OS :windows8.1
RAM: 8GB
Storage: 1TB

1. **SQL**:SELECT COUNT(DISTINCT Origin,Dest)
        FROM ontime;
   time:1min 50.46sec
   ans:6901

```
mysql> SELECT count(DISTINCT Origin,Dest) FROM ontime;
+----------------------------+
| count(DISTINCT Origin,Dest) |
+----------------------------+
|                       6901 |
+----------------------------+
1 row in set (1 min 50.46 sec)
```

2. **SQL**:SELECT COUNT(FlightNum)
        FROM ontime
        WHERE Dest='JFK' AND ActualElapsedTime BETWEEN 60 AND
                180;
   time:1min 44.69sec
   ans:303868

```
mysql> SELECT COUNT(FlightNum) FROM ontime WHERE Dest='JFK' AND ActualElapsedTim
e BETWEEN 60 AND 180;
+-----------------+
| COUNT(FlightNum) |
+-----------------+
|          303868 |
+-----------------+
1 row in set (1 min 44.69 sec)
```

3. **SQL**: SELECT Model,COUNT(*)
      FROM plane_data
      WHERE Model LIKE '737%'
      GROUP BY Model;

time:0.32sec

ans:

```
+-----------+----------+
| Model     | COUNT(*) |
+-----------+----------+
| 737-230   |        1 |
| 737-236   |        4 |
| 737-282   |        1 |
| 737-282C  |        1 |
| 737-2P6   |        1 |
| 737-2X6C  |        1 |
| 737-2Y5   |        1 |
| 737-301   |        7 |
| 737-317   |        4 |
| 737-322   |       64 |
| 737-33A   |        4 |
| 737-3A4   |        9 |
| 737-3B7   |       16 |
| 737-3G7   |       20 |
| 737-3H4   |      147 |
| 737-3K2   |        2 |
| 737-3L9   |        2 |
| 737-3Q8   |        9 |
| 737-3S3   |        4 |
| 737-3T5   |        3 |
| 737-3TO   |       50 |
| 737-3Y0   |        6 |
| 737-401   |       13 |
| 737-490   |       16 |
| 737-4B7   |       27 |
| 737-4Q8   |       22 |
| 737-4S3   |        1 |
| 737-522   |       30 |
| 737-524   |       56 |
| 737-5H4   |       25 |
| 737-705   |        1 |
| 737-724   |       36 |
| 737-73A   |        2 |
| 737-76N   |       27 |
| 737-76Q   |        2 |
| 737-790   |       19 |
| 737-7AD   |        1 |
| 737-7BD   |       32 |
| 737-7H4   |      308 |
| 737-7Q8   |        2 |
| 737-824   |      100 |
| 737-832   |       68 |
| 737-890   |       33 |
| 737-8FH   |        1 |
| 737-924   |       12 |
| 737-924ER |        8 |
| 737-990   |       12 |
+-----------+----------+
47 rows in set (0.32 sec)
```

4. **SQL**: SELECT P.model,AVG(O.Distance/O.ActualElapsedTime)
    FROM ontime O,plane_data P
    WHERE O.Tailnum=P.Tailnum
    GROUP BY P.model
    HAVING P.model is not null;

time:15min 36.08 sec

create index TailNum on plane_data(TailNum); 6min 34.57sec

ans:

model	AVG(O.Distance/O.ActualElapsedTime)
1121	7.45922090
150	6.00871776
172E	7.43541518
172M	6.02399881
182A	6.15383110
182P	5.71229341
206B	5.73144489
210-5(205)	5.69416609
421C	5.85028051
550	5.69575436
60	5.74692199
65-A90	6.30822105
690A	7.46694314
717-200	4.92841909
737-230	3.56633213
737-236	3.53836791
737-282	3.54783782
737-282C	3.50006890
737-2P6	3.56940270
737-2X6C	3.29341766
737-2Y5	3.59042513
737-301	4.89653280
737-317	5.34246654
737-322	5.37584390
737-33A	5.38464576
737-3A4	5.34591614
737-3B7	4.69470560
737-3G7	5.38574373
737-3H4	5.35385347
737-3K2	5.34987084
737-3L9	5.35489660
737-3Q8	5.33705180
737-3S3	5.44089677
737-3T5	5.35099803
737-3T0	5.47877479
737-3Y0	5.36379618
737-401	4.98537587
737-490	5.50309631
737-4B7	4.98998185
737-4Q8	5.48036722
737-4S3	5.47623346
737-522	5.30952338
737-524	5.09829604
737-5H4	5.11821909
737-705	5.74360238
737-724	6.16892893
737-73A	6.84045691
737-76N	5.91484291
737-76Q	5.69456961
737-790	6.06163486
737-7AD	5.65069971
737-7BD	5.84315045

737-7H4		5.69387143
737-7Q8		6.01779993
737-824		6.25023217
737-832		5.92803131
737-890		6.58983890
737-8FH		6.66189573
737-924		6.05892520
737-924ER		6.08330925
737-990		6.32032872
747-2B5F		5.76387866
747-422		7.05052574
747-451		7.24618056
757-212		5.73738041
757-222		6.48735779
757-223		6.58163599
757-224		6.19901772
757-225		5.85619148
757-231		6.01631238
757-232		6.08536679
757-23N		5.61862914
757-251		6.08862848
757-26D		5.90242444
757-2B7		5.92887728
757-2G7		6.37816545
757-2Q8		6.08611150
757-2S7		6.27718303
757-324		6.34802659
757-33N		6.38893997
757-351		6.61726846
767-201		5.58747775
767-223		7.25699046
767-224		6.47785174
767-2B7		5.50566748
767-322		7.12439193
767-323		7.48829121
767-324		6.39677479
767-332		6.01136097
767-33A		8.33291014
767-3CB		8.34960941
767-3G5		8.32383528
767-3P6		6.28681421
767-424ER		7.82712501
767-432ER		6.65655326
777-222		7.07345618
777-224		6.39500636
777-232		5.63552656
777-232LR		5.54514737
A-1B		7.47777770
A109E		7.46711458
A318-111		6.04423361
A319-111		6.11964510
A319-112		4.87062393
A319-114		5.56599585

A319-131		6.13089967
A319-132		5.83985075
A320-211		5.66497479
A320-212		5.78182969
A320-214		5.80944963
A320-231		5.87357212
A320-232		6.12900519
A321-211		6.20837310
A330-223		7.19813488
A330-323		7.45819045
AS 355F1		7.52326691
ATR 72-212		2.73799220
ATR-72-212		2.73057280
C90		5.72977006
CL-600-2B19		4.65866369
CL-600-2C10		5.14731761
CL600-2D24		4.69881964
DA 20-A1		6.44310222
DC-7BF		7.51643604
DC-9-31		4.31437263
DC-9-32		4.54482708
DC-9-41		4.15109328
DC-9-51		4.19736659
DC-9-82(MD-82)		5.71411409
DC-9-83(MD-83)		6.01276033
DHC-8-102		2.21289783
DHC-8-202		2.70823933
E-90		7.47215482
EMB-120		2.99991614
EMB-120ER		2.89337716
EMB-135ER		3.92278663
EMB-135KL		4.64341410
EMB-135LR		4.38972467
EMB-145		4.40944713
EMB-145EP		3.77987348
EMB-145LR		4.49770874
EMB-145XR		5.44425269
ERJ 190-100 IGW		4.55153074
EXEC 162F		5.61732857
F85P-1		6.57307498
FALCON XP		5.90986933
FALCON-XP		5.95919506
G-IV		7.48951840
HST-550		5.71123316
KITFOX IV		5.72691654
MD 83		6.02135289
MD-88		4.83169635
MD-90-30		5.62475021
OTTER DHC-3		6.01741290
PA-28-180		4.99265725
PA-31-350		5.98431425
PA-32R-300		5.70264955
PA-32RT-300		7.42477979
S-50A		5.72232349
S-76A		7.51061258
S55A		5.71044407
SAAB 340B		2.41822527
T210N		5.68815375
T337G		5.61930305
VANS AIRCRAFT RV6		5.74740807

165 rows in set (6 min 34.57 sec)

5. **SQL**: SELECT abs(round((A1.Longitude-A2.Longitude)/15)) as
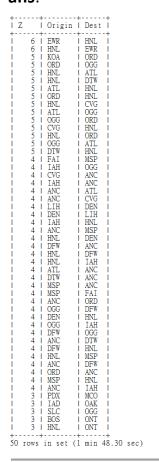   Z,O.Origin,O.Dest
   FROM airport A1,airport A2,(SELECT DISTINCT Origin,Dest FROM
   Ontime) as O
   WHERE O.Origin=A1.Iata AND O.Dest=A2.Iata

   ORDER BY Z DESC LIMIT 50;
time:1min 48.30sec
ans:

Z	Origin	Dest
6	EWR	HNL
6	HNL	EWR
5	KOA	ORD
5	ORD	OGG
5	HNL	ATL
5	HNL	DTW
5	ATL	HNL
5	ORD	HNL
5	HNL	CVG
5	ATL	OGG
5	OGG	ORD
5	CVG	HNL
5	HNL	ORD
5	OGG	ATL
5	DTW	HNL
4	FAI	MSP
4	IAH	OGG
4	CVG	ANC
4	IAH	ANC
4	ANC	ATL
4	ANC	CVG
4	LIH	DEN
4	DEN	LIH
4	IAH	HNL
4	ANC	MSP
4	HNL	DEN
4	DFW	ANC
4	HNL	DFW
4	HNL	IAH
4	ATL	ANC
4	DTW	ANC
4	MSP	ANC
4	MSP	FAI
4	ANC	ORD
4	OGG	DFW
4	DEN	HNL
4	OGG	IAH
4	DFW	OGG
4	ANC	DTW
4	DFW	HNL
4	HNL	MSP
4	ANC	DFW
4	ORD	ANC
4	MSP	HNL
4	ANC	IAH
3	PDX	MCO
3	IAD	OAK
3	SLC	OGG
3	BOS	ONT
3	HNL	ONT

50 rows in set (1 min 48.30 sec)

6. **SQL**: SELECT DISTINCT p.Model
   FROM(SELECT DISTINCT p2.Model FROM ontime s1, plane_data
       p2 WHERE s1.TailNum = p2.TailNum AND
       s1.Year != 2008)AS p
    WHERE p.model NOT IN
     (SELECT DISTINCT p1.model FROM ontime s, plane_data p1
      WHERE s.Tailnum = p1.Tailnum AND s.Year =2008);
time: 2min 45.35sec
ans: Empty set

7. **SQL**:SELECT DISTINCT P.Manufacturer
       FROM plane_data P,ontime O
       WHERE p.Tailnum=O.Tailnum
       GROUP BY P.Manufacturer
       HAVING AVG(O.ArrDelay)>30;
   time:4min 31.25sec
   ans:Empty set

---

8. **(1)**
   SQL:SELECT O.DayOfWeek,AVG(O.DepDelay)
       FROM ontime O
       GROUP BY O.DayOfWeek;
   time:1min 38.87sec
   ans:
   Monday,9.9567
   Tuesday,7.7625
   Wednesday,8.5909
   Thursday,10.4960
   Friday,11.4533

   Saturday,7.5284 → Best day

   Sunday,9.9867

(2)

SQL:SELECT Temp.hours, AVG(Temp. ArrDelay)
    FROM (SELECT (o.DepTime DIV 100)MOD 24 AS hours,
         o.ArrDelay FROM ontime o) AS Temp
    GROUP BY Temp.hours;

time:1min 27.65 sec

ans:

```
+-------+---------------------+
| hours | AVG(Temp. ArrDelay) |
+-------+---------------------+
|   01  |              8.0519 |
|   02  |             81.9936 |
|   03  |            103.0305 |
|   04  |            123.8330 |
|   05  |              4.3416 |
|   06  |             -5.4801 | => Best time
|   07  |             -2.7015 |
|   08  |             -0.9260 |
|   09  |              0.6111 |
|   10  |              2.3712 |
|   11  |              3.5362 |
|   12  |              4.3806 |
|   13  |              5.2808 |
|   14  |              6.6522 |
|   15  |              8.0505 |
|   16  |              9.5393 |
|   17  |             10.4627 |
|   18  |             11.2645 |
|   19  |             13.6344 |
|   20  |             15.6441 |
|   21  |             19.2466 |
|   22  |             22.5240 |
|   23  |             32.7163 |
|   24  |             45.4989 |
+-------+---------------------+
24 rows in set (1 min 27.65 sec)
```

9. **SQL**: SELECT O.Year-P.year,AVG(O.ArrDelay)
   FROM ontime O,plane_data P
   WHERE O.Year>=P.year AND O.TailNum=P.TailNum
   GROUP BY O.Year-P.year;

time:5min 41.81sec

ans:

```
+--------------+----------------+
| O.Year-P.year | AVG(O.ArrDelay) |
+--------------+----------------+
|            0 |         8.0793 |
|            1 |         7.3142 |
|            2 |         7.6349 |
|            3 |         7.7414 |
|            4 |         8.2949 |
|            5 |         8.3453 |
|            6 |         8.0105 |
|            7 |         7.9492 |
|            8 |         8.3566 |
|            9 |         8.4179 |
|           10 |         8.1416 |
|           11 |         8.2526 |
|           12 |         8.1291 |
|           13 |         9.0144 |
|           14 |         9.0326 |
|           15 |         8.8955 |
|           16 |         8.9918 |
|           17 |         8.9060 |
|           18 |         8.9447 |
|           19 |         9.1339 |
|           20 |         9.4034 |
|           21 |         9.1511 |
|           22 |         9.4683 |
|           23 |         9.3160 |
|           24 |         9.7061 |
|           25 |         9.4672 |
|           26 |         8.8054 |
|           27 |        11.6197 |
|           28 |         9.8767 |
|           29 |         9.2858 |
|           30 |         9.7788 |
|           31 |        10.4580 |
|           32 |        10.5374 |
|           33 |         8.7592 |
|           34 |         8.8549 |
|           35 |         5.8234 |
|           36 |         6.5474 |
|           37 |         6.8885 |
|           38 |         8.2750 |
|           39 |         9.9333 |
|           40 |         9.9413 |
|           41 |         8.3119 |
|           42 |         8.6611 |
|           43 |        10.5377 |
|           44 |        12.1632 |
|           45 |         8.5636 |
|           46 |         7.7605 |
|           47 |         8.5959 |
|           48 |         9.2737 |
|           49 |         8.1800 |
|           50 |         6.6139 |
|           51 |         5.4319 |
|           52 |        18.9513 |
|         2004 |         5.6570 |
|         2005 |         7.3148 |
|         2006 |         9.1909 |
|         2007 |        11.2360 |
|         2008 |         7.3118 |
+--------------+----------------+
58 rows in set (5 min 41.81 sec)
```

Older planes don't suffer more delays due on my own view.

10. SQL: SELECT AVG(O.WeatherDelay)
        FROM ontime O
        GROUP BY FLOOR((O.Month - 1)/3)
        ORDER BY FLOOR((O.Month - 1)/3);
    time: 1 min 42.12 sec
    ans:

    →1-3 月和 7-9 月的 weather delay 比 4-6 月和 10-12 月嚴重

```
+---------------------+
| AVG(O.WeatherDelay) |
+---------------------+
|              0.7286 |
|              0.6851 |
|              0.7211 |
|              0.6494 |
+---------------------+
```

12. SQL: SELECT COUNT(*)
        FROM ontime O
            WHERE O.CancellationCode='A';
    time:1min 43.49sec
    ans: 295471

    →2004-2008 年有 295471 班航班因為 carrier 而被取消