20),
    PRIMARY KEY (Plan_ID, Session_ID),
    FOREIGN KEY (Plan_ID) REFERENCES Plan(Plan_ID),
    FOREIGN KEY (Session_ID) REFERENCES Session(Session_ID)
);

```

```
CREATE TABLE Session_Contains (  
    Session_ID INT,  
    Set_ID INT,  
    Set_Reps INT,  
    PRIMARY KEY (Session_ID, Set_ID),  
    FOREIGN KEY (Session_ID) REFERENCES Session(Session_ID),  
    FOREIGN KEY (Set_ID) REFERENCES Sets(Set_ID)  
);  
  
CREATE TABLE Set_Contains (  
    Set_ID INT,  
    Exercise_ID INT,  
    E_Reps INT,  
    PRIMARY KEY (Set_ID, Exercise_ID),  
    FOREIGN KEY (Set_ID) REFERENCES Sets(Set_ID),  
    FOREIGN KEY (Exercise_ID) REFERENCES Exercises(Exercise_ID)  
);
```

Num rows in each table

Table_Name	Row_Count
Users	2500
Plan	1419
Session	10176
Sets	15334
Exercises	2917
Plan_Contains	5700
Session_Contains	15334
Set_Contains	46091

8 rows in set (0.12 sec)

Query I used

```

SELECT 'Users' AS Table_Name, COUNT(*) AS Row_Count FROM Users
UNION ALL
SELECT 'Plan' AS Table_Name, COUNT(*) AS Row_Count FROM Plan
UNION ALL
SELECT 'Session' AS Table_Name, COUNT(*) AS Row_Count FROM Session
UNION ALL
SELECT 'Sets' AS Table_Name, COUNT(*) AS Row_Count FROM Sets
UNION ALL
SELECT 'Exercises' AS Table_Name, COUNT(*) AS Row_Count FROM Exercises
UNION ALL
SELECT 'Plan_Contains' AS Table_Name, COUNT(*) AS Row_Count FROM Plan_Contains
UNION ALL
SELECT 'Session_Contains' AS Table_Name, COUNT(*) AS Row_Count FROM Session_Contains
UNION ALL
SELECT 'Set_Contains' AS Table_Name, COUNT(*) AS Row_Count FROM Set_Contains

```

All of our Tables

```
mysql> show tables;
+-----+
| Tables_in_splitdata |
+-----+
| Exercises            |
| Goal_Plan_Recommendation |
| Plan                 |
| Plan_Contains        |
| Session              |
| Session_Contains     |
| Set_Contains         |
| Sets                 |
| Users                |
+-----+
9 rows in set (0.01 sec)
```

Description of the tables

```
mysql> DESCRIBE Users;
+-----+-----+-----+-----+-----+-----+
| Field          | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| User_ID        | int           | NO   | PRI | NULL    |       |
| Name           | varchar(100)  | YES  |     | NULL    |       |
| Age            | int           | YES  |     | NULL    |       |
| Gender         | varchar(10)   | YES  |     | NULL    |       |
| Height         | decimal(4,1)  | YES  |     | NULL    |       |
| Weight         | decimal(5,1)  | YES  |     | NULL    |       |
| Fitness_level  | varchar(15)   | YES  |     | NULL    |       |
```

Goal	varchar(255)	YES		NULL	

8 rows in set (0.03 sec)

```
mysql> DESCRIBE Plan;
```

Field	Type	Null	Key	Default	Extra
Plan_ID	int	NO	PRI	NULL	
Plan_Name	varchar(255)	YES		NULL	
User_ID	int	YES	MUL	NULL	

3 rows in set (0.00 sec)

```
mysql> DESCRIBE Session;
```

Field	Type	Null	Key	Default	Extra
Session_ID	int	NO	PRI	NULL	
Session_Name	varchar(100)	YES		NULL	
User_ID	int	YES		NULL	

3 rows in set (0.01 sec)

```
mysql> DESCRIBE Sets;
```

Field	Type	Null	Key	Default	Extra
Set_ID	int	NO	PRI	NULL	
Set_Name	varchar(255)	YES		NULL	
User_ID	int	YES	MUL	NULL	

3 rows in set (0.00 sec)

```
mysql> DESCRIBE Exercises;
```

Field	Type	Null	Key	Default	Extra
Exercise_ID	int	NO	PRI	NULL	
Exercise_Name	varchar(255)	YES		NULL	
Muscle_Group	varchar(100)	YES		NULL	
Difficulty	varchar(15)	YES		NULL	

4 rows in set (0.00 sec)

```
mysql> DESCRIBE Plan_Contains;
```

Field	Type	Null	Key	Default	Extra
Plan_ID	int	NO	PRI	NULL	
Session_ID	int	NO	PRI	NULL	
Day_of_Week	varchar(20)	YES		NULL	

3 rows in set (0.01 sec)

```
mysql> DESCRIBE Session_Contains;
```

Field	Type	Null	Key	Default	Extra
Session_ID	int	NO	PRI	NULL	
Set_ID	int	NO	PRI	NULL	
Set_Reps	int	YES		NULL	

3 rows in set (0.00 sec)

```
mysql> DESCRIBE Set_Contains;
```

Field	Type	Null	Key	Default	Extra
Set_ID	int	NO	PRI	NULL	
Exercise_ID	int	NO	PRI	NULL	
E_Reps	int	YES		NULL	

```
+-----+-----+-----+-----+-----+
3 rows in set (0.00 sec)
```

Query 1 - GOOD

Get Users' Total Number of Sessions per Plan

```
SELECT p.Plan_ID, p.Plan_Name, u.User_ID, u.Name, pc.Total_Sess:
FROM Plan p
JOIN Users u ON p.User_ID = u.User_ID
JOIN (
    SELECT Plan_ID, COUNT(Session_ID) AS Total_Sessions
    FROM Plan_Contains
    GROUP BY Plan_ID
) pc ON p.Plan_ID = pc.Plan_ID
ORDER BY pc.Total_Sessions DESC
LIMIT 15;
```

```
+-----+-----+-----+-----+-----+
| Plan_ID | Plan_Name           | User_ID | Name    | Total_Sessions |
+-----+-----+-----+-----+-----+
|      2  | Muscle Gain Plan    |      560 | Marvin    |              7 |
|     20  | Muscle Gain Plan    |     1909 | Goddart |              7 |
|     42  | Endurance Plan      |     1272 | Basil   |              7 |
|     46  | Rehabilitation Plan |      662 | Moses   |              7 |
|     68  | Endurance Plan      |      179 | Sandie  |              7 |
|     73  | Flexibility Plan    |      246 | Kip     |              7 |
|     88  | Flexibility Plan    |      241 | Garry   |              7 |
|     97  | Flexibility Plan    |     1291 | Anthea  |              7 |
|    100  | Weight Loss Plan    |     2067 | Tatum   |              7 |
|    108  | Muscle Gain Plan    |      625 | Andrew  |              7 |
|    113  | Muscle Gain Plan    |     2495 | Bonny   |              7 |
|    140  | Weight Loss Plan    |     1206 | Chad    |              7 |
|    149  | Muscle Gain Plan    |     2165 | Carl    |              7 |
|    152  | Weight Loss Plan    |      388 | Dieter  |              7 |
|    173  | Weight Loss Plan    |     1515 | Seamus  |              7 |
+-----+-----+-----+-----+-----+
15 rows in set (0.02 sec)
```


Query 2

Retrieve Exercises with Above-Average Difficulty per Muscle Group

```
WITH RankedExercises AS (  
    SELECT e.Exercise_Name, e.Muscle_Group, e.Difficulty,  
           ROW_NUMBER() OVER (PARTITION BY e.Muscle_Group ORDER  
FROM Exercises e  
JOIN Sets s ON e.Exercise_ID = s.Set_ID  
JOIN Users u ON s.User_ID = u.User_ID  
WHERE e.Difficulty > (  
    SELECT AVG(e2.Difficulty)  
    FROM Exercises e2  
    WHERE e2.Muscle_Group = e.Muscle_Group  
    )  
    )  
SELECT Exercise_Name, Muscle_Group, Difficulty  
FROM RankedExercises  
WHERE rn = 1  
ORDER BY Difficulty DESC  
LIMIT 15;
```

```
+-----+-----+-----+  
| Exercise_Name | Muscle_Group | Difficulty |  
+-----+-----+-----+  
| Holman Feet-Elevated Straight Plank Toe-Tap Series | Abdominals | 9.0 |  
| Lateral Band Walk | Abductors | 9.0 |  
| Thigh adductor | Adductors | 9.0 |  
| 30 Arms Incline Biceps Curl | Biceps | 9.0 |  
| Hack squat calf raise | Calves | 9.0 |  
| Medicine ball sprawl to chest press | Chest | 9.0 |  
| Dumbbell suitcase carry | Forearms | 9.0 |  
| Walking lunge | Glutes | 9.0 |  
| Linear Acceleration Wall Drill | Hamstrings | 9.0 |  
| Seated Machine Row - Gethin Variation | Lats | 9.0 |  
| Band good morning- | Lower Back | 9.0 |  
| Partner side plank band row | Middle Back | 9.0 |  
| FYR2 Squat Jump | Quadriceps | 9.0 |  
| Landmine Linear Jammer | Shoulders | 9.0 |  
| Dumbbell pull-over | Traps | 9.0 |  
+-----+-----+-----+  
15 rows in set (1.74 sec)
```

Query 3

```
SELECT p.Plan_ID, p.Plan_Name, COUNT(DISTINCT e.Muscle_Group) AS Muscle_Groups_Targeted
FROM Plan p
JOIN Plan_Contains pc ON p.Plan_ID = pc.Plan_ID
JOIN Session s ON pc.Session_ID = s.Session_ID
JOIN Session_Contains sc ON s.Session_ID = sc.Session_ID
JOIN Sets se ON sc.Set_ID = se.Set_ID
JOIN Set_Contains sec ON se.Set_ID = sec.Set_ID
JOIN Exercises e ON sec.Exercise_ID = e.Exercise_ID
GROUP BY p.Plan_ID, p.Plan_Name
ORDER BY Muscle_Groups_Targeted DESC, p.Plan_ID DESC
LIMIT 15;
```

Plan_ID	Plan_Name	Muscle_Groups_Targeted
1235	Endurance Plan	16
837	Muscle Gain Plan	16
152	Weight Loss Plan	16
1197	Flexibility Plan	15
1086	Rehabilitation Plan	15
920	Flexibility Plan	15
784	Weight Loss Plan	15
689	Muscle Gain Plan	15
622	Endurance Plan	15
468	Muscle Gain Plan	15
455	Endurance Plan	15
398	Rehabilitation Plan	15
360	Rehabilitation Plan	15
331	Flexibility Plan	15
119	Rehabilitation Plan	15

Query 4

```

EXPLAIN ANALYZE
WITH ExerciseFrequency AS (
    SELECT e.Exercise_ID, e.Exercise_Name, e.Muscle_Group, COUNT(*)
    FROM Exercises e
    JOIN Set_Contains sc ON e.Exercise_ID = sc.Exercise_ID
    GROUP BY e.Exercise_ID, e.Exercise_Name, e.Muscle_Group
), RankedExercises AS (
    SELECT Exercise_Name, Muscle_Group,
           ROW_NUMBER() OVER (PARTITION BY Muscle_Group ORDER BY ExerciseFrequency)
    FROM ExerciseFrequency
)
SELECT Exercise_Name, Muscle_Group
FROM RankedExercises
WHERE rn = 1
ORDER BY Muscle_Group
LIMIT 15;

```

```

+-----+-----+
| Exercise_Name | Muscle_Group |
+-----+-----+
| Holman Seated Killer Abs Overhead Press | Abdominals |
| Dynamic pigeon stretch | Abductors |
| HM Left Leg Swing | Adductors |
| Suspended Curl | Biceps |
| Standing Calf Raises | Calves |
| MetaBurn 3-Phase Push-Up | Chest |
| Plate Pinch | Forearms |
| Holman Butt Tap to Jump | Glutes |
| One-Arm Open Palm Kettlebell Clean | Hamstrings |
| Straight-Arm Pull-Down - Gethin Variation | Lats |
| Atlas Stones | Lower Back |
| UN Barbell Rack Pull | Middle Back |
| Neck-SMR | Neck |
| 30 Legs Machine Hack Squat | Quadriceps |
| Reach-roll-lift combo | Shoulders |
+-----+-----+
15 rows in set (2.45 sec)

```

BACKUP QUERY

Query X

```
SELECT e.Muscle_Group, e.Exercise_Name, COUNT(sc.Set_ID) AS Times_Performed
FROM Exercises e
JOIN Set_Contains sc ON e.Exercise_ID = sc.Exercise_ID
JOIN Sets s ON sc.Set_ID = s.Set_ID
GROUP BY e.Muscle_Group, e.Exercise_Name
HAVING COUNT(sc.Set_ID) >= ALL (
    SELECT COUNT(sc2.Set_ID)
    FROM Exercises e2
    JOIN Set_Contains sc2 ON e2.Exercise_ID = sc2.Exercise_ID
    JOIN Sets s2 ON sc2.Set_ID = s2.Set_ID
    WHERE e2.Muscle_Group = e.Muscle_Group
    GROUP BY e2.Exercise_Name
)
ORDER BY Times_Performed DESC
LIMIT 15;
```

Output

Muscle_Group	Exercise_Name	Times_Performed
Middle Back	Seated Cable Rows	47
Chest	Band-suspended kettlebell bench press	37
Abdominals	Exercise Ball Cable Crunch - Gethin Variation	35
Quadriceps	30 Legs Machine Hack Squat	31
Shoulders	Arnold press	31
Triceps	Floor Press with Chains	31
Biceps	Suspended Curl	28
Forearms	Plate Pinch	27
Glutes	Holman Butt Tap to Jump	27
Hamstrings	One-Arm Open Palm Kettlebell Clean	26
Lower Back	Atlas Stones	26
Abductors	Dynamic pigeon stretch	25
Adductors	HM Left Leg Swing	24
Calves	Standing Calf Raises	24
Lats	Straight-Arm Pull-Down - Gethin Variation	24

15 rows in set (12 min 9.86 sec)