Εθνικό Μετσόβιο Πολυτεχνείο

Σχολή Ηλεκτρολόγων Μηχανικών και Μηχανικών Υπολογιστών

Προηγμένα Θέματα Βάσεων Δεδομένων

Εξαμηνιαία Εργασία, Ακ. Έτος 2022-2023

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Χριστίνα Προεστάκη: 03118877

Απαντήσεις στα ζητούμενα της εργασίας

GitHub Link: https://github.com/G-Papad/adv-db-2022.git

Ζητούμενο 1

Η απάντηση για το Ζητούμενο 1 βρίσκεται στο README στο github.

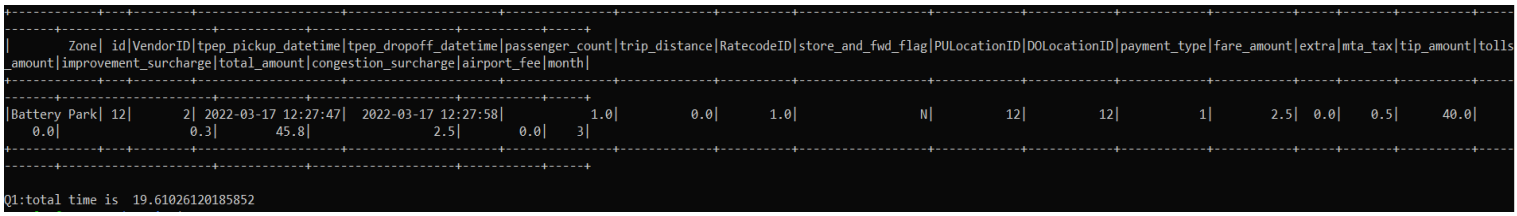
Συνοπτική παρουσίαση των χρόνων για τα ζητούμενα 2-4.

$Query$ \ $\#\ of\ workers$	1	2
$Q1$	19.61	20.019
$Q2$	55.442	57.458
$Q3$	20.62	22.173
$Q3\ -\ RDD$	352.227	352.66
$Q4$	27.372	27.123
$Q5$	23.586	23.765

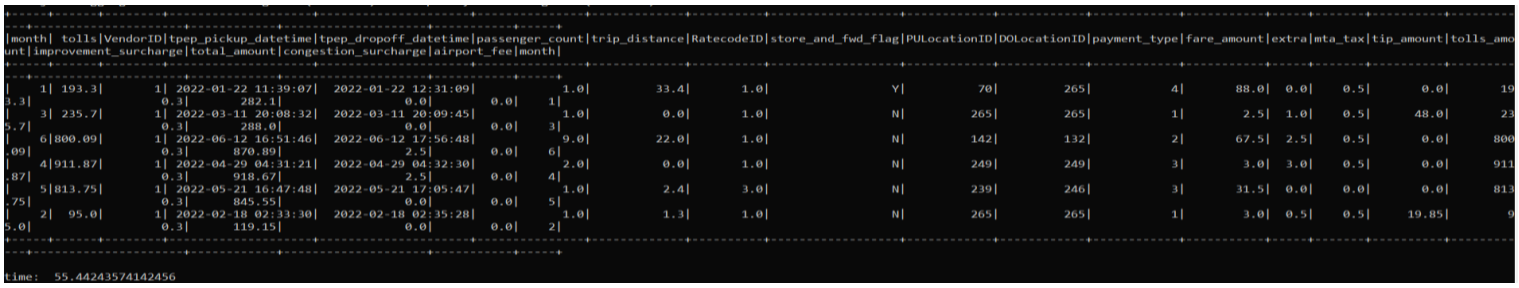
Ζητούμενο 2

Εκτέλεση Q1, Q2 χρησιμοποιώντας το DataFrame/SQL API.

1 worker (Q1+Q2)

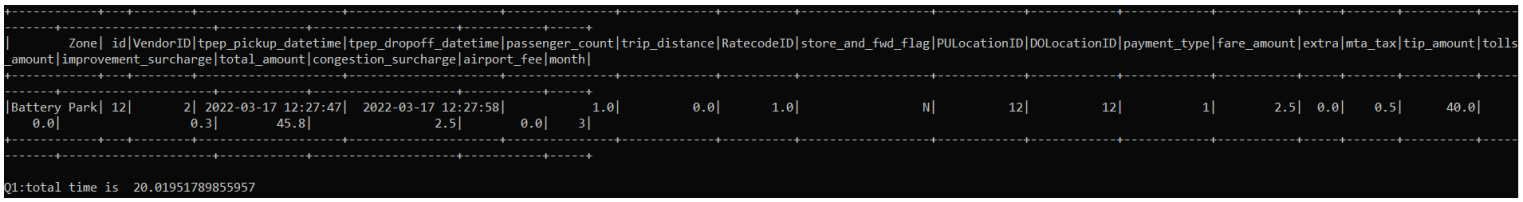


Q1 - 1 worker

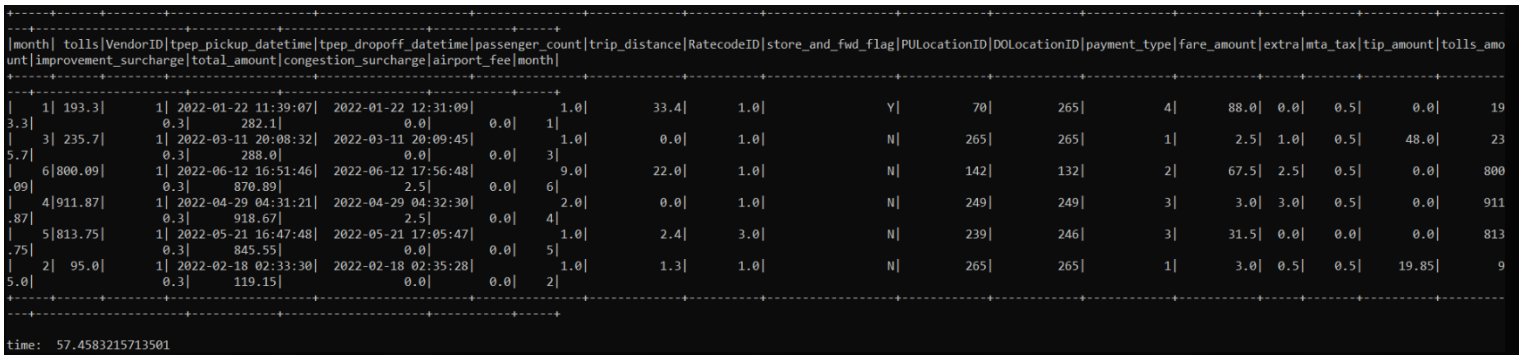


Q2 - 1 worker

2 workers (Q1+Q2)



Q1 - 2 workers

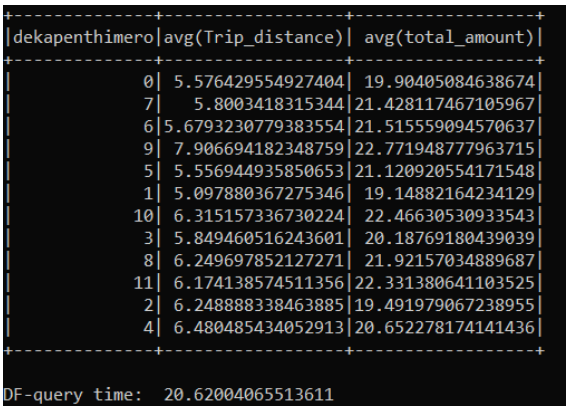


Q2 - 2 workers

Ζητούμενο 3

Εκτέλεση Q3 χρησιμοποιώντας το DataFrame/SQL API και RDD.

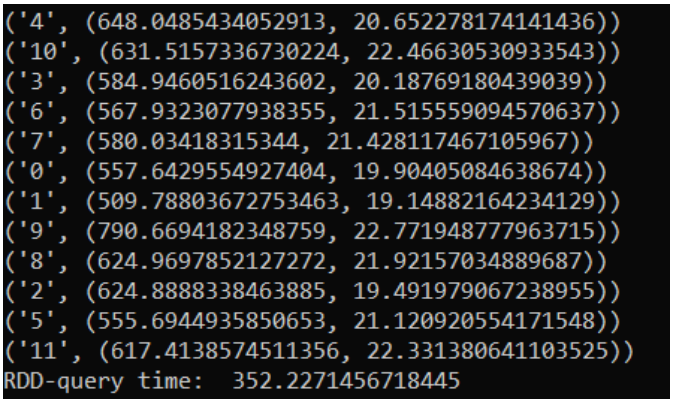
1 worker (Q3 + Q3-rdd)



```
+-------------+------------------+------------------+
|dekapenthimero|avg(Trip_distance)| avg(total_amount)|
+-------------+------------------+------------------+
|            0| 5.576429554927404| 19.90405084638674|
|            7|   5.8003418315344|21.428117467105967|
|            6|5.6793230779383554|21.515559094570637|
|            9| 7.906694182348759|22.771948777963715|
|            5| 5.556944935850653|21.120920554171548|
|            1| 5.097880367275346| 19.14882164234129|
|           10| 6.315157336730224| 22.46630530933543|
|            3| 5.849460516243601| 20.18769180439039|
|            8| 6.249697852127271| 21.92157034889687|
|           11| 6.174138574511356|22.331380641103525|
|            2| 6.248888338463885|19.491979067238955|
|            4| 6.480485434052913|20.652278174141436|
+-------------+------------------+------------------+

DF-query time:  20.62004065513611
```

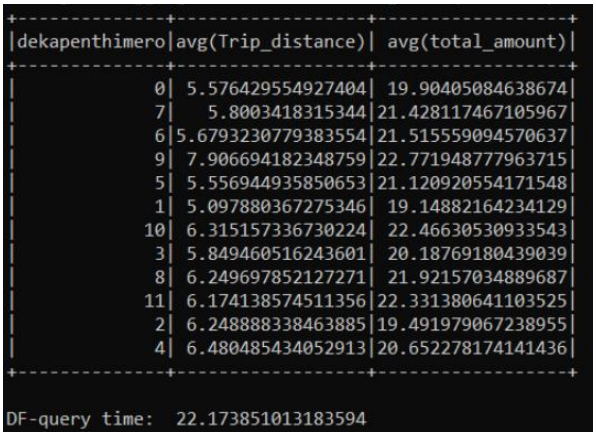
Q3(DataFrame/SQL API) - 1 worker



```
('4', (648.0485434052913, 20.652278174141436))
('10', (631.5157336730224, 22.46630530933543))
('3', (584.9460516243602, 20.18769180439039))
('6', (567.9323077938355, 21.515559094570637))
('7', (580.03418315344, 21.428117467105967))
('0', (557.6429554927404, 19.90405084638674))
('1', (509.78803672753463, 19.14882164234129))
('9', (790.6694182348759, 22.771948777963715))
('8', (624.9697852127272, 21.92157034889687))
('2', (624.8888338463885, 19.491979067238955))
('5', (555.6944935850653, 21.120920554171548))
('11', (617.4138574511356, 22.331380641103525))
RDD-query time:  352.2271456718445
```

Q3(RDD) - 1 worker

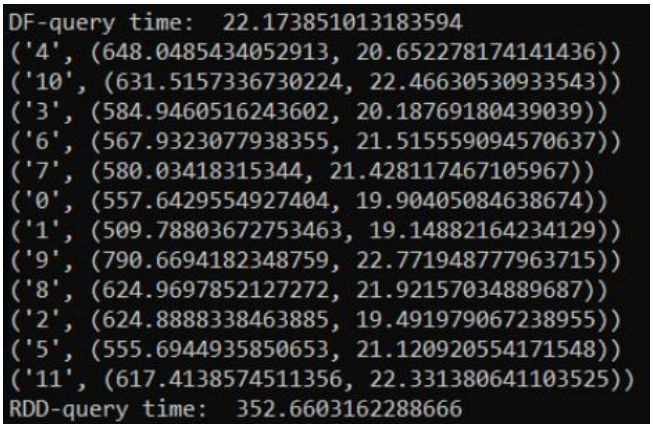
2 workers (Q3 + Q3-rdd)



```
+-------------+------------------+------------------+
|dekapenthimero|avg(Trip_distance)| avg(total_amount)|
+-------------+------------------+------------------+
|            0| 5.576429554927404| 19.90405084638674|
|            7|   5.8003418315344|21.428117467105967|
|            6|5.6793230779383554|21.515559094570637|
|            9| 7.906694182348759|22.771948777963715|
|            5| 5.556944935850653|21.120920554171548|
|            1| 5.097880367275346| 19.14882164234129|
|           10| 6.315157336730224| 22.46630530933543|
|            3| 5.849460516243601| 20.18769180439039|
|            8| 6.249697852127271| 21.92157034889687|
|           11| 6.174138574511356|22.331380641103525|
|            2| 6.248888338463885|19.491979067238955|
|            4| 6.480485434052913|20.652278174141436|
+-------------+------------------+------------------+

DF-query time:  22.173851013183594
```

Q3(DataFrame/SQL API) - 2 workers



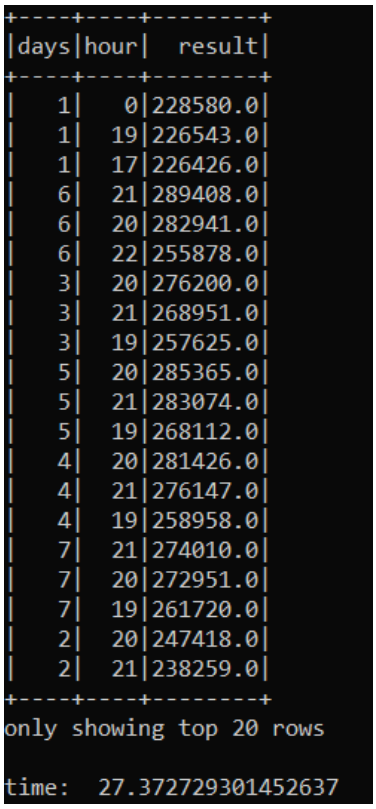
```
DF-query time:  22.173851013183594
('4', (648.0485434052913, 20.652278174141436))
('10', (631.5157336730224, 22.46630530933543))
('3', (584.9460516243602, 20.18769180439039))
('6', (567.9323077938355, 21.515559094570637))
('7', (580.03418315344, 21.428117467105967))
('0', (557.6429554927404, 19.90405084638674))
('1', (509.78803672753463, 19.14882164234129))
('9', (790.6694182348759, 22.771948777963715))
('8', (624.9697852127272, 21.92157034889687))
('2', (624.8888338463885, 19.491979067238955))
('5', (555.6944935850653, 21.120920554171548))
('11', (617.4138574511356, 22.331380641103525))
RDD-query time:  352.6603162288666
```

Q3(RDD) - 2 workers

Ζητούμενο 4

Εκτέλεση Q4, Q5 χρησιμοποιώντας το DataFrame/SQL API.

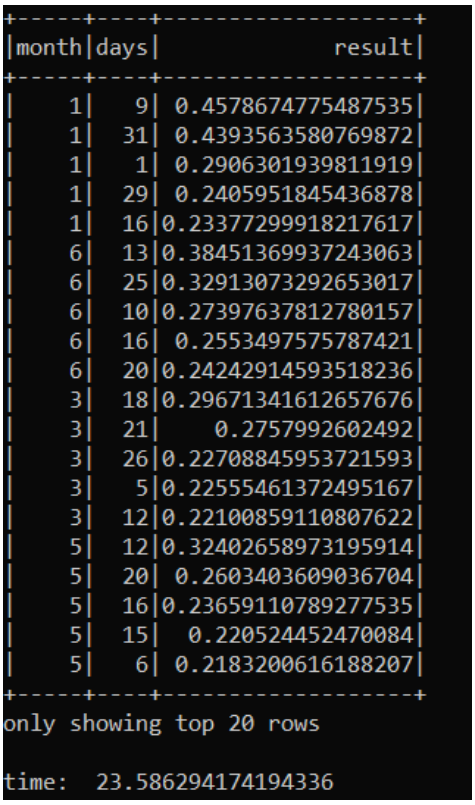
1 worker (Q4+Q5)



```
+----+----+--------+
|days|hour|  result|
+----+----+--------+
|   1|   0|228580.0|
|   1|  19|226543.0|
|   1|  17|226426.0|
|   6|  21|289408.0|
|   6|  20|282941.0|
|   6|  22|255878.0|
|   3|  20|276200.0|
|   3|  21|268951.0|
|   3|  19|257625.0|
|   5|  20|285365.0|
|   5|  21|283074.0|
|   5|  19|268112.0|
|   4|  20|281426.0|
|   4|  21|276147.0|
|   4|  19|258958.0|
|   7|  21|274010.0|
|   7|  20|272951.0|
|   7|  19|261720.0|
|   2|  20|247418.0|
|   2|  21|238259.0|
+----+----+--------+
only showing top 20 rows

time:  27.372729301452637
```

Q4 - 1 worker

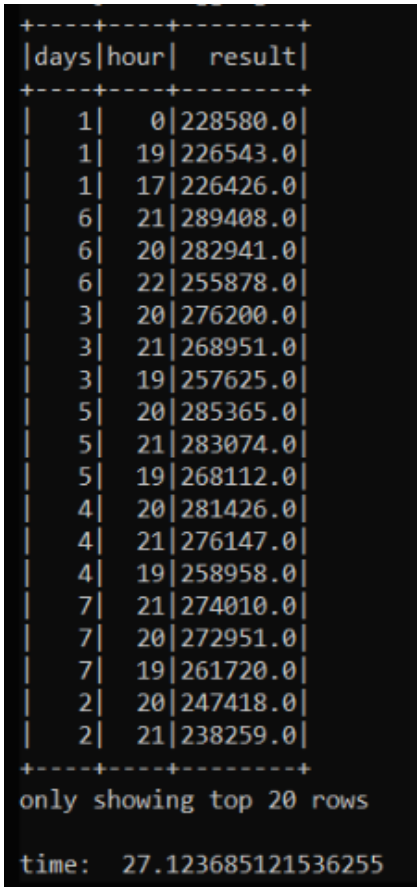


```
+-----+----+-------------------+
|month|days|             result|
+-----+----+-------------------+
|    1|   9| 0.4578674775487535|
|    1|  31| 0.4393563580769872|
|    1|   1| 0.2906301939811919|
|    1|  29| 0.2405951845436878|
|    1|  16|0.23377299918217617|
|    6|  13|0.38451369937243063|
|    6|  25|0.32913073292653017|
|    6|  10|0.27397637812780157|
|    6|  16| 0.2553497575787421|
|    6|  20|0.24242914593518236|
|    3|  18|0.29671341612657676|
|    3|  21|    0.2757992602492|
|    3|  26|0.22708845953721593|
|    3|   5|0.22555461372495167|
|    3|  12|0.22100859110807622|
|    5|  12|0.32402658973195914|
|    5|  20| 0.2603403609036704|
|    5|  16|0.23659110789277535|
|    5|  15|  0.220524452470084|
|    5|   6| 0.2183200616188207|
+-----+----+-------------------+
only showing top 20 rows

time:  23.586294174194336
```

Q5 - 1 worker

2 workers (Q4+Q5)

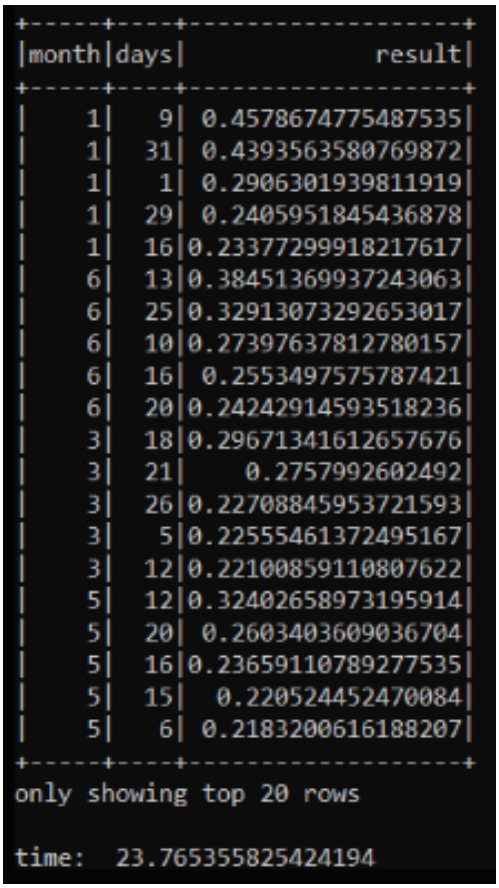


days	hour	result
1	0	228580.0
1	19	226543.0
1	17	226426.0
6	21	289408.0
6	20	282941.0
6	22	255878.0
3	20	276200.0
3	21	268951.0
3	19	257625.0
5	20	285365.0
5	21	283074.0
5	19	268112.0
4	20	281426.0
4	21	276147.0
4	19	258958.0
7	21	274010.0
7	20	272951.0
7	19	261720.0
2	20	247418.0
2	21	238259.0

only showing top 20 rows

time: 27.123685121536255

Q4 - 2 workers



month	days	result
1	9	0.4578674775487535
1	31	0.4393563580769872
1	1	0.2906301939811919
1	29	0.2405951845436878
1	16	0.23377299918217617
6	13	0.38451369937243063
6	25	0.32913073292653017
6	10	0.27397637812780157
6	16	0.2553497575787421
6	20	0.24242914593518236
3	18	0.29671341612657676
3	21	0.2757992602492
3	26	0.22708845953721593
3	5	0.22555461372495167
3	12	0.22100859110807622
5	12	0.32402658973195914
5	20	0.260340360903 6704
5	16	0.23659110789277535
5	15	0.220524452470084
5	6	0.2183200616188207

only showing top 20 rows

time: 23.765355825424194

Q5 - 2 workers