VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"JnanaSangama", Belgaum -590014, Karnataka.

LAB REPORT

on

Database Management Systems (23CS3PCDBM)

Submitted by

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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

December-2024 to Feb-2025

B. M. S. College of Engineering,

Bull Temple Road, Bengaluru 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 (22CS3PCDBM)" carried out by **Hemanth Kumar R (1BM23CS110),** 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 during the year 2024. 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.

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Index

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_CS098;
use insurance_CS098;
```

Create table

```
create database insurance_CS098;
use insurance_CS098;
create table person_CS098(
driver_id varchar(3) primary key,
name varchar(20) not null,
address varchar(100)
);

create table car_CS098(
reg_no char(8) primary key,
model varchar(20),
year int(4) not null
);

create table accident_CS098(
        report_no int(4) primary key,
   accident_date date,
   location varchar(100)
);
```

```
create table owns_CS098(
        driver_id varchar(3),
        reg_no char(8),
        foreign key(driver_id) references
   person_CS098(driver_id), foreign key(reg_no) references
   car_CS098(reg_no)
);

create table participated_CS098(
        driver_id varchar(3),
   reg_no char(8),
   report_no int(4),
   damage_amt int,
   foreign key(driver_id) references person_CS098(driver_id),
   foreign key(reg_no) references car_CS098(reg_no),
   foreign key (report_no) references accident_CS098(report_no)
);
```

Structure of the table

desc person_CS098;

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_CS098;

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

desc participated_CS098;

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_CS098;

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

desc owns_CS098;

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_CS098 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_CS098 values
        ("KA052250", "Indica", 1990),
   ("KA031181", "Lancer", 1957),
   ("KA095477", "Toyota", 1998),
   ("KA053408", "Honda", 2008),
   ("KA041702", "Audi", 2005);


insert into owns_CS098 values
("A01", "KA052250");
insert into owns_CS098 values
("A02", "KA031181");
insert into owns_CS098 values
("A03", "KA095477");
insert into owns_CS098 values
("A04", "KA053408");
insert into owns_CS098 values
("A05", "KA041702");


insert into accident_CS098 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_CS098 values
        ("A01", "KA052250", 11, 10000), ("A02", "KA031181", 12, 50000),
   ("A03", "KA053408", 13, 25000),
   ("A04", "KA095477", 14, 3000),
   ("A05", "KA041702", 15, 5000);
```

select * **from**
person_CS098; **select** *
from car_CS098; **select** *
from accident_CS098;
select * **from**
owns_CS098;
select * **from** participated_CS098;

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_CS098 **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_CS098, accident_CS098 **where** participated_CS098.report_no = accident_CS098.report_no **and** accident_CS098.accident_date **like "%-08"**;

people_involv...
1

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

insert into accident_CS098 **values** (16, **"01-01-10"**, **"BTM"**); **select** * **from** accident_CS098;

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

TO DO:

- **DISPLAY ACCIDENT DATE AND LOCATION**

select accident_date **as** date, location **from** accident_CS098;

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_CS098.driver_id **as** driver_id **from** accident_CS098, participated_CS098 **where** accident_CS098.report_no = participated_CS098.report_no **and** participated_CS098.damage_amt >= 25000;

driver_id
A02
A03

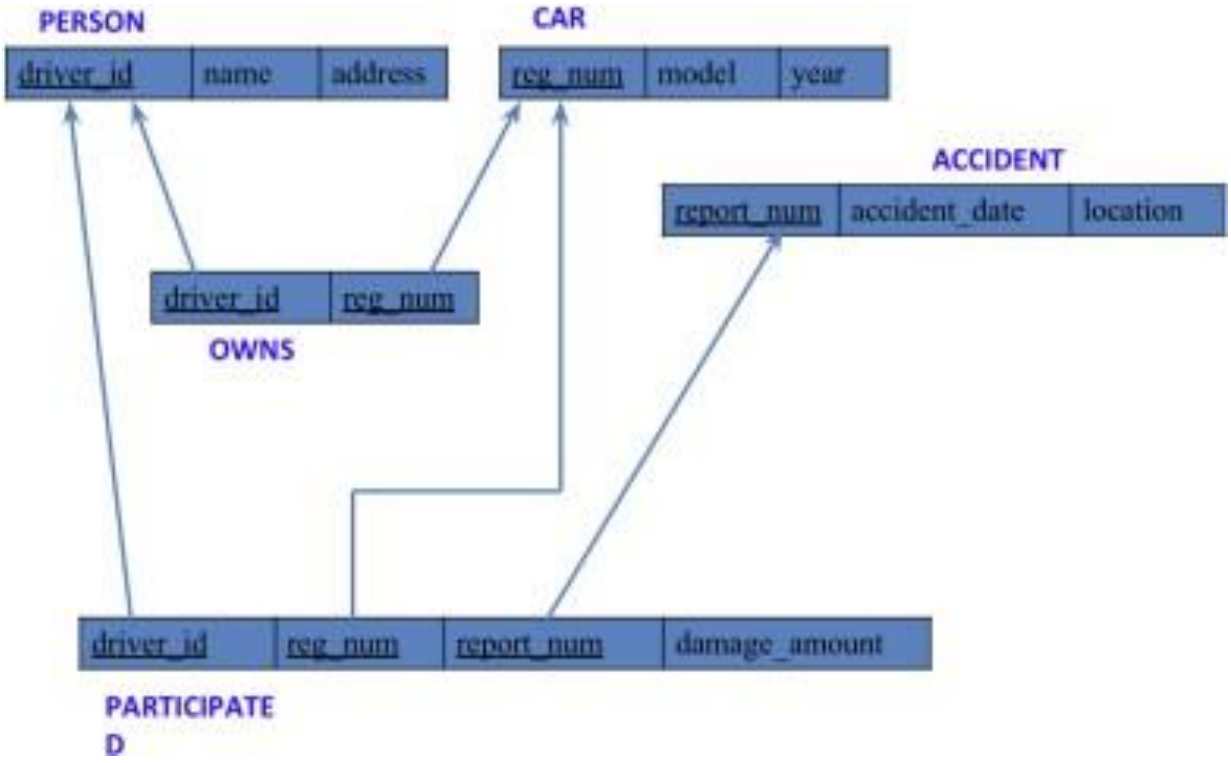
More Queries on Insurance Database

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_CS098 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_CS098, car_CS098 **where** participated_CS098.reg_no = car_CS098.reg_no **group by model**;

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

TO DO:

- **FIND THE AVERAGE DAMAGE AMOUNT**

select avg(damage_amt) **as** average **from** participated_CS098;

average
13600.0000

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

delete from participated_CS098 **where** damage_amt < (**select** * **from** (**select avg**(damage_amt) **from** participated_CS098) **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_CS098, participated_CS098 **where** person_CS098.driver_id = participated_CS098.driver_id **and** participated_CS098.damage_amt > (**select avg**(damage_amt) **from** participated_CS098);

name
Pradeep
Smith

● **FIND MAXIMUM DAMAGE AMOUNT.**

select max(damage_amt) **from** participated_CS098;

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)

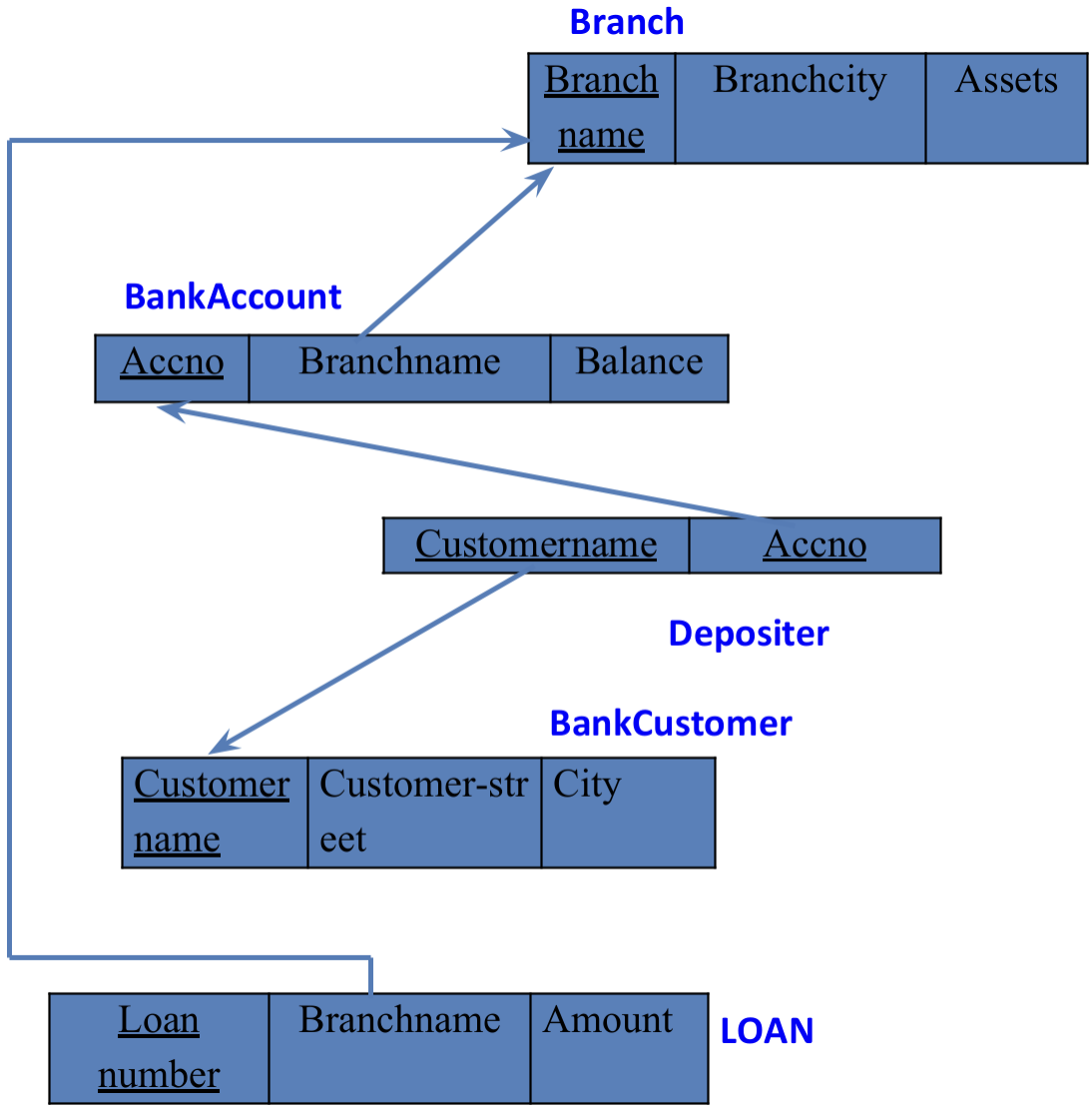
- Create the above tables by properly specifying the primary keys and the foreign keys. - Enter at least five tuples for each relation.

- 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_CS098;
use bank_CS098;
```

Create table

```
create table branch_CS098(
        branch_name varchar(20) primary key,
        branch_city varchar(20),
        assets float
);

create table bank_account_CS098(
```

```
        acc_no int primary key,
        branch_name varchar(20),
    balance float,
    foreign key(branch_name) references branch_CS098(branch_name)
);

create table deposits_CS098(
        customer_name varchar(20),
    acc_no int,
    foreign key(acc_no) references bank_account_CS098(acc_no),
    foreign key(customer_name) references bank_customer_CS098(customer_name)
);

create table bank_customer_CS098(
        customer_name varchar(20) primary key,
    customer_street varchar(50),
    city varchar(15)
);

create table loans_CS098(
        loan_no int primary key,
    branch_name varchar(20),
    amt float,
    foreign key(branch_name) references branch_CS098(branch_name)
);
```

Structure of the table

desc branch_CS098;

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_CS098;

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_CS098;

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

desc loans_CS098;

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_CS098;

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_CS098 values
("Chamrajpet","Banglore",50000),
("ResideRoad","Banglore",10000),
("ShivaRoad","Bombay",20000),
("Parliament","Delhi",10000),
("JMantar","Delhi",20000);

insert into bank_account_CS098 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_CS098 values
("Avinash","BulTemple","Banglore"),
("Dinesh","Banrgutta","Banglore"),
("Mohan","National college","Banglore"),
("Nikhil","Akbar road","Delhi"),
("Ravi","Prithviraj  road","Delhi");

insert into deposits_CS098 values
("Avinash",1),
("Dinesh",2),
("Nikhil",4),
("Ravi",5),
("Avinash",8),
("Nikhil",9),
("Dinesh",10),
("Nikhil",11);

insert into loans_CS098 values
(1,"Chamrajpet",1000),
(2,"ResideRoad",2000),
(3,"ShivaRoad",3000),
(4,"Parliament",4000),
(5,"JMantar",5000);
```

select * **from**
branch_CS098; **select** *
from deposits_CS098;
select * **from** loans_CS098;
select * **from** bank_customer_CS098;
select * **from** bank_account_CS098;

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

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_CS098 **rename column** assets **to** assets_in_lks;
select branch_name, assets_in_lks **from** branch_CS098;

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_CS098 d, bank_account_CS098 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_CS098 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).

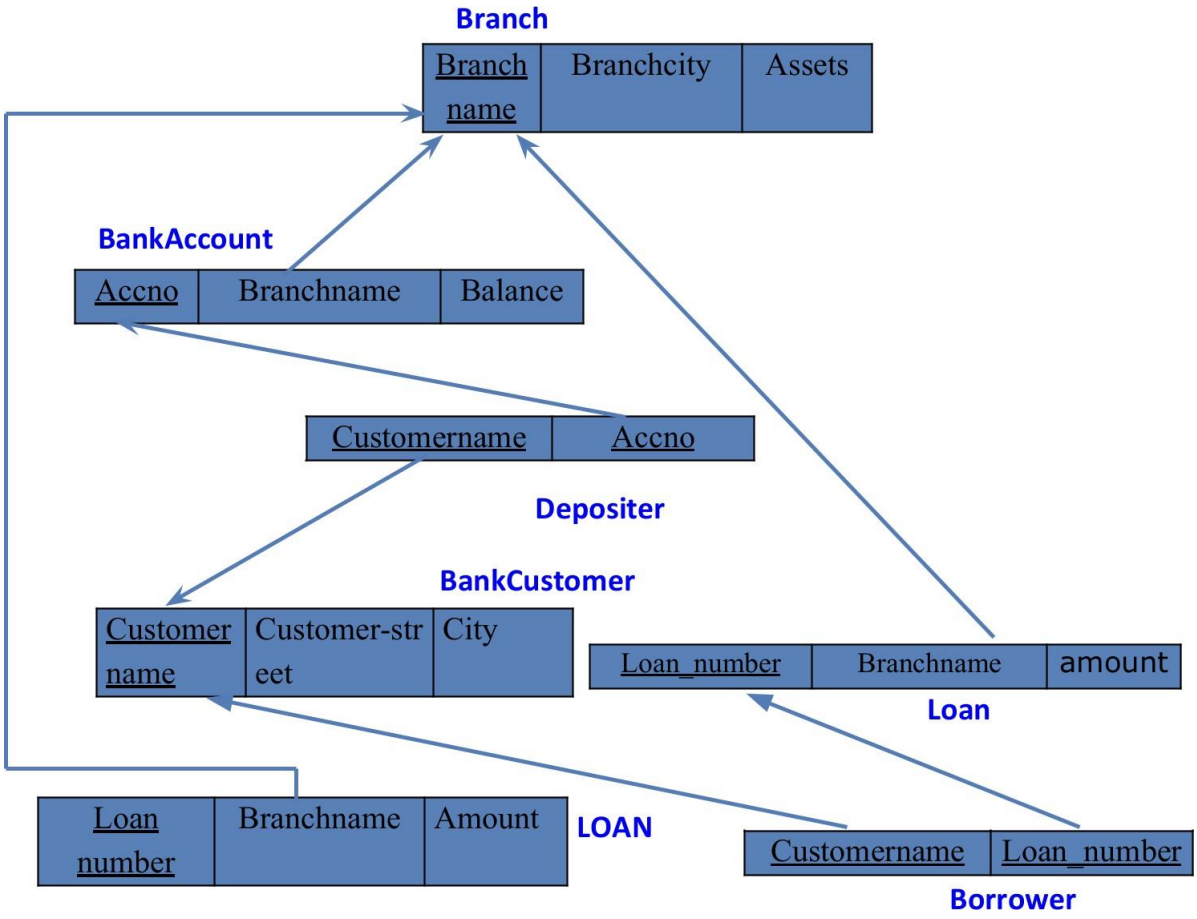
- Find all customers who have a loan at the bank but do not have an account. - Find all customers who have both an account and a loan at the Bangalore branch

- 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_CS098(
        customer_name varchar(20),
   loan_no int,
   foreign key(customer_name) references
                                                bank_customer_CS098(customer_nam
   e), foreign key(loan_no) references loans_CS098(loan_no)
);
```

Inserting values:

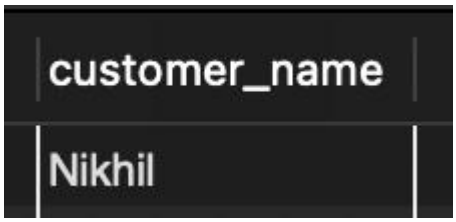
```
insert into branch_CS098 values ("SBI_MantriMarg", "Delhi",
200000); insert into bank_account_CS098 values (12,
"SBI_MantriMarg", 2000); insert into deposits_CS098
values("Nikhil", 12);

insert into borrower_CS098 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).**

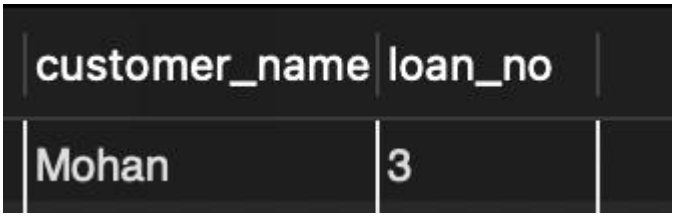
select d.customer_name **from** branch_CS098 b, deposits_CS098 d, bank_account_CS098 ba **where**
b.branch_city='**Delhi' and** d.acc_no=ba.acc_no **and** b.branch_name=ba.branch_name
group by d.customer_name **having count**(**distinct** b.branch_name)= (**select count**(**distinct** b.branch_name) **from** branch_CS098 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.**

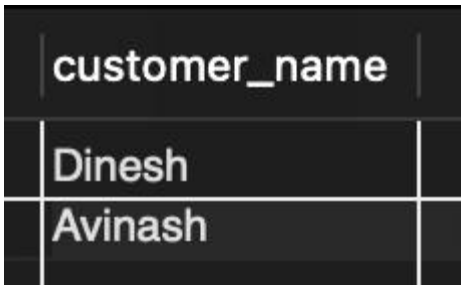
select customer_name, loans_CS098.loan_no
from (borrower_CS098 **right outer join** loans_CS098
on loans_CS098.loan_no = borrower_CS098.loan_no)
where customer_name **not in** (**select** customer_name
from deposits_CS098, bank_account_CS098 **where** deposits_CS098.acc_no = bank_account_CS098.acc_no
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_CS098
where customer_name **in** (**select** deposits_CS098.customer_name **from** branch_CS098, bank_account_CS098, deposits_CS098
where branch_CS098.branch_city = **"Banglore" and** branch_CS098.branch_name = bank_account_CS098.branch_name **and** bank_account_CS098.acc_no = deposits_CS098.acc_no) **and** customer_name **in** (**select** customer_name **from** borrower_CS098, loans_CS098 **where** branch_name **in** (**select** branch_name **from** branch_CS098 **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_CS098 where assets_in_lks > all(select assets_in_lks from branch_CS098 where branch_city = "Banglore");

branch_name
SBI_MantriMarg

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

update bank_account_CS098 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_CS098 where branch_name in (select branch_name from branch_CS098 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.

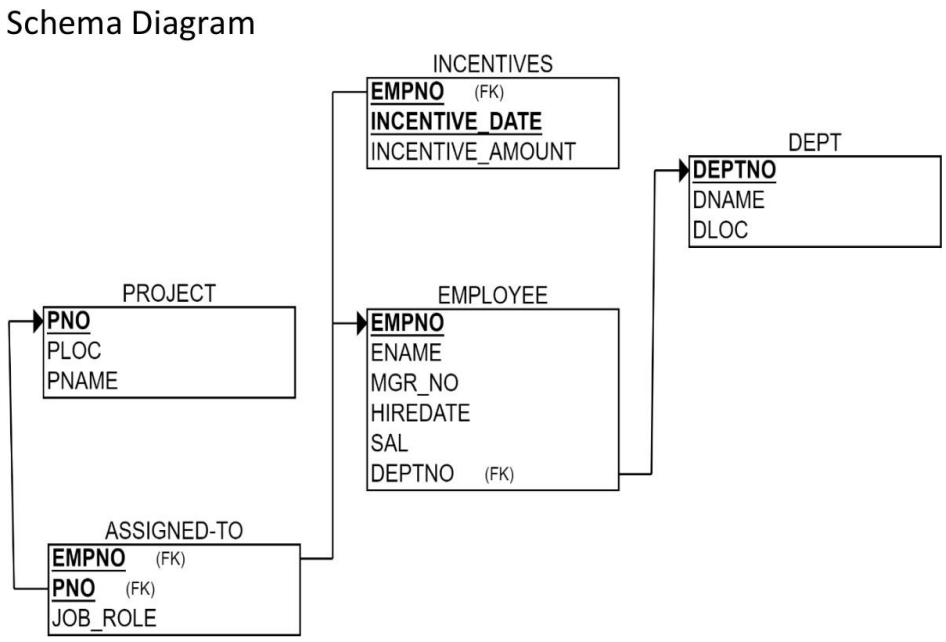
2. Enter greater than five tuples for each table.

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_CS098;
use employee_database_CS098;
```

Create table

```
create table project_CS098(
        pno int primary key,
        ploc varchar(20),
        pname varchar(20)
);
create table dept_CS098(
        deptno int primary key,
        dname varchar(30),
        dloc varchar(30)
);
create table employee_CS098(
        empno int primary key,
        ename varchar(20),
        mgr_no int,
        hiredate date,
        sal double,
        deptno int,
        foreign key(deptno) references dept_CS098(deptno)
);
create table assigned_to_CS098(
        empno int primary key,
        pno int,
        job_role varchar(20),
        foreign key(empno) references
        employee_CS098(empno), foreign key(pno) references
        project_CS098(pno)
);
create table incentives_CS098(
        empno int,
        incentive_date date primary key,
        incentive_amount double,
        foreign key(empno) references employee_CS098(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_CS098 values
        (1,"bengaluru","abcd"),
        (2,"hyderabad","bcda"),
        (3,"bengaluru","abab"),
        (4,"bengaluru","baba"),
        (5,"hyderabad","cdcd"),
    (6, "mysuru", "efef");
select * from
project_CS098;
```

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_CS098 values
        (1,"cse","bengaluru"),
        (2,"ise","hyderabad"),
        (3,"ece","bengaluru"),
        (4,"ete","hyderabad"),
        (5,"ime","bengaluru"),
    (6, "mech", "mysuru");
select * from dept_CS098;
```

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

```
insert into employee_CS098 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_CS098;
```

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_CS098 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_CS098;
```

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

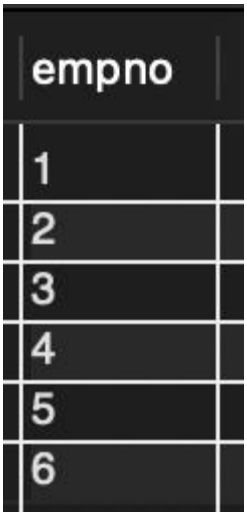
```
insert into assigned_to_CS098
        values
        (1,1, "employee"),
        (2,1, "manager"),
        (3,2, "manager"),
        (4,3, "employee"),
        (5,4, "employee"),
    (6, 6, "employee");
select * from assigned_to_CS098;
```

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_CS098.empno from assigned_to_CS098, project_CS098
where assigned_to_CS098.pno = project_CS098.pno and project_CS098.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_CS098 where empno not in (select empno
from incentives_CS098);
```

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_CS098.empno, ename, dname, job_role, dloc, ploc
from employee_CS098, assigned_to_CS098, project_CS098, dept_CS098
where ploc = dloc and assigned_to_CS098.empno = employee_CS098.empno
and employee_CS098.deptno = dept_CS098.deptno and project_CS098.pno = assigned_to_CS098.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

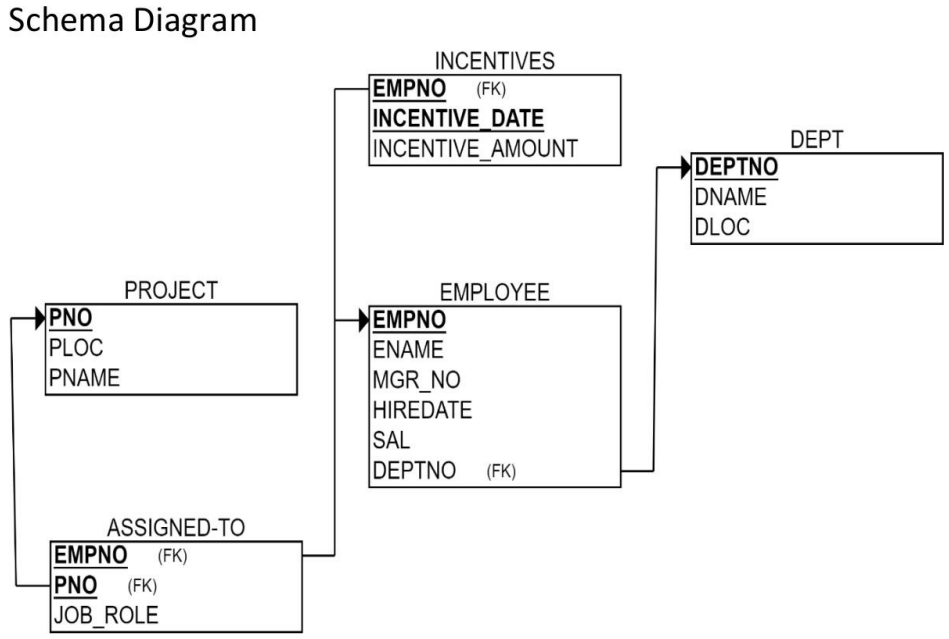
More Queries on Employee Database

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_CS098 e1, employee_CS098 e2
where e1.empno=e2.mgr_no group by e1.ename
having count(e1.mgr_no)=(select count(e1.ename)
from employee_CS098 e1, employee_CS098 e2 where e1.empno=e2.mgr_no
group by e1.ename order by count(e1.ename) desc limit 1);
```

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

```
select m.ename from employee_CS098 m
where m.empno in
(select mgr_no from employee_CS098)
and m.sal>(select avg(n.sal) from employee_CS098 n
where n.mgr_no=m.empno);
```

- **Find the employee details who got second maximum incentive in January 2019.** select * from employee_CS098 where empno=

(select i.empno from incentives_CS098 i

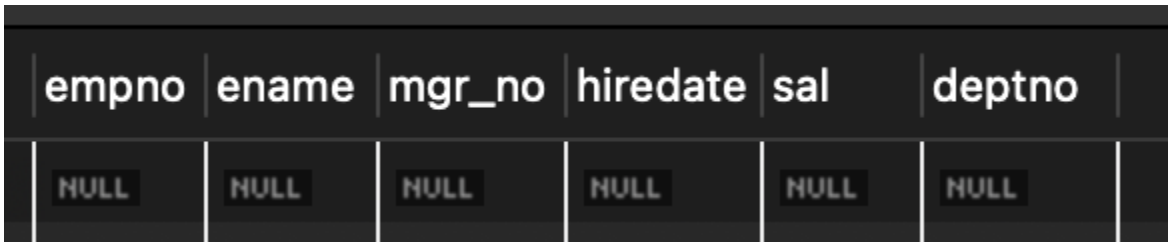
where i.incentive_amount= (select max(n.incentive_amount) from incentives_CS098 n

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

incentives_CS098
inc

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

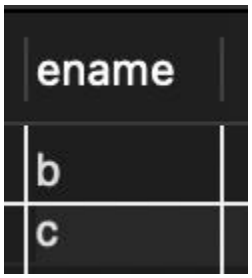
between 2023-01-01 and 2023-12-31));



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_CS098 e1, employee_CS098 e2
where e1.empno=e2.mgr_no and e1.deptno=e2.deptno;
```



ename
b
c

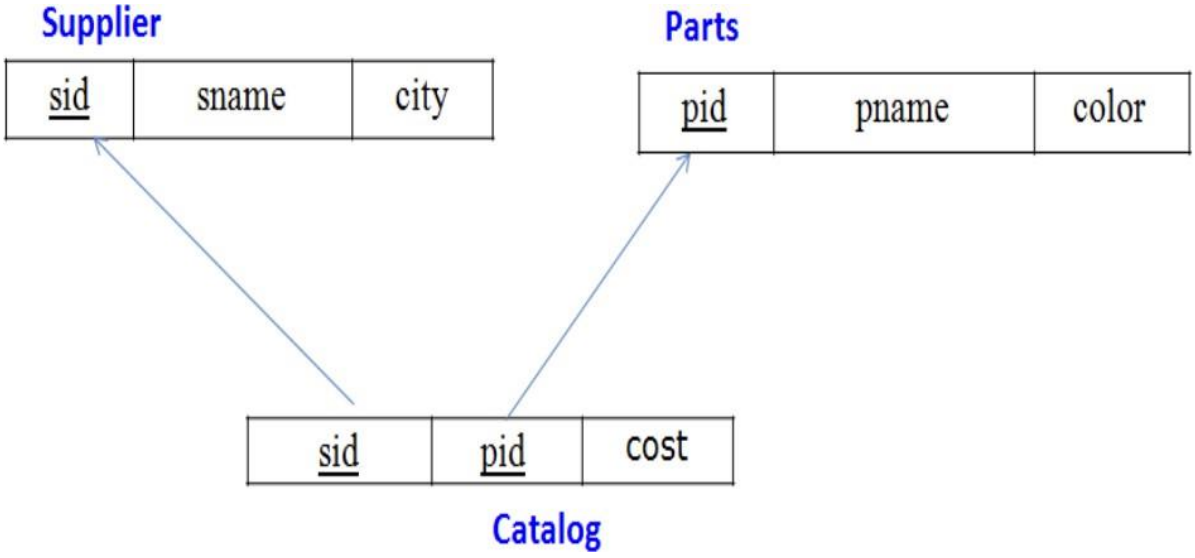
Supplier Database

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_CS098;
use supply_CS098;
```

Create table

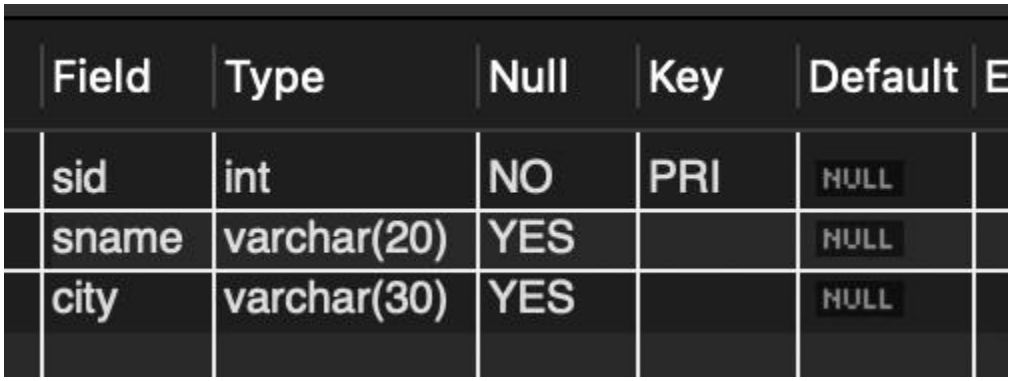
```
create table supplier_CS098(
        sid int primary key,
   sname varchar(20),
   city varchar(30)
);

create table parts_CS098(
        pid int primary key,
   pname varchar(20),
   color varchar(20)
);

create table catalog_CS098(
sid int, pid int,
   cost int,
   foreign key(sid) references
   supplier_CS098(sid), foreign key(pid)
   references parts_CS098(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_CS098 values
        (10001, "acne", "Bangalore"),
    (10002, "johns", "Kolkata"),
    (10003, "vimal", "Mumbai"),
    (10004, "reliance", "Delhi");
select * from supplier_CS098;
```

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

```
insert into parts_CS098 values
        (20001, "Book", "Red"),
    (20002, "Pen", "Red"),
    (20003, "Pencil", "Green"),
    (20004, "Mobile", "Green"),
    (20005, "Charger", "Black");
select * from parts_CS098;
```

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

```
insert into catalog_CS098 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_CS098;
```

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_CS098 **where** pid **in** (**select** pid **from** catalog_CS098);

pname
Book
Pen
Pencil
Mobile
Charger

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

select sname **from** supplier_CS098 **where sid in**
(**select sid from** catalog_CS098 **group by sid having count**(**distinct** pid) = (**select count**(**distinct** pid) **from** parts_CS098));

sname
acne

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

select distinct sname **from** supplier_CS098, parts_CS098, catalog_CS098
where supplier_CS098.sid = catalog_CS098.sid **and**parts_CS098.pid = catalog_CS098.pid **and**
parts_CS098.color="**Red**";

sname
acne
johns

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

select pname **from** parts_CS098 **where** pid **not in**
(**select** pid **from** catalog_CS098 **where sid in** (**select sid from** supplier_CS098 **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_CS098 a **where** a.cost > (**select avg**(b.cost) **from** catalog_CS098 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_CS098 a, supplier_CS098
where a.cost = (**select max**(b.cost) **from** catalog_CS098 b **where** a.pid = b.pid **group by** b.pid) **and**

supplier_CS098.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,**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"**}]);

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

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

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
}
```

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

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
}
```

- **Export the created table into local file system**

mongoexport mongodb+srv://CS098:<password>@cluster0.xbmgopf.mongodb.net/test --collection=Student -- out C:\Users\eashan\Documents\test.Students.json

- **Drop the table**

db.Student.drop();

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

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

mongoimport mongodb+srv://CS098:<password>@cluster0.xbmgopf.mongodb.net/test --collection=Student -- type json -file C:\Users\easha n\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://CS098:<password>@cluster0.xbmgopf.mongodb.net/test --collection=Customer -- out C:\Users\eashan\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://CS098:<password>@cluster0.xbmgopf.mongodb.net/test

```
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'
  }
]
```

--collection=Customer -- type json -file C:\Users\nidhi\Documents\test.Customer.json

db.Customer.find():

NoSQL Lab 3

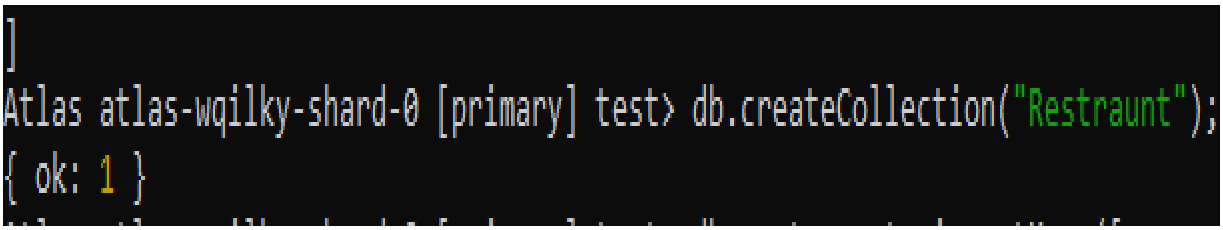
Question

(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**");



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"
 },
{
  "address": {
   "building": "2001",
   "coord": [-74.005941, 40.712776],
   "street": "Broadway",
   "zipcode": "10001",
   "borough": "Manhattan"
  },
  "cuisine": "Italian",
  "grades": [
```

```
      {"date": new Date("2015-08-20"), "grade": "A", "score": 8},
      {"date": new Date("2014-06-10"), "grade": "B", "score": 4},
      {"date": new Date("2013-12-15"), "grade": "A", "score": 11},
      {"date": new Date("2012-09-30"), "grade": "A", "score": 9},
      {"date": new Date("2011-05-12"), "grade": "A", "score": 12}
    ],
    "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": [
      {"date": new Date("2016-04-15"), "grade": "A", "score": 9},
      {"date": new Date("2015-12-05"), "grade": "B", "score": 6},
      {"date": new Date("2014-09-20"), "grade": "A", "score": 11},
      {"date": new Date("2013-06-18"), "grade": "A", "score": 8},
      {"date": new Date("2012-02-10"), "grade": "A", "score": 10}
    ],
    "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": [
      {"date": new Date("2019-10-25"), "grade": "A", "score": 8},
      {"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": [
      {"date": new Date("2020-12-10"), "grade": "A", "score": 9},
```

```
    {"date": new Date("2019-08-25"), "grade": "B", "score": 7},
    {"date": new Date("2018-04-15"), "grade": "A", "score": 11},
    {"date": new Date("2017-01-22"), "grade": "A", "score": 8},
    {"date": new Date("2016-06-30"), "grade": "A", "score": 10}
  ],
  "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": [
    {"date": new Date("2021-09-18"), "grade": "A", "score": 8},
    {"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": {
```

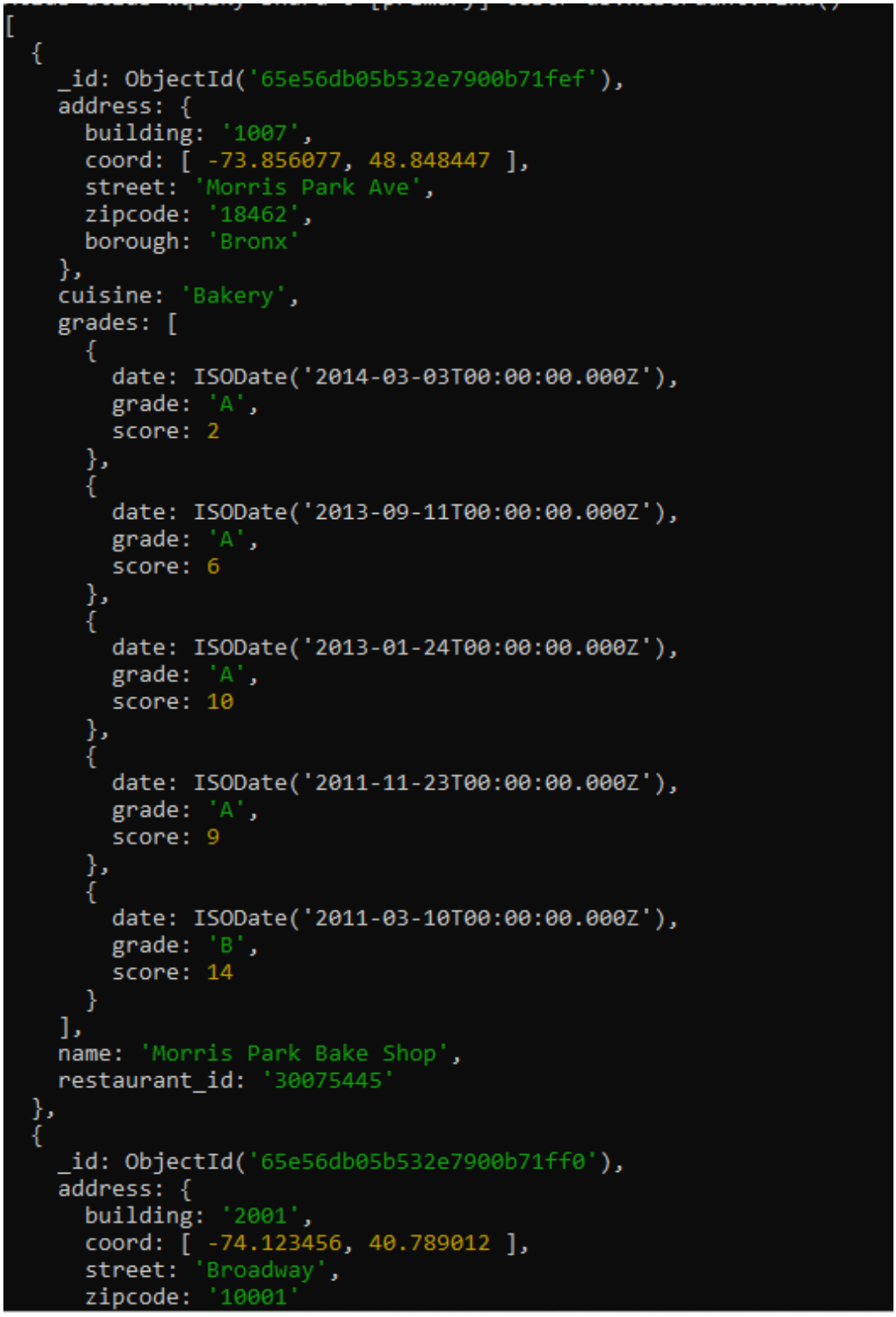
```
    "building": "7007",
    "coord": [73.856743, 18.5CS09830],
    "street": "Pune-Nashik Highway",
    "zipcode": "411001",
    "borough": "Pune"
  },
  "cuisine": "Maharashtrian",
  "grades": [
    {"date": new Date("2022-05-20"), "grade": "A", "score": 9},
    {"date": new Date("2021-01-15"), "grade": "B", "score": 7},
    {"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, 18.5CS09830],
    "street": "Shivaji Road",
    "zipcode": "411001",
    "borough": "Pune"
  },
  "cuisine": "Maharashtrian",
  "grades": [
    {"date": new Date("2022-04-30"), "grade": "A", "score": 9},
    {"date": new Date("2021-10-15"), "grade": "B", "score": 7},
```

```
      {"date": new Date("2020-06-28"), "grade": "A", "score": 12},
      {"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": [
      {"date": new Date("2021-07-22"), "grade": "A", "score": 8},
      {"date": new Date("2020-02-10"), "grade": "B", "score": 5},
      {"date": new Date("2019-09-05"), "grade": "A", "score": 10},
      {"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"
  },
   {
    "address": {
      "building": "9009",
```

```
    "coord": [80.270718, 13.082680],
    "street": "Anna Salai",
    "zipcode": "600002",
    "borough": "Chennai"
  },
  "cuisine": "Tamil",
  "grades": [
    {"date": new Date("2022-01-15"), "grade": "A", "score": 8},
    {"date": new Date("2021-06-05"), "grade": "B", "score": 6},
    {"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"
}]);
```

QUERIES

1) db.Restraunt.find()

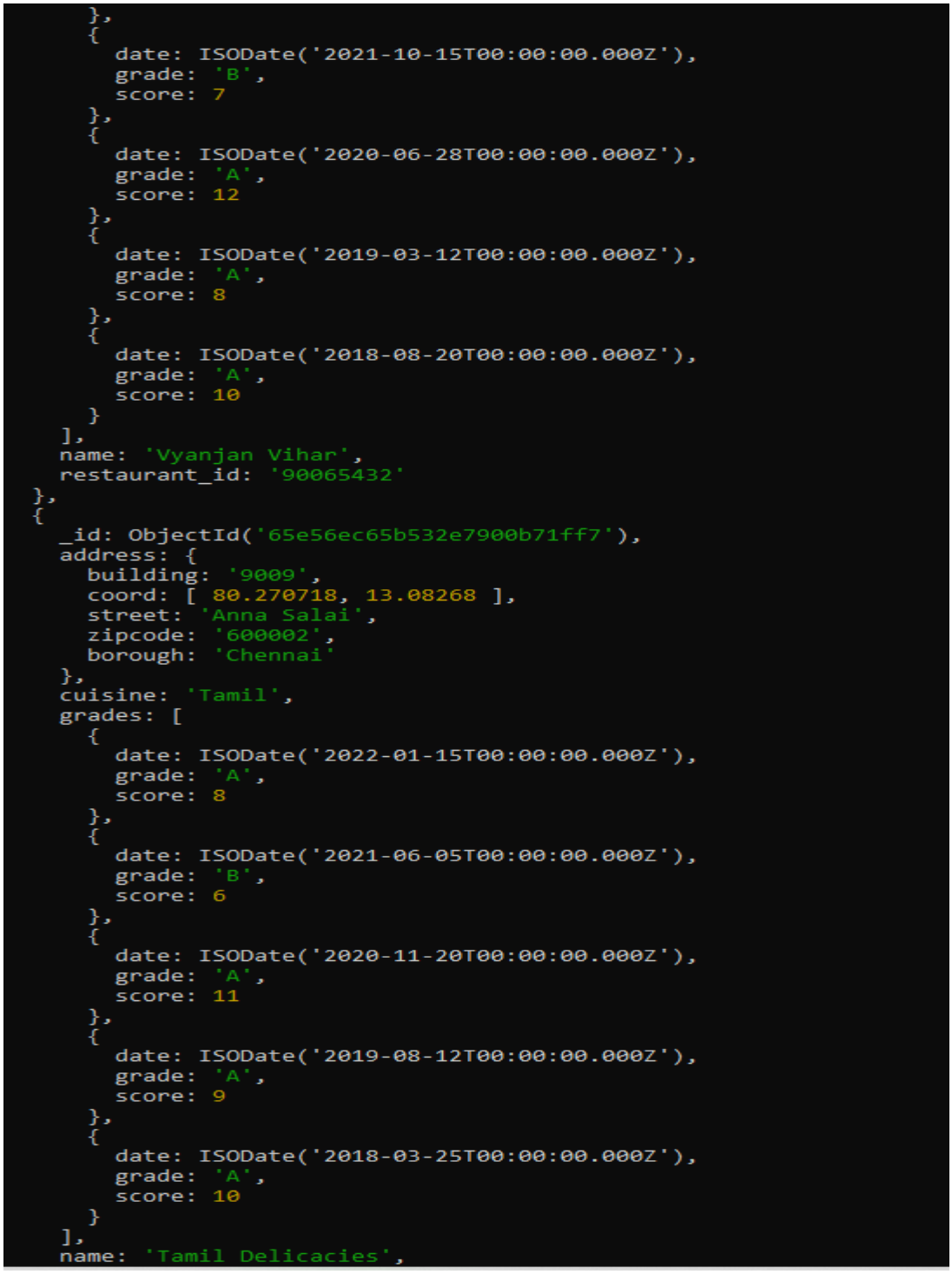


```
[
  {
    _id: ObjectId('65e56db05b532e7900b71fef'),
    address: {
      building: '1007',
      coord: [ -73.856077, 48.848447 ],
      street: 'Morris Park Ave',
      zipcode: '18462',
      borough: 'Bronx'
    },
    cuisine: 'Bakery',
    grades: [
      {
        date: ISODate('2014-03-03T00:00:00.000Z'),
        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('65e56db05b532e7900b71ff0'),
    address: {
      building: '2001',
      coord: [ -74.123456, 40.789012 ],
      street: 'Broadway',
      zipcode: '10001'
```

```
},
{
  _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('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
    },
    {
```

```
{
  _id: ObjectId('65e56ec65b532e7900b71ff3'),
  address: {
    building: '5005',
    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
    },
    {
      date: ISODate('2019-02-28T00:00:00.000Z'),
```

```
      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: [
    {
      date: ISODate('2022-04-30T00:00:00.000Z'),
      grade: 'A',
      score: 9
```



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

```
[
  {
    _id: ObjectId('65e56ec65b532e7900b71ff6'),
    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'),
        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',
```

```
  },
  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',
  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
    },
```

```
      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: [
    {
      date: ISODate('2020-12-10T00:00:00.000Z'),
      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, 48.848447 ],
    street: 'Morris Park Ave',
```

```
  name: 'Namma Oota',
  restaurant_id: '80076543'
},
{
  _id: ObjectId('65e56db05b532e7900b71fef'),
  address: {
    building: '1007',
    coord: [ -73.856077, 48.848447 ],
    street: 'Morris Park Ave',
    zipcode: '18462',
    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'
  }
]
```