Dataset - https://data.cityofnewyork.us/browse?q=parking+tickets

Step 1: Create a table which stores the above downloaded dataset

Hive> create table parking\_violations\_issued

(

Summons\_Number bigint,

Plate\_ID string,

Registration\_State string,

Plate\_Type string,

Issue\_Date string,

Violation\_Code int,

Vehicle\_Body\_Type string,

Vehicle\_Make string,

Issuing\_Agency string,

Street\_Code1 int,

Street\_Code2 int,

Street\_Code3 int,

Vehicle\_Expiration Date,

Violation\_Location int,

Violation\_Precinct int,

Issuer\_Precinct int,

Issuer\_Code int,

Issuer\_Command string,

Issuer\_Squad string,

Violation\_Time string,

Time\_First\_Observed string,

Violation\_County string,

Violation\_In\_Front\_Of\_Or\_Opposite string,

House\_Number string,

Street\_Name string,

Intersecting\_Street string,

Date\_First\_Observed int,

Law\_Section int,

Sub\_Division string,

Violation\_Legal\_Code string,

Days\_Parking\_In\_Effect string,

From\_Hours\_In\_Effect string,

To\_Hours\_In\_Effect string,

Vehicle\_Color string,

Unregistered\_Vehicle int,

Vehicle\_Year string,

Meter\_Number string,

Feet\_From\_Curb int,

Violation\_Post\_Code string,

Violation\_Description string,

No\_Standing\_or\_Stopping\_Violation string,

Hydrant\_Violation string,

Double\_Parking\_Violation string

)

row format delimited

fields terminated by ','

tblproperties ("skip.header.line.count" = "1");

Step 2: Load the data into the above table, can be done from two places

a. From local:

load data local inpath'/home/cloudera/sidd/Challenge/mini\_project\_2/Parking\_Violations\_Issued\_-\_Fiscal\_Year\_2017.csv' into table parking\_violations\_issued;

b. From Hadoop:

> For that first put the data into the hadoop directory of your choice, the command for that is:

hdfs dfs -put /Users/thestupidmonk/Downloads/Parking\_Violations\_Issued\_-\_Fiscal\_Year\_2017.csv /data/

> Next perform the below query to load the data in the table:

load data inpath '/data/Parking\_Violations\_Issued\_-\_Fiscal\_Year\_2017.csv' into table parking\_violations\_issued;

Step 3: queries to check if the data is uploaded properly or not

select \* from parking\_violations\_issued limit 20;

Step 4: Extracting year from issue\_date

select year(from\_unixtime(unix\_timestamp(issue\_date,'mm/dd/yyyy'), 'yyyy-mm-dd')) as n\_year from parking\_violations\_issued limit 100;

Note: Consider only the year 2017 for analysis and not the Fiscal year.

for year 2017 only

Step 5: Creating table to store only the tickets issued in year 2017:

Hive> create table parking\_violations\_issued\_2017

(

Summons\_Number bigint,

Plate\_ID string,

Registration\_State string,

Plate\_Type string,

Issue\_Date string,

Violation\_Code int,

Vehicle\_Body\_Type string,

Vehicle\_Make string,

Issuing\_Agency string,

Street\_Code1 int,

Street\_Code2 int,

Street\_Code3 int,

Vehicle\_Expiration Date,

Violation\_Location int,

Violation\_Precinct int,

Issuer\_Precinct int,

Issuer\_Code int,

Issuer\_Command string,

Issuer\_Squad string,

Violation\_Time string,

Time\_First\_Observed string,

Violation\_In\_Front\_Of\_Or\_Opposite string,

House\_Number string,

Street\_Name string,

Intersecting\_Street string,

Date\_First\_Observed int,

Law\_Section int,

Sub\_Division string,

Violation\_Legal\_Code string,

Days\_Parking\_In\_Effect string,

From\_Hours\_In\_Effect string,

To\_Hours\_In\_Effect string,

Vehicle\_Color string,

Unregistered\_Vehicle int,

Vehicle\_Year string,

Meter\_Number string,

Feet\_From\_Curb int,

Violation\_Post\_Code string,

Violation\_Description string,

No\_Standing\_or\_Stopping\_Violation string,

Hydrant\_Violation string,

Double\_Parking\_Violation string

)

COMMENT 'A bucketed sorted parking\_violations\_issued\_2017'

partitioned by (Violation\_County string)

CLUSTERED BY (Violation\_Code) sorted by (Violation\_Code) INTO 8 BUCKETS

row format delimited

fields terminated by ','

tblproperties ("skip.header.line.count" = "1");

Step 6: To load data into partition and bucket table we need to set few properties to enable bucketing and

Dynamic partition

hive>set hive.exec.dynamic.partition=true;

hive>set hive.exec.dynamic.partition.mode=nonstrict;

hive>set hive.enforce.bucketing = true;

Step 7: Load data from parking\_violations\_issued to parking\_violations\_issued\_2017

Hive> insert into parking\_violations\_issued\_2017 partition(Violation\_County) select

Summons\_Number,

Plate\_ID,

Registration\_State,

Plate\_Type,

Issue\_Date,

Violation\_Code,

Vehicle\_Body\_Type,

Vehicle\_Make,

Issuing\_Agency,

Street\_Code1,

Street\_Code2,

Street\_Code3,

Vehicle\_Expiration,

Violation\_Location,

Violation\_Precinct,

Issuer\_Precinct,

Issuer\_Code,

Issuer\_Command,

Issuer\_Squad,

Violation\_Time,

Time\_First\_Observed,

Violation\_In\_Front\_Of\_Or\_Opposite,

House\_Number,

Street\_Name,

Intersecting\_Street,

Date\_First\_Observed,

Law\_Section,

Sub\_Division,

Violation\_Legal\_Code,

Days\_Parking\_In\_Effect,

From\_Hours\_In\_Effect,

To\_Hours\_In\_Effect,

Vehicle\_Color,

Unregistered\_Vehicle,

Vehicle\_Year,

Meter\_Number,

Feet\_From\_Curb,

Violation\_Post\_Code,

Violation\_Description,

No\_Standing\_or\_Stopping\_Violation,

Hydrant\_Violation,

Double\_Parking\_Violation,

Violation\_County

from parking\_violations\_issued where year(from\_unixtime(unix\_timestamp(issue\_date,'mm/dd/yyyy'), 'yyyy-mm-dd')) = 2017;

The analysis can be divided into two parts:

Part-I: Examine the data

1. Find the total number of tickets for the year.

Hive> select count(distinct summons\_number) No\_Tickets ,year(issue\_date) as year from parking\_violations\_issued\_2017 group by year(issue\_date);

> 539901

2. Find out how many unique states the cars which got parking tickets came from.

Hive> select count(distinct Registration\_State) as Reg\_state\_count from parking\_violations\_issued\_2017;

Hive> select distinct(Registration\_State) as Reg\_state from parking\_violations\_issued\_2017;

Hive> SELECT Registration\_State,Count(1) as Number\_of\_Records from parking\_violations\_issued\_2017 group by Registration\_State order by Number\_of\_Records;

3. Some parking tickets don’t have addresses on them, which is cause for concern. Find out how many such tickets there are(i.e. tickets where either "Street Code 1" or "Street Code 2" or "Street Code 3" is empty )

Hive> select count(distinct summons\_number) as No\_Tickets\_without\_address from parking\_violations\_issued where Street\_code1 = 0 or Street\_code2 = 0 or Street\_code3 = 0;

Part-II: Aggregation tasks

1. How often does each violation code occur? (frequency of violation codes - find the top 5)

Hive> select count(Violation\_Code) as frequency\_of\_violation,Violation\_Code from parking\_violations\_issued\_2017 group by Violation\_Code order by frequency\_of\_violation desc limit 5;

2. How often does each vehicle body type get a parking ticket? How about the vehicle make? (find the top 5 for both)

Hive> select Vehicle\_Body\_Type,count(summons\_number)as frequency\_of\_getting\_parking\_ticket from challenge.parking\_violations\_issued\_2017 group by Vehicle\_Body\_Type order by frequency\_of\_getting\_parking\_ticket desc limit 5; --done

Hive> select Vehicle\_make,count(summons\_number)as frequency\_of\_getting\_parking\_ticket from challenge.parking\_violations\_issued\_2017 group by Vehicle\_make order by frequency\_of\_getting\_parking\_ticket desc limit 5; --done

3. A precinct is a police station that has a certain zone of the city under its command. Find the (5 highest) frequencies of:

a. Violating Precincts (this is the precinct of the zone where the violation occurred)

hive> select Violation\_Precinct,count(\*) as IssuedTicket from challenge.parking\_violations\_issued group by Violation\_Precinct order by IssuedTicket desc limit 6;--correct

b. Issuer Precincts (this is the precinct that issued the ticket)

Hive> select Issuer\_Precinct,count(\*) as IssuedTicket from challenge.parking\_violations\_issued group by Issuer\_Precinct order by IssuedTicket desc limit 6;--correct

4. Find the violation code frequency across 3 precincts which have issued the most number of tickets - do these precinct zones have an exceptionally high frequency of certain violation codes?

select Issuer\_Precinct,Violation\_Code, count(\*) as TicketsIssued from challenge.parking\_violations\_issued\_2017 group by Issuer\_Precinct, Violation\_Code order by TicketsIssued desc limit 7;

We will not be considering 0. Therefore 18,19,14 are the three issuer precincts which have the maximum number of violations. Lets analyze the Issuer Precincts one by one.

--Issuer Precinct 18

select Violation\_Code, count(\*) as TicketsIssued from challenge.parking\_violations\_issued\_2017 where Issuer\_Precinct=18 group by Violation\_Code order by TicketsIssued desc limit 7;

--Issuer Precinct 19

select Violation\_Code, count(\*) as TicketsIssued from challenge.parking\_violations\_issued\_2017 where Issuer\_Precinct=19 group by Violation\_Code order by TicketsIssued desc limit 7;

--Issuer Precinct 14

Hive> select Violation\_Code, count(\*) as TicketsIssued from challenge.parking\_violations\_issued\_2017 where Issuer\_Precinct=14 group by Violation\_Code order by TicketsIssued desc limit 7;

--Common codes accross precincts

Hive> select Issuer\_Precinct,Violation\_Code, count(\*) as TicketsIssued from challenge.parking\_violations\_issued\_2017 where Issuer\_Precinct in (18,19,14)

group by Issuer\_Precinct,Violation\_Code order by TicketsIssued desc limit 10;

5. Find out the properties of parking violations across different times of the day: The Violation Time field is specified in a strange format. Find a way to make this into a time attribute that you can use to divide into groups.

Hive> select from\_unixtime(unix\_timestamp(regexp\_extract(violation\_time,'(.\*)[A-Z]',1),'HHmm'),"HH:mm") as date\_data from parking\_violations\_issued limit 2;--> converted to time format 01:43

Hive> select from\_unixtime(unix\_timestamp(concat(violation\_time,'M'), 'HHmmaaa'),"HH:mmaaa") as date\_data from parking\_violations\_issued limit 2;--> working 01:43AM

6. Divide 24 hours into 6 equal discrete bins of time. The intervals you choose are at your discretion. For each of these groups, find the 3 most commonly occurring violations

partitoned view :

hive> create view vw\_parking\_violations\_2017\_partitioned\_bins partitioned on (Violation\_Code) as

SELECT Summons\_Number, Violation\_Time, Issuer\_Precinct,

case

when substring(Violation\_Time,1,2) in ('00','01','02','03','12') and upper(substring(Violation\_Time,-1))='A' then 1

when substring(Violation\_Time,1,2) in ('04','05','06','07') and upper(substring(Violation\_Time,-1))='A' then 2

when substring(Violation\_Time,1,2) in ('08','09','10','11') and upper(substring(Violation\_Time,-1))='A' then 3

when substring(Violation\_Time,1,2) in ('12','00','01','02','03') and upper(substring(Violation\_Time,-1))='P' then 4

when substring(Violation\_Time,1,2) in ('04','05','06','07') and upper(substring(Violation\_Time,-1))='P' then 5

when substring(Violation\_Time,1,2) in ('08','09','10','11') and upper(substring(Violation\_Time,-1))='P'then 6

else null end as Violation\_Time\_bin,Violation\_Code

from parking\_violations\_issued\_2017

where Violation\_Time is not null or (length(Violation\_Time)=5 and upper(substring(Violation\_Time,-1))in ('A','P')

and substring(Violation\_Time,1,2) in ('00','01','02','03','04','05','06','07', '08','09','10','11','12'));

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bin1

select Violation\_Code,count(\*) TicketsIssued from vw\_parking\_violations\_2017\_partitioned\_bins where Violation\_Time\_bin == 1 group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_code

TicktesIssued

21

3660

40

2584

14

1574

bin2

select Violation\_Code,count(\*) TicketsIssued from vw\_parking\_violations\_2017\_partitioned\_bins where Violation\_Time\_bin == 2 group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_code

TicktesIssued

14

7250

40

6403

21

5669

bin3

select Violation\_Code,count(\*) TicketsIssued from vw\_parking\_violations\_2017\_partitioned\_bins where Violation\_Time\_bin == 3 group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_code

TicktesIssued

21

59465

36

37767

38

17587

bin4

select Violation\_Code,count(\*) TicketsIssued from vw\_parking\_violations\_2017\_partitioned\_bins where Violation\_Time\_bin == 4 group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_code

TicktesIssued

36

28600

38

23877

37

16777

bin5

select Violation\_Code,count(\*) TicketsIssued from vw\_parking\_violations\_2017\_partitioned\_bins where Violation\_Time\_bin == 5 group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_code

TicktesIssued

38

10148

14

7609

37

6944

bin6

select Violation\_Code,count(\*) TicketsIssued from vw\_parking\_violations\_2017\_partitioned\_bins where Violation\_Time\_bin == 6 group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_code

TicktesIssued

7

2602

40

2159

14

2091

7. Now, try another direction. For the 3 most commonly occurring violation codes, find the most common times of day (in terms of the bins from the previous part)

Hive> select Violation\_Time\_bin, count(\*) TicketsIssued from vw\_parking\_violations\_2017\_partitioned\_bins where Violation\_Code in (21, 37, 38,36)

group by Violation\_Time\_bin order by TicketsIssued desc limit 3;

Violation\_Time\_bin

TicketsIssued

3

116785

4

76701

5

18437

8. Let’s try and find some seasonality in this data

a. First, divide the year into some number of seasons, and find frequencies of tickets for each season. (Hint: A quick Google search reveals the following seasons in NYC: Spring(March, April, March); Summer(June, July, August); Fall(September, October, November); Winter(December, January, February))

Season Month interval

spring March, April, May

summer June, July, August

autumn September, October, November

winter December, January, February

normal view

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Hive> create view vw\_tickets\_issued\_2017\_bins as

select Violation\_Code , Issuer\_Precinct,

case

when MONTH(Issue\_Date) between 03 and 05 then 'spring'

when MONTH(Issue\_Date) between 06 and 08 then 'summer'

when MONTH(Issue\_Date) between 09 and 11 then 'autumn'

when MONTH(Issue\_Date) in (1,2,12) then 'winter'

else 'unknown' end as season from parking\_violations\_issued\_2017;

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partioned view :

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Hive> create view vw\_tickets\_issued\_2017\_partitioned\_bins partitioned on (Violation\_Code) as

select Issuer\_Precinct,

case

when MONTH(Issue\_Date) between 03 and 05 then 'spring'

when MONTH(Issue\_Date) between 06 and 08 then 'summer'

when MONTH(Issue\_Date) between 09 and 11 then 'autumn' select

when MONTH(Issue\_Date) in (1,2,12) then 'winter'

else 'unknown' end as season,Violation\_Code from parking\_violations\_issued\_2017;

Hive> select season, count(\*) as TicketsIssued from vw\_tickets\_issued\_2017\_partitioned\_bins group by season order by TicketsIssued desc;

Season

TicktesIssued

Spring

285875

Winter

169466

Summer

84560

autumn

0

b. Then, find the 3 most common violations for each of these seasons.

# spring season

select Violation\_Code, count(\*) as TicketsIssued from vw\_tickets\_issued\_2017\_partitioned\_bins where

season = 'spring' group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_Code

TicketsIssued

21

40045

36

34354

38

27001

# winter season

select Violation\_Code, count(\*) as TicketsIssued from vw\_tickets\_issued\_2017\_partitioned\_bins where

season = 'winter' group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_Code

TicketsIssued

21

23684

36

22084

38

18450

# summer season

select Violation\_Code, count(\*) as TicketsIssued from vw\_tickets\_issued\_2017\_partitioned\_bins where

season = 'summer' group by Violation\_Code order by TicketsIssued desc limit 3;

Violation\_Code

TicketsIssued

21

12565

36

9655

38

8331

# autumn season

select Violation\_Code, count(\*) as TicketsIssued from vw\_tickets\_issued\_2017\_partitioned\_bins where

season = 'autumn' group by Violation\_Code order by TicketsIssued desc limit 3;