1. The longest delay in this dataset.

```
>>> theLongestDelay.show()
[Stage 17:================

+---------+
|max(delay)|
+---------+
|     2755|
+---------+
```

2. The number of delayed versus on-time/early flights.

```
>>> on_time_or_early = tripGraph.edges.filter("delay <= 0").count()
[Stage 21:============================>

>>> on_time_or_early
272559
>>> delayed = tripGraph.edges.filter("delay > 0").count()
[Stage 23:============================>

>>> delayed
168917
>>> on_time_or_early + delayed
441476
```

On-time or early와 delayed를 더한 것이 441476 밖에 안되는 것으로 보아 결측치가 있음을 추측할 수 있다.

3.What flights departing Seattle are most likely to have significant delays?

```
>>> seattle_delayed_dst_avg_sorted.show()
[Stage 45:=============================>
[Stage 46:==============================

+---+------------------+
|dst|        avg(delay)|
+---+------------------+
|SBA|            90.375|
|LGB| 57.59090909090909|
|BZN|              57.0|
|OKC|           55.3125|
|PHL|             52.25|
|EWR|   51.8780487804878|
|SFO|50.923611111111114|
|BNA|50.666666666666664|
|PSC|49.421052631578945|
|COS|45.333333333333336|
|KTN|43.333333333333336|
|BOI|  42.25423728813559|
|DAL|              38.7|
|KOA|  37.04761904761905|
|DEN|  36.87951807228916|
|SLC|36.544642857142854|
|DCA|  36.11764705882353|
|BUR|  35.92307692307692|
|SMF|  35.73109243697479|
|PDX|           35.6125|
+---+------------------+
```

4.Top 5 busiest airports (most flights in and out)

ATL, ORD, LAX, DEN, DFW가 가장 바쁜 상위 5개 공항이다.

```
+---+------+
| id|degree|
+---+------+
|ATL| 60273|
|ORD| 37565|
|LAX| 34629|
|DEN| 34051|
|DFW| 30628|
|SFO| 26572|
|PHX| 26507|
|LAS| 24974|
|MCO| 21996|
|IAH| 21593|
|SEA| 20251|
|DTW| 19391|
|MSP| 19250|
|BOS| 18911|
|EWR| 18557|
|SLC| 18202|
|CLT| 18049|
|FLL| 15957|
|JFK| 15478|
|BWI| 15293|
+---+------+
```

5.Airport ranking using PageRank.
Reset probability=0.15, max iteration = 5을 주었을 때 페이지랭크는 아래와 같다.

- vertices page rank

```
+-----+------------------+---------------+-------------------+---+--------+
|   No|        Airport ID|           City|            Country| id|pagerank|
+-----+------------------+---------------+-------------------+---+--------+
| 8077|Aransas County Ai...|       Rockport|      United States|RKP|    0.15|
|11401|Sultan Bantilan A...|      Toli-Toli|          Indonesia|TLI|    0.15|
| 6160|    Bugulma Airport|        Bugulma|             Russia|UUA|    0.15|
| 2548|Marechal Rondon A...|         Cuiaba|             Brazil|CGB|    0.15|
| 4315|Milas Bodrum Inte...|         Bodrum|             Turkey|BJV|    0.15|
| 6752|    Tacheng Airport|        Tacheng|              China|TCG|    0.15|
| 7069|The Florida Keys ...|       Marathon|      United States|MTH|    0.15|
| 6184| Hanimaadhoo Airport|Haa Dhaalu Atoll|           Maldives|HAQ|    0.15|
| 7986|Rawlins Municipal...|        Rawlins|      United States|RWL|    0.15|
|  117|Greater Moncton I...|        Moncton|             Canada|YQM|    0.15|
| 6917|Antonio Nery Juar...|        Arecibo|        Puerto Rico|ARE|    0.15|
|   70|John C. Munro Ham...|       Hamilton|             Canada|YHM|    0.15|
|  179|    Smithers Airport|       Smithers|             Canada|YYD|    0.15|
| 1032|      Matari Airport|          Isiro|  Congo (Kinshasa)|IRP|    0.15|
|11880|      Teruel Airport|         Teruel|              Spain|TEV|    0.15|
| 3153|Trivandrum Intern...|     Trivandrum|              India|TRV|    0.15|
| 2987|Voronezh Internat...|       Voronezh|             Russia|VOZ|    0.15|
| 3423|Tatalina LRRS Air...|       Tatalina|      United States|TLJ|    0.15|
| 1646|Sarajevo Internat...|       Sarajevo|Bosnia and Herzeg...|SJJ|    0.15|
| 1511| Pantelleria Airport|    Pantelleria|              Italy|PNL|    0.15|
+-----+------------------+---------------+-------------------+---+--------+
```

-edges page rank

```
+-------+-----+---+---+----------------+--------+-----+------------------+
| tripid|delay|src|dst|        city_dst|state_dst|label|            weight|
+-------+-----+---+---+----------------+--------+-----+------------------+
|1008719|   -5|DCA|SLC|Salt Lake City, UT|      UT|   -5|1.643115346697338...|
|1015971|   -6|DCA|SLC|Salt Lake City, UT|      UT|   -6|1.643115346697338...|
|1020773|   50|DCA|SLC|Salt Lake City, UT|      UT|   50|1.643115346697338...|
|1039188|   -2|DCA|SLC|Salt Lake City, UT|      UT|   -2|1.643115346697338...|
|1039519|   -6|DCA|SLC|Salt Lake City, UT|      UT|   -6|1.643115346697338...|
|1048385|   15|DCA|SLC|Salt Lake City, UT|      UT|   15|1.643115346697338...|
|1048714|    1|DCA|SLC|Salt Lake City, UT|      UT|    1|1.643115346697338...|
|1063760|   -6|DCA|SLC|Salt Lake City, UT|      UT|   -6|1.643115346697338...|
|1064099|   47|DCA|SLC|Salt Lake City, UT|      UT|   47|1.643115346697338...|
|1084657|    1|DCA|SLC|Salt Lake City, UT|      UT|    1|1.643115346697338...|
|1084992|   12|DCA|SLC|Salt Lake City, UT|      UT|   12|1.643115346697338...|
|1094878|   97|DCA|SLC|Salt Lake City, UT|      UT|   97|1.643115346697338...|
|1110864|   50|DCA|SLC|Salt Lake City, UT|      UT|   50|1.643115346697338...|
|1111202|   -3|DCA|SLC|Salt Lake City, UT|      UT|   -3|1.643115346697338...|
|1119695|   -3|DCA|SLC|Salt Lake City, UT|      UT|   -3|1.643115346697338...|
|1120077|   -5|DCA|SLC|Salt Lake City, UT|      UT|   -5|1.643115346697338...|
|1134830|    1|DCA|SLC|Salt Lake City, UT|      UT|    1|1.643115346697338...|
|1135187|    0|DCA|SLC|Salt Lake City, UT|      UT|    0|1.643115346697338...|
|1148112|   -4|DCA|SLC|Salt Lake City, UT|      UT|   -4|1.643115346697338...|
|1148473|    4|DCA|SLC|Salt Lake City, UT|      UT|    4|1.643115346697338...|
+-------+-----+---+---+----------------+--------+-----+------------------+
```