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CIS4301
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Assignment 3

PEAK (NAME, ELEV, DIFF, MAP, REGION)	AS	PK
CLIMBER (NAME, SEX)	AS	CR
PARTICIPATED (TRIP_ID, NAME)	AS	P
CLIMBED (TRIP_ID, PEAK, WHEN_CLIMBED)	AS	CD

1. Who has climbed 'Pilot Knob (S)'?
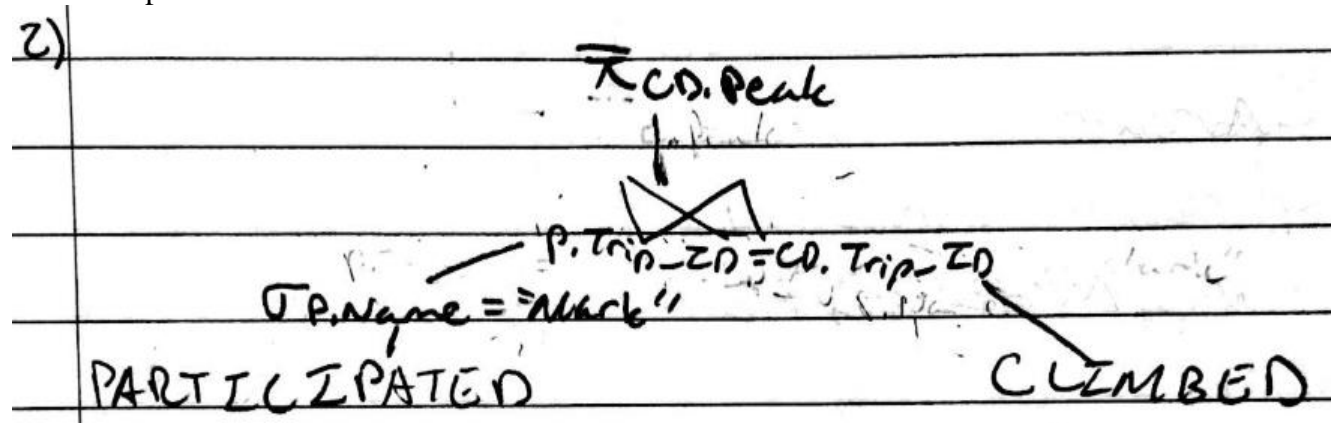Extended Relational Algebra Expression Tree:
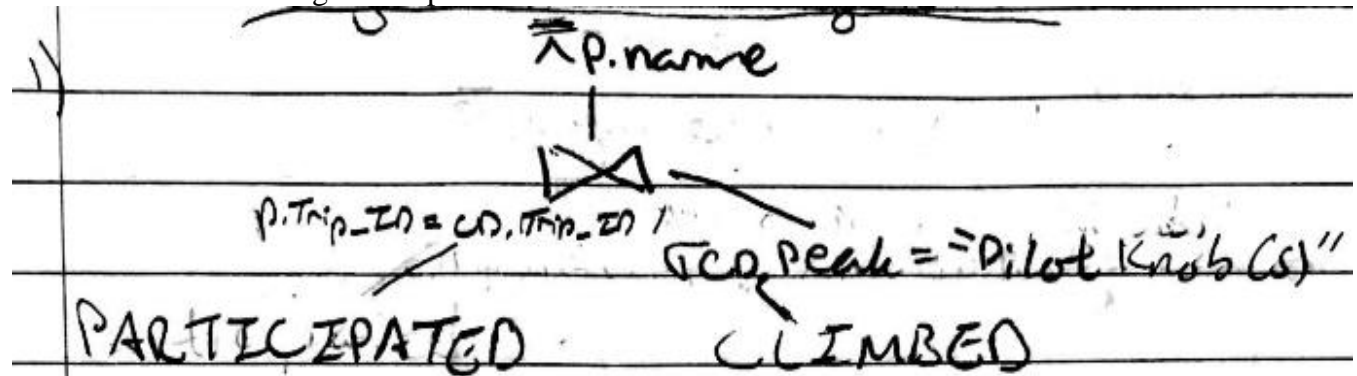
--Queue Question 1:
SELECT DISTINCT p.NAME
FROM PARTICIPATED P, CLIMBED CD
WHERE P.TRIP_ID = CD.TRIP_ID AND CD.PEAK = "Pilot Knob (S)";

Output 1:
PNAME

PNAME
JOHN
MARK
MICHAEL

2. Which peaks has Mark climbed?

-- Queue Question 2
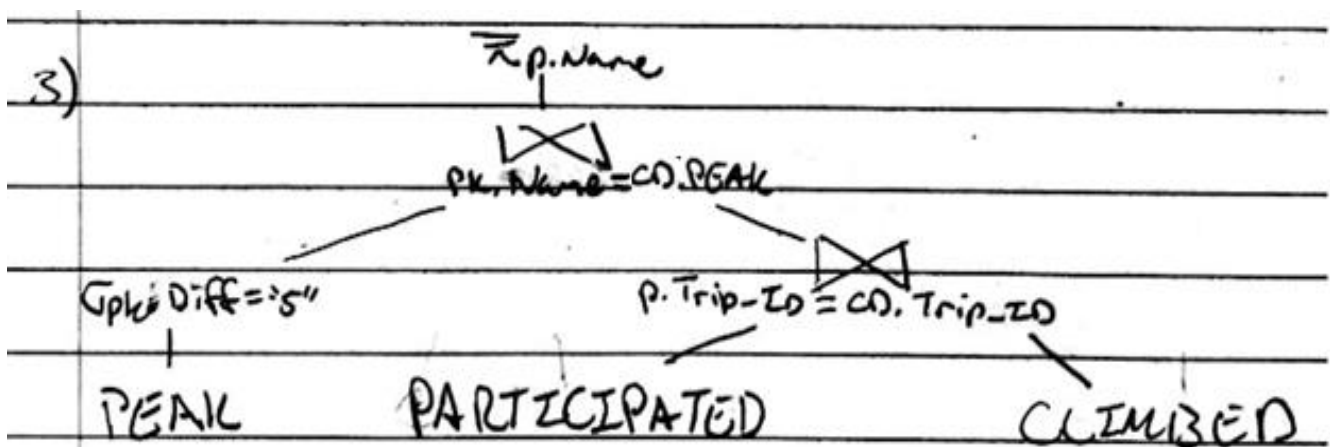SELECT DISTINCT CD.PEAK
FROM PARTICIPATED P, CLIMBED CD
WHERE P.TRIP_ID = CD.TRIP_ID AND P.name = "MARK";

Output 2:

PEAK

PEAK
Center Peak
North Maggie Mountain
Whaleback
Kearsarge Peak
Lion Rock
Midway Mountain
Mount Hale
Mount Langley
Pilot Knob (S)
Dragon Peak
Mount Barnard
Mount Guyot
Mount Newcomb
South Guard
Thor Peak
Angora Mountain
Florence Peak
Joe Devel Peak
Mount McAdie
Mount Rixford
Muah Mountain
Olancha Peak
Moses Mountain
Mount Williamson
Needham Mountain

3. Who has climbed a peak rated class 5 in difficulty?

--Queue Question 3
SELECT DISTINCT PNAME
FROM PEAK PK,
        (SELECT CD.PEAK AS CDPEAK, P.name AS PNAME
    FROM PARTICIPATED P, CLIMBED CD
    WHERE P.trip_id = CD.trip_id)
WHERE PK.diff="5" AND PK.NAME=CDPEAK;

Output 3:
PNAME

PNAME
DONNA
ELIZABETH
JOHN

4. Which peaks have been climbed exactly once?

--Queue Question 4
SELECT GPEAK
FROM (
  SELECT CD.PEAK AS GPEAK, COUNT(CD.WHEN_CLIMBED) as NUM
  FROM CLIMBED CD
  GROUP BY CD.PEAK
)
 WHERE NUM = 1;
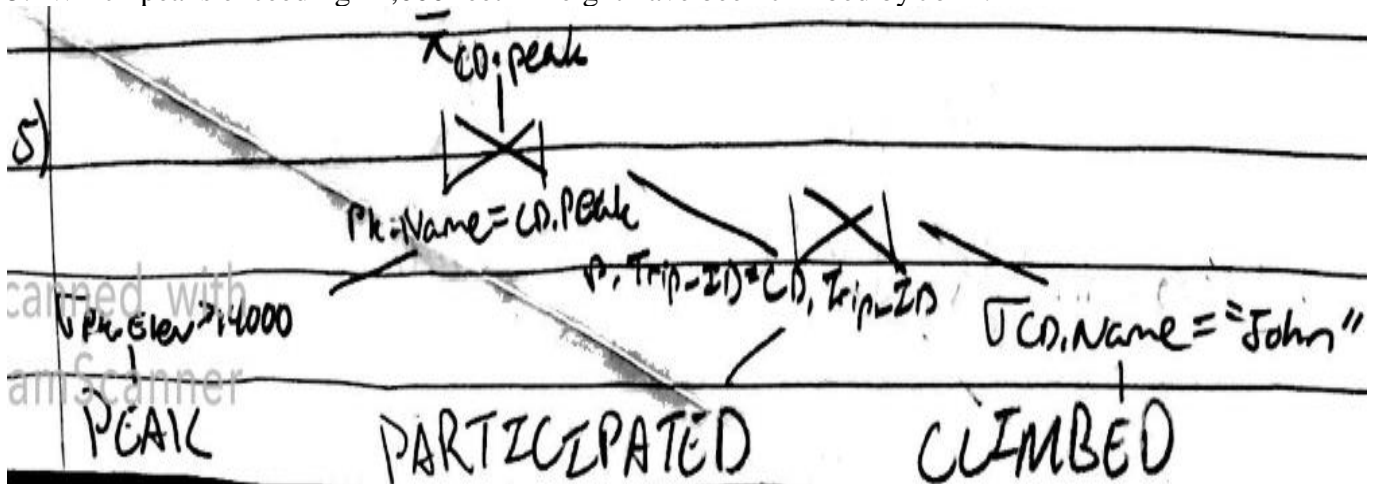
Output 4:
GPEAK

GPEAK
Angora Mountain
Cartago Peak
Center Peak
Coyote Peaks
Crag Peak
Dragon Peak
Kern Peak

Lamont Peak
Lone Pine Peak
Mount Barnard
Mount Bradley
Mount Clarance King
Mount Gardiner
Mount Genevra
Mount LeConte
Mount Muir
Mount Pickering
Mount Stanford (S)
Mount Whitney
North Guard
North Maggie Mountain
Owens Peak
Pilot Knob (S)
Spanish Needle
Triple Divide Peak
University Peak
Vandever Mountain

5. Which peaks exceeding 14,000 feet in height have been climbed by John?

--Queue Question 5
SELECT DISTINCT CDPEAK
FROM PEAK PK,
       (SELECT CD.PEAK AS CDPEAK
    FROM PARTICIPATED P, CLIMBED CD
    WHERE P.trip_id = CD.trip_id AND P.name="JOHN")
WHERE PK.elev>14000 AND PK.NAME=CDPEAK;

Output 5:
CDPEAK

Mount Langley
Mount Whitney

6. Which maps have more than a 2000 foot difference between the highest and lowest peaks?

--Queue Question 6
SELECT DISTINCT PKMAP
FROM (
　SELECT PK.MAP AS PKMAP, MAX(PK.elev) AS TOP, MIN(PK.elev) AS BOT
　FROM PEAK PK
　GROUP BY PK.map
　)
　WHERE TOP-BOT>2000;

Output 6:
PKMAP

Kearsarge Peak
Mount Whitney

7. Sort the various maps according to the average height of the peaks on the map, and give the average height of the peaks on each map.
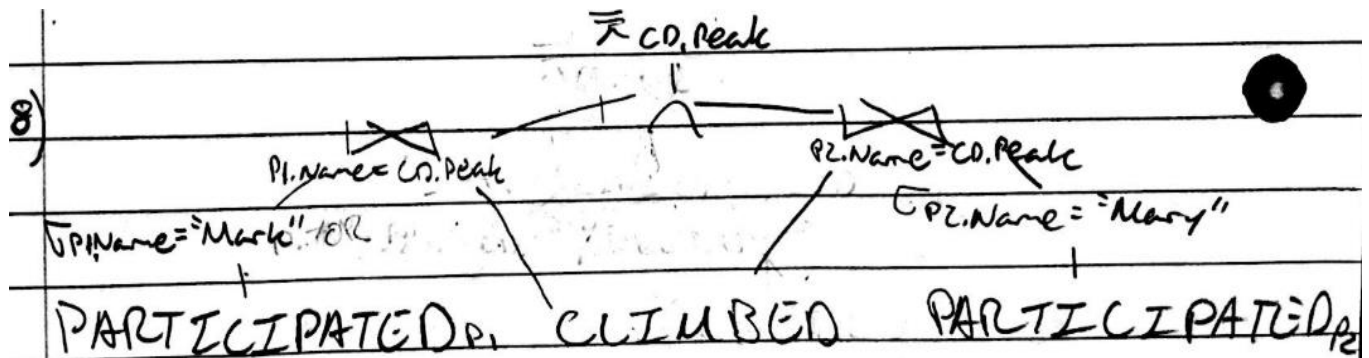

--Queue Question 7
SELECT DISTINCT PKMAP, average
FROM (
　SELECT PK.MAP AS PKMAP, AVG(PK.elev) AS average

FROM PEAK PK
GROUP by PK.map
)
ORDER BY average;

Output 7:

PKMAP	average
Onyx	6200
Lament Peak	7635
Ninemile Canyon	8000
Rockhouse Basin	8360
Owens Peak	8453
Kearsarge Peak	8550.667
Cannell Peak	8802
Silver City	9023
Crag Peak	9480
Monache Mtn	9533
Moses Mtn	9782.5
Sirretta Peak	9977
Kern Lake	10545
Bartlett	11016
Mt Silliman	11188
Lodgepole	11240
Olancha	11301.5
Kern Peak	11510
Sphinx Lakes	11717
Mineral King	12280.4
Triple Divide Peak	12657.38
Mt Clarence King	12838.38
Cirque Peak	12900
Mt Kaweah	12945
Mt Brewer	13334.36
Mount Whitney	13493.28
Mt Langley	13561
Mt Williamson	13747.78

8. Which peaks have been climbed by Mark and Mary?

--Queue Question 8
SELECT DISTINCT CD.PEAK
FROM PARTICIPATED P, CLIMBED CD
WHERE P.TRIP_ID = CD.TRIP_ID AND P.NAME = "MARK" INTERSECT
  SELECT DISTINCT CD2.PEAK
  FROM PARTICIPATED P2, CLIMBED CD2
  WHERE P2.TRIP_ID = CD2.TRIP_ID AND P2.NAME = "MARY";

Output 8:

PEAK

PEAK
Kearsarge Peak
Mount Guyot
Mount Langley
Muah Mountain
Olancha Peak
Thor Peak
Needham Mountain
Mount Hale
Mount Rixford
Midway Mountain
Moses Mountain
South Guard
Joe Devel Peak
Mount McAdie
Mount Newcomb
Mount Williamson
Dragon Peak
Mount Barnard
Lion Rock

9. How many peaks remain unclimbed in each region?
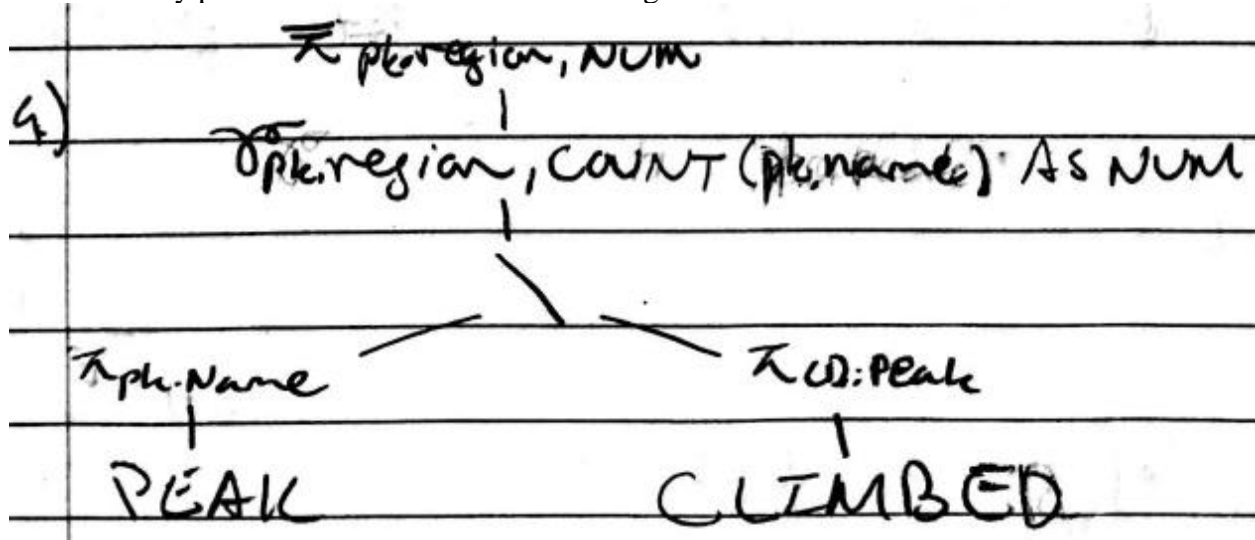
--Queue Question 9
SELECT DISTINCT PKREGION, COUNT(PKNAME)
FROM(
   SELECT PK.region AS PKREGION, PK.NAME AS PKNAME
   FROM PEAK PK
   WHERE PK.name not in (
    SELECT PEAK
    FROM CLIMBED)
)
GROUP BY PKREGION

Output 9:

PKREGION	COUNT(PKNAME)
Corocoran to Whitney	1
Great Western Divide	3
Kaweahs and West	9
Kearsarge Pass	4
Kings Kern Divide	6
Mineral King	1
Olancha to Langley	3
Southern Sierra	3
Whitney to Williamson	5

10. On which trips did the total elevation gained by all participants exceed 500,000 feet?

10)

$$\pi_{trip\_ID}$$

$$\sigma_{Total > 500000}$$

$$\gamma_{Trip\_ID, SUM(pk.Elev) AS Total}$$

$$pk.name = CD.peak$$
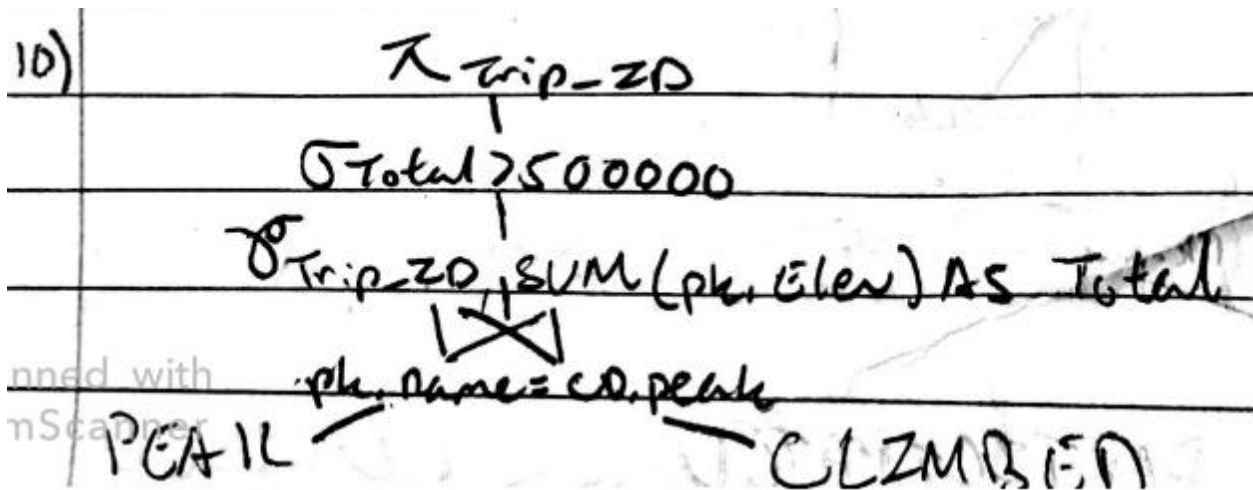
PEAK — ⋈ — CLIMBED

--Queue Question 10
SELECT DISTINCT CD.trip_id
FROM PEAK PK, CLIMBED CD, PARTICIPATED P
WHERE PK.name=CD.PEAK AND P.trip_id=CD.TRIP_ID
GROUP BY CD.trip_id HAVING SUM(PK.elev)>500000

Output 10:

TRIP_ID
8
13

11. Compute the average number of peaks scaled by the men in the club and by the women in the club.
--Queue Question 11
SELECT DISTINCT CR2.sex, NUM/COUNT(CR2.name)
FROM CLIMBER CR2, (
  SELECT CR.sex AS psex, COUNT (CD.PEAK) AS NUM
  FROM CLIMBED CD, PARTICIPATED P, CLIMBER CR
  WHERE CR.name = P.name AND
    P.trip_id = CD.trip_id
  GROUP BY CR.SEX
)
WHERE CR2.SEX = psex
GROUP BY CR2.SEX

Output 11:

SEX	NUM/COUNT(CR2.NAME)
F	21
M	15

12. Which people have climbed every single peak that Maria has climbed?
--Queue Question 12
SELECT DISTINCT P2.NAME

```
FROM PARTICIPATED P2, CLIMBED CD, (
  SELECT P.trip_id AS PTRIP, CD.PEAK AS CDPEAK
  FROM PARTICIPATED P, CLIMBED CD
  WHERE P.name="MARIA" AND CD.TRIP_ID=P.trip_id )
WHERE PTRIP=CD.TRIP_ID=P2.trip_id AND CD.PEAK=CDPEAK;
```

Output 12:

NAME

MARY

13. Which region has had the highest fraction of its peaks climbed, and what is that fraction?
```
--Queue Question 13
SELECT PK.region, ROUND(COUNT(DISTINCT PK.name)*1.0/MOUNT,4)
FROM PEAK PK, CLIMBED CD, (
  SELECT PK2.region, COUNT(DISTINCT PK2.name) AS MOUNT
  FROM PEAK PK2, CLIMBED CD2
  GROUP BY PK2.region
 )
WHERE CD.PEAK=PK.name
GROUP BY PK.region;
```

Output 13:

REGION	FRACTION
Corocoran to Whitney	0.8889
Great Western Divide	0.7778
Kaweahs and West	0.3333
Kearsarge Pass	0.8889
Kings Kern Divide	0.5556
Mineral King	1
Olancha to Langley	0.8889
Southern Sierra	0.7778
Whitney to Williamson	0.4444

14. Which pair of climbers have climbed the most peaks together, and how many peaks is that?
```
--Queue Question 14
SELECT P.Name, P2.Name, COUNT( DISTINCT CD.peak ) AS num_peaks_climbed
FROM PARTICIPATED P INNER JOIN  PARTICIPATED p2 ON (P.trip_id = P2.trip_id),
   PARTICIPATED INNER JOIN CLIMBED CD ON (P.trip_id = CD.trip_id )
WHERE P.name > P2.name
GROUP BY P.Name, P2.Name
HAVING COUNT(DISTINCT P.trip_id) != 0
ORDER BY num_peaks_climbed DESC
```

Output 14:

NAME1	NAME2	NUM
MARY	KENNETH	30
PATRICIA	MARY	17
ELIZABETH	DONNA	15
JOHN	DONNA	15
JOHN	ELIZABETH	15
LINDA	KENNETH	15
MARK	JOHN	15
MARY	DONNA	15
MARY	LINDA	15
MARY	DONALD	14
MARY	BARBARA	13
STEVEN	JOHN	12
STEVEN	MARK	12
MARY	MARK	11
DONALD	BARBARA	10
KENNETH	BARBARA	10
KENNETH	DONALD	10
MARY	GEORGE	10
MARY	JENNIFER	10
PATRICIA	KENNETH	10
PATRICIA	LINDA	10
STEVEN	KENNETH	10
STEVEN	LINDA	10
STEVEN	MARY	10
STEVEN	PATRICIA	10
MARY	DANIEL	8
ELIZABETH	BARBARA	7
ELIZABETH	DONALD	7
KENNETH	BETTY	7
KENNETH	ELIZABETH	7
KENNETH	GEORGE	7
MARK	BETTY	7
MARK	KENNETH	7
MARY	BETTY	7
MARY	ELIZABETH	7
MICHAEL	JOHN	7
MICHAEL	MARK	7
JENNIFER	DONALD	5
KENNETH	JENNIFER	5

LINDA	DANIEL	5
LINDA	JENNIFER	5
ROBERT	EDWARD	5
DANIEL	BARBARA	4
MARK	DANIEL	4
PATRICIA	BARBARA	4
PATRICIA	DANIEL	4
PAUL	DANIEL	4
PAUL	MARK	4
PAUL	MARY	4
MARIA	GEORGE	3
MARY	MARIA	3
PATRICIA	GEORGE	3
PATRICIA	MARIA	3

15. Who has climbed more than 20 peaks in some 60 day span?
--Queue Question 15
WITH TP AS (SELECT CD.PEAK, CD.when_climbed, P.NAME
 FROM CLIMBED CD
 INNER JOIN PARTICIPATED P ON P.TRIP_ID = CD.TRIP_ID
)

SELECT DISTINCT NAME
FROM (SELECT T1.NAME
  FROM TP T1
  LEFT JOIN TP T2 ON T1.NAME = T2.NAME AND
       (T2.when_climbed > T1.when_climbed OR (T2.when_climbed=T1.when_climbed AND
T2.PEAK>T1.PEAK))
       WHERE julianday(T2.when_climbed)- julianday(T1.when_climbed)>60
)
GROUP BY NAME
HAVING COUNT(*) > 20

Output 15:
NAME

BARBARA
BETTY
DANIEL
DONALD
DONNA
ELIZABETH
GEORGE
JENNIFER
JOHN

KENNETH
LINDA
MARK
MARY
MICHAEL
PATRICIA
STEVEN