Step 1

Query1 :

SELECT smallA.uid1, smallA.uid2 from

(SELECT \* FROM followers as A WHERE A.uid1 < A.uid2) as smallA

JOIN (SELECT \* FROM followers AS B WHERE B.uid1 > B.uid2) AS smallB

ON smallA.uid1 = smallB.uid2 and smallA.uid2 = smallB.uid1;

SQLite Result:

CREATE TABLE friends (uid1 integer, uid2 integer);

Run Time: real 0.196 user 0.000000 sys 0.000000

INSERT INTO friends

SELECT smallA.uid1, smallA.uid2 FROM

(SELECT \* FROM followers AS A WHERE A.uid1 < A.uid2) AS smallA

JOIN

(SELECT \* FROM followers AS B WHERE B.uid1 > B.uid2) AS smallB

ON smallA.uid1 = smallB.uid2 and smallA.uid2 = smallB.uid1;

Run Time: real 393.437 user 205.016000 sys 60.644000

SELECT count(\*) FROM friends;

21776094

Run Time: real 3.535 user 0.068000 sys 0.568000

Note: from the assignment, it requires us provide both count and list of true friends. So, we insert the results into a new table first then produce the count.

Query2:

SELECT c.uid, sum(c.co) AS s FROM (

SELECT A.uid1 as uid, -count(\*) AS co FROM followers AS A GROUP BY A.uid1

UNION

SELECT B.uid2 as uid, count(\*) AS co FROM followers as B GROUP BY B.uid2

) c

GROUP BY c.uid ORDER BY s DESC LIMIT 10;

SQLite Result:

5994113|564220

7496|344850

1349110|340491

1629776|170111

8121005|155933

2041453|152069

797152|118752

6623784|115819

645019|107639

3403|97931

Run Time: real 216.425 user 199.192000 sys 10.260000

Step 3:

My Query1 result:

b2210-30:/s/csc443/yufangzh/A1P3/A1part3$ /usr/bin/time -v ./query1 data1.dat 16384

total number match 21776094

Command being timed: "./query1 data1.dat 16384"

User time (seconds): 21.04

System time (seconds): 3.44

Percent of CPU this job got: 35%

Elapsed (wall clock) time (h:mm:ss or m:ss): 1:09.45

Average shared text size (kbytes): 0

Average unshared data size (kbytes): 0

Average stack size (kbytes): 0

Average total size (kbytes): 0

Maximum resident set size (kbytes): 1265276

Average resident set size (kbytes): 0

Major (requiring I/O) page faults: 0

Minor (reclaiming a frame) page faults: 16588

Voluntary context switches: 122378

Involuntary context switches: 2886

Swaps: 0

File system inputs: 0

File system outputs: 5673512

Socket messages sent: 0

Socket messages received: 0

Signals delivered: 0

Page size (bytes): 4096

Exit status: 0

Total number of true friends is 21776094

My Query2 Result:

b2210-30:/s/csc443/yufangzh/A1P3/A1part3$ /usr/bin/time -v ./query2 data1.dat 16384

distinct user number: 11316811

uid:5994113 , in-out:564220

uid:7496 , in-out:344850

uid:1349110 , in-out:340491

uid:1629776 , in-out:170111

uid:8121005 , in-out:155933

uid:2041453 , in-out:152069

uid:797152 , in-out:118752

uid:6623784 , in-out:115819

uid:645019 , in-out:107639

uid:3403 , in-out:97931

Command being timed: "./query2 data1.dat 16384"

User time (seconds): 22.25

System time (seconds): 3.75

Percent of CPU this job got: 33%

Elapsed (wall clock) time (h:mm:ss or m:ss): 1:18.54

Average shared text size (kbytes): 0

Average unshared data size (kbytes): 0

Average stack size (kbytes): 0

Average total size (kbytes): 0

Maximum resident set size (kbytes): 410976

Average resident set size (kbytes): 0

Major (requiring I/O) page faults: 0

Minor (reclaiming a frame) page faults: 19401

Voluntary context switches: 106368

Involuntary context switches: 3052

Swaps: 0

File system inputs: 0

File system outputs: 6104304

Socket messages sent: 0

Socket messages received: 0

Signals delivered: 0

Page size (bytes): 4096

Exit status: 0