Compare the algorithm complexities of Step a 1, 2, 3 and 4. Compare the timing results of Step a 1, 2, 3 and 4. Would you have any discovery from the comparison? If so, how would you explain the discovery? Document your comparison, discovery and explanation in step\_a.doc.

The query results are saved in folder CSCE811\_HW03\_c as the following files:

Stage1\_step\_a\_1

Stage1\_step\_a\_2

Stage1\_step\_a\_3

Stage1\_step\_a\_4

**Number of records, recorded times, and complexity:**

*Step a - 1:*

Total number of user records that meet the requirement: 37

Process time 0.512641 seconds

Process time without printing 0.355279 seconds

Complexity of algorithm: O(n) for the algorithm - We have one for loop that goes through all the records and finds their location. It also takes another O(n) inside the strsplit function, so the overall time is O(n^2).

*Step a - 2:*

Number of records: 1509

Process time 0.412667 seconds

Process time without printing: 0.351296 seconds

Complexity of algorithm: O(n^2) - We have one for loop that goes through all the records, and one that goes through the messages to find the ones meeting the condition.

*Step a - 3:*

Number of records: 28

Process time 0.366600 seconds

Process time without printing: 0.329150 seconds

Complexity of algorithm: O(n^2) - We have one for loop that goes through all the records, and one that goes through the messages to find the ones meeting the condition. The printing makes the first processing time greater than the processing time for step a - 2.

*Step a - 4:*

Max message: 6, sender: Regine Jersey

Process time 0.415893 seconds

Complexity of algorithm: O(n^2) - Again we have to go through all the records and messages to find the person in a specific location sending the most messages.

Discovery:

Our processing time is not much different in different stages, as our complexity is consistently O(n^2). Printing takes much more time so that why for the large number of results we get a bigger processing time with printing (step a-2).