

Q4. CCM and CQL commands to create a cluster, a keyspace and the tables

a-1).Create a cluster

```
ccm create -n 6 swen432a1
```

a-2).Create a keyspace

```
CREATE KEYSPACE IF NOT EXISTS tranzmetro WITH REPLICATION={ 'class': 'SimpleStrategy',  
'replication_factor':3};
```

b).Create tables

- **driver table [Q3-1]**

```
CREATE TABLE driver (  
    driver_name text,  
    password text,  
    mobile text,  
    current_position text,  
    skills set<text>,  
    PRIMARY KEY (driver_name));
```

```
CREATE INDEX driver_current_position_idx ON tranzmetro.driver  
(current_position);
```

- **vehicle table[Q3-2]**

```
CREATE TABLE vehicle (  
    vehicle_id text,  
    status text,  
    type text,  
    PRIMARY KEY (vehicle_id));
```

```
CREATE INDEX vehicle_status_idx ON tranzmetro.vehicle (status);
```

- **vehicle distance table[Q3-3]**

```
CREATE TABLE vehicle_distance (  
    vehicle_id text,  
    date int,  
    daily_distance double,  
    total_distance double static,  
    PRIMARY KEY (vehicle_id, date));
```

- **timetable[Q3-4]**
 CREATE TABLE time_table (
 line_name text,
 service_no int,
 latitude double,
 station_name text,
 time int,
 distance double,
 PRIMARY KEY ((line_name, service_no),latitude, time));
- **departure station timetable[Q3-5]**
 CREATE TABLE dept_stat_time_table (
 line_name text,
 service_no int,
 dept_stat_name text,
 time int,
 PRIMARY KEY ((line_name, service_no), time))
 WITH CLUSTERING ORDER BY (time DESC);
- **data point table [Q3-6]**
 CREATE TABLE data_point (
 line_name text,
 service_no int,
 day int,
 sequence timestamp,
 latitude double,
 longitude double,
 speed double,
 PRIMARY KEY ((line_name, service_no, day), sequence))
 WITH CLUSTERING ORDER BY (sequence DESC)
 AND COMPACTION = {'class':'LeveledCompactionStrategy'};
- **driver attendance table [Q3-7]**
 CREATE TABLE driver_attendance (
 driver_name text,
 month int,
 monthly_days counter,
 PRIMARY KEY (driver_name, month));

Q5. CQL statements to support each of the application write and update requests

1) Insert new data into each table

- **Insert new data into driver table**
consistency;
Insert into driver(driver_name,current_position,mobile,password,skills)
values('Jane','Waikanae','213141','jjjj',{'Matangi'});
Insert into driver(driver_name,current_position,mobile,password,skills)
values('Milan','Upper Hutt','211111','jjjj1',{'Matangi'});
Insert into driver(driver_name,current_position,mobile,password,skills)
values('Pavle','Upper Hutt','213344','jjjj2',{'Ganz Mavag,Guliver'});
- **Insert new data into vehicle table**
consistency;
Insert into vehicle(vehicle_id,status,type) values('FA1122','Upper
Hutt','Matangi');
Insert into vehicle(vehicle_id,status,type)
values('FP8899','Wellington','Ganz Mavag');
Insert into vehicle(vehicle_id,status,type)
values('FA4864','Wellington','Matangi');
Insert into vehicle(vehicle_id,status,type)
values('KW3300','Wellington','Matangi');
Insert into vehicle(vehicle_id,status,type) values('FA8899','Lower
Hutt','Gulliver');
- **Insert new data into vehicle distance table**
consistency;
Insert into vehicle_distance(vehicle_id,date,daily_distance,
total_distance) values('FA8899',20170328,200,2362.2);
Insert into vehicle_distance(vehicle_id,date,daily_distance,
total_distance) values('KW3300',20170401,200,2362.2);
Insert into vehicle_distance(vehicle_id,date,daily_distance,
total_distance) values('KW3300',20170402,200,2562.2);

- **Insert new data into timetable**

consistency;

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',1,-41.2865,0605,0,'Wellington');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',1,-41.2227,0617,8.3,'Petone');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',1,-41.2092,0625,11,'Waterloo');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',1,-41.1798,0634,19,'Taita');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',1,-41.1539,0642,26.5,'Silverstream');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',1,-41.1244,0650,34.3,'UpperHutt');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',11,-41.2865,1935,0,'Wellington');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',11,-41.2227,1947,8.3,'Petone');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',11,-41.2092,1955,11,'Waterloo');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',11,-41.1798,2010,19,'Taita');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',11,-41.1539,2019,26.5,'Silverstream');
```

insert into

```
time_table(line_name,service_no,latitude,time,distance,station_name)
values ('Hutt_Vale_Line',11,-41.1244,2025,34.3,'UpperHutt');
```


- **Insert new data into departure stations timetable**
consistency;
insert into
dept_stat_time_table(line_name,service_no,time,dept_stat_name)
values ('Hutt_Vale_Line',1,0605,'Wellington');
insert into
dept_stat_time_table(line_name,service_no,time,dept_stat_name)
values ('Hutt_Vale_Line',5,1025,'Wellington');
insert into
dept_stat_time_table(line_name,service_no,time,dept_stat_name)
values ('Hutt_Vale_Line',11,1935,'Wellington');
- **Insert new data into data point table**
consistency;
insert into
data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',1,20170403,'2017-04-03 10:47:50',-41.2202,174.98,29.8);
insert into
data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',1,20170403,'2017-04-03 10:37:50',-41.2262,174.77,29.1);
insert into
data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',5,20170403,'2017-04-03 10:49:50',-41.1251,174.99,32.1);
insert into
data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',5,20170403,'2017-04-03 10:39:50',-41.1213,175,31);

2) Write or update table for each request

- **Change driver's password by driver_name. [Q1)-1]]**
consistency;
update driver set password = 'Jane new password' where driver_name='Jane';
update driver set password = 'Milan new password' where driver_name='Milan';
update driver set password = 'Pavle new password' where driver_name='Pavle';
- **Update driver's current_position by station's name or vehicle's ID or 'not_available'. [Q1)-2]]**
consistency;
update driver set current_position = 'Wellington' where driver_name='Jane';
update driver set current_position = 'FP8899' where driver_name='Milan';
update driver set current_position = 'not_available' where driver_name='Pavle';
- **Update driver's skills. [Q1)-3]]**
consistency;
update driver set skills = skills + {'Kiwi Rail'} where driver_name='Jane';
update driver set skills = skills + {'Ganz Mavag'} where driver_name='Milan';
update driver set skills = skills + {'Matangi'} where driver_name='Pavle';
- **Update vehicle 's status by the station name or 'in use' or 'maintenance' or 'out_of_order'. [Q1)-4]]**
consistency;
update vehicle set status = 'Wellington' where vehicle_id='KW3300';
update vehicle set status = 'in_use' where vehicle_id='FA8899';
update vehicle set status = 'out_of_order' where vehicle_id='FA4864';
update vehicle set status = 'maintenance' where vehicle_id='FP8899';

- Update vehicle 's daily distance and total distance.[Q1)-5]]**
 consistency;
 update vehicle_distance set daily_distance = 34.5, total_distance = 2396.7 where vehicle_id='FA8899' and date=20170403;
 update vehicle_distance set daily_distance = 100, total_distance = 2496.7 where vehicle_id='FA8899' and date=20170402;
 update vehicle_distance set daily_distance = 200, total_distance = 2696.7 where vehicle_id='FA8899' and date=20170401;
- Record data point information.[Q1)-6]]**
 consistency;
 insert into
 data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',1,20170403,'2017-04-03 10:57:50',-41.2154,174.98,29.8);
 insert into
 data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',1,20170403,'2017-04-03 11:07:50',-41.2103,174.77,29.1);
 insert into
 data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',5,20170403,'2017-04-03 10:59:50',-41.1293,174.99,32.1);
 insert into
 data_point(line_name,service_no,day,sequence,latitude,longitude,speed) values ('Hutt_Vale_Line',5,20170403,'2017-04-03 11:09:50',-41.1342,175,31.8);
- Record the number of days per month a driver registered.[Q1)-7]]**
 consistency;
 update driver_attendance set monthly_days = monthly_days + 19 where driver_name='Jane' and month=201702;
 update driver_attendance set monthly_days = monthly_days + 20 where driver_name='Jane' and month=201703;
 update driver_attendance set monthly_days = monthly_days + 1 where driver_name='Jane' and month=201704;

Q6. CQL statements to support each of the application read requests and the result

1) Get password by driver name, in order to check whether the old password is right or perform authentication. [Q2-1)]

```
consistency QUORUM;  
consistency;  
select password from driver where driver_name = 'Jane';
```

Results:

password

Jane new password

2) Publish a time table for passengers.[Q2-2)]

```
consistency ONE;  
consistency;  
select line_name, service_no, station_name, time from time_table  
where line_name = 'Hutt_Vale_Line' ALLOW FILTERING;
```

Results:

line_name | service_no | station_name | time

-----+-----+-----+-----

Hutt_Vale_Line	1	Wellington	605
Hutt_Vale_Line	1	Petone	617
Hutt_Vale_Line	1	Waterloo	625
Hutt_Vale_Line	1	Taita	634
Hutt_Vale_Line	1	Silverstream	642
Hutt_Vale_Line	1	UpperHutt	650
Hutt_Vale_Line	11	Wellington	1935
Hutt_Vale_Line	11	Petone	1947
Hutt_Vale_Line	11	Waterloo	1955
Hutt_Vale_Line	11	Taita	2010
Hutt_Vale_Line	11	Silverstream	2019
Hutt_Vale_Line	11	UpperHutt	2025

3) Get a service due to be dispatched next.[Q2-3)]

```
consistency ONE;
consistency;
select line_name, service_no, dept_stat_name, time from
dept_stat_time_table where time > 0735 LIMIT 1 ALLOW FILTERING;
```

Results:

line_name	service_no	dept_stat_name	time
Hutt_Vale_Line	5	Wellington	1025

4) Find an available vehicle at the departure station.[Q2-4)]

```
consistency QUORUM;
consistency;
select vehicle_id, type from vehicle where status = 'Wellington' LIMIT 1;
```

Results:

vehicle_id	type
KW3300	Matangi

5) Find an available driver having the needed skill at the departure station.[Q2-5)]

```
consistency QUORUM;
consistency;
select driver_name, mobile from driver where skills CONTAINS 'Kiwi Rail'
and current_position = 'Wellington' LIMIT 1 ALLOW FILTERING;
```

Results:

driver_name	mobile
Jane	213141

6) Find the last data point for a service on a day [Q2-6]

consistency ONE;

consistency;

select line_name, service_no, latitude, speed from data_point where
line_name='Hutt_Vale_Line' and service_no=1 and day=20170403;

Results:

line_name	service_no	latitude	speed
Hutt_Vale_Line	1	-41.2103	29.1
Hutt_Vale_Line	1	-41.2154	29.8
Hutt_Vale_Line	1	-41.2202	29.8
Hutt_Vale_Line	1	-41.2262	29.1

7) Find the data point for a service on a day in a time interval [Q2-7]

consistency ONE;

consistency;

select line_name, service_no, latitude, speed from data_point where
line_name='Hutt_Vale_Line' and service_no=1 and day=20170403 and
sequence < '2017-04-03 10:47:51' and sequence > '2017-04-03 10:37:49';

Results:

line_name	service_no	latitude	speed
Hutt_Vale_Line	1	-41.2202	29.8
Hutt_Vale_Line	1	-41.2262	29.1

8) For a given data point find the closest stations in south. [Q2-8]

consistency ONE;

consistency;

select station_name, latitude, distance, time from time_table where
line_name='Hutt_Vale_Line' and service_no=1 and latitude < -41.19
ORDER BY latitude DESC LIMIT 1;

Results:

station_name	latitude	distance	time
--------------	----------	----------	------

Waterloo	-41.2092	11	625

9) For a given data point find the closest stations in the north.[Q2-9]]

consistency ONE;

consistency;

select station_name, latitude, distance, time from time_table where
line_name='Hutt_Vale_Line' and service_no=1 and latitude > -41.19
LIMIT 1;

Results:

station_name	latitude	distance	time
--------------	----------	----------	------

Taita	-41.1798	19	634
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10) Get a daily and total distance travelled for each vehicle. [Q2-10]]

consistency ONE;

consistency;

select vehicle_id, date, daily_distance, total_distance from
vehicle_distance where vehicle_id='FA8899' and date=20170403;

Results:

vehicle_id	date	daily_distance	total_distance
------------	------	----------------	----------------

FA8899	20170403	34.5	2696.7
--------	----------	------	--------

11) Get total distance travelled for a vehicle. [Q2-11]]

consistency ONE;

consistency;

select vehicle_id, date, total_distance from vehicle_distance where
vehicle_id='FA8899' LIMIT 1;

Results:

vehicle_id	date	total_distance
------------	------	----------------

FA8899	20170328	2696.7
--------	----------	--------

12) Record the number of days per month a driver registered.[Q2-12)]

consistency ONE;

consistency;

select driver_name, month, monthly_days from driver_attendance
where driver_name='Jane' and month=201703;

Results:

driver_name | month | monthly_days

-----+-----+-----
Jane | 201703 | 20