VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT
on

Database Management Systems (23CS3PCDBM)

Submitted by

Sushanth C (1WA23CS001)

in partial fulfilment for the award of the degree of
BACHELOR OF ENGINEERING
in
COMPUTER SCIENCE AND ENGINEERING

B.M.S. COLLEGE OF ENGINEERING
(Autonomous Institution under VTU)
BENGALURU-560019
Sep-2024 to Jan-2025

B.M.S. College of Engineering,

Bull Temple Road, Bangalore 560019

(Affiliated To Visvesvaraya Technological University, Belgaum)

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the Lab work entitled “Database Management Systems (23CS3PCDBM)” carried out by **TARUN S SUNADOLI (1WA23CS015),** who is a bonafide student of **B.M.S. College of Engineering.** It is in partial fulfilment for the award of **Bachelor of Engineering in Computer Science and Engineering** of the Visvesvaraya Technological University, Belgaum. The Lab report has been approved as it satisfies the academic requirements in respect of a Database Management Systems (23CS3PCDBM) work prescribed for the said degree.

Rashmi H Assistant Professor Department of CSE, BMSCE	Dr. Kavitha Sooda Professor & HOD Department of CSE, BMSCE

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Insurance Database

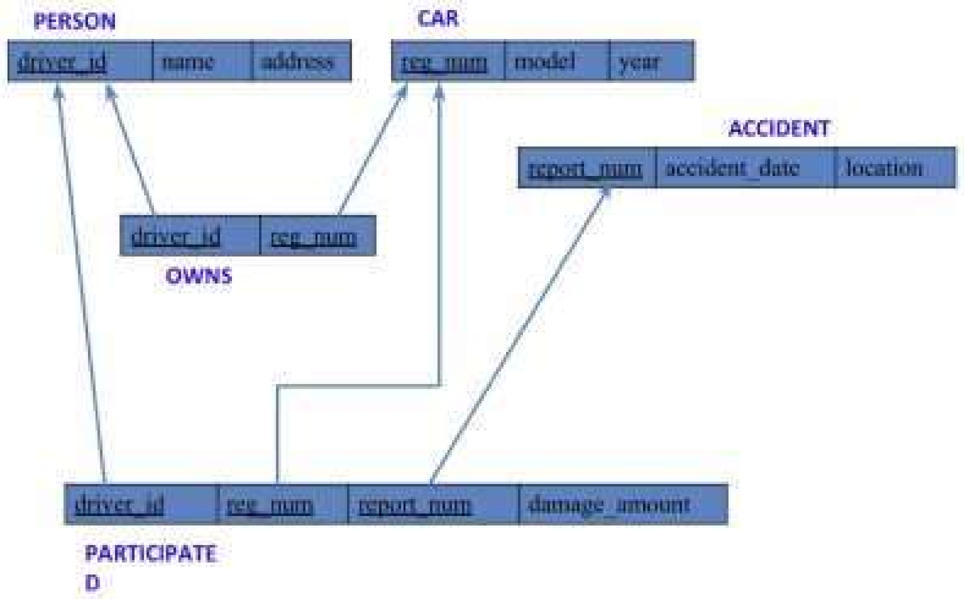
Question

(Week 1)

- PERSON (driver_id: String, name: String, address: String)
- CAR (reg_num: String, model: String, year: int)
- ACCIDENT (report_num: int, accident_date: date, location: String)
- OWNS (driver_id: String, reg_num: String)
- PARTICIPATED (driver_id: String,reg_num: String, report_num: int, damage_amount: int)

- Create the above tables by properly specifying the primary keys and the foreign keys. - Enter at least five tuples for each relation
- Display Accident date and location
- Update the damage amount to 25000 for the car with a specific reg_num (example 'K A031181') for which the accident report number was 12.
- Add a new accident to the database.
- To Do
- Display Accident date and location
- Display driver_id who did accident with damage amount greater than or equal to Rs.25000

Schema Diagram



Create database

create database insurance_204;
use insurance_204;

Create table

create database insurance_204;
use insurance_204;
create table person_204(
driver_id varchar(3) primary **key**,
name varchar(20) **not null**,
address varchar(100)
);

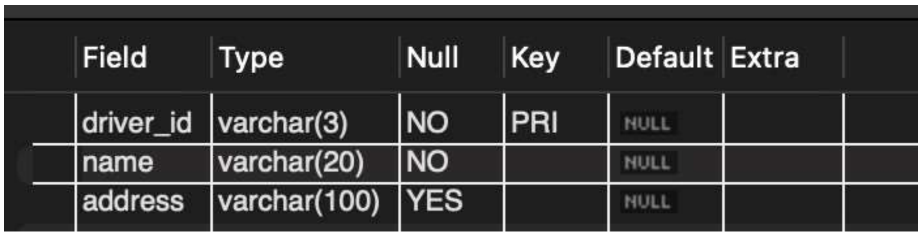
create table car_204(
reg_no char(8) primary **key**,
model varchar(20),
year int(4) **not null**
);

create table accident_204(
report_no int(4) primary **key**,
accident_date date,
location varchar(100)
);

```
create table owns_204(
            driver_id varchar(3),
            reg_no char(8),
            foreign key(driver_id) references person_204(driver_id),
    foreign key(reg_no) references car_204(reg_no)
);

create table participated_204(
            driver_id varchar(3),
    reg_no char(8),
    report_no int(4),
    damage_amt int,
    foreign key(driver_id) references person_204(driver_id),
    foreign key(reg_no) references car_204(reg_no),
    foreign key (report_no) references accident_204(report_no)
);
```

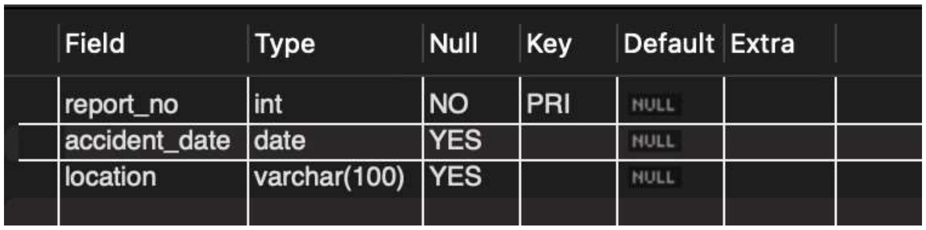
Structure of the table

desc person_204;



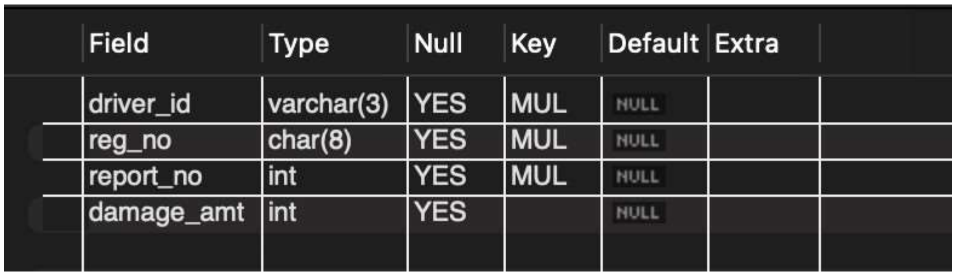
Field	Type	Null	Key	Default	Extra
driver_id	varchar(3)	NO	PRI	NULL	
name	varchar(20)	NO		NULL	
address	varchar(100)	YES		NULL	

desc accident_204;



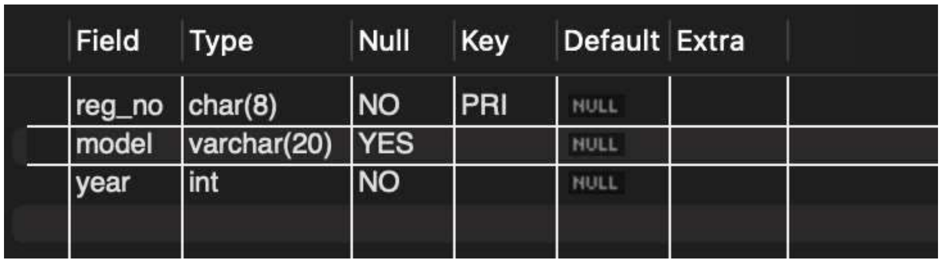
Field	Type	Null	Key	Default	Extra
report_no	int	NO	PRI	NULL	
accident_date	date	YES		NULL	
location	varchar(100)	YES		NULL	

desc participated_204;



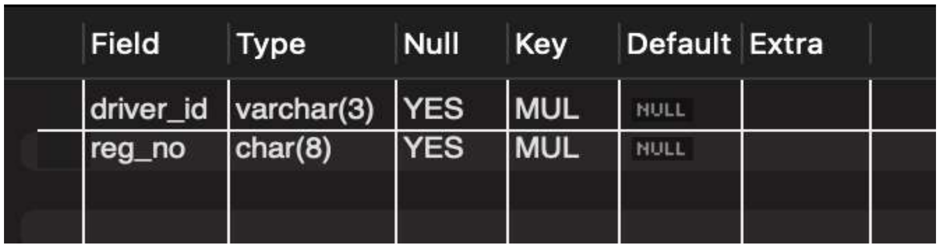
Field	Type	Null	Key	Default	Extra
driver_id	varchar(3)	YES	MUL	NULL	
reg_no	char(8)	YES	MUL	NULL	
report_no	int	YES	MUL	NULL	
damage_amt	int	YES		NULL	

desc car_204;



Field	Type	Null	Key	Default	Extra
reg_no	char(8)	NO	PRI	NULL	
model	varchar(20)	YES		NULL	
year	int	NO		NULL	

desc owns_204;



Field	Type	Null	Key	Default	Extra
driver_id	varchar(3)	YES	MUL	NULL	
reg_no	char(8)	YES	MUL	NULL	

Inserting Values into the table

```
insert into person_204 values
            ("A01", "Richard", "Sri Nagar"),
            ("A02", "Pradeep", "Raj Nagar"),
   ("A03", "Smith", "Ashok Nagar"),
   ("A04", "Venu", "N R Colony"),
   ("A05", "John", "Hanu Nagar");
```

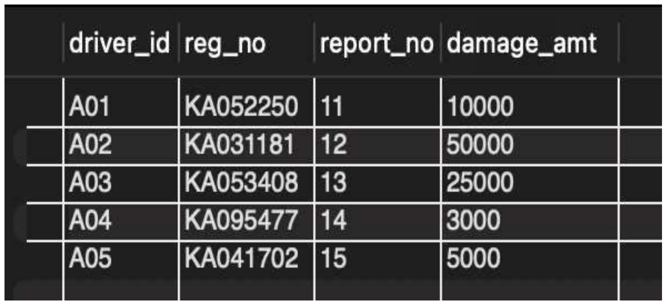
```
insert into car_204 values
            ("KA052250", "Indica", 1990),
   ("KA031181", "Lancer", 1957),
   ("KA095477", "Toyota", 1998),
   ("KA053408", "Honda", 2008),
   ("KA041702", "Audi", 2005);
```

```
insert into owns_204 values
("A01", "KA052250");
insert into owns_204 values
("A02", "KA031181");
insert into owns_204 values
("A03", "KA095477");
insert into owns_204 values
("A04", "KA053408");
insert into owns_204 values
("A05", "KA041702");
```

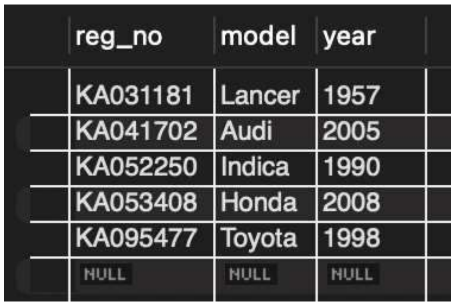
```
insert into accident_204 values
            (11, "01-01-03", "Mysore Rd"),
   (12, "02-02-04", "SE Circle"),
   (13, "21-01-03", "Bull Temple Rd"),
   (14, "17-02-08", "Mysore Rd"),
   (15, "04-03-05", "KR Puram");
```

```
insert into participated_204 values
            ("A01", "KA052250", 11, 10000), ("A02", "KA031181", 12, 50000),
   ("A03", "KA053408", 13, 25000),
   ("A04", "KA095477", 14, 3000),
   ("A05", "KA041702", 15, 5000);
```

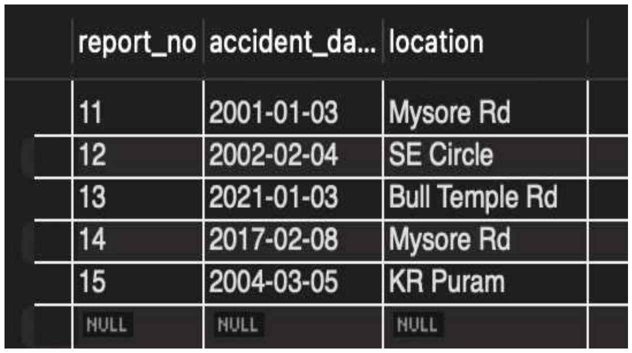
select * **from** person_204;
select * **from** car_204;
select * **from** accident_204;
select * **from** owns_204;
select * **from** participated_204;



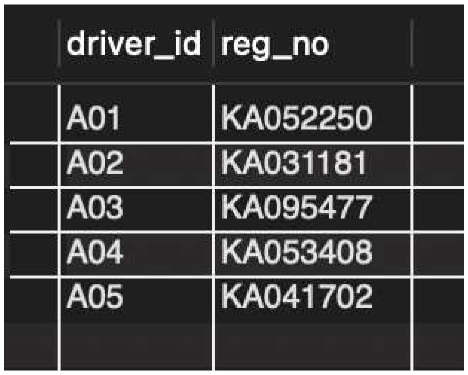
driver_id	reg_no	report_no	damage_amt
A01	KA052250	11	10000
A02	KA031181	12	50000
A03	KA053408	13	25000
A04	KA095477	14	3000
A05	KA041702	15	5000



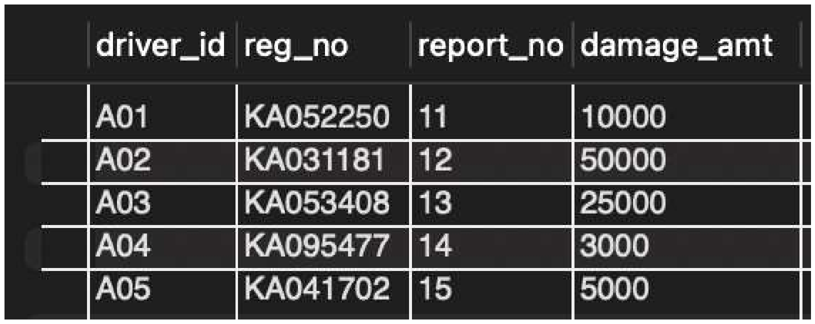
reg_no	model	year
KA031181	Lancer	1957
KA041702	Audi	2005
KA052250	Indica	1990
KA053408	Honda	2008
KA095477	Toyota	1998
NULL	NULL	NULL



report_no	accident_da...	location
11	2001-01-03	Mysore Rd
12	2002-02-04	SE Circle
13	2021-01-03	Bull Temple Rd
14	2017-02-08	Mysore Rd
15	2004-03-05	KR Puram
NULL	NULL	NULL



driver_id	reg_no
A01	KA052250
A02	KA031181
A03	KA095477
A04	KA053408
A05	KA041702

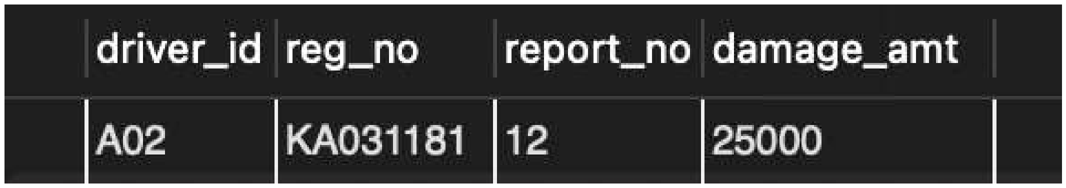


driver_id	reg_no	report_no	damage_amt
A01	KA052250	11	10000
A02	KA031181	12	50000
A03	KA053408	13	25000
A04	KA095477	14	3000
A05	KA041702	15	5000

Queries

- **Update the damage amount to 25000 for the car with a specific reg-num (example 'KA031181') for which the accident report number was 12.**

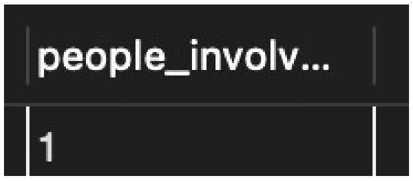
update participated_204 **set** damage_amt = 25000 **where** reg_no = **"KA031181"** **and** report_no = 12;



driver_id	reg_no	report_no	damage_amt
A02	KA031181	12	25000

- **Find the total number of people who owned cars that were involved in accidents in 2008.**

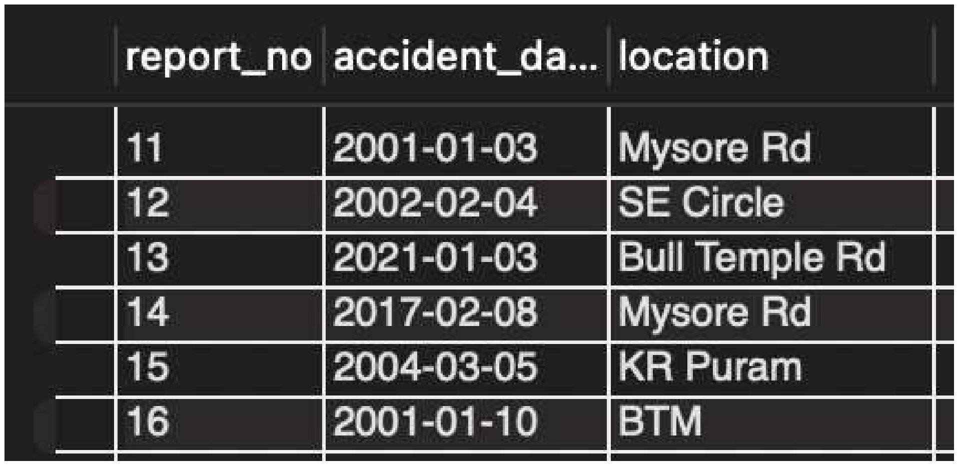
select **count**(driver_id) people_involved **from** participated_204, accident_204 **where** participated_204.report_no = accident_204.report_no **and** accident_204.accident_date **like** **"%-08"**;



people_involv...
1

- **Add a new accident to the database.**

insert into accident_204 **values** (16, **"01-01-10"**, **"BTM"**);
select * **from** accident_204;

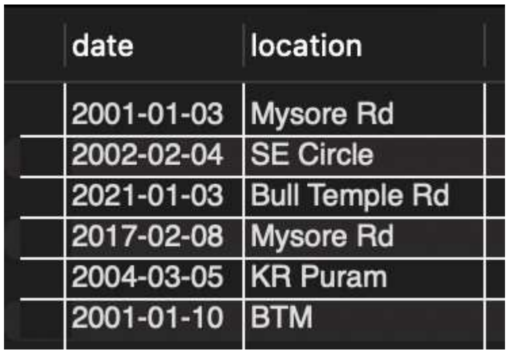


report_no	accident_da...	location
11	2001-01-03	Mysore Rd
12	2002-02-04	SE Circle
13	2021-01-03	Bull Temple Rd
14	2017-02-08	Mysore Rd
15	2004-03-05	KR Puram
16	2001-01-10	BTM

<u>TO DO:</u>

- **DISPLAY ACCIDENT DATE AND LOCATION**

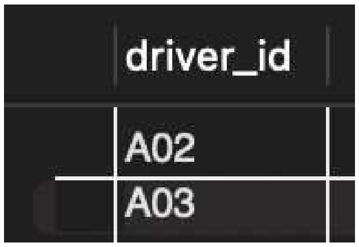
select accident_date **as** date, location **from** accident_204;



date	location
2001-01-03	Mysore Rd
2002-02-04	SE Circle
2021-01-03	Bull Temple Rd
2017-02-08	Mysore Rd
2004-03-05	KR Puram
2001-01-10	BTM

- **DISPLAY DRIVER ID WHO DID ACCIDENT WITH DAMAGE AMOUNT GREATER THAN OR EQUAL TO RS.25000**

select participated_204.driver_id **as** driver_id **from** accident_204, participated_204 **where** accident_204.report_no = participated_204.report_no **and** participated_204.damage_amt >= 25000;



driver_id
A02
A03

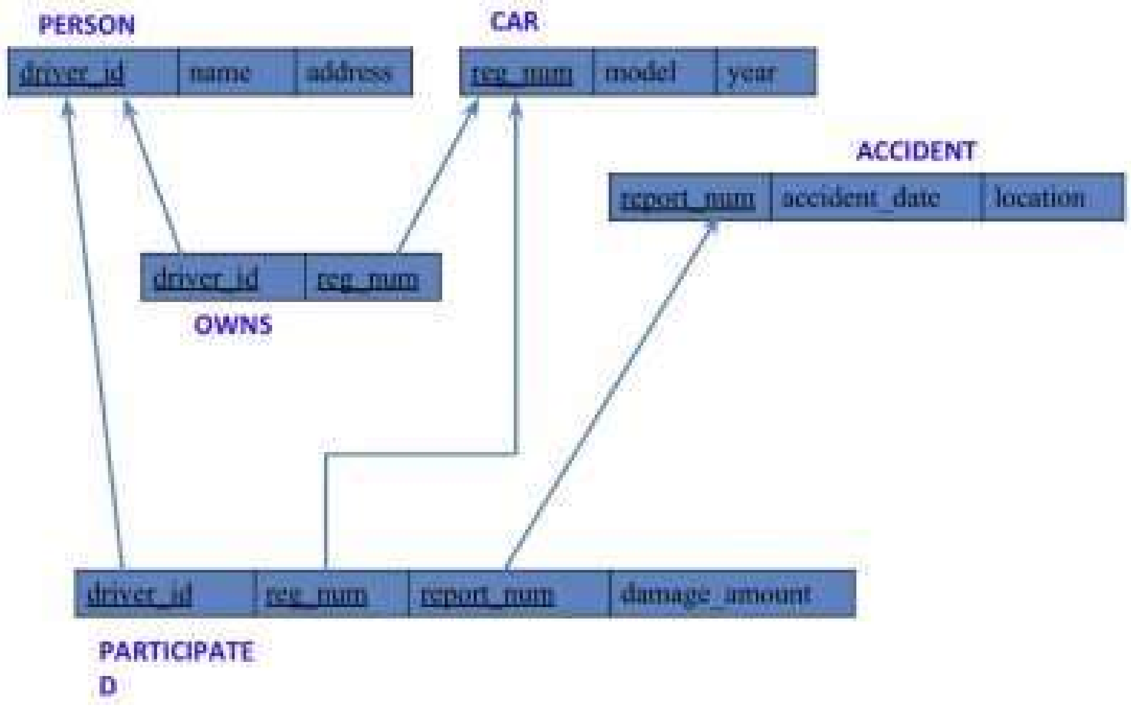
More Queries on Insurance Database

Question

(Week 2)

- PERSON (driver_id: String, name: String, address: String)
- CAR (reg_num: String, model: String, year: int)
- ACCIDENT (report_num: int, accident_date: date, location: String)
- OWNS (driver_id: String, reg_num: String)
- PARTICIPATED (driver_id: String,reg_num: String, report_num: int, damage_amount: int)
- Display the entire CAR relation in the ascending order of manufacturing year.
- Find the number of accidents in which cars belonging to a specific model (example 'Lancer') were involved.
- Find the total number of people who owned cars that were involved in accidents in 2008.

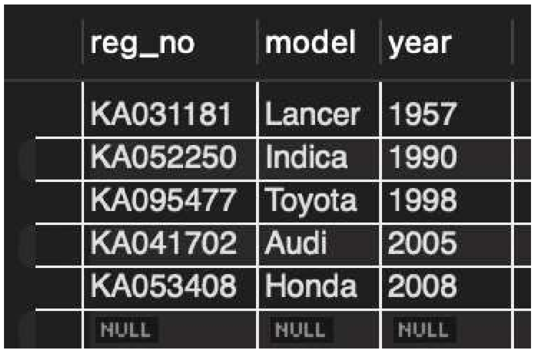
Schema Diagram



Queries

- **Display the entire CAR relation in the ascending order of manufacturing year.**

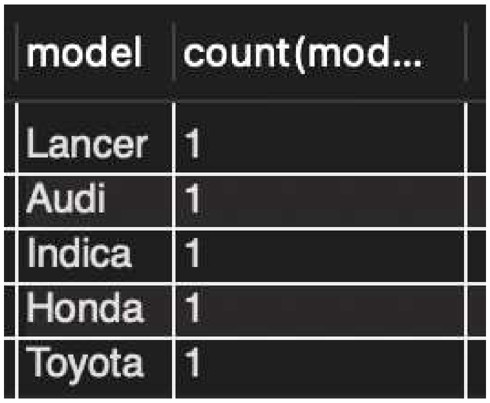
select * from car_204 order by year asc;



reg_no	model	year
KA031181	Lancer	1957
KA052250	Indica	1990
KA095477	Toyota	1998
KA041702	Audi	2005
KA053408	Honda	2008
NULL	NULL	NULL

- **Find the number of accidents in which cars belonging to a specific model (example 'Lancer') were involved.**

select model, **count**(**model**) **from** participated_204, car_204 **where** participated_204.reg_no = car_204.reg_no **group by model**;

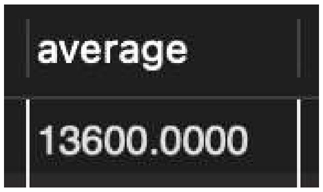


model	count(mod...
Lancer	1
Audi	1
Indica	1
Honda	1
Toyota	1

<u>TO DO:</u>

- **FIND THE AVERAGE DAMAGE AMOUNT**

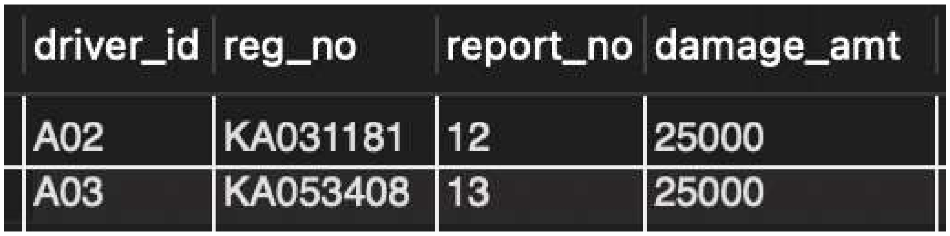
select avg(damage_amt) **as** average **from** participated_204;



average
13600.0000

- **DELETE THE TUPLE WHOSE DAMAGE AMOUNT IS BELOW THE AVERAGE DAMAGE AMOUNT**

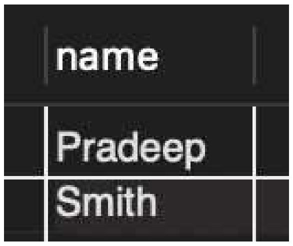
delete from participated_204 **where** damage_amt < (**select** * **from** (**select avg**(damage_amt) **from** participated_204) **as** average);



driver_id	reg_no	report_no	damage_amt
A02	KA031181	12	25000
A03	KA053408	13	25000

● **LIST THE NAME OF DRIVERS WHOSE DAMAGE IS GREATER THAN THE AVERAGE DAMAGE AMOUNT.**

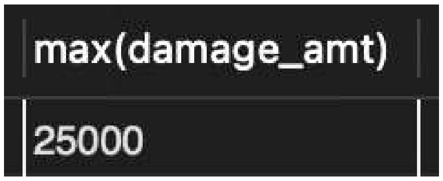
select name from person_204, participated_204 **where** person_204.driver_id = participated_204.driver_id **and** participated_204.damage_amt > (**select avg**(damage_amt) **from** participated_204);



name
Pradeep
Smith

● **FIND MAXIMUM DAMAGE AMOUNT.**

select max(damage_amt) **from** participated_204;



max(damage_amt)
25000

Bank Database

Question

(Week 3)

- Branch (branch-name: String, branch-city: String, assets: real)

- BankAccount(accno: int, branch-name: String, balance: real)

- BankCustomer (customer-name: String, customer-street: String, customer-city: String) - Depositer(customer-name: String, accno: int)

- LOAN (loan-number: int, branch-name: String, amount: real)

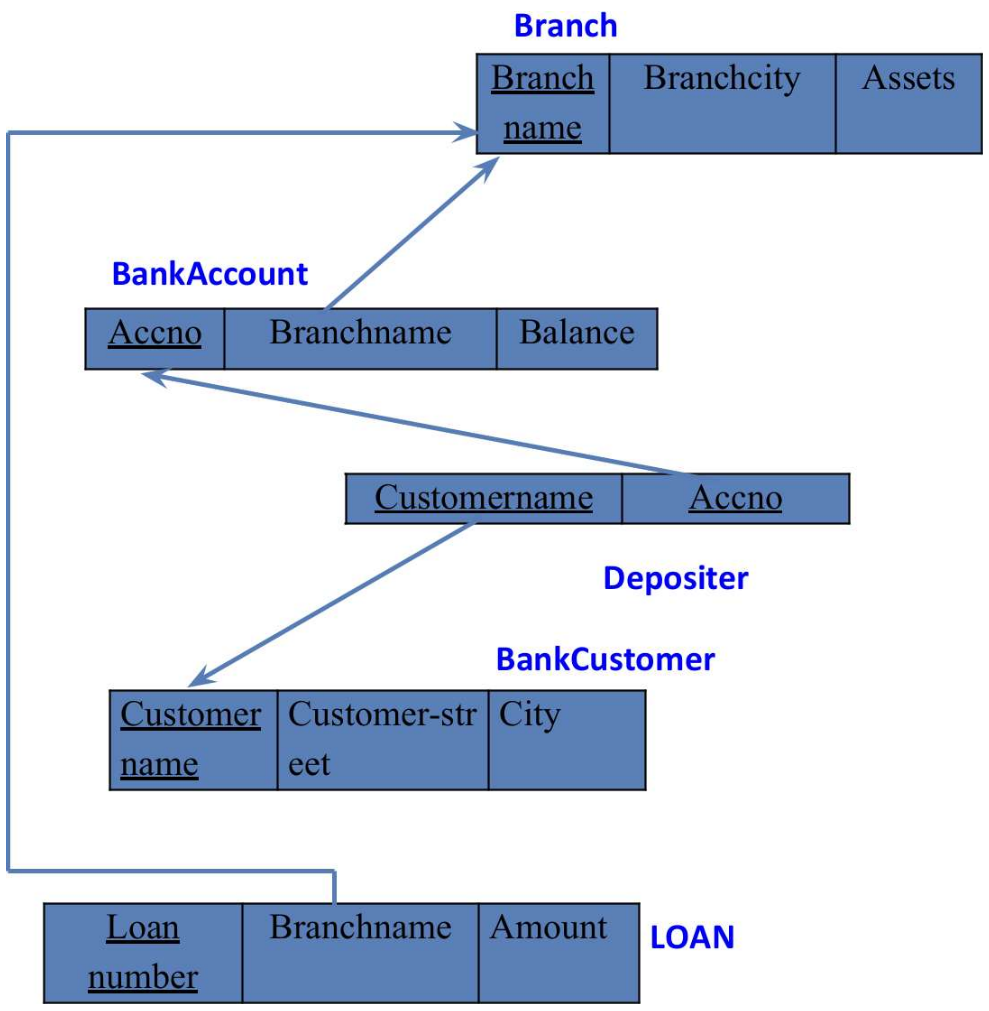
- Create the above tables by properly specifying the primary keys and the foreign keys. - Enter at least five tuples for each relation.

- Display the branch name and assets from all branches in lakhs of rupees and rename the assets column to 'assets in lakhs'.

- Find all the customers who have at least two accounts at the same branch (ex. SBI_ResidencyRoad).

- Create a view which gives each branch the sum of the amount of all the loans at the branch.

Schema Diagram



Create database

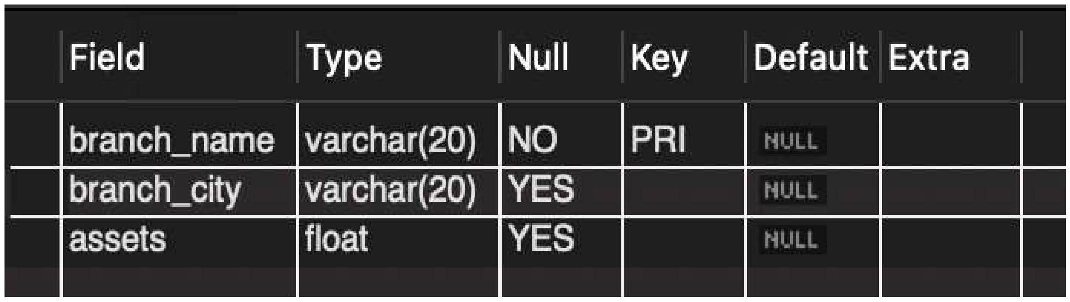
create database bank_204;
use bank_204;

Create table

```
create table branch_204(
        branch_name varchar(20) primary key,
        branch_city varchar(20),
        assets float
);

create table bank_account_204(
            acc_no int primary key,
            branch_name varchar(20),
    balance float,
    foreign key(branch_name) references branch_204(branch_name)
);

create table deposits_204(
            customer_name varchar(20),
    acc_no int,
    foreign key(acc_no) references bank_account_204(acc_no),
    foreign key(customer_name) references bank_customer_204(customer_name)
);

create table bank_customer_204(
            customer_name varchar(20) primary key,
    customer_street varchar(50),
    city varchar(15)
);

create table loans_204(
            loan_no int primary key,
    branch_name varchar(20),
    amt float,
    foreign key(branch_name) references branch_204(branch_name)
);
```

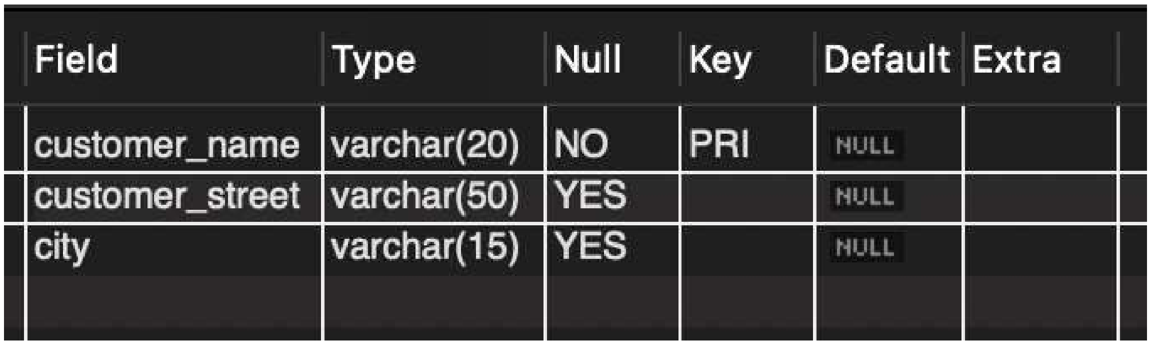
Structure of the table

desc branch_204;



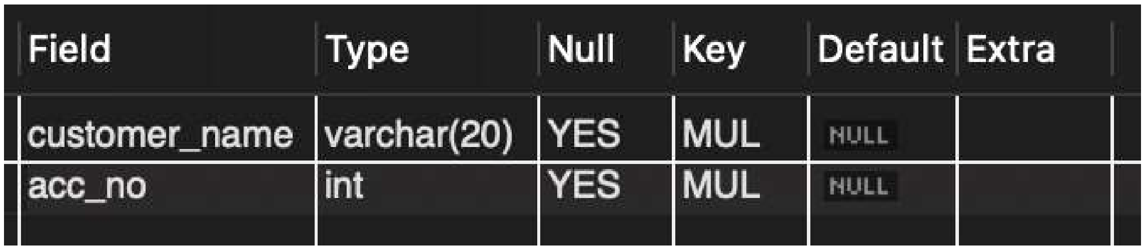
Field	Type	Null	Key	Default	Extra
branch_name	varchar(20)	NO	PRI	NULL	
branch_city	varchar(20)	YES		NULL	
assets	float	YES		NULL	

desc bank_customer_204;



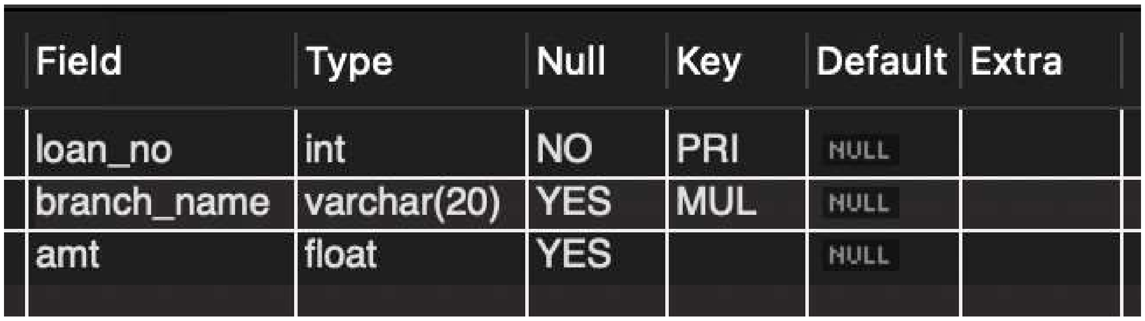
Field	Type	Null	Key	Default	Extra
customer_name	varchar(20)	NO	PRI	NULL	
customer_street	varchar(50)	YES		NULL	
city	varchar(15)	YES		NULL	

desc deposits_204;



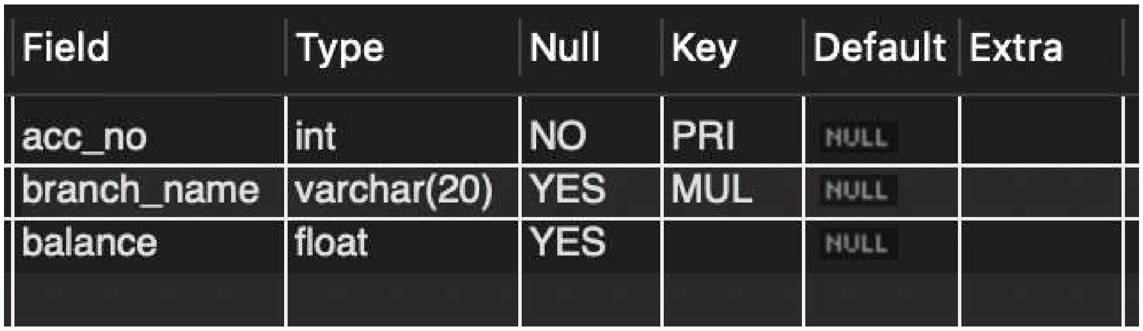
Field	Type	Null	Key	Default	Extra
customer_name	varchar(20)	YES	MUL	NULL	
acc_no	int	YES	MUL	NULL	

desc loans_204;



Field	Type	Null	Key	Default	Extra
loan_no	int	NO	PRI	NULL	
branch_name	varchar(20)	YES	MUL	NULL	
amt	float	YES		NULL	

desc bank_account_204;

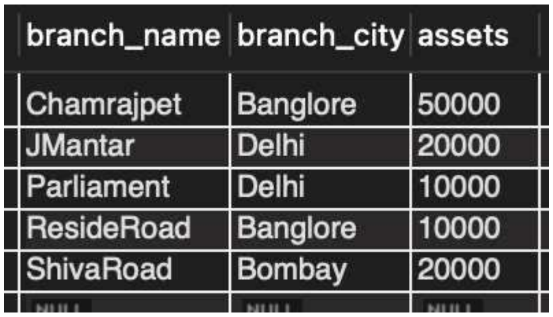


Field	Type	Null	Key	Default	Extra
acc_no	int	NO	PRI	NULL	
branch_name	varchar(20)	YES	MUL	NULL	
balance	float	YES		NULL	

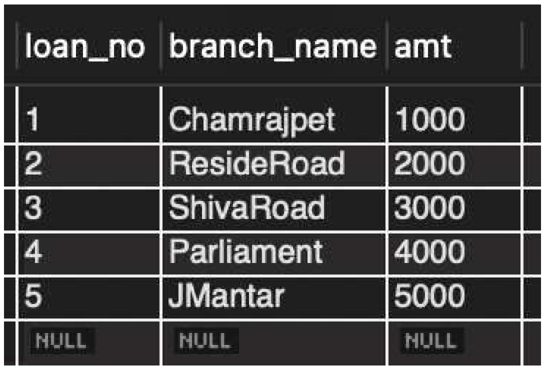
Inserting Values to the table

```
insert into branch_204 values
("Chamrajpet","Banglore",50000),
("ResideRoad","Banglore",10000),
("ShivaRoad","Bombay",20000),
("Parliament","Delhi",10000),
("JMantar","Delhi",20000);

insert into bank_account_204 values
(1,"Chamrajpet",2000),
(2,"ResideRoad",5000),
(3,"ShivaRoad",6000),
(4,"Parliament",9000),
(5,"JMantar",8000),
(6,"ShivaRoad",4000),
(8,"ResideRoad",4000),
(9,"Parliament",3000),
(10,"ResideRoad",5000),
(11,"JMantar",2000);

insert into bank_customer_204 values
("Avinash","BulTemple","Banglore"),
("Dinesh","Banrgutta","Banglore"),
("Mohan","National college","Banglore"),
("Nikhil","Akbar road","Delhi"),
("Ravi","Prithviraj road","Delhi");

insert into deposits_204 values
("Avinash",1),
("Dinesh",2),
("Nikhil",4),
("Ravi",5),
("Avinash",8),
("Nikhil",9),
("Dinesh",10),
("Nikhil",11);

insert into loans_204 values
(1,"Chamrajpet",1000),
(2,"ResideRoad",2000),
(3,"ShivaRoad",3000),
(4,"Parliament",4000),
(5,"JMantar",5000);
```

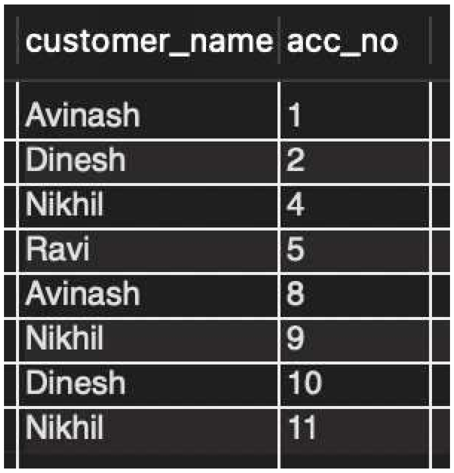
```
select * from branch_204;
select * from deposits_204;
select * from loans_204;
select * from bank_customer_204;
select * from bank_account_204;
```



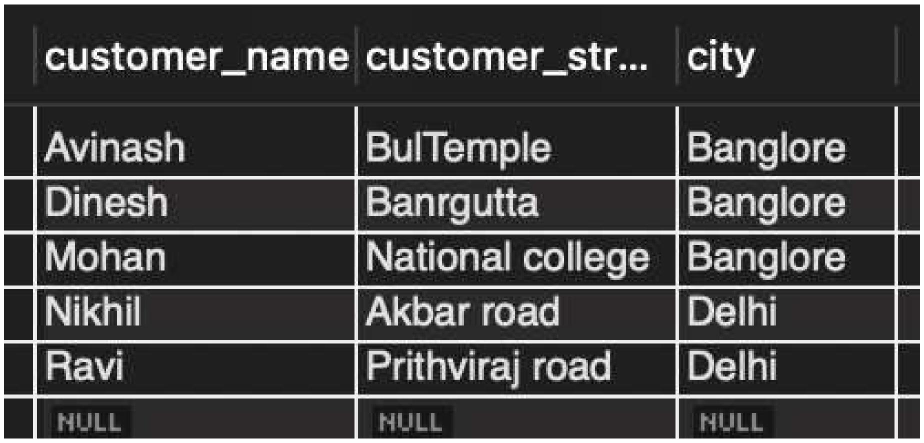
branch_name	branch_city	assets
Chamrajpet	Banglore	50000
JMantar	Delhi	20000
Parliament	Delhi	10000
ResideRoad	Banglore	10000
ShivaRoad	Bombay	20000
NULL	NULL	NULL



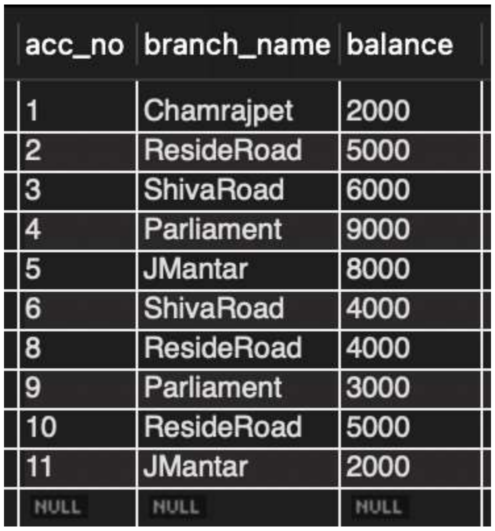
loan_no	branch_name	amt
1	Chamrajpet	1000
2	ResideRoad	2000
3	ShivaRoad	3000
4	Parliament	4000
5	JMantar	5000
NULL	NULL	NULL



customer_name	acc_no
Avinash	1
Dinesh	2
Nikhil	4
Ravi	5
Avinash	8
Nikhil	9
Dinesh	10
Nikhil	11



customer_name	customer_str...	city
Avinash	BulTemple	Banglore
Dinesh	Banrgutta	Banglore
Mohan	National college	Banglore
Nikhil	Akbar road	Delhi
Ravi	Prithviraj road	Delhi
NULL	NULL	NULL

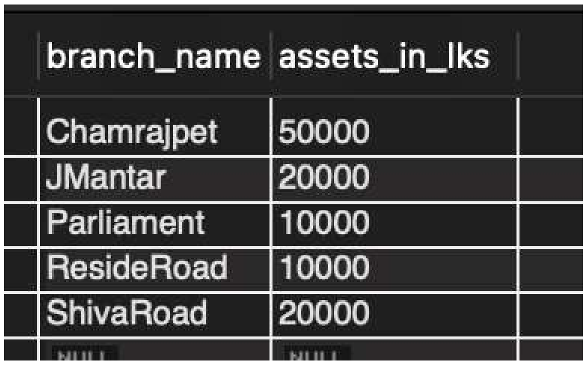


acc_no	branch_name	balance
1	Chamrajpet	2000
2	ResideRoad	5000
3	ShivaRoad	6000
4	Parliament	9000
5	JMantar	8000
6	ShivaRoad	4000
8	ResideRoad	4000
9	Parliament	3000
10	ResideRoad	5000
11	JMantar	2000
NULL	NULL	NULL

Queries

- **Display the branch name and assets from all branches and rename the assets column to 'assets in lakhs'.**

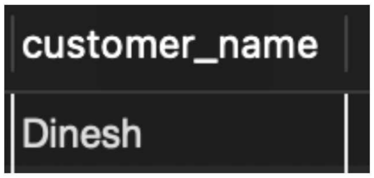
alter table branch_204 **rename column** assets **to** assets_in_lks;
select branch_name, assets_in_lks **from** branch_204;



branch_name	assets_in_lks
Chamrajpet	50000
JMantar	20000
Parliament	10000
ResideRoad	10000
ShivaRoad	20000
NULL	NULL

- **Find all the customers who have at least two accounts at the same branch (ex.SBI_ResidencyRoad).**

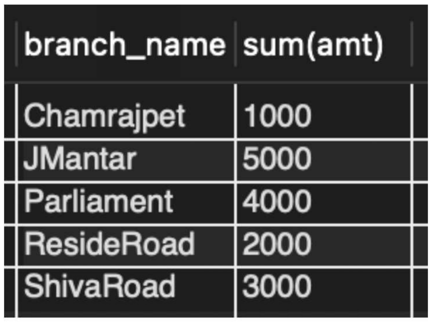
select d.customer_name **from** deposits_204 d, bank_account_204 b **where** b.branch_name=**'ResideRoad'** **and** d.acc_no=b.acc_no **group by** d.customer_name **having count**(d.acc_no)>=2;



customer_name
Dinesh

- **Create a view which gives each branch the sum of the amount of all the loans at the branch.**

```
create view loansum as (
	select branch_name, sum(amt) from loans_204 group by branch_name
);

select * from loansum;
```



branch_name	sum(amt)
Chamrajpet	1000
JMantar	5000
Parliament	4000
ResideRoad	2000
ShivaRoad	3000

More Queries on Bank Database

Question

(Week 4)

- Branch (branch-name: String, branch-city: String, assets: real)

- BankAccount(accno: int, branch-name: String, balance: real)

- BankCustomer (customer-name: String, customer-street: String, customer-city: String) - Depositer(customer-name: String, accno: int)

- LOAN (loan-number: int, branch-name: String, amount: real)

- Find all the customers who have an account at all the branches

- located in a specific city (Ex. Delhi).

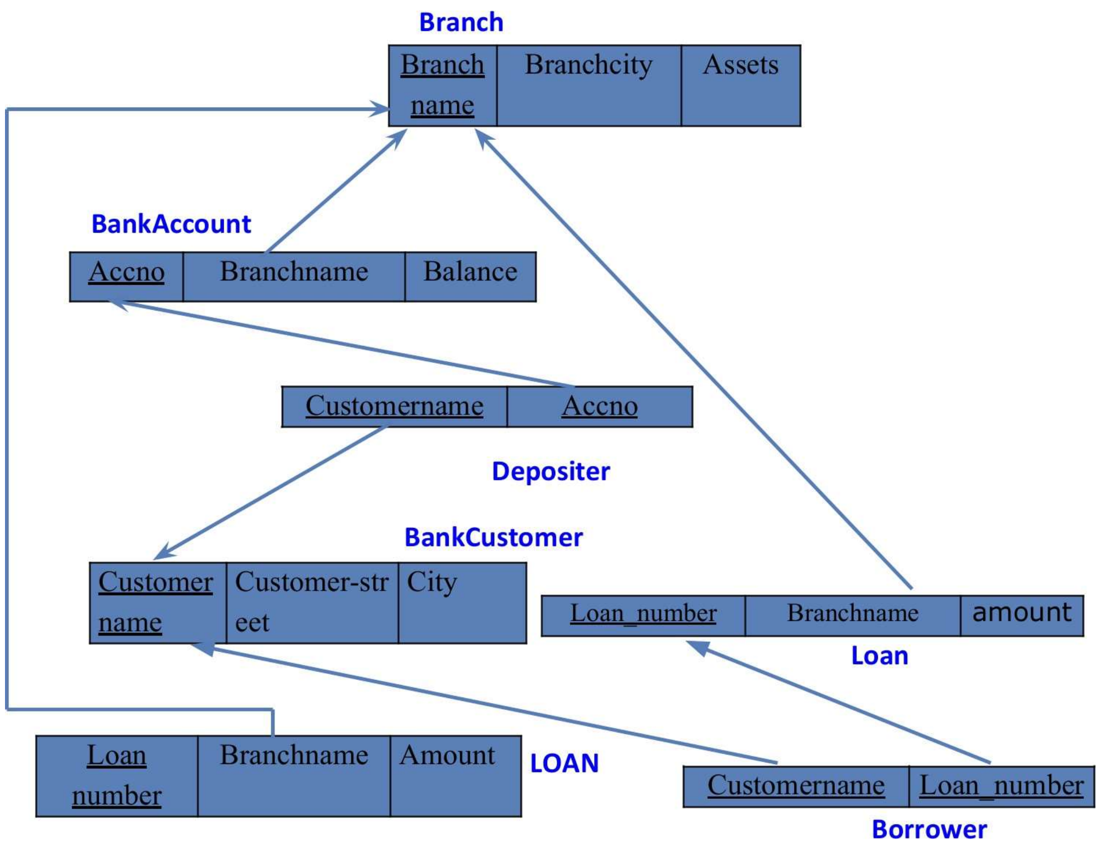
- Find all customers who have a loan at the bank but do not have an account. - Find all customers who have both an account and a loan at the Bangalore branch

- Find the names of all branches that have greater assets than all branches located in Bangalore.

- Demonstrate how you delete all account tuples at every branch located in a specific city (Ex. Bombay).

- Update the Balance of all accounts by 5%

Schema Diagram



Creating Table:

```
create table borrower_204(
        customer_name varchar(20),
    loan_no int,
    foreign key(customer_name) references          bank_customer_204(customer_name),
    foreign key(loan_no) references loans_204(loan_no)
);
```

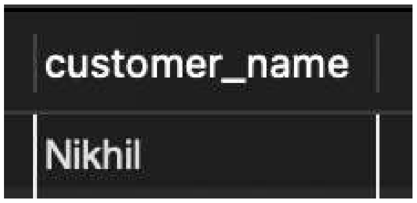
Inserting values:

```
insert into branch_204 values ("SBI_MantriMarg", "Delhi", 200000);
insert into bank_account_204 values (12, "SBI_MantriMarg", 2000);
insert into deposits_204 values("Nikhil", 12);

insert into borrower_204 values
        ("Avinash", 1),
    ("Dinesh", 2),
    ("Mohan", 3),
        ("Nikhil", 4),
    ("Ravi", 5);
```

Queries

- **Find all the customers who have an account at all the branches located in a specific city (Ex. Delhi).**

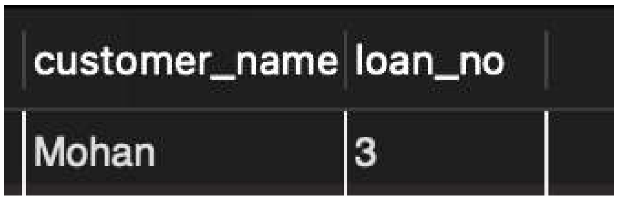
select d.customer_name **from** branch_204 b, deposits_204 d, bank_account_204 ba **where** b.branch_city=**'Delhi'** **and** d.acc_no=ba.acc_no **and** b.branch_name=ba.branch_name
group by d.customer_name **having** **count**(**distinct** b.branch_name)= (**select** **count**(**distinct** b.branch_name) **from** branch_204 b **where** b.branch_city=**'Delhi'**;



customer_name
Nikhil

- **Find all customers who have a loan at the bank but do not have an account.**

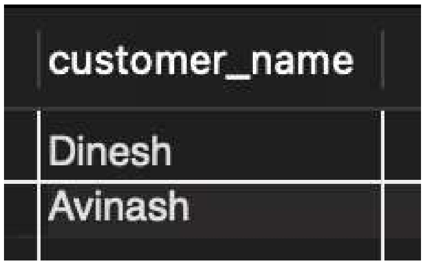
select customer_name, loans_204.loan_no
from (borrower_204 **right outer join** loans_204
on loans_204.loan_no = borrower_204.loan_no)
where customer_name **not in** (**select** customer_name
from deposits_204, bank_account_204 **where** deposits_204.acc_no = bank_account_204.acc_no
group by customer_name, branch_name);



customer_name	loan_no
Mohan	3

- **Find all customers who have both an account and a loan at the Bangalore branch.**

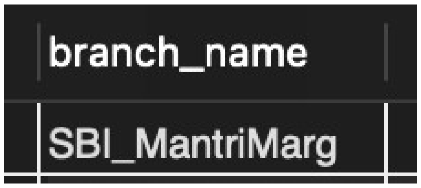
select distinct customer_name **from** deposits_204
where customer_name **in** (**select** deposits_204.customer_name **from** branch_204, bank_account_204, deposits_204
where branch_204.branch_city = **"Banglore"** **and** branch_204.branch_name = bank_account_204.branch_name **and** bank_account_204.acc_no = deposits_204.acc_no) **and** customer_name **in** (**select** customer_name **from** borrower_204, loans_204 **where** branch_name **in** (**select** branch_name **from** branch_204 **where** branch_city = **"Banglore"**));



```
customer_name
Dinesh
Avinash
```

- **Find the names of all branches that have greater assets than all branches located in Bangalore.**

select branch_name from branch_204 where assets_in_lks > all(select assets_in_lks from branch_204 where branch_city = "Banglore");



```
branch_name
SBI_MantriMarg
```

- **Update the Balance of all accounts by 5%**

update bank_account_204 set balance = 1.05*balance;

- **Demonstrate how you delete all account tuples at every branch located in a specific city (Ex. Bombay).**

delete from bank_account_204 where branch_name in (select branch_name from branch_204 where branch_city = "Bombay");

Employee Database

Question

(Week 5)

1. Using Scheme diagram, Create tables by properly specifying the primary keys and the foreign keys.

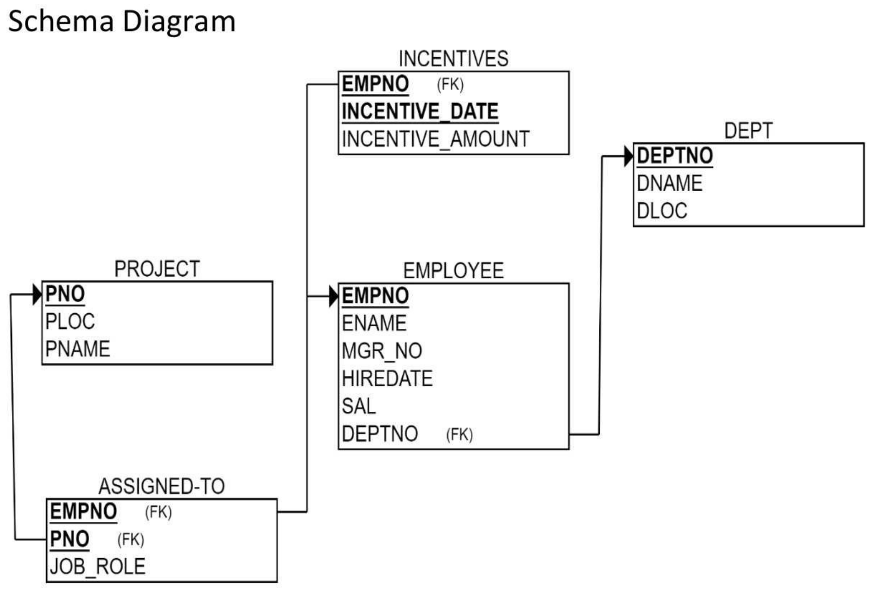
2. Enter greater than five tuples for each table.

3. Retrieve the employee numbers of all employees who work on project located in Bengaluru, Hyderabad, or Mysuru

4. Get Employee ID's of those employees who didn't receive incentives

5. Write a SQL query to find the employees name, number, dept, job_role, department location and project location who are working for a project location same as his/her department location.

Schema Diagram



Create database

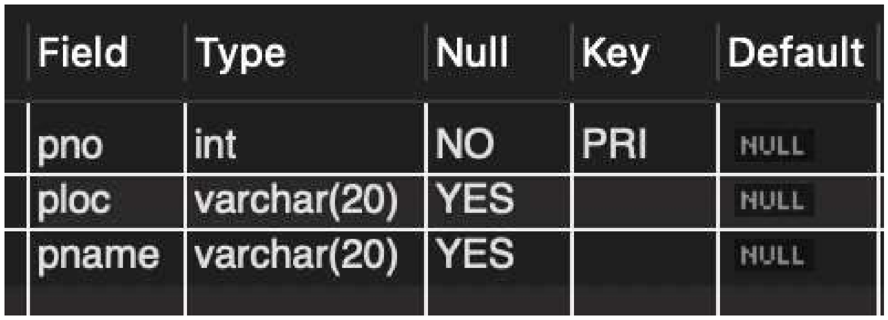
```
create database employee_database_204;
use employee_database_204;
```

Create table

```
create table project_204(
        pno int primary key,
        ploc varchar(20),
        pname varchar(20)
);
create table dept_204(
        deptno int primary key,
        dname varchar(30),
        dloc varchar(30)
);
create table employee_204(
        empno int primary key,
        ename varchar(20),
        mgr_no int,
        hiredate date,
        sal double,
        deptno int,
        foreign key(deptno) references dept_204(deptno)
);
create table assigned_to_204(
        empno int primary key,
        pno int,
        job_role varchar(20),
        foreign key(empno) references employee_204(empno),
        foreign key(pno) references project_204(pno)
);
create table incentives_204(
        empno int,
        incentive_date date primary key,
        incentive_amount double,
        foreign key(empno) references employee_204(empno)
);
```

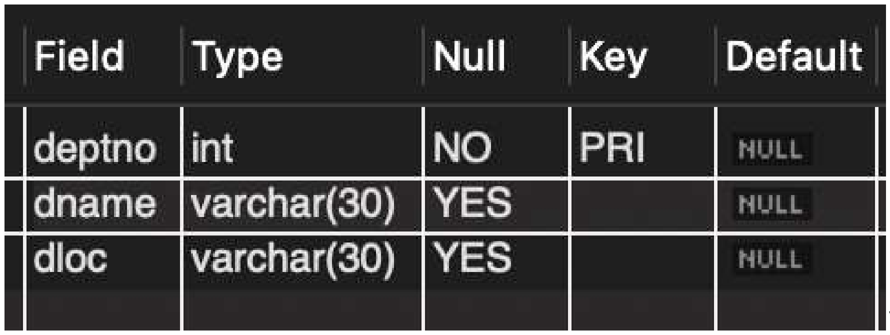
Structure of the table

desc project;



Field	Type	Null	Key	Default
pno	int	NO	PRI	NULL
ploc	varchar(20)	YES		NULL
pname	varchar(20)	YES		NULL

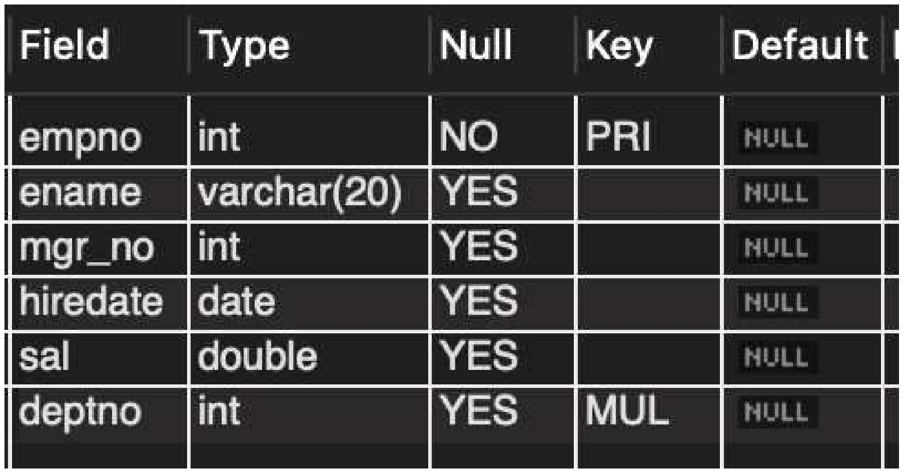
desc dept;



Field	Type	Null	Key	Default
deptno	int	NO	PRI	NULL
dname	varchar(30)	YES		NULL
dloc	varchar(30)	YES		NULL

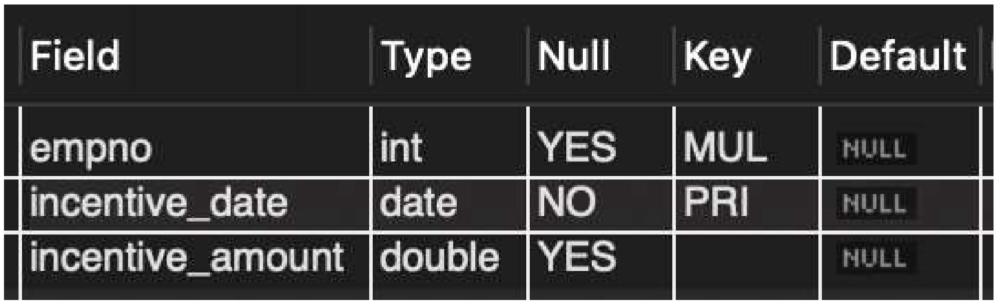
\

desc employee;



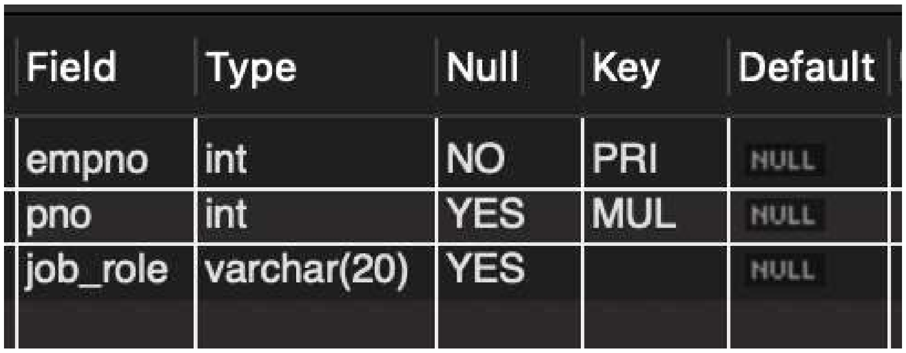
Field	Type	Null	Key	Default
empno	int	NO	PRI	NULL
ename	varchar(20)	YES		NULL
mgr_no	int	YES		NULL
hiredate	date	YES		NULL
sal	double	YES		NULL
deptno	int	YES	MUL	NULL

desc incentives;



Field	Type	Null	Key	Default
empno	int	YES	MUL	NULL
incentive_date	date	NO	PRI	NULL
incentive_amount	double	YES		NULL

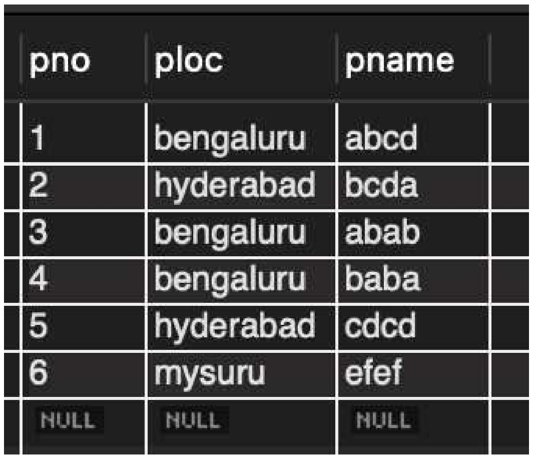
desc assigned_to;



Field	Type	Null	Key	Default
empno	int	NO	PRI	NULL
pno	int	YES	MUL	NULL
job_role	varchar(20)	YES		NULL

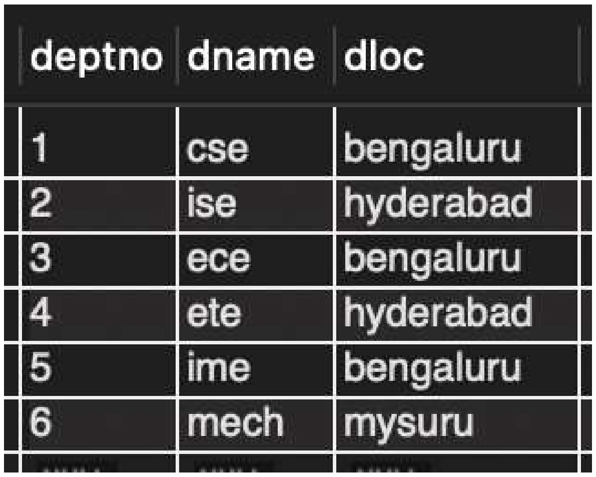
Inserting Values to the table

```
insert into project_204 values
            (1,"bengaluru","abcd"),
            (2,"hyderabad","bcda"),
            (3,"bengaluru","abab"),
            (4,"bengaluru","baba"),
            (5,"hyderabad","cdcd"),
   (6, "mysuru", "efef");
select * from project_204;
```



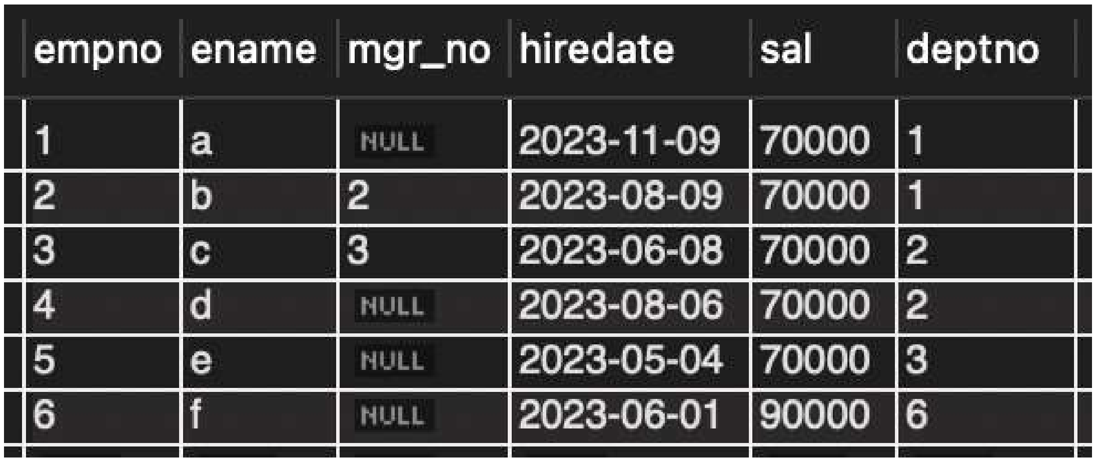
pno	ploc	pname
1	bengaluru	abcd
2	hyderabad	bcda
3	bengaluru	abab
4	bengaluru	baba
5	hyderabad	cdcd
6	mysuru	efef
NULL	NULL	NULL

insert into dept_204 **values**
(1,**"cse"**,**"bengaluru"**),
(2,**"ise"**,**"hyderabad"**),
(3,**"ece"**,**"bengaluru"**),
(4,**"ete"**,**"hyderabad"**),
(5,**"ime"**,**"bengaluru"**),
(6, **"mech"**, **"mysuru"**);
select * **from** dept_204;



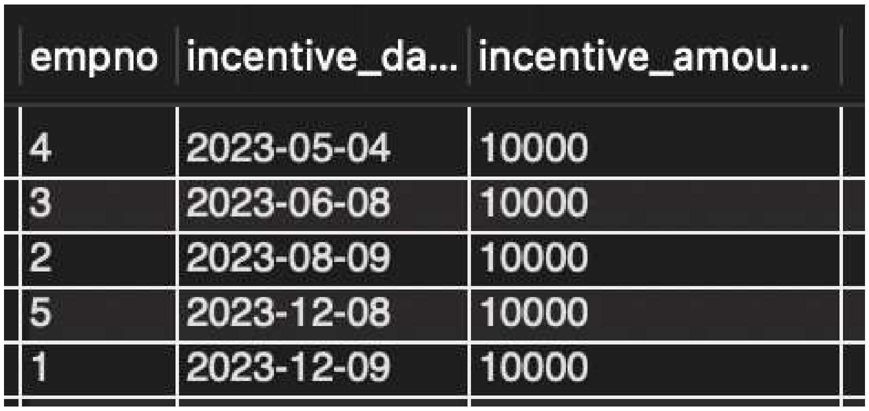
deptno	dname	dloc
1	cse	bengaluru
2	ise	hyderabad
3	ece	bengaluru
4	ete	hyderabad
5	ime	bengaluru
6	mech	mysuru

insert into employee_204 **values**
(1,**"a"**,**null**,**"2023-11-9"**,70000,1),
(2,**"b"**,2,**"2023-8-9"**,70000,1),
(3,**"c"**,3,**"2023-6-8"**,70000,2),
(4,**"d"**,**null**,**"2023-8-6"**,70000,2),
(5,**"e"**,**null**,**"2023-5-4"**,70000,3),
(6, **"f"**, **null**, **"2023-6-1"**, 90000, 6);
select * **from** employee_204;



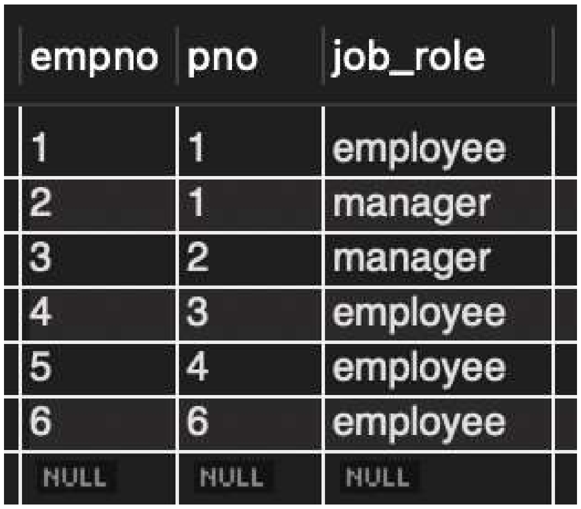
empno	ename	mgr_no	hiredate	sal	deptno
1	a	NULL	2023-11-09	70000	1
2	b	2	2023-08-09	70000	1
3	c	3	2023-06-08	70000	2
4	d	NULL	2023-08-06	70000	2
5	e	NULL	2023-05-04	70000	3
6	f	NULL	2023-06-01	90000	6

```
insert into incentives_204 values
        (1,"2023-12-9",10000),
        (2,"2023-8-9",10000),
        (3,"2023-6-8",10000),
        (4,"2023-5-4",10000),
        (5,"2023-12-8",10000);
select * from incentives_204;
```



empno	incentive_da...	incentive_amou...
4	2023-05-04	10000
3	2023-06-08	10000
2	2023-08-09	10000
5	2023-12-08	10000
1	2023-12-09	10000

```
insert into assigned_to_204 values
        (1,1, "employee"),
        (2,1, "manager"),
        (3,2, "manager"),
        (4,3, "employee"),
        (5,4, "employee"),
  (6, 6, "employee");
select * from assigned_to_204;
```

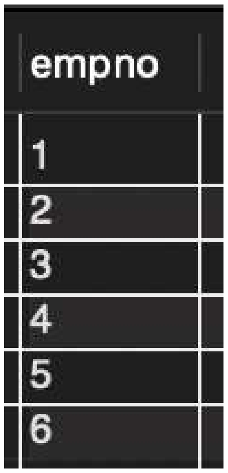


empno	pno	job_role
1	1	employee
2	1	manager
3	2	manager
4	3	employee
5	4	employee
6	6	employee
NULL	NULL	NULL

Queries

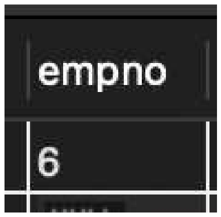
- **Retrieve the employee numbers of all employees who work on project located in Bengaluru, Hyderabad, or Mysuru.**

select assigned_to_204.empno **from** assigned_to_204, project_204
where assigned_to_204.pno = project_204.pno **and** project_204.ploc **in** (**"bengaluru"**, **"mysuru"**, **"hyderabad"**);



```
empno
1
2
3
4
5
6
```

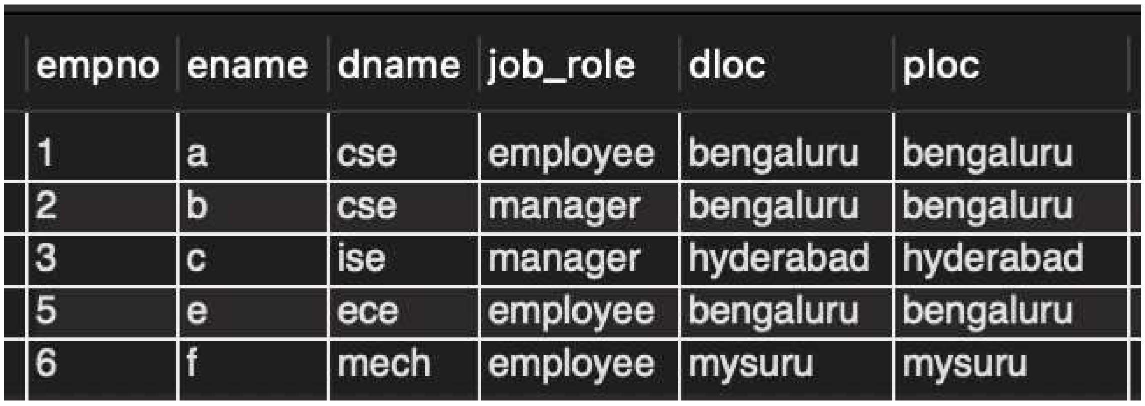
- **Get Employee ID's of those employees who didn't receive incentives**
  select empno from employee_204 where empno not in (select empno from incentives_204);



```
empno
6
```

● **Write a SQL query to find the employees name, number, dept, job_role, department location and project location who are working for a project location same as his/her department location.**

select employee_204.empno, ename, dname, job_role, dloc, ploc
from employee_204, assigned_to_204, project_204, dept_204
where ploc = dloc **and** assigned_to_204.empno = employee_204.empno
and employee_204.deptno = dept_204.deptno **and** project_204.pno = assigned_to_204.pno;



empno	ename	dname	job_role	dloc	ploc
1	a	cse	employee	bengaluru	bengaluru
2	b	cse	manager	bengaluru	bengaluru
3	c	ise	manager	hyderabad	hyderabad
5	e	ece	employee	bengaluru	bengaluru
6	f	mech	employee	mysuru	mysuru

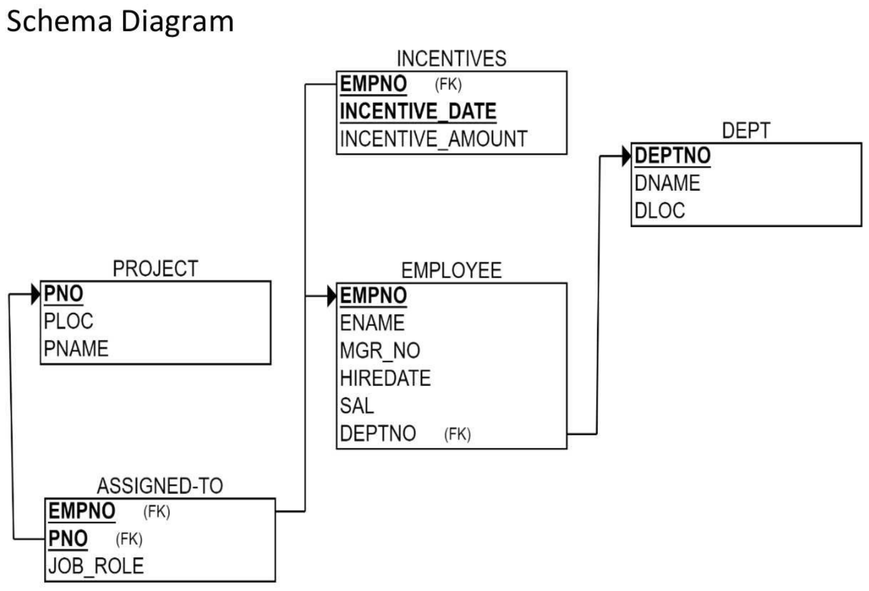
More Queries on Employee Database

Question

(Week 6)

1. Using Scheme diagram, Create tables by properly specifying the primary keys and the foreign keys.
2. Enter greater than five tuples for each table.
3. List the name of the managers with the maximum employees
4. Display those managers name whose salary is more than average salary of his employee.
5. Find the name of the second top level managers of each department.
6. Find the employee details who got the second maximum incentive in January 2019.
7. Display those employees who are working in the same department where his the manager is working.

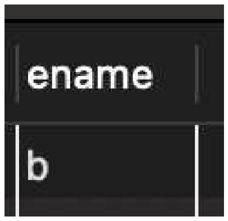
Schema Diagram



Queries

- **List the name of the managers with the maximum employees**

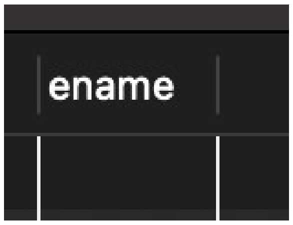
select e1.ename
from employee_204 e1, employee_204 e2
where e1.empno=e2.mgr_no **group by** e1.ename
having count(e1.mgr_no)=(**select count**(e1.ename)
from employee_204 e1, employee_204 e2 **where** e1.empno=e2.mgr_no
group by e1.ename **order by count**(e1.ename) **desc limit** 1);



```
ename
b
```

- **Display those managers name whose salary is more than average salary of his employee**

select m.ename **from** employee_204 m
where m.empno **in**
(**select** mgr_no **from** employee_204)
and m.sal>(**select avg**(n.sal) **from** employee_204 n
where n.mgr_no=m.empno);



```
ename
```

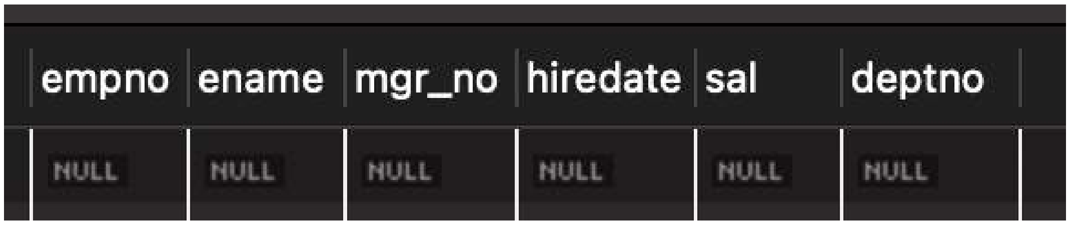
- **Find the employee details who got second maximum incentive in January 2019.** select * from employee_204 where empno=

(select i.empno from incentives_204 i

where i.incentive_amount= (select max(n.incentive_amount) from incentives_204 n

where n.incentive_amount < (select max(inc.incentive_amount) from incentives_204 inc

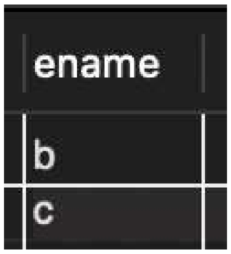
where inc.incentive_date between 2023-01-01 and 2023-12-31) and incentive_date between 2023-01-01 and 2023-12-31));



empno	ename	mgr_no	hiredate	sal	deptno
NULL	NULL	NULL	NULL	NULL	NULL

● **Display those employees who are working in the same department where his manager is working.**

select e2.ename
from employee_204 e1, employee_204 e2
where e1.empno=e2.mgr_no **and** e1.deptno=e2.deptno;



ename
b
c

Supplier Database

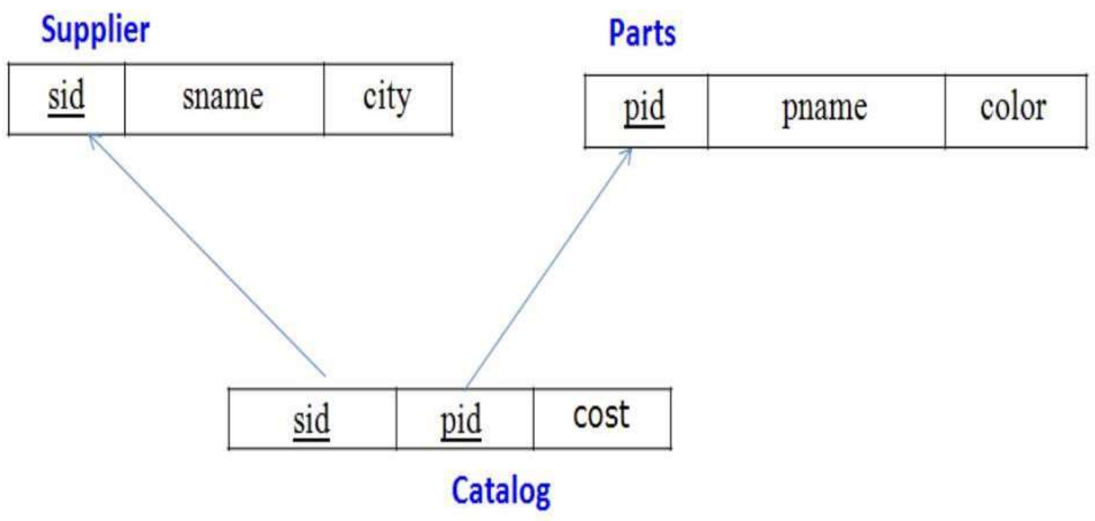
Question

(Week 7)

1. Using Scheme diagram, Create tables by properly specifying the primary keys and the foreign keys.
2. Insert appropriate records in each table.
3. Find the pnames of parts for which there is some supplier.
4. Find the snames of suppliers who supply every part.
5. Find the snames of suppliers who supply every red part.
6. Find the pnames of parts supplied by Acme Widget Suppliers and by no one else.
7. Find the sids of suppliers who charge more for some part than the average cost of that part (averaged over all the suppliers who supply that part).
8. For each part, find the sname of the supplier who charges the most for

   that part.

Schema Diagram



Create database

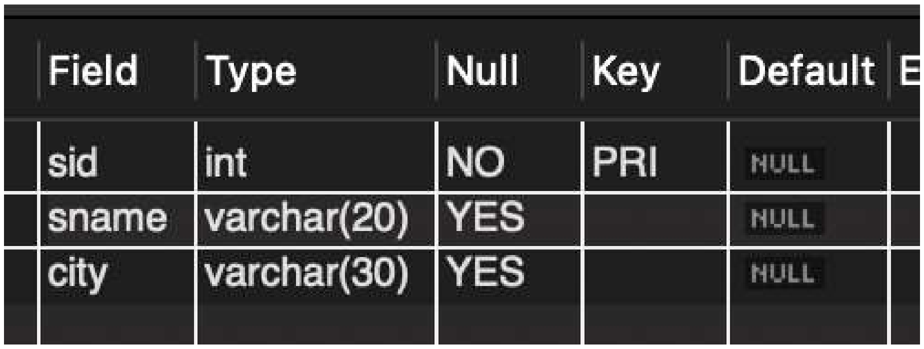
```
create database supply_204;
use supply_204;
```

Create table

```
create table supplier_204(
        sid int primary key,
  sname varchar(20),
  city varchar(30)
);

create table parts_204(
        pid int primary key,
  pname varchar(20),
  color varchar(20)
);


create table catalog_204(
sid int, pid int,
  cost int,
  foreign key(sid) references supplier_204(sid),
  foreign key(pid) references parts_204(pid)
);
```

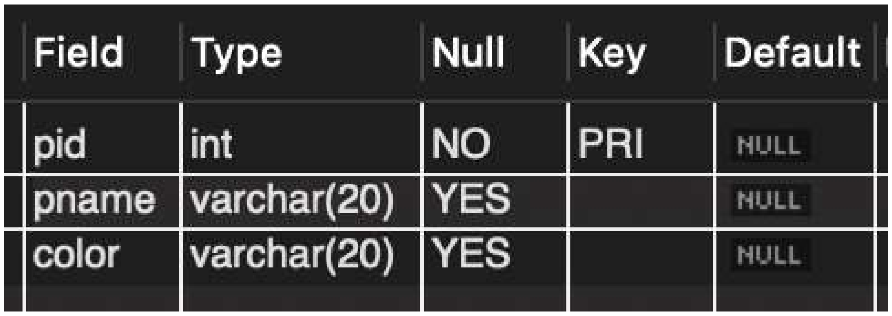
Structure of the table

desc Supplierr;



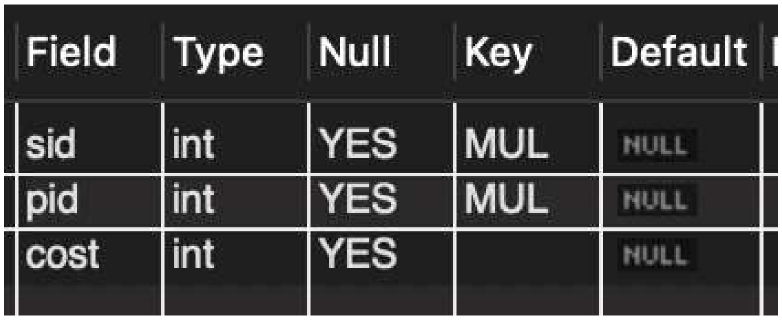
Field	Type	Null	Key	Default	E
sid	int	NO	PRI	NULL	
sname	varchar(20)	YES		NULL	
city	varchar(30)	YES		NULL	

desc Parts;



Field	Type	Null	Key	Default
pid	int	NO	PRI	NULL
pname	varchar(20)	YES		NULL
color	varchar(20)	YES		NULL

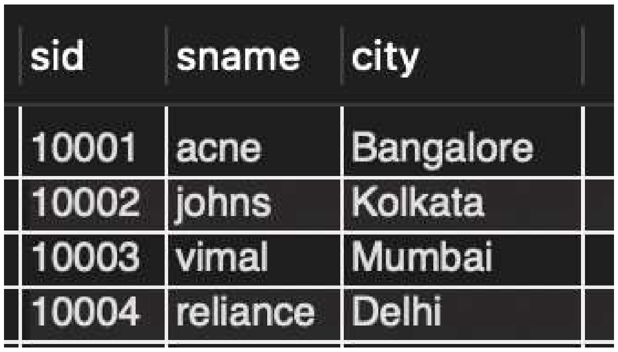
desc Catalog;



Field	Type	Null	Key	Default
sid	int	YES	MUL	NULL
pid	int	YES	MUL	NULL
cost	int	YES		NULL

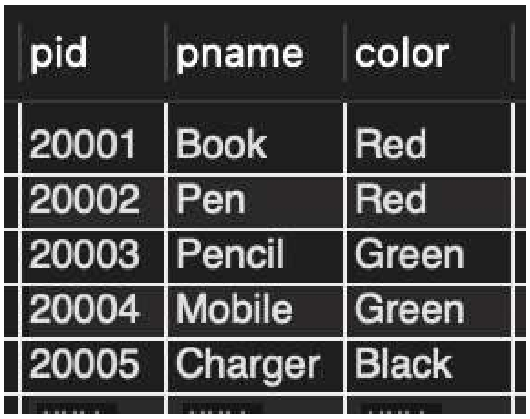
Inserting Values to the table

```
insert into supplier_204 values
        (10001, "acne", "Bangalore"),
  (10002, "johns", "Kolkata"),
  (10003, "vimal", "Mumbai"),
  (10004, "reliance", "Delhi");
select * from supplier_204;
```



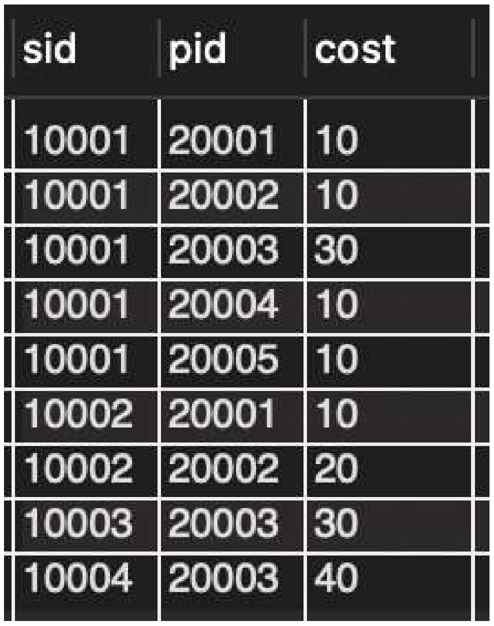
sid	sname	city
10001	acne	Bangalore
10002	johns	Kolkata
10003	vimal	Mumbai
10004	reliance	Delhi

```
insert into parts_204 values
            (20001, "Book", "Red"),
    (20002, "Pen", "Red"),
    (20003, "Pencil", "Green"),
    (20004, "Mobile", "Green"),
    (20005, "Charger", "Black");
select * from parts_204;
```



pid	pname	color
20001	Book	Red
20002	Pen	Red
20003	Pencil	Green
20004	Mobile	Green
20005	Charger	Black

```
insert into catalog_204 values
            (10001, 20001, 10),
    (10001, 20002, 10),
    (10001, 20003, 30),
    (10001, 20004, 10),
    (10001, 20005, 10),
    (10002, 20001, 10),
    (10002, 20002, 20),
    (10003, 20003, 30),
    (10004, 20003, 40);
select * from catalog_204;
```

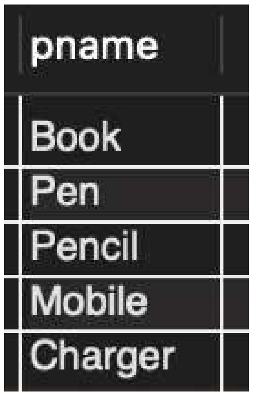


sid	pid	cost
10001	20001	10
10001	20002	10
10001	20003	30
10001	20004	10
10001	20005	10
10002	20001	10
10002	20002	20
10003	20003	30
10004	20003	40

Queries

● **Find the pnames of parts for which there is some supplier.**

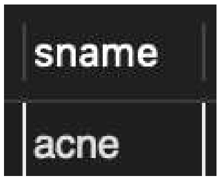
select pname **from** parts_204 **where** pid **in** (**select** pid **from** catalog_204);



pname
Book
Pen
Pencil
Mobile
Charger

● **Find the snames of suppliers who supply every part.**

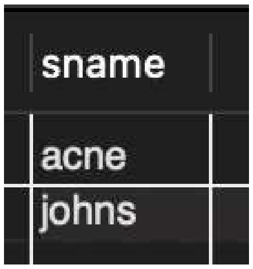
select sname **from** supplier_204 **where sid in**
(**select sid from** catalog_204 **group by sid having count**(**distinct** pid) = (**select count**(**distinct** pid) **from** parts_204));



sname
acne

● **Find the snames of suppliers who supply every red part.**

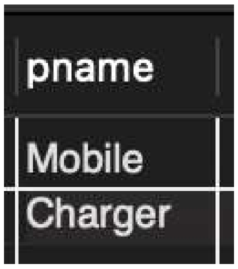
select distinct sname **from** supplier_204, parts_204, catalog_204
where supplier_204.sid = catalog_204.sid **and** parts_204.pid = catalog_204.pid **and** parts_204.color=**"Red"**;



```
sname
acne
johns
```

● **Find the pnames of parts supplied by Acme Widget Suppliers and by no one else.**

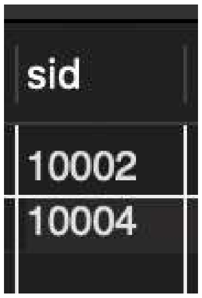
select pname **from** parts_204 **where** pid **not in**
(**select** pid **from** catalog_204 **where** **sid** **in** (**select** **sid** **from** supplier_204 **where** sname != **"acne"**));



```
pname
Mobile
Charger
```

● **Find the sids of suppliers who charge more for some part than the average cost of that part (averaged over all the suppliers who supply that part).**

select sid from catalog_204 a **where** a.cost > (**select avg**(b.cost) **from** catalog_204 b **where** a.pid = b.pid **group by** b.pid);

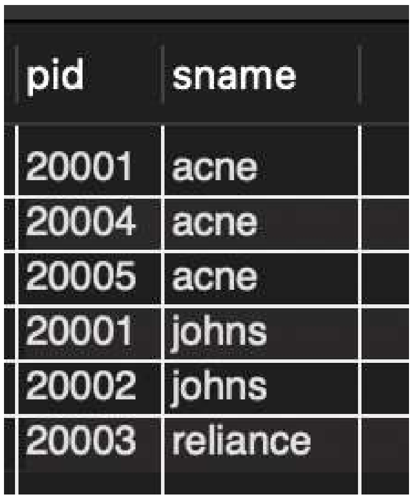


```
sid
10002
10004
```

● **For each part, find the sname of the supplier who charges the most for that part.**

select pid, sname **from** catalog_204 a, supplier_204
where a.cost = (**select max**(b.cost) **from** catalog_204 b **where** a.pid = b.pid **group by** b.pid) **and**

supplier_204.sid = a.sid;



pid	sname
20001	acne
20004	acne
20005	acne
20001	johns
20002	johns
20003	reliance

NoSQL Lab 1

Question

(Week 8)

Perform the following DB operations using MongoDB.

1. Create a database "Student" with the following attributes Rollno, Age, ContactNo, Email-Id.

2. Insert appropriate values

3. Write query to update Email-Id of a student with rollno 10.

4. Replace the student name from "ABC" to "FEM" of rollno 11.

5. Export the created table into local file system

6. Drop the table

7. Import a given csv dataset from local file system into

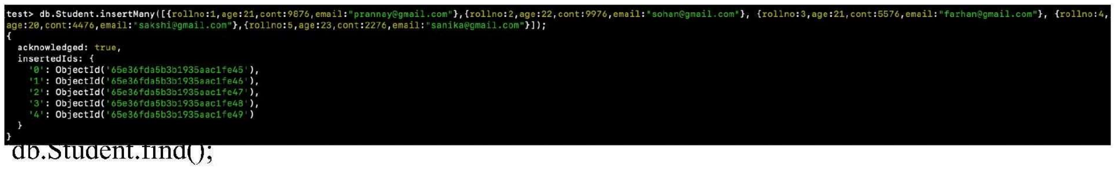
mongodb collection.

Create database

```
db.createCollection("Student");
```

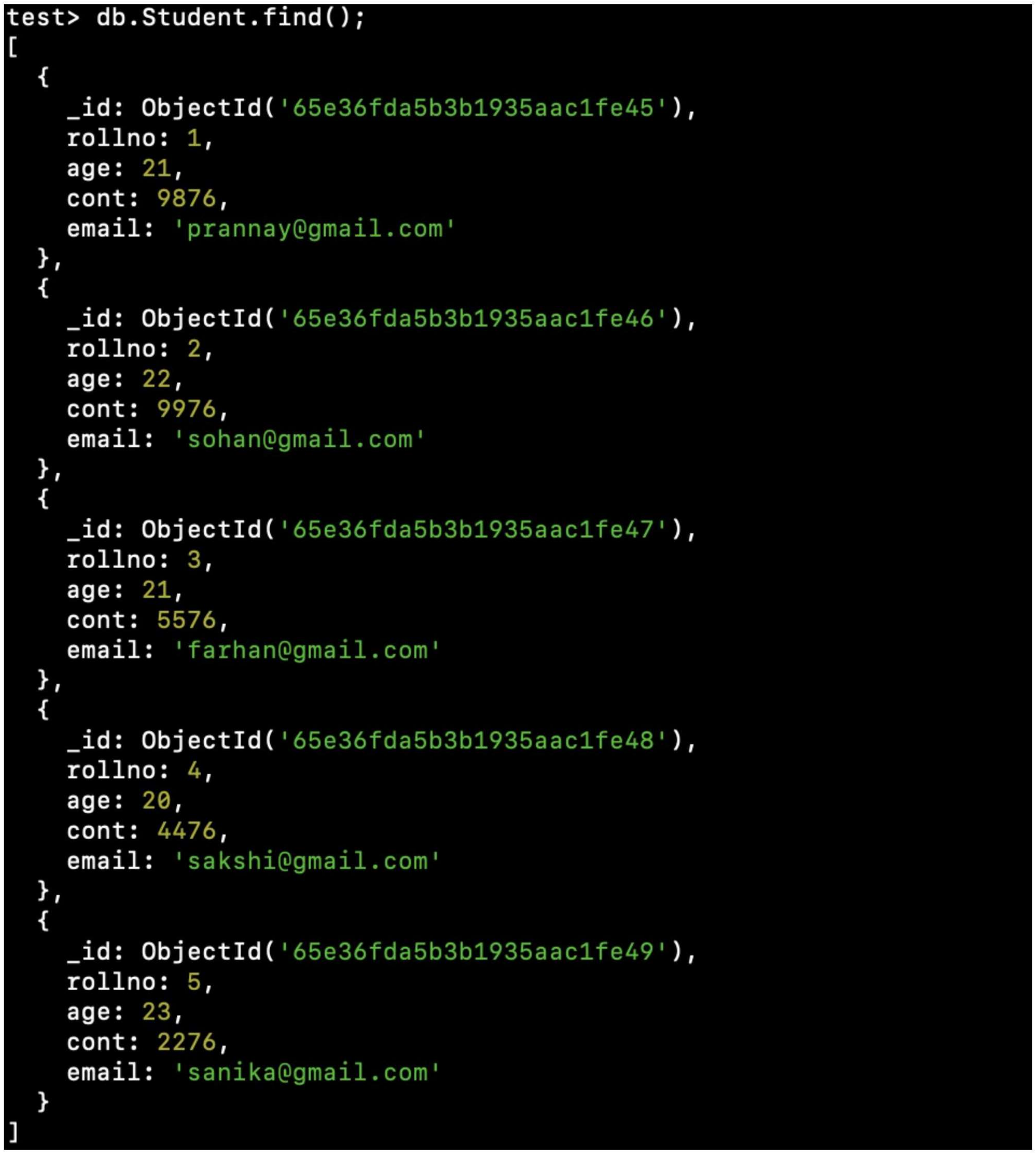
Create table & Inserting Values to the table

```
db.Student.insertMany([{rollno:1,age:21,cont:9876,email:"prannay@gmail.com"},{rollno:2,a
ge:22,cont:9976,email:"sohan@gmail.com"},
{rollno:3,age:21,cont:5576,email:"farhan@gmail.com"},
{rollno:4,age:20,cont:4476,email:"sakshi@gmail.com"},{rollno:5,age:23,cont:2276,email:"sa
nika@gmail.com"}]);
```



```
test> db.Student.insertMany([{rollno:1,age:21,cont:9876,email:"prannay@gmail.com"},{rollno:2,age:22,cont:9976,email:"sohan@gmail.com"}, {rollno:3,age:21,cont:5576,email:"farhan@gmail.com"}, {rollno:4,
age:20,cont:4476,email:"sakshi@gmail.com"},{rollno:5,age:23,cont:2276,email:"sanika@gmail.com"}]);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId('65e36fda5b3b1935aac1fe45'),
    '1': ObjectId('65e36fda5b3b1935aac1fe46'),
    '2': ObjectId('65e36fda5b3b1935aac1fe47'),
    '3': ObjectId('65e36fda5b3b1935aac1fe48'),
    '4': ObjectId('65e36fda5b3b1935aac1fe49')
  }
}
```

db.Student.find();

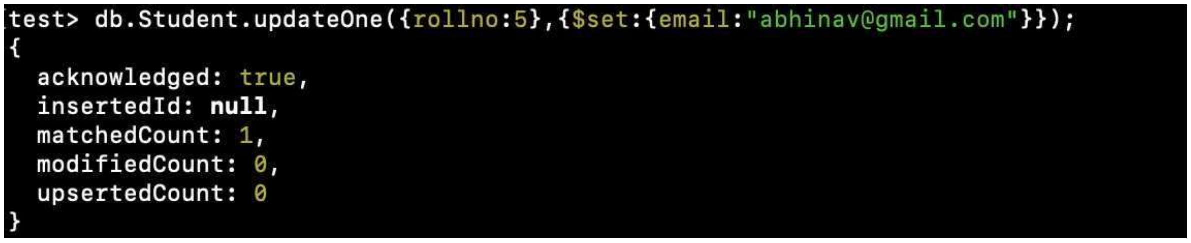


```
test> db.Student.find();
[
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe45'),
    rollno: 1,
    age: 21,
    cont: 9876,
    email: 'prannay@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe46'),
    rollno: 2,
    age: 22,
    cont: 9976,
    email: 'sohan@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe47'),
    rollno: 3,
    age: 21,
    cont: 5576,
    email: 'farhan@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe48'),
    rollno: 4,
    age: 20,
    cont: 4476,
    email: 'sakshi@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe49'),
    rollno: 5,
    age: 23,
    cont: 2276,
    email: 'sanika@gmail.com'
  }
]
```

Queries

- **<u>Write a query to update the Email-Id of a student with rollno 5.</u>**

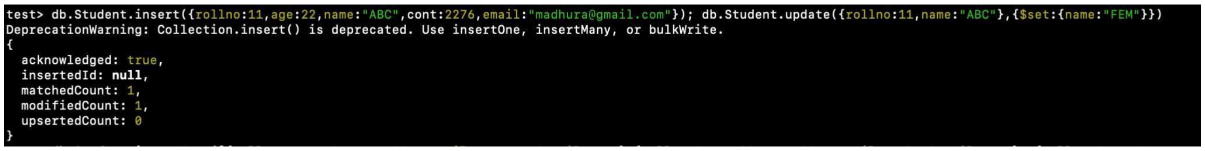
db.Student.update({**rollno**:5},{**$set**:{**email**:**"abhinav@gmail.com"**}});



```
test> db.Student.updateOne({rollno:5},{$set:{email:"abhinav@gmail.com"}});
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 0,
  upsertedCount: 0
}
```

- **<u>Replace the student name from “ABC” to “FEM” of rollno 11.</u>**

db.Student.insert({**rollno**:11,**age**:22,**name**:**"ABC"**,**cont**:2276,**email**:**"madhura@gmail.com"**});
db.Student.update({**rollno**:11,**name**:**"ABC"**},{**$set**:{**name**:**"FEM"**}})



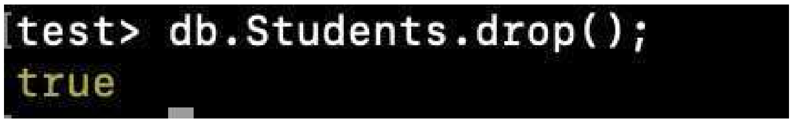
```
test> db.Student.insert({rollno:11,age:22,name:"ABC",cont:2276,email:"madhura@gmail.com"}); db.Student.update({rollno:11,name:"ABC"},{$set:{name:"FEM"}})
DeprecationWarning: Collection.insert() is deprecated. Use insertOne, insertMany, or bulkWrite.
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
```

- **<u>Export the created table into local file system</u>**

mongoexport mongodb+srv://204:<password>@cluster0.xbmgopf.mongodb.net/test --collection=Student -- out C:\Users\nidhiy\Documents\test.Students.json

- **<u>Drop the table</u>**

db.Student.drop();

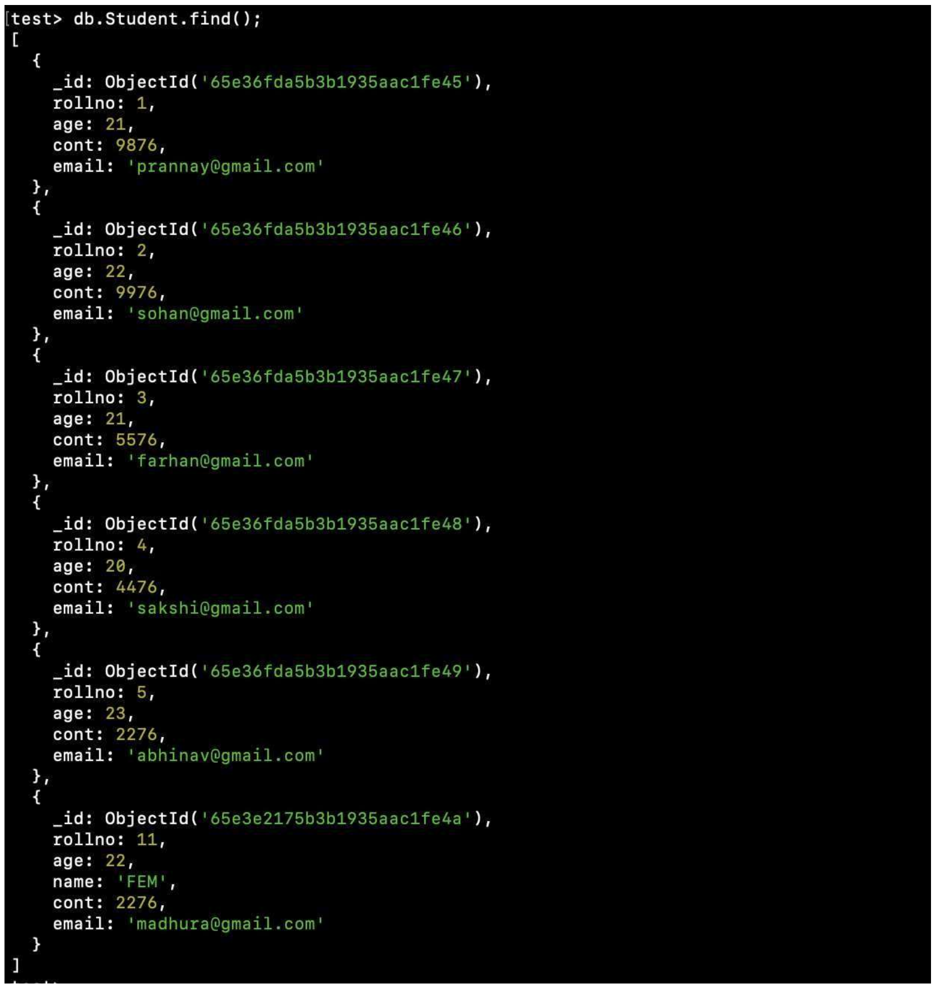


```
test> db.Students.drop();
true
```

● **Import a given csv dataset from local file system into mongodb collection.**

mongoimport mongodb+srv://204:<password>@cluster0.xbmgopf.mongodb.net/test --collection=Student -- type json -file C:\Users\nidhi\Documents\test.Students.json

db.Student.find();



```
test> db.Student.find();
[
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe45'),
    rollno: 1,
    age: 21,
    cont: 9876,
    email: 'prannay@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe46'),
    rollno: 2,
    age: 22,
    cont: 9976,
    email: 'sohan@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe47'),
    rollno: 3,
    age: 21,
    cont: 5576,
    email: 'farhan@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe48'),
    rollno: 4,
    age: 20,
    cont: 4476,
    email: 'sakshi@gmail.com'
  },
  {
    _id: ObjectId('65e36fda5b3b1935aac1fe49'),
    rollno: 5,
    age: 23,
    cont: 2276,
    email: 'abhinav@gmail.com'
  },
  {
    _id: ObjectId('65e3e2175b3b1935aac1fe4a'),
    rollno: 11,
    age: 22,
    name: 'FEM',
    cont: 2276,
    email: 'madhura@gmail.com'
  }
]
```

NoSQL Lab 2

Question

(Week 9)

Perform the following DB operations using MongoDB.

1. Create a collection by name Customers with the following attributes.

Cust_id, Acc_Bal, Acc_Type

2. Insert at least 5 values into the table

3. Write a query to display those records whose total account balance

is greater than 1200 of account type ‘Checking' for each customer_id.

4. Determine Minimum and Maximum account balance for each

customer_id.

5. Export the created collection into local file system

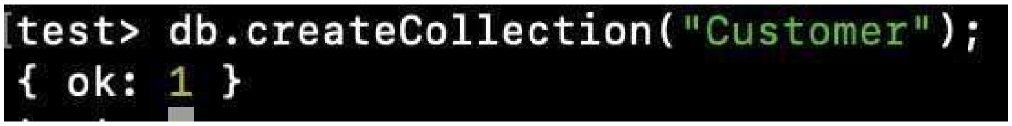
6. Drop the table

7. Import a given csv dataset from local file system into mongodb

collection.

Create Table:

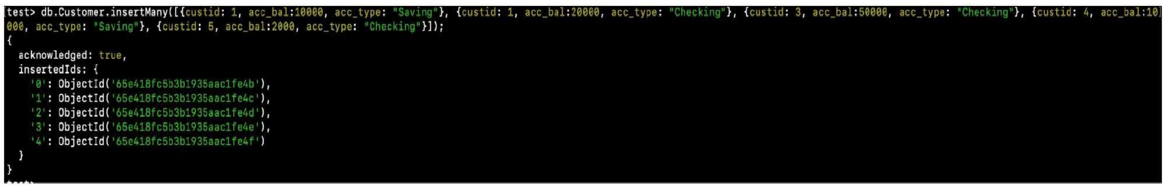
db.createCollection(**"Customer"**);



```
test> db.createCollection("Customer");
{ ok: 1 }
```

Inserting Values:

db.Customer.insertMany([{**custid:** 1, **acc_bal:**10000, **acc_type: "Saving"**}, {**custid:** 1, **acc_bal:**20000, **acc_type: "Checking"**}, {**custid:** 3, **acc_bal:**50000, **acc_type: "Checking"**}, {**custid:** 4, **acc_bal:**10000, **acc_type: "Saving"**}, {**custid:** 5, **acc_bal:**2000, **acc_type: "Checking"**}]);

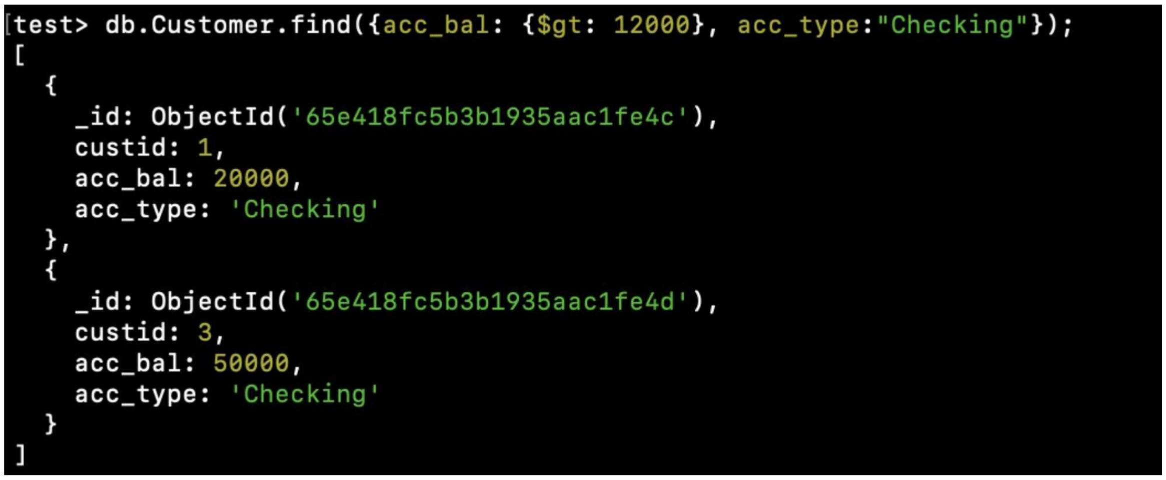


```
test> db.Customer.insertMany([{custid: 1, acc_bal:10000, acc_type: "Saving"}, {custid: 1, acc_bal:20000, acc_type: "Checking"}, {custid: 3, acc_bal:50000, acc_type: "Checking"}, {custid: 4, acc_bal:10
000, acc_type: "Saving"}, {custid: 5, acc_bal:2000, acc_type: "Checking"}]);
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId('65e418fc5b3b1935aac1fe4b'),
    '1': ObjectId('65e418fc5b3b1935aac1fe4c'),
    '2': ObjectId('65e418fc5b3b1935aac1fe4d'),
    '3': ObjectId('65e418fc5b3b1935aac1fe4e'),
    '4': ObjectId('65e418fc5b3b1935aac1fe4f')
  }
}
```

Queries:

- **Finding all checking accounts with balance greater than 12000**

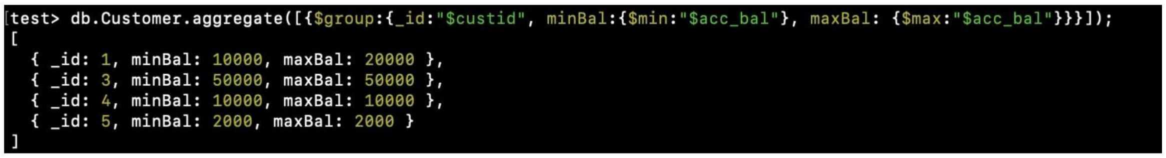
db.Customer.find({**acc_bal**: {$gt: 12000}, **acc_type**:"Checking"});



```
test> db.Customer.find({acc_bal: {$gt: 12000}, acc_type:"Checking"});
[
  {
    _id: ObjectId('65e418fc5b3b1935aac1fe4c'),
    custid: 1,
    acc_bal: 20000,
    acc_type: 'Checking'
  },
  {
    _id: ObjectId('65e418fc5b3b1935aac1fe4d'),
    custid: 3,
    acc_bal: 50000,
    acc_type: 'Checking'
  }
]
```

- **Finding the maximum and minimum balance of each customer**

db.Customer.aggregate([{$group:{_id:**"$custid"**, minBal:{$min:**"$acc_bal"**}, maxBal: {$max:**"$acc_bal"**}}}]);



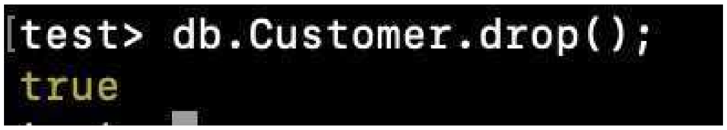
```
test> db.Customer.aggregate([{$group:{_id:"$custid", minBal:{$min:"$acc_bal"}, maxBal: {$max:"$acc_bal"}}}]);
[
  { _id: 1, minBal: 10000, maxBal: 20000 },
  { _id: 3, minBal: 50000, maxBal: 50000 },
  { _id: 4, minBal: 10000, maxBal: 10000 },
  { _id: 5, minBal: 2000, maxBal: 2000 }
]
```

- **Exporting the collection to a json file**

mongoexport mongodb+srv://204:<password>@cluster0.xbmgopf.mongodb.net/test --collection=Customer -- out C:\Users\nidhi\Documents\test.Customer.json

- **Dropping collection "Customer"**

  db.Customer.drop();

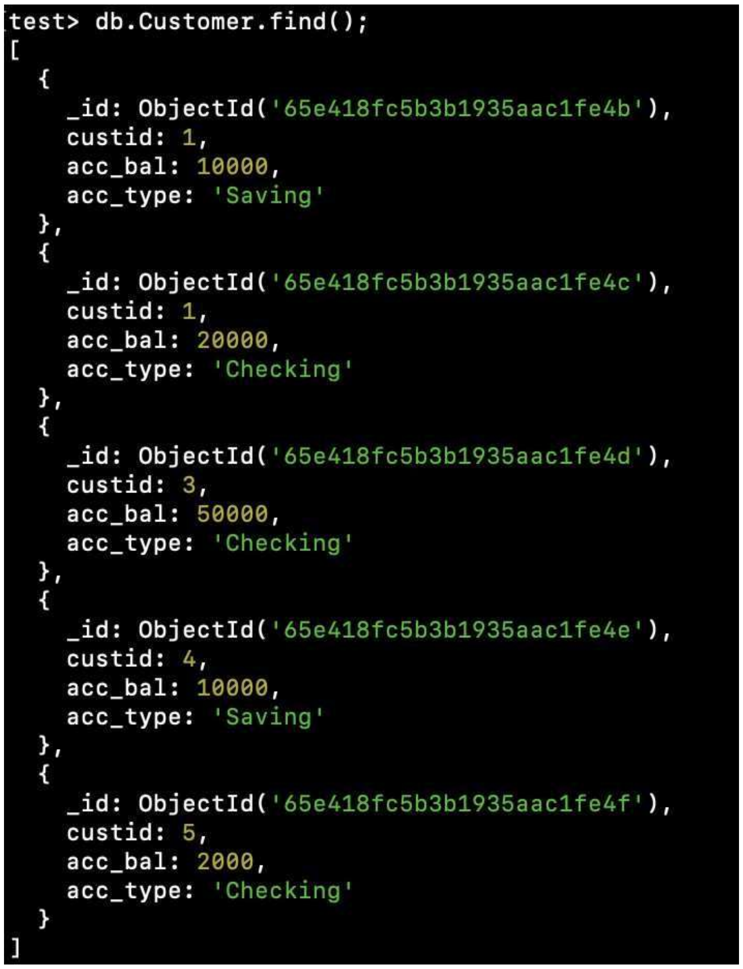


```
[test> db.Customer.drop();
true
```

- **Exporting from a json file to the collection**

mongoimport mongodb+srv://204:<password>@cluster0.xbmgopf.mongodb.net/test --collection=Customer -- type json -file C:\Users\nidhi\Documents\test.Customer.json

db.Customer.find();



```
test> db.Customer.find();
[
  {
    _id: ObjectId('65e418fc5b3b1935aac1fe4b'),
    custid: 1,
    acc_bal: 10000,
    acc_type: 'Saving'
  },
  {
    _id: ObjectId('65e418fc5b3b1935aac1fe4c'),
    custid: 1,
    acc_bal: 20000,
    acc_type: 'Checking'
  },
  {
    _id: ObjectId('65e418fc5b3b1935aac1fe4d'),
    custid: 3,
    acc_bal: 50000,
    acc_type: 'Checking'
  },
  {
    _id: ObjectId('65e418fc5b3b1935aac1fe4e'),
    custid: 4,
    acc_bal: 10000,
    acc_type: 'Saving'
  },
  {
    _id: ObjectId('65e418fc5b3b1935aac1fe4f'),
    custid: 5,
    acc_bal: 2000,
    acc_type: 'Checking'
  }
]
```

NoSQL Lab 3

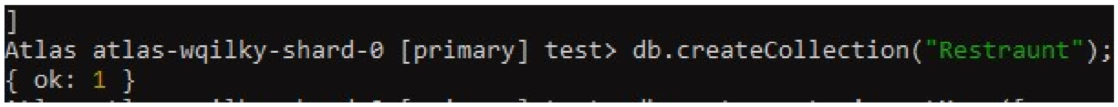
Question

(Week 10)

1. Write a MongoDB query to display all the documents in the collection restaurants.
2. Write a MongoDB query to arrange the name of the restaurants in descending along with all the columns.
3. Write a MongoDB query to find the restaurant Id, name, town and cuisine for those restaurants which achieved a score which is not more than 10.
4. Write a MongoDB query to find the average score for each restaurant.
5. Write a MongoDB query to find the name and address of the restaurants that have a zipcode that starts with '10'.

Creating Table:

db.createCollection(**"Restaurant"**);



```
]
Atlas atlas-wqilky-shard-0 [primary] test> db.createCollection("Restraunt");
{ ok: 1 }
```

Inserting Values:

db.Restraunt.insertMany([

```
 {
  "address": {
   "building": "1007",
   "coord": [-73.856077, 48.848447],
   "street": "Morris Park Ave",
   "zipcode": "18462",
   "borough": "Bronx"
  },
  "cuisine": "Bakery",
  "grades": [
   {"date": new Date("2014-03-03"), "grade": "A", "score": 2},
   {"date": new Date("2013-09-11"), "grade": "A", "score": 6},
   {"date": new Date("2013-01-24"), "grade": "A", "score": 10},
   {"date": new Date("2011-11-23"), "grade": "A", "score": 9},
   {"date": new Date("2011-03-10"), "grade": "B", "score": 14}
  ],
  "name": "Morris Park Bake Shop",
  "restaurant_id": "30075445"
 },
{
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   "building": "2001",
   "coord": [-74.005941, 40.712776],
   "street": "Broadway",
   "zipcode": "10001",
   "borough": "Manhattan"
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  ],
  "name": "Pasta Paradise",
  "restaurant_id": "40092138"
 },
{
  "address": {
   "building": "3003",
   "coord": [-118.243685, 34.052235],
   "street": "Hollywood Blvd",
   "zipcode": "90028",
   "borough": "Los Angeles"
  },
  "cuisine": "Mexican",
  "grades": [
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  ],
  "name": "Sizzling Tacos",
  "restaurant_id": "50065432"
 },
{
  "address": {
    "building": "4004",
    "coord": [77.209021, 28.613939],
    "street": "Connaught Place",
    "zipcode": "110001",
    "borough": "New Delhi"
  },
  "cuisine": "Indian",
  "grades": [
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    {"date": new Date("2018-07-15"), "grade": "B", "score": 5},
    {"date": new Date("2017-04-30"), "grade": "A", "score": 10},
    {"date": new Date("2016-01-12"), "grade": "A", "score": 9},
    {"date": new Date("2015-05-20"), "grade": "A", "score": 12}
  ],
  "name": "Spice Delight",
  "restaurant_id": "60098765"
 },
{
  "address": {
    "building": "5005",
    "coord": [76.780253, 30.728592],
    "street": "Balle Balle Lane",
    "zipcode": "160022",
    "borough": "Chandigarh"
  },
  "cuisine": "Punjabi",
  "grades": [
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    {"date": new Date("2019-08-25"), "grade": "B", "score": 7},
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    {"date": new Date("2017-01-22"), "grade": "A", "score": 8},
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  ],
  "name": "Pind Flavors",
  "restaurant_id": "70087654"
},
{
  "address": {
    "building": "6006",
    "coord": [77.594562, 12.971598],
    "street": "Vidyarthi Bhavan Road",
    "zipcode": "560004",
    "borough": "Bangalore"
  },
  "cuisine": "Kannadiga",
  "grades": [
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    {"date": new Date("2020-05-12"), "grade": "B", "score": 6},
    {"date": new Date("2019-02-28"), "grade": "A", "score": 10},
    {"date": new Date("2018-11-15"), "grade": "A", "score": 9},
    {"date": new Date("2017-07-05"), "grade": "A", "score": 12}
  ],
  "name": "Namma Oota",
  "restaurant_id": "80076543"
},
{
  "address": {
    "building": "7007",
    "coord": [73.856743, 18.520430],
    "street": "Pune-Nashik Highway",
    "zipcode": "411001",
    "borough": "Pune"
  },
  "cuisine": "Maharashtrian",
  "grades": [
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    {"date": new Date("2020-08-10"), "grade": "A", "score": 11},
    {"date": new Date("2019-04-25"), "grade": "A", "score": 8},
    {"date": new Date("2018-10-12"), "grade": "A", "score": 10}
  ],
  "name": "Misal Junction",
  "restaurant_id": "90065432"
 },
{
  "address": {
    "building": "7007",
    "coord": [73.856743, 18.520430],
    "street": "Shivaji Road",
    "zipcode": "411001",
    "borough": "Pune"
  },
  "cuisine": "Maharashtrian",
  "grades": [
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    {"date": new Date("2019-03-12"), "grade": "A", "score": 8},
    {"date": new Date("2018-08-20"), "grade": "A", "score": 10}
  ],
  "name": "Vyanjan Vihar",
  "restaurant_id": "90065432"
 },
{
  "address": {
    "building": "8008",
    "coord": [79.312929, 9.288536],
    "street": "Temple Road",
    "zipcode": "623526",
    "borough": "Rameshwaram"
  },
  "cuisine": "Cafe",
  "grades": [
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    {"date": new Date("2018-04-18"), "grade": "A", "score": 9},
    {"date": new Date("2017-11-30"), "grade": "A", "score": 12}
  ],
  "name": "Rameshwaram Retreat",
  "restaurant_id": "10076543"
 },
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  "address": {
    "building": "9009",
    "coord": [80.270718, 13.082680],
    "street": "Anna Salai",
    "zipcode": "600002",
    "borough": "Chennai"
  },
  "cuisine": "Tamil",
  "grades": [
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    {"date": new Date("2020-11-20"), "grade": "A", "score": 11},
    {"date": new Date("2019-08-12"), "grade": "A", "score": 9},
    {"date": new Date("2018-03-25"), "grade": "A", "score": 10}
  ],
  "name": "Tamil Delicacies",
  "restaurant_id": "11076543"
}]);
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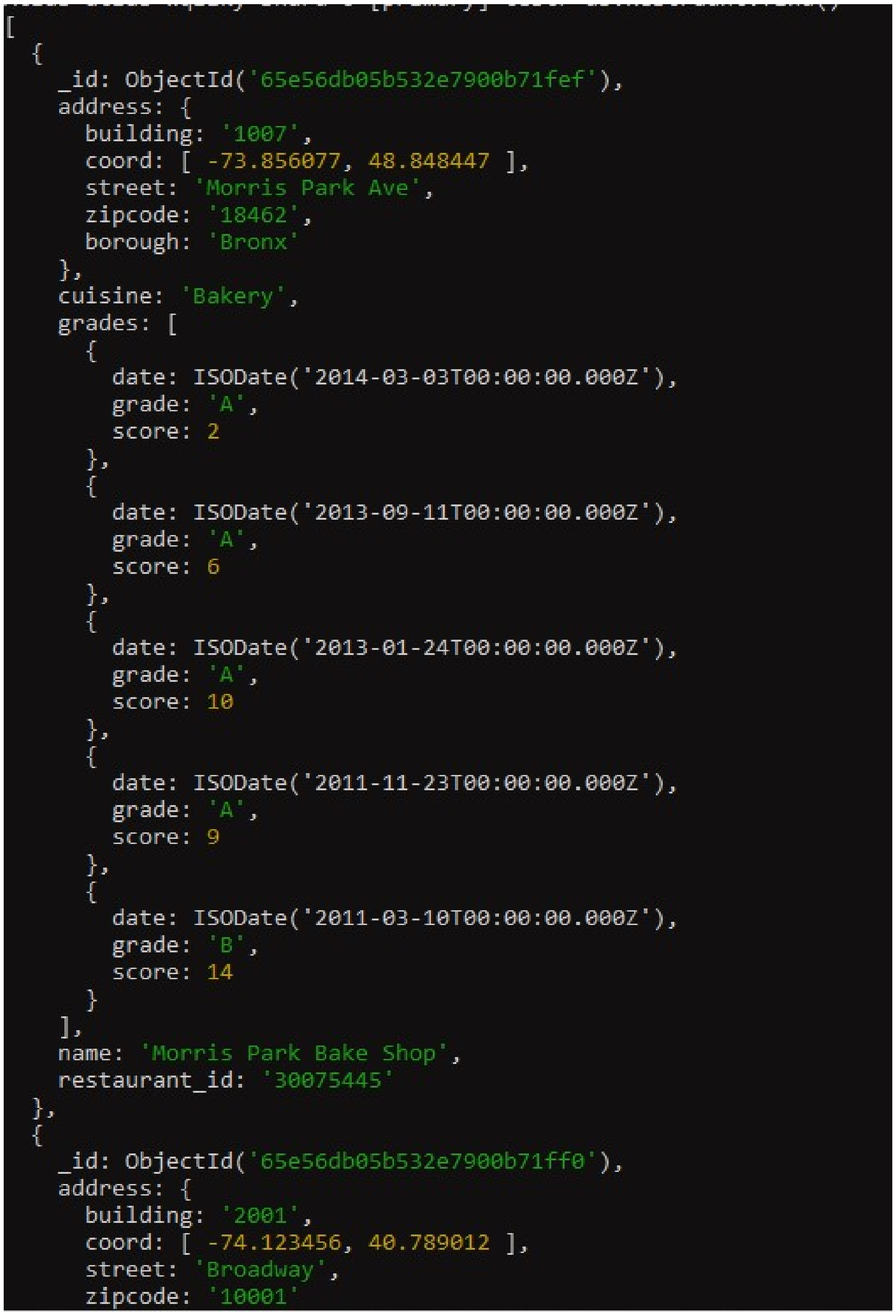
QUERIES

1) db.Restraunt.find()



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  {
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    address: {
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      street: 'Morris Park Ave',
      zipcode: '18462',
      borough: 'Bronx'
    },
    cuisine: 'Bakery',
    grades: [
      {
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        grade: 'A',
        score: 2
      },
      {
        date: ISODate('2013-09-11T00:00:00.000Z'),
        grade: 'A',
        score: 6
      },
      {
        date: ISODate('2013-01-24T00:00:00.000Z'),
        grade: 'A',
        score: 10
      },
      {
        date: ISODate('2011-11-23T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2011-03-10T00:00:00.000Z'),
        grade: 'B',
        score: 14
      }
    ],
    name: 'Morris Park Bake Shop',
    restaurant_id: '30075445'
  },
  {
    _id: ObjectId('65e56db05b532e7900b71ff0'),
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      coord: [ -74.123456, 40.789012 ],
      street: 'Broadway',
      zipcode: '10001'
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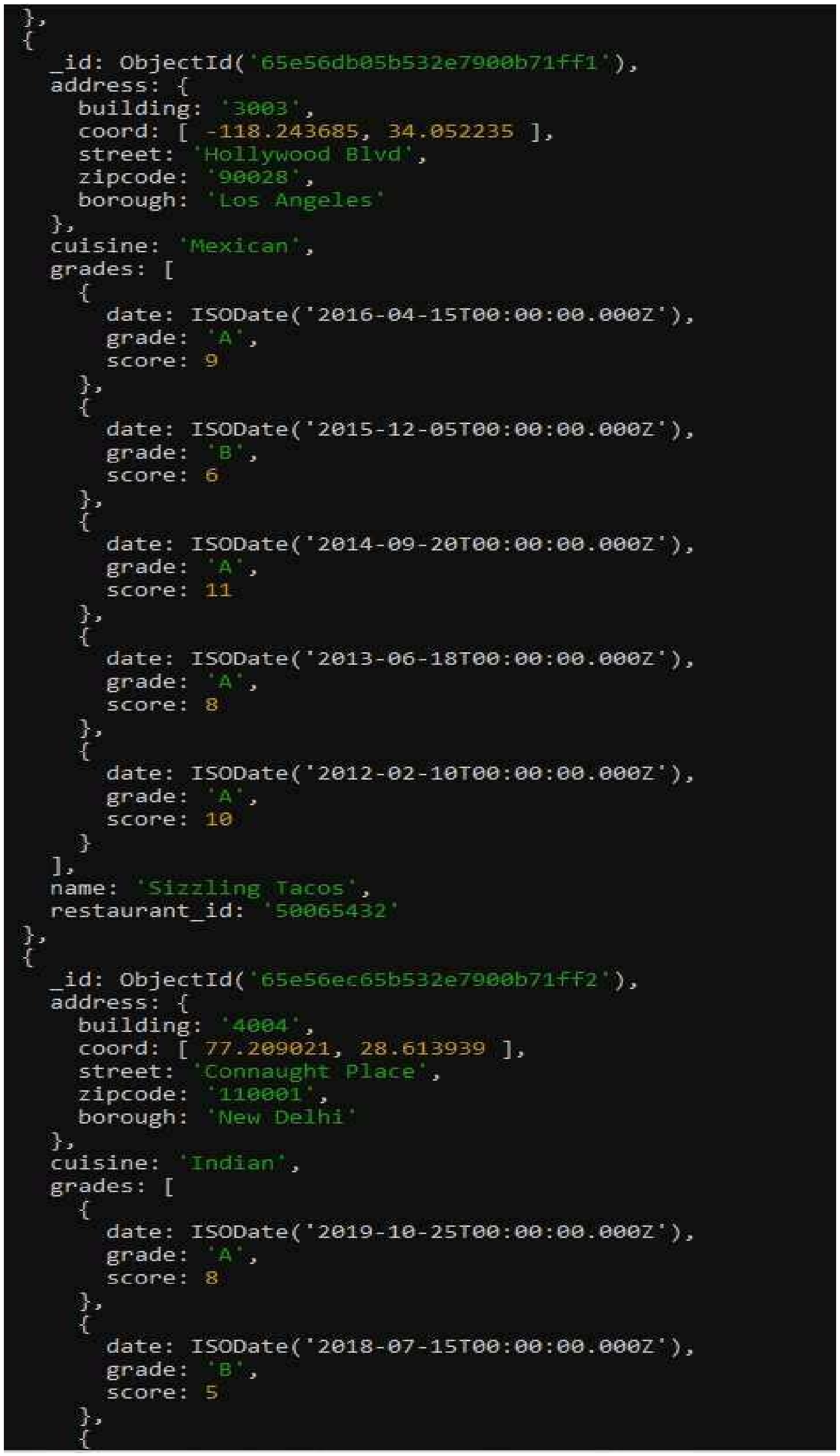

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},
{
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    coord: [ -118.243685, 34.052235 ],
    street: 'Hollywood Blvd',
    zipcode: '90028',
    borough: 'Los Angeles'
  },
  cuisine: 'Mexican',
  grades: [
    {
      date: ISODate('2016-04-15T00:00:00.000Z'),
      grade: 'A',
      score: 9
    },
    {
      date: ISODate('2015-12-05T00:00:00.000Z'),
      grade: 'B',
      score: 6
    },
    {
      date: ISODate('2014-09-20T00:00:00.000Z'),
      grade: 'A',
      score: 11
    },
    {
      date: ISODate('2013-06-18T00:00:00.000Z'),
      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2012-02-10T00:00:00.000Z'),
      grade: 'A',
      score: 10
    }
  ],
  name: 'Sizzling Tacos',
  restaurant_id: '50065432'
},
{
  _id: ObjectId('65e56ec65b532e7900b71ff2'),
  address: {
    building: '4004',
    coord: [ 77.209021, 28.613939 ],
    street: 'Connaught Place',
    zipcode: '110001',
    borough: 'New Delhi'
  },
  cuisine: 'Indian',
  grades: [
    {
      date: ISODate('2019-10-25T00:00:00.000Z'),
      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2018-07-15T00:00:00.000Z'),
      grade: 'B',
      score: 5
    },
    {
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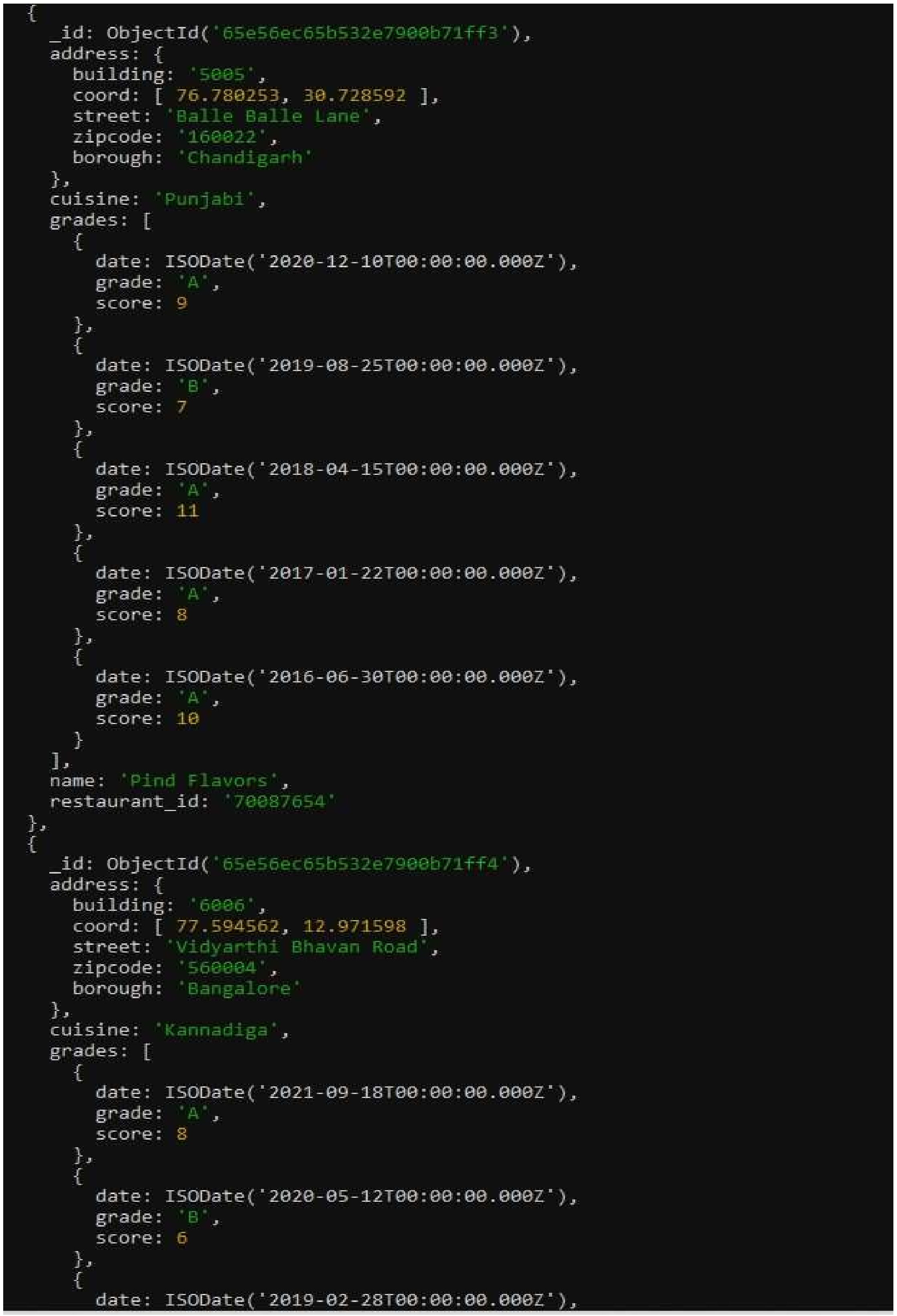

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    coord: [ 76.780253, 30.728592 ],
    street: 'Balle Balle Lane',
    zipcode: '160022',
    borough: 'Chandigarh'
  },
  cuisine: 'Punjabi',
  grades: [
    {
      date: ISODate('2020-12-10T00:00:00.000Z'),
      grade: 'A',
      score: 9
    },
    {
      date: ISODate('2019-08-25T00:00:00.000Z'),
      grade: 'B',
      score: 7
    },
    {
      date: ISODate('2018-04-15T00:00:00.000Z'),
      grade: 'A',
      score: 11
    },
    {
      date: ISODate('2017-01-22T00:00:00.000Z'),
      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2016-06-30T00:00:00.000Z'),
      grade: 'A',
      score: 10
    }
  ],
  name: 'Pind Flavors',
  restaurant_id: '70087654'
},
{
  _id: ObjectId('65e56ec65b532e7900b71ff4'),
  address: {
    building: '6006',
    coord: [ 77.594562, 12.971598 ],
    street: 'Vidyarthi Bhavan Road',
    zipcode: '560004',
    borough: 'Bangalore'
  },
  cuisine: 'Kannadiga',
  grades: [
    {
      date: ISODate('2021-09-18T00:00:00.000Z'),
      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2020-05-12T00:00:00.000Z'),
      grade: 'B',
      score: 6
    },
    {
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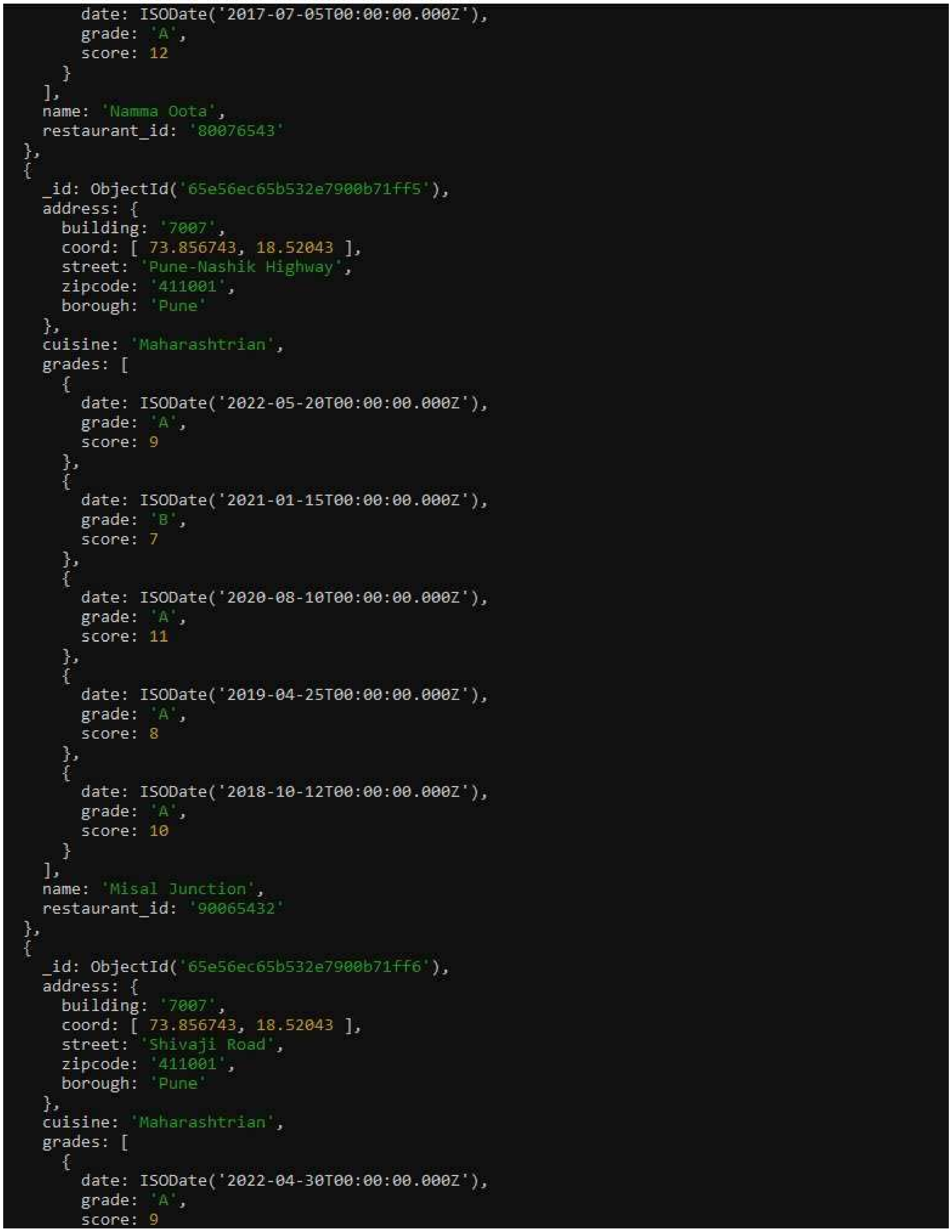
```
      date: ISODate('2017-07-05T00:00:00.000Z'),
      grade: 'A',
      score: 12
    }
  ],
  name: 'Namma Oota',
  restaurant_id: '80076543'
},
{
  _id: ObjectId('65e56ec65b532e7900b71ff5'),
  address: {
    building: '7007',
    coord: [ 73.856743, 18.52043 ],
    street: 'Pune-Nashik Highway',
    zipcode: '411001',
    borough: 'Pune'
  },
  cuisine: 'Maharashtrian',
  grades: [
    {
      date: ISODate('2022-05-20T00:00:00.000Z'),
      grade: 'A',
      score: 9
    },
    {
      date: ISODate('2021-01-15T00:00:00.000Z'),
      grade: 'B',
      score: 7
    },
    {
      date: ISODate('2020-08-10T00:00:00.000Z'),
      grade: 'A',
      score: 11
    },
    {
      date: ISODate('2019-04-25T00:00:00.000Z'),
      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2018-10-12T00:00:00.000Z'),
      grade: 'A',
      score: 10
    }
  ],
  name: 'Misal Junction',
  restaurant_id: '90065432'
},
{
  _id: ObjectId('65e56ec65b532e7900b71ff6'),
  address: {
    building: '7007',
    coord: [ 73.856743, 18.52043 ],
    street: 'Shivaji Road',
    zipcode: '411001',
    borough: 'Pune'
  },
  cuisine: 'Maharashtrian',
  grades: [
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      date: ISODate('2022-04-30T00:00:00.000Z'),
      grade: 'A',
      score: 9
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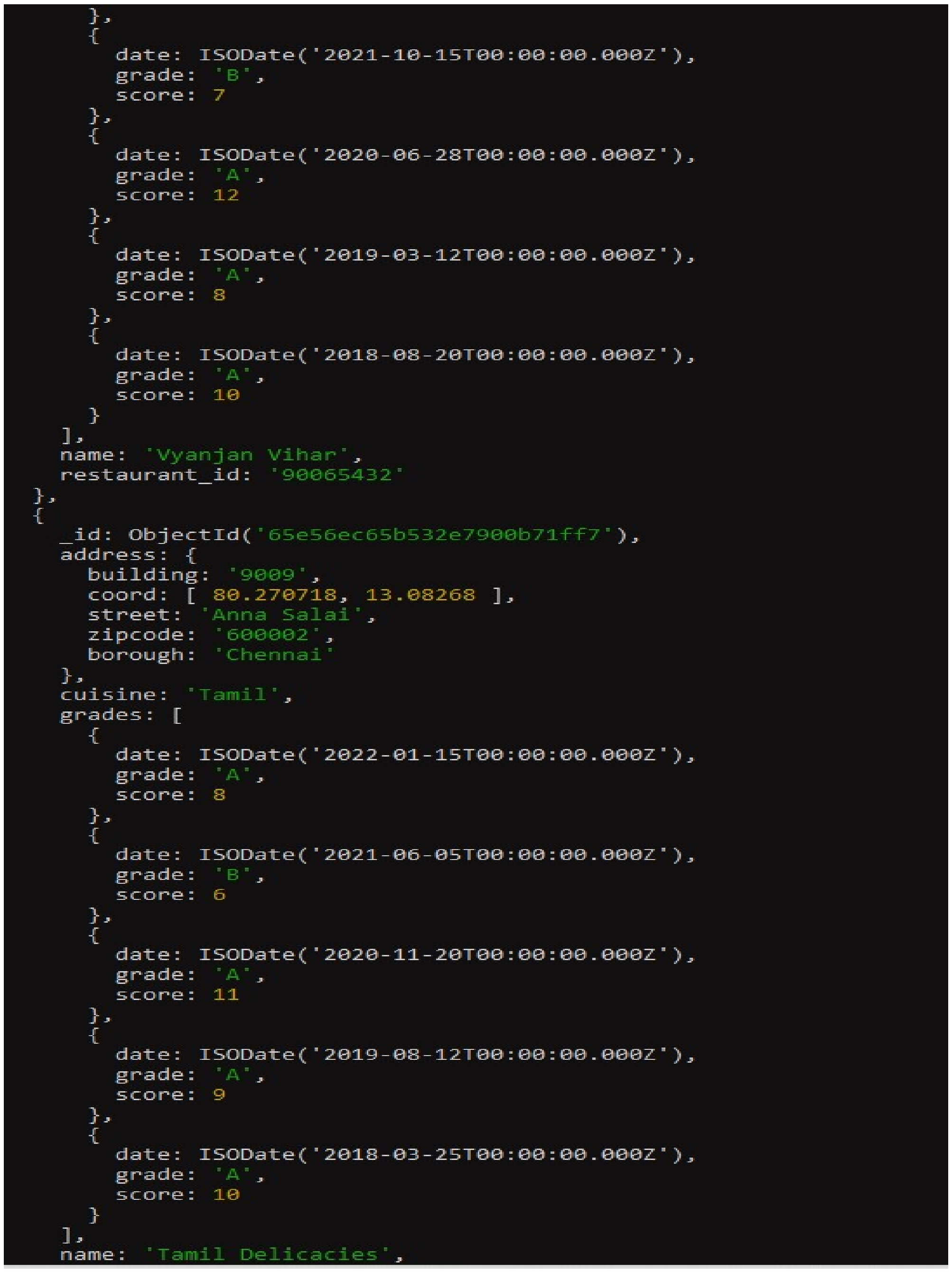

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        grade: 'B',
        score: 7
      },
      {
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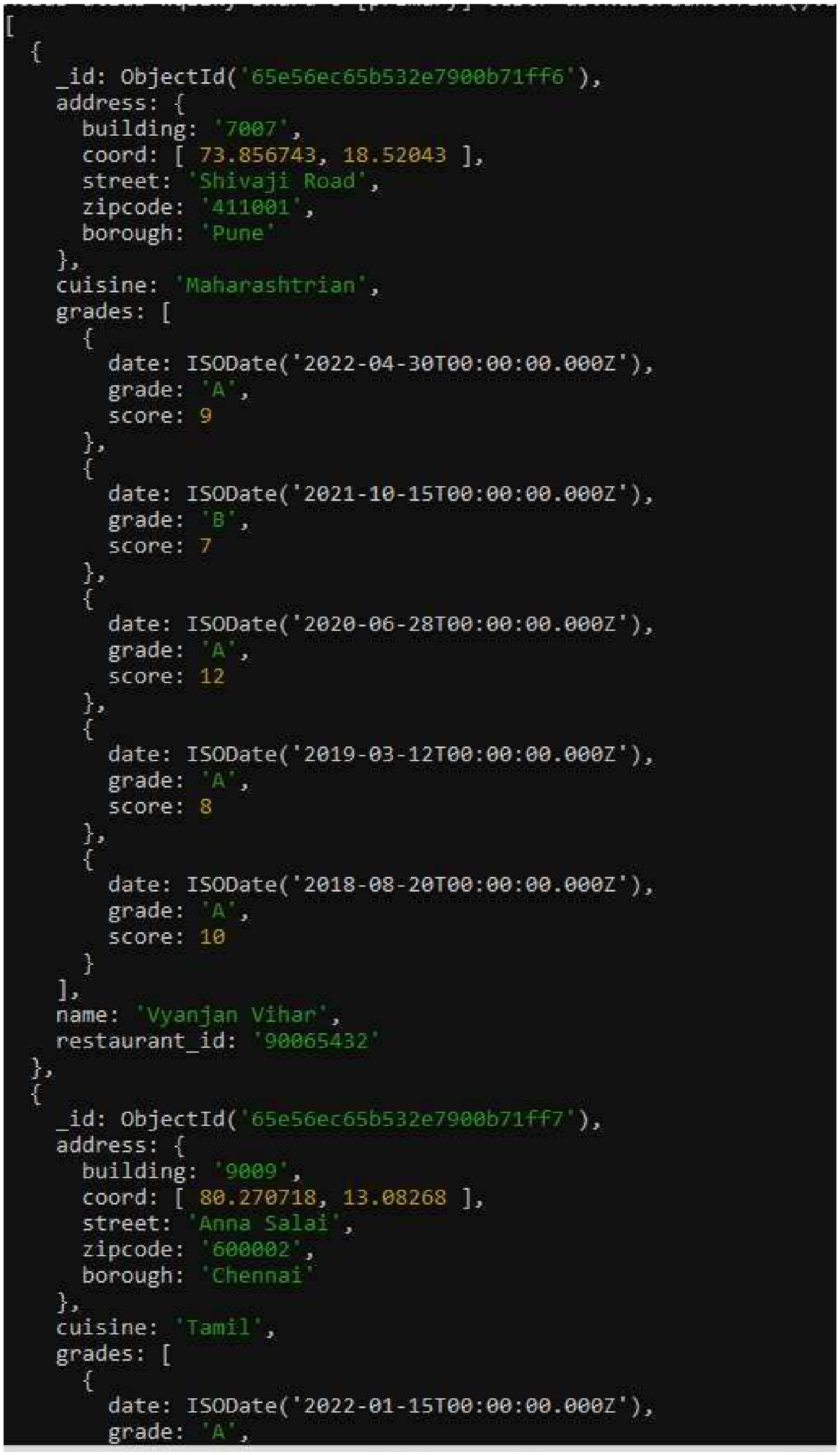
        grade: 'A',
        score: 12
      },
      {
        date: ISODate('2019-03-12T00:00:00.000Z'),
        grade: 'A',
        score: 8
      },
      {
        date: ISODate('2018-08-20T00:00:00.000Z'),
        grade: 'A',
        score: 10
      }
    ],
    name: 'Vyanjan Vihar',
    restaurant_id: '90065432'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff7'),
    address: {
      building: '9009',
      coord: [ 80.270718, 13.08268 ],
      street: 'Anna Salai',
      zipcode: '600002',
      borough: 'Chennai'
    },
    cuisine: 'Tamil',
    grades: [
      {
        date: ISODate('2022-01-15T00:00:00.000Z'),
        grade: 'A',
        score: 8
      },
      {
        date: ISODate('2021-06-05T00:00:00.000Z'),
        grade: 'B',
        score: 6
      },
      {
        date: ISODate('2020-11-20T00:00:00.000Z'),
        grade: 'A',
        score: 11
      },
      {
        date: ISODate('2019-08-12T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2018-03-25T00:00:00.000Z'),
        grade: 'A',
        score: 10
      }
    ],
    name: 'Tamil Delicacies',
```

2) db.Restraunt.find().sort({ "name": -1 });



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    address: {
      building: '7007',
      coord: [ 73.856743, 18.52043 ],
      street: 'Shivaji Road',
      zipcode: '411001',
      borough: 'Pune'
    },
    cuisine: 'Maharashtrian',
    grades: [
      {
        date: ISODate('2022-04-30T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2021-10-15T00:00:00.000Z'),
        grade: 'B',
        score: 7
      },
      {
        date: ISODate('2020-06-28T00:00:00.000Z'),
        grade: 'A',
        score: 12
      },
      {
        date: ISODate('2019-03-12T00:00:00.000Z'),
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        score: 8
      },
      {
        date: ISODate('2018-08-20T00:00:00.000Z'),
        grade: 'A',
        score: 10
      }
    ],
    name: 'Vyanjan Vihar',
    restaurant_id: '90065432'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff7'),
    address: {
      building: '9009',
      coord: [ 80.270718, 13.08268 ],
      street: 'Anna Salai',
      zipcode: '600002',
      borough: 'Chennai'
    },
    cuisine: 'Tamil',
    grades: [
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        date: ISODate('2022-01-15T00:00:00.000Z'),
        grade: 'A',
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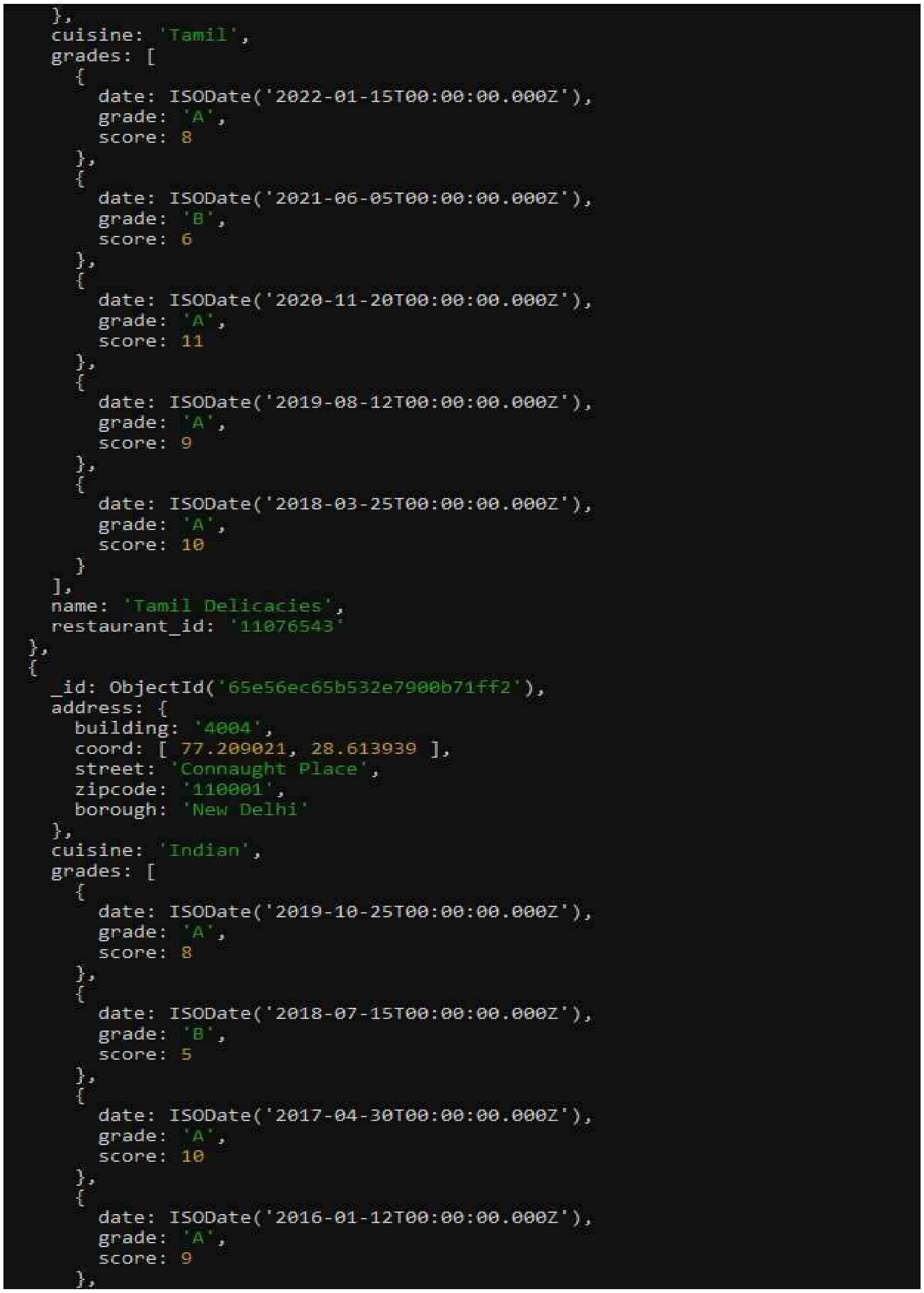

```
  },
  cuisine: 'Tamil',
  grades: [
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      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2021-06-05T00:00:00.000Z'),
      grade: 'B',
      score: 6
    },
    {
      date: ISODate('2020-11-20T00:00:00.000Z'),
      grade: 'A',
      score: 11
    },
    {
      date: ISODate('2019-08-12T00:00:00.000Z'),
      grade: 'A',
      score: 9
    },
    {
      date: ISODate('2018-03-25T00:00:00.000Z'),
      grade: 'A',
      score: 10
    }
  ],
  name: 'Tamil Delicacies',
  restaurant_id: '11076543'
},
{
  _id: ObjectId('65e56ec65b532e7900b71ff2'),
  address: {
    building: '4004',
    coord: [ 77.209021, 28.613939 ],
    street: 'Connaught Place',
    zipcode: '110001',
    borough: 'New Delhi'
  },
  cuisine: 'Indian',
  grades: [
    {
      date: ISODate('2019-10-25T00:00:00.000Z'),
      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2018-07-15T00:00:00.000Z'),
      grade: 'B',
      score: 5
    },
    {
      date: ISODate('2017-04-30T00:00:00.000Z'),
      grade: 'A',
      score: 10
    },
    {
      date: ISODate('2016-01-12T00:00:00.000Z'),
      grade: 'A',
      score: 9
    },
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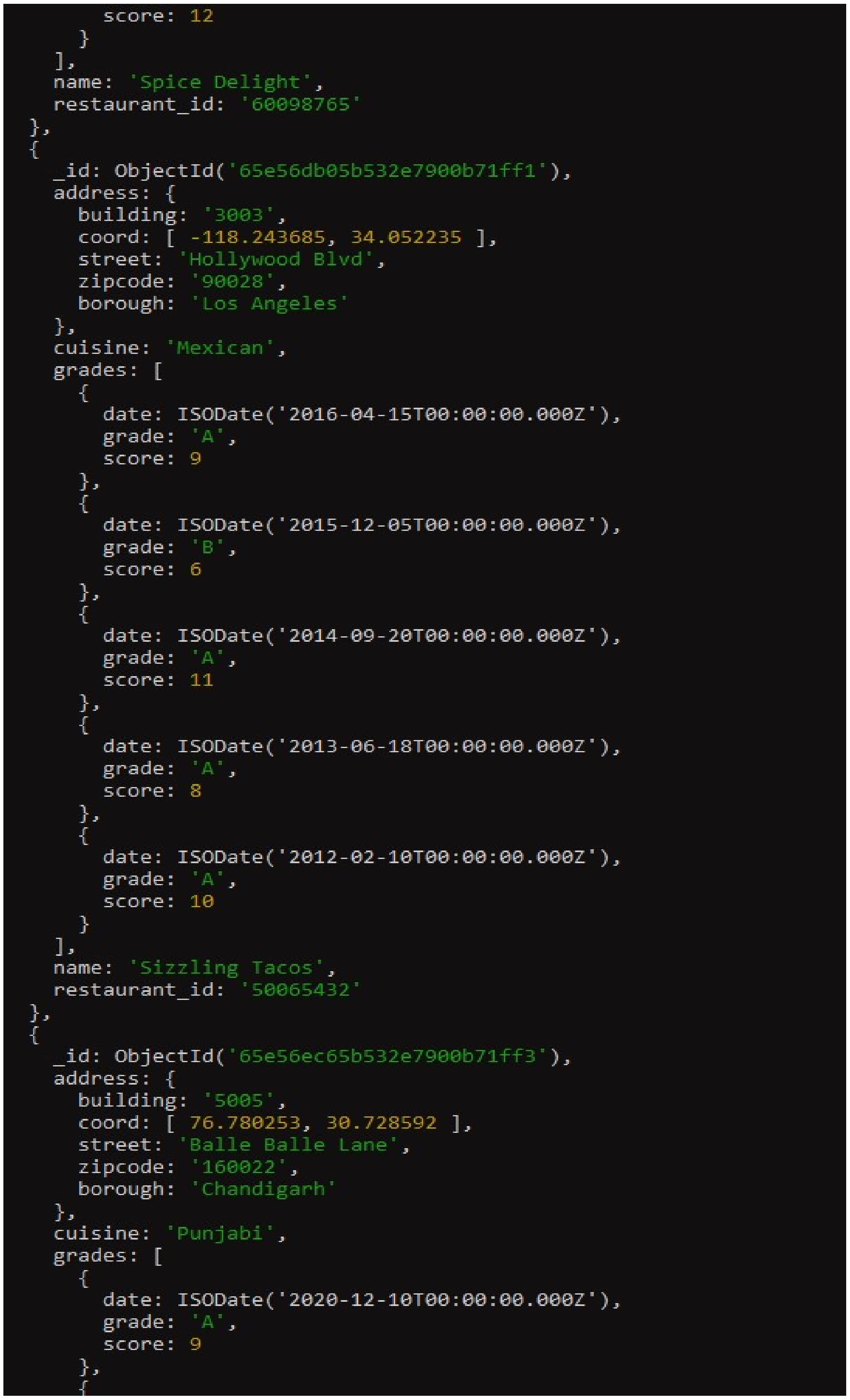

```
        score: 12
      }
    ],
    name: 'Spice Delight',
    restaurant_id: '60098765'
  },
  {
    _id: ObjectId('65e56db05b532e7900b71ff1'),
    address: {
      building: '3003',
      coord: [ -118.243685, 34.052235 ],
      street: 'Hollywood Blvd',
      zipcode: '90028',
      borough: 'Los Angeles'
    },
    cuisine: 'Mexican',
    grades: [
      {
        date: ISODate('2016-04-15T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2015-12-05T00:00:00.000Z'),
        grade: 'B',
        score: 6
      },
      {
        date: ISODate('2014-09-20T00:00:00.000Z'),
        grade: 'A',
        score: 11
      },
      {
        date: ISODate('2013-06-18T00:00:00.000Z'),
        grade: 'A',
        score: 8
      },
      {
        date: ISODate('2012-02-10T00:00:00.000Z'),
        grade: 'A',
        score: 10
      }
    ],
    name: 'Sizzling Tacos',
    restaurant_id: '50065432'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff3'),
    address: {
      building: '5005',
      coord: [ 76.780253, 30.728592 ],
      street: 'Balle Balle Lane',
      zipcode: '160022',
      borough: 'Chandigarh'
    },
    cuisine: 'Punjabi',
    grades: [
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        grade: 'A',
        score: 9
      },
      {
```
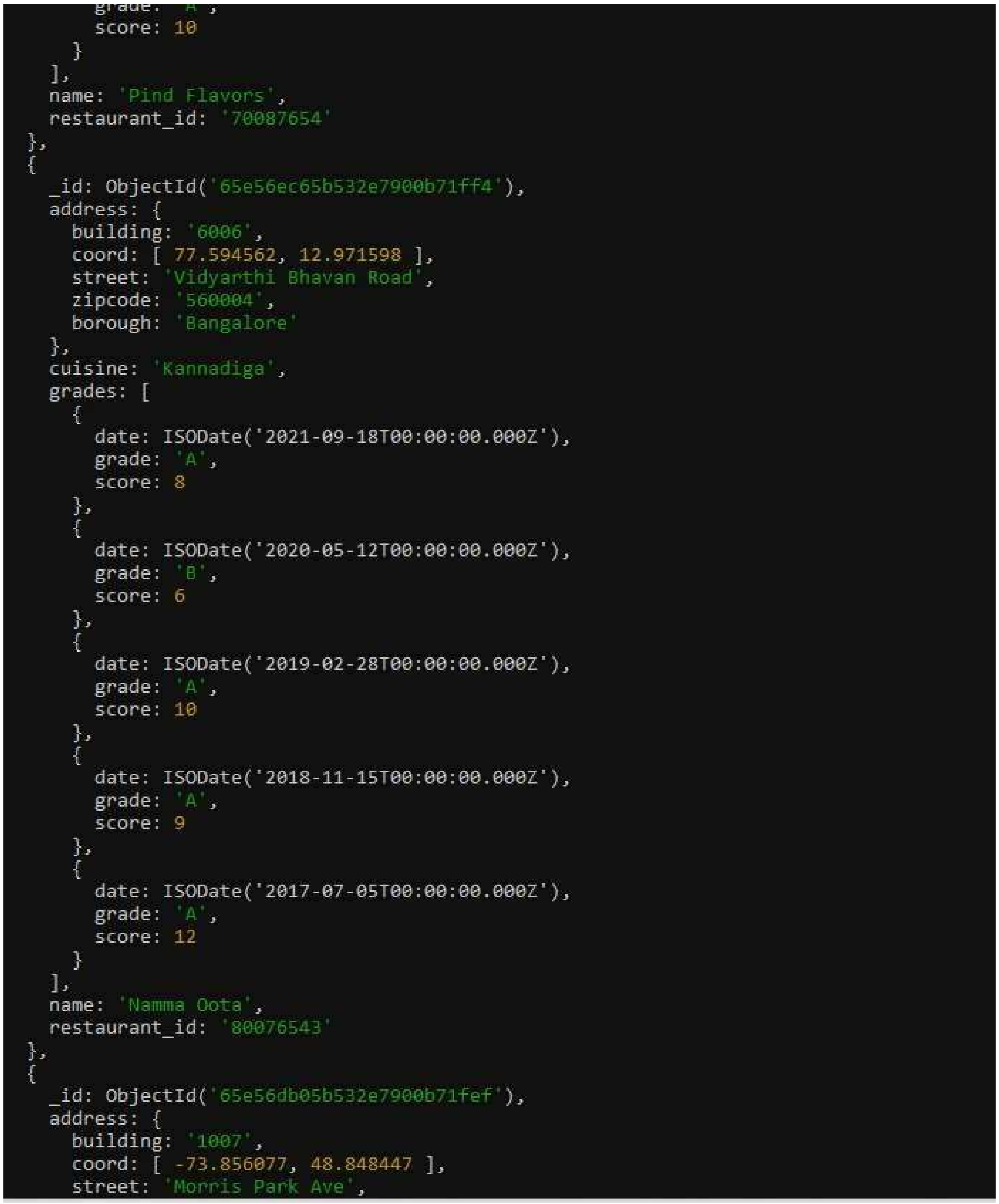
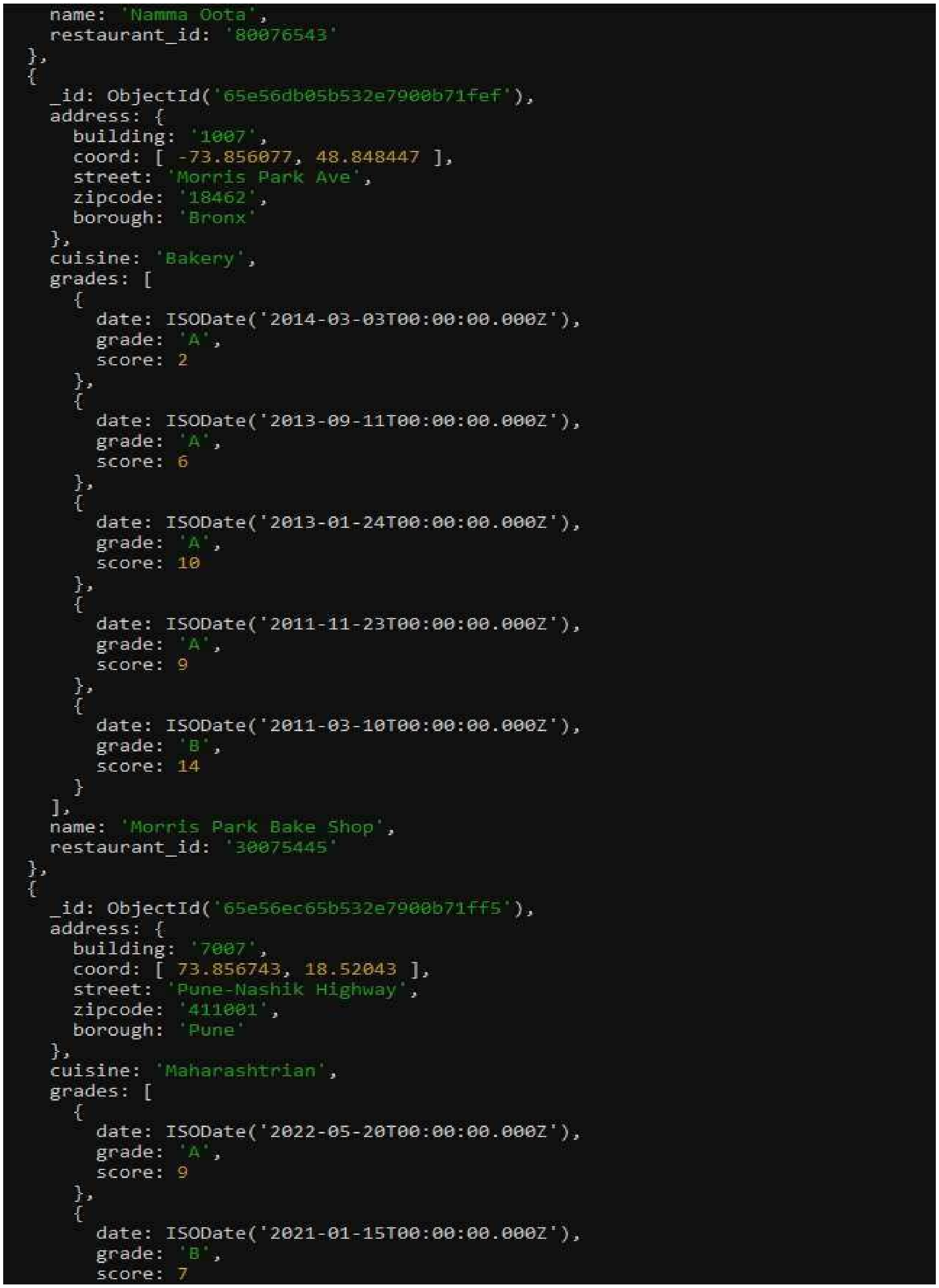
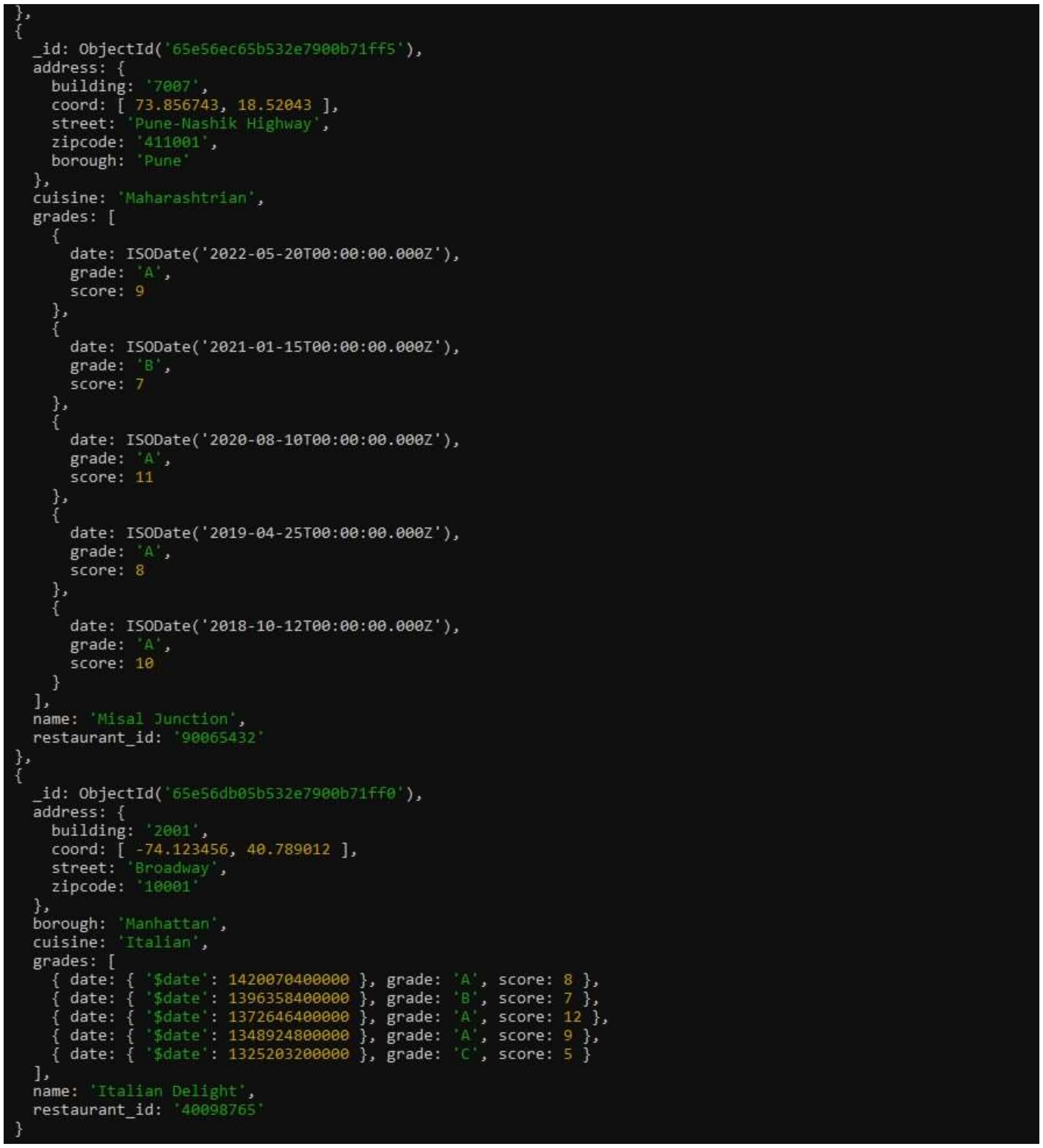
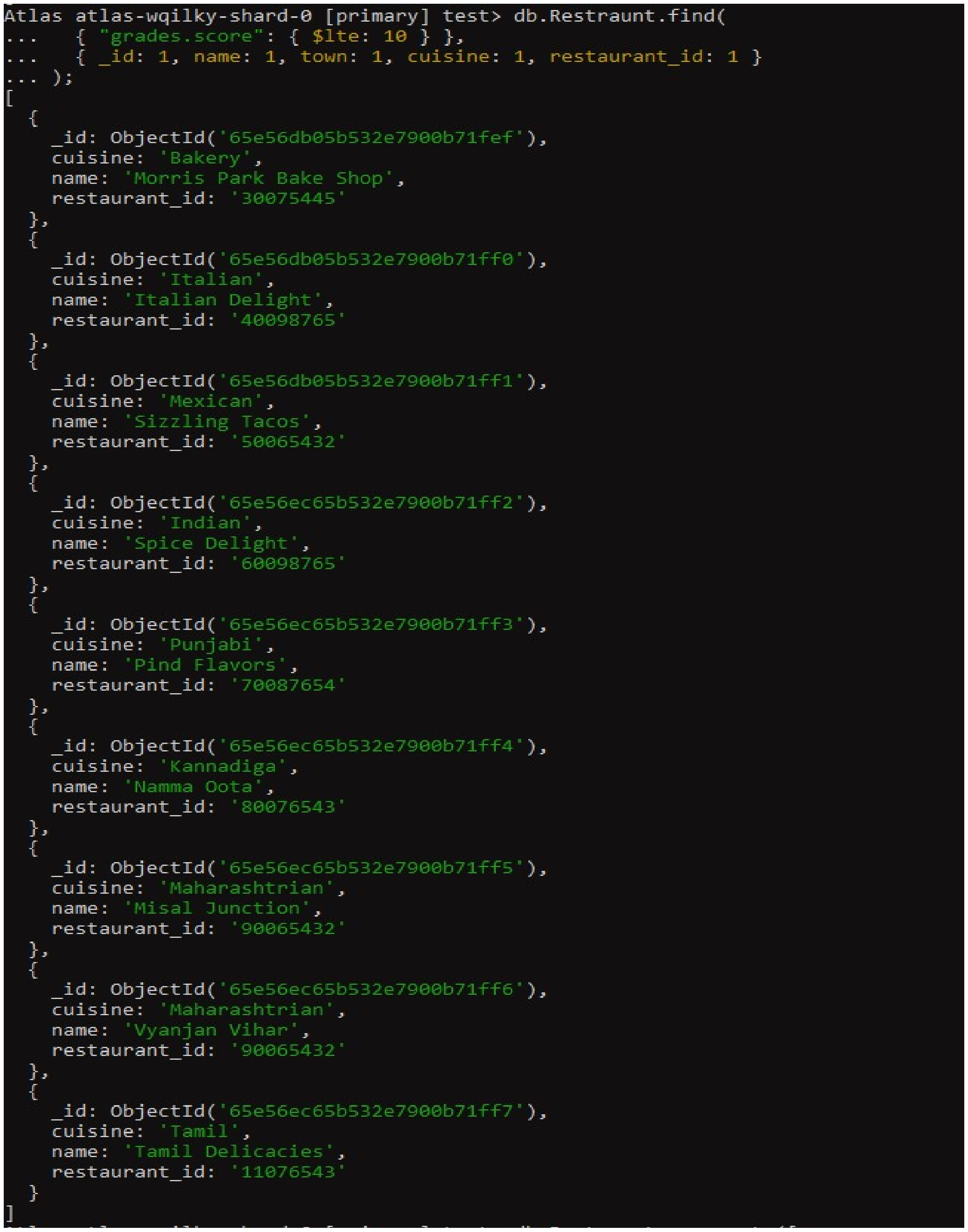



```
        grade: 'A',
        score: 10
      }
    ],
    name: 'Pind Flavors',
    restaurant_id: '70087654'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff4'),
    address: {
      building: '6006',
      coord: [ 77.594562, 12.971598 ],
      street: 'Vidyarthi Bhavan Road',
      zipcode: '560004',
      borough: 'Bangalore'
    },
    cuisine: 'Kannadiga',
    grades: [
      {
        date: ISODate('2021-09-18T00:00:00.000Z'),
        grade: 'A',
        score: 8
      },
      {
        date: ISODate('2020-05-12T00:00:00.000Z'),
        grade: 'B',
        score: 6
      },
      {
        date: ISODate('2019-02-28T00:00:00.000Z'),
        grade: 'A',
        score: 10
      },
      {
        date: ISODate('2018-11-15T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2017-07-05T00:00:00.000Z'),
        grade: 'A',
        score: 12
      }
    ],
    name: 'Namma Oota',
    restaurant_id: '80076543'
  },
  {
    _id: ObjectId('65e56db05b532e7900b71fef'),
    address: {
      building: '1007',
      coord: [ -73.856077, 40.848447 ],
      street: 'Morris Park Ave',
```

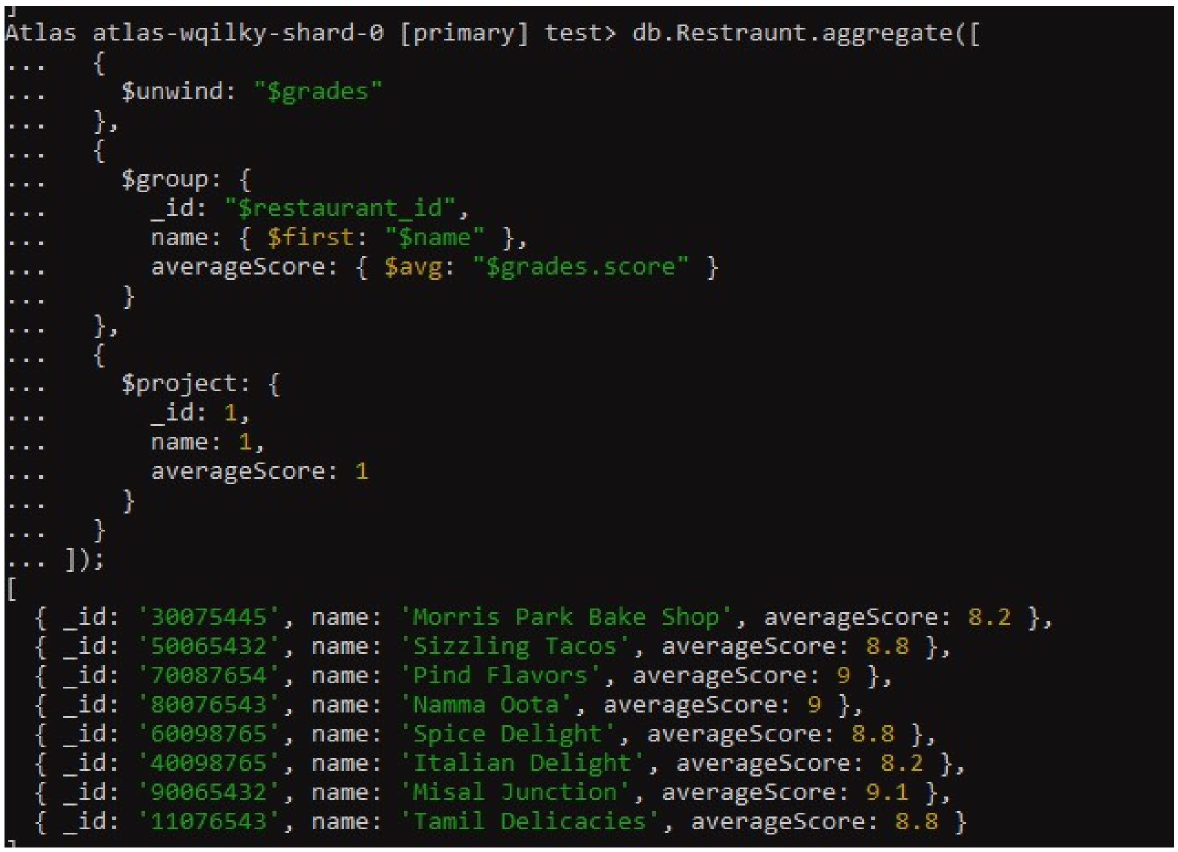

```
    name: 'Namma Oota',
    restaurant_id: '80076543'
  },
  {
    _id: ObjectId('65e56db05b532e7900b71fef'),
    address: {
      building: '1007',
      coord: [ -73.856077, 40.848447 ],
      street: 'Morris Park Ave',
      zipcode: '10462',
      borough: 'Bronx'
    },
    cuisine: 'Bakery',
    grades: [
      {
        date: ISODate('2014-03-03T00:00:00.000Z'),
        grade: 'A',
        score: 2
      },
      {
        date: ISODate('2013-09-11T00:00:00.000Z'),
        grade: 'A',
        score: 6
      },
      {
        date: ISODate('2013-01-24T00:00:00.000Z'),
        grade: 'A',
        score: 10
      },
      {
        date: ISODate('2011-11-23T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2011-03-10T00:00:00.000Z'),
        grade: 'B',
        score: 14
      }
    ],
    name: 'Morris Park Bake Shop',
    restaurant_id: '30075445'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff5'),
    address: {
      building: '7007',
      coord: [ 73.856743, 18.52043 ],
      street: 'Pune-Nashik Highway',
      zipcode: '411001',
      borough: 'Pune'
    },
    cuisine: 'Maharashtrian',
    grades: [
      {
        date: ISODate('2022-05-20T00:00:00.000Z'),
        grade: 'A',
        score: 9
      },
      {
        date: ISODate('2021-01-15T00:00:00.000Z'),
        grade: 'B',
        score: 7
```


```
},
{
  _id: ObjectId('65e56ec65b532e7900b71ff5'),
  address: {
    building: '7007',
    coord: [ 73.856743, 18.52043 ],
    street: 'Pune-Nashik Highway',
    zipcode: '411001',
    borough: 'Pune'
  },
  cuisine: 'Maharashtrian',
  grades: [
    {
      date: ISODate('2022-05-20T00:00:00.000Z'),
      grade: 'A',
      score: 9
    },
    {
      date: ISODate('2021-01-15T00:00:00.000Z'),
      grade: 'B',
      score: 7
    },
    {
      date: ISODate('2020-08-10T00:00:00.000Z'),
      grade: 'A',
      score: 11
    },
    {
      date: ISODate('2019-04-25T00:00:00.000Z'),
      grade: 'A',
      score: 8
    },
    {
      date: ISODate('2018-10-12T00:00:00.000Z'),
      grade: 'A',
      score: 10
    }
  ],
  name: 'Misal Junction',
  restaurant_id: '90065432'
},
{
  _id: ObjectId('65e56db05b532e7900b71ff0'),
  address: {
    building: '2001',
    coord: [ -74.123456, 40.789012 ],
    street: 'Broadway',
    zipcode: '10001'
  },
  borough: 'Manhattan',
  cuisine: 'Italian',
  grades: [
    { date: { '$date': 1420070400000 }, grade: 'A', score: 8 },
    { date: { '$date': 1396358400000 }, grade: 'B', score: 7 },
    { date: { '$date': 1372646400000 }, grade: 'A', score: 12 },
    { date: { '$date': 1348924800000 }, grade: 'A', score: 9 },
    { date: { '$date': 1325203200000 }, grade: 'C', score: 5 }
  ],
  name: 'Italian Delight',
  restaurant_id: '40098765'
}
```

```
   3)  db.Restraunt.find(
  { "grades.score": { $lte: 10 } },
  { _id: 1, name: 1, town: 1, cuisine: 1, restaurant_id: 1 }
);
```


```
Atlas atlas-wqilky-shard-0 [primary] test> db.Restraunt.find(
...   { "grades.score": { $lte: 10 } },
...   { _id: 1, name: 1, town: 1, cuisine: 1, restaurant_id: 1 }
... );
[
  {
    _id: ObjectId('65e56db05b532e7900b71fef'),
    cuisine: 'Bakery',
    name: 'Morris Park Bake Shop',
    restaurant_id: '30075445'
  },
  {
    _id: ObjectId('65e56db05b532e7900b71ff0'),
    cuisine: 'Italian',
    name: 'Italian Delight',
    restaurant_id: '40098765'
  },
  {
    _id: ObjectId('65e56db05b532e7900b71ff1'),
    cuisine: 'Mexican',
    name: 'Sizzling Tacos',
    restaurant_id: '50065432'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff2'),
    cuisine: 'Indian',
    name: 'Spice Delight',
    restaurant_id: '60098765'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff3'),
    cuisine: 'Punjabi',
    name: 'Pind Flavors',
    restaurant_id: '70087654'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff4'),
    cuisine: 'Kannadiga',
    name: 'Namma Oota',
    restaurant_id: '80076543'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff5'),
    cuisine: 'Maharashtrian',
    name: 'Misal Junction',
    restaurant_id: '90065432'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff6'),
    cuisine: 'Maharashtrian',
    name: 'Vyanjan Vihar',
    restaurant_id: '90065432'
  },
  {
    _id: ObjectId('65e56ec65b532e7900b71ff7'),
    cuisine: 'Tamil',
    name: 'Tamil Delicacies',
    restaurant_id: '11076543'
  }
]
```

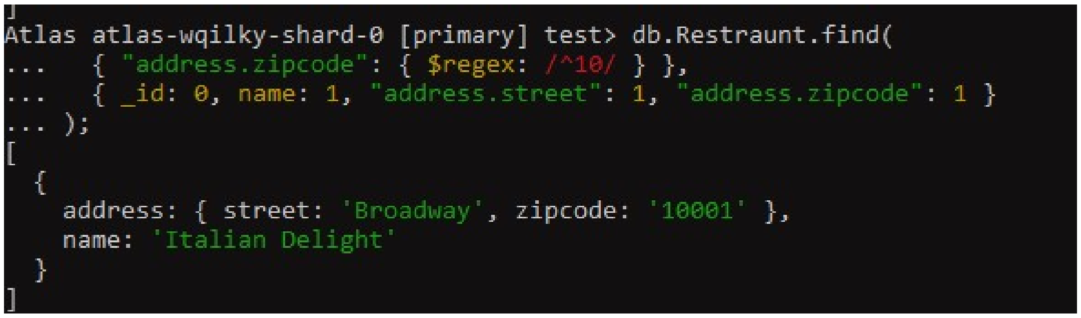
4) db.Restraunt.aggregate([
```
{
  $unwind: "$grades"
},
        {
                $group: {
                _id: "$restaurant_id",
                name: { $first: "$name" },
               averageScore: { $avg: "$grades.score" }
        }
 },
        {
                $project: {
                _id: 1,
                name: 1,
               averageScore: 1
        }
 }
]);
```



```
Atlas atlas-wqilky-shard-0 [primary] test> db.Restraunt.aggregate([
...   {
...     $unwind: "$grades"
...   },
...   {
...     $group: {
...       _id: "$restaurant_id",
...       name: { $first: "$name" },
...       averageScore: { $avg: "$grades.score" }
...     }
...   },
...   {
...     $project: {
...       _id: 1,
...       name: 1,
...       averageScore: 1
...     }
...   }
... ]);
[
  { _id: '30075445', name: 'Morris Park Bake Shop', averageScore: 8.2 },
  { _id: '50065432', name: 'Sizzling Tacos', averageScore: 8.8 },
  { _id: '70087654', name: 'Pind Flavors', averageScore: 9 },
  { _id: '80076543', name: 'Namma Oota', averageScore: 9 },
  { _id: '60098765', name: 'Spice Delight', averageScore: 8.8 },
  { _id: '40098765', name: 'Italian Delight', averageScore: 8.2 },
  { _id: '90065432', name: 'Misal Junction', averageScore: 9.1 },
  { _id: '11076543', name: 'Tamil Delicacies', averageScore: 8.8 }
```

5) db.Restraunt.find(

```
            { "address.zipcode": { $regex: /^10/ } },
            { _id: 0, name: 1, "address.street": 1, "address.zipcode": 1 }
);
```



```
]
Atlas atlas-wqilky-shard-0 [primary] test> db.Restraunt.find(
...   { "address.zipcode": { $regex: /^10/ } },
...   { _id: 0, name: 1, "address.street": 1, "address.zipcode": 1 }
... );
[
  {
    address: { street: 'Broadway', zipcode: '10001' },
    name: 'Italian Delight'
  }
]
```