

**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 BENGALURU-560019**  
**(Autonomous Institution under VTU)**  
**Sep-2025 to Jan-2026**

**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 **Mouneshwar(1BM24CS175)**, who is 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 2022. 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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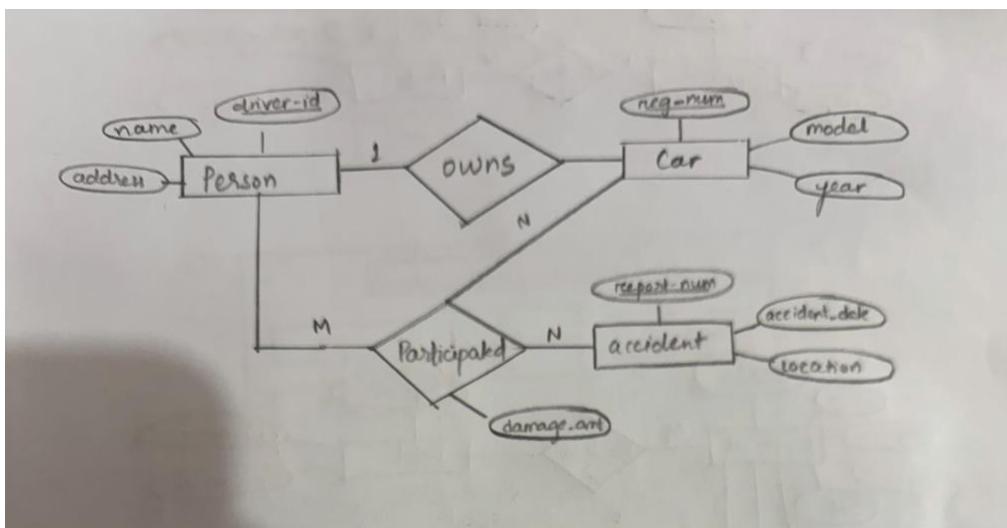
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# **Experiment 1: Insurance Database**

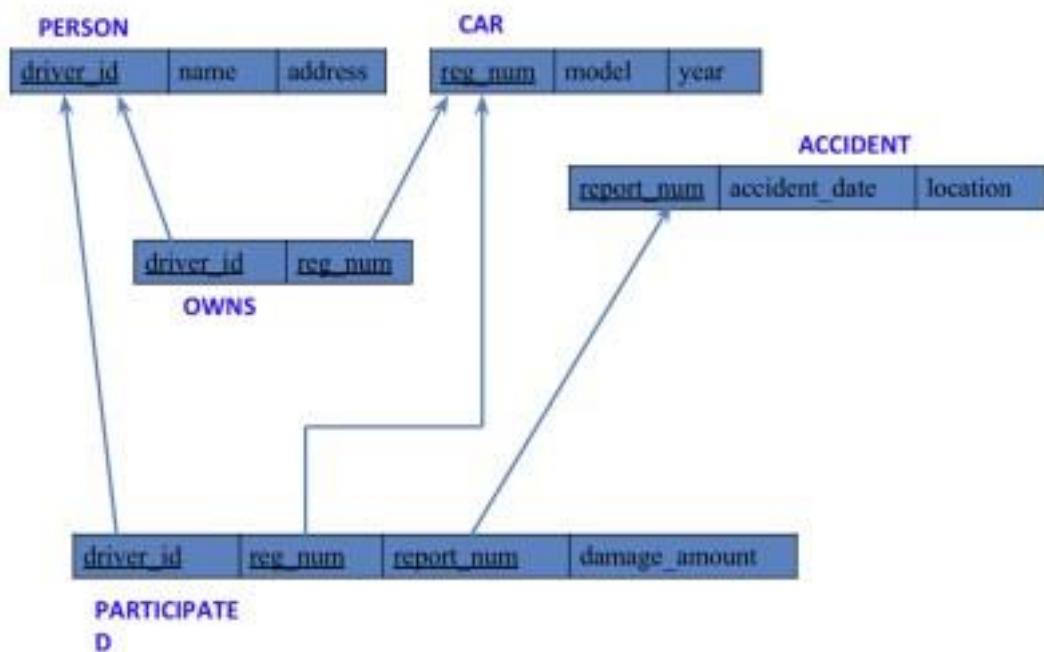
## Specification of Insurance Database Application

The insurance database must maintain information about drivers, the cars they own, the accidents reported, and the participation of each driver and car in those accidents. Each driver in the system is uniquely identified by a driver ID, along with their name and address, and each car is uniquely identified by its registration number together with details such as model and manufacturing year. The system must allow storing ownership information that links a driver to one or more cars, while also allowing a car to be linked to one or more drivers if shared ownership occurs; duplicate ownership records for the same driver and car must not exist. Accident information must be stored using a unique report number assigned to each accident, along with the date on which the accident occurred and the location where it happened. Every accident reported in the system must have at least one participating driver and car, and this participation is recorded by linking the driver, the involved car, and the accident report together with the corresponding damage amount for that particular involvement. A participation record must reference an existing driver, an existing car, and an existing accident, and no two participation entries may repeat the same combination of driver, car, and accident report. The database must ensure that damage amounts are non-negative, accident dates are valid calendar dates, and car manufacturing years fall within reasonable limits. It must also preserve referential integrity so that ownership or participation entries cannot exist without valid driver, car, and accident information already present in the system. Deletion policies must prevent removal of drivers or cars that appear in past accident participation records unless historical consistency is preserved through controlled deletion rules or archival mechanisms. The system should maintain accurate links between drivers, cars, and accidents at all times, ensuring reliable retrieval of ownership histories, accident histories, and damage information for administrative, legal, and insurance-related purposes.

## Entity Relationship Diagram



## Schema Diagram



- 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

### **Create database**

```
create database insurance_barsha;
```

```
use
```

```
insurance_barsha;
```

### **Create table** create table

```
person (  driver_id
          varchar(10),  name
          varchar(30),  address
          varchar(50),  primary
          key (driver_id)
        );
```

```
create table car (
  reg_num varchar(15),
  model varchar(20),
  year int,
  primary key (reg_num)
);
```

```
create table accident (
    report_num int,
    accident_date date,
    location varchar(30),
    primary key
    (report_num) );

create table owns (
    driver_id varchar(10),
    reg_num varchar(15),    primary key
    (driver_id, reg_num),   foreign key
    (driver_id) references person(driver_id),
    foreign key (reg_num) references
    car(reg_num)
);

create table participated (
    driver_id varchar(10),
    reg_num varchar(15),
    report_num int,
    damage_amount int,
    primary key (driver_id, reg_num, report_num),
    foreign key (driver_id) references
    person(driver_id),   foreign key (reg_num)
    references car(reg_num),   foreign key
    (report_num) references accident(report_num)
```

);

## Structure of the table

desc person;

Field	Type	Null	Key	Default	Extra
driver_id	varchar(20)	NO	PRI	NULL	
reg_num	varchar(10)	NO	PRI	NULL	
report_num	int	NO	PRI	NULL	
damage_amount	int	YES		NULL	

desc accident;

Field	Type	Null	Key	Default	Extra
report_num	int	NO	PRI	NULL	
accident_date	date	YES		NULL	
location	varchar(50)	YES		NULL	

desc participated;

Field	Type	Null	Key	Default	Extra
driver_id	varchar(20)	NO	PRI	NULL	
reg_num	varchar(10)	NO	PRI	NULL	
report_num	int	NO	PRI	NULL	
damage_amount	int	YES		NULL	

desc car;

Field	Type	Null	Key	Default	Extra
reg_num	varchar(15)	NO	PRI	NULL	
model	varchar(10)	YES		NULL	
year	int	YES		NULL	

desc owns;

Field	Type	Null	Key	Default	Extra
driver_id	varchar(20)	NO	PRI	NULL	
reg_num	varchar(10)	NO	PRI	NULL	

Inserting Values to the table

insert into person values

('d101','rahul','bangalore'),

('d102','amit','delhi'),

('d103','neha','mumbai'),

('d104','riya','chennai'),

('d105','arjun','kolkata');

Select \* from person;

driver_id	name	address
d101	rahul	bangalore
d102	amit	delhi
d103	neha	mumbai
d104	riya	chennai
d105	arjun	kolkata
NULL	NULL	NULL

insert into car values

('ka01ab1234','lancer',200  
5),

('ka02cd5678','swift',2008  
),

('mh03ef9012','creta',2010  
),

```
('dl04gh3456','verna',2007  
),  
('tn05ij7890','lancer',2008  
); select * from car;
```

Result Grid			Filter Rows:	Edit:	Export/Import
	driver_id	name	address		
▶	d101	rahul	bangalore		
	d102	amit	delhi		
	d103	neha	mumbai		
	d104	riya	chennai		
	d105	arjun	kolkata		
*	NULL	NULL	NULL		

insert into accident values

```
(101,'2008-02-  
12','bangalore'),  
(102,'2009-05-20','delhi'),  
(103,'2008-08-  
15','mumbai'),  
(104,'2010-03-  
10','chennai'),  
(105,'2008-11-  
25','kolkata');
```

Select \* from accident;

The screenshot shows a MySQL Workbench interface. On the left is a 'Result Grid' displaying data for the 'owns' table. The columns are 'report\_num', 'accident\_date', and 'location'. The data rows are:

	report_num	accident_date	location
▶	101	2008-02-12	bangalore
	102	2009-05-20	delhi
	103	2008-08-15	mumbai
	104	2010-03-10	chennai
*	105	2008-11-25	kolkata
*	HULL	HULL	HULL

On the right, there is a vertical sidebar with three icons: 'Result Grid' (selected), 'Form Editor', and 'Field Types'. Below the icons are up and down arrows.

insert into owns values

```
('d101','ka01ab1234'),
```

```
('d102','ka02cd5678'),
```

```
('d103','mh03ef9012'),
```

```
('d104','dl04gh3456')
```

,

```
('d105','tn05ij7890');
```

select \* from owns

The screenshot shows a MySQL Workbench interface. On the left is a 'Result Grid' displaying data for the 'participated' table. The columns are 'driver\_id' and 'reg\_num'. The data rows are:

	driver_id	reg_num
▶	d104	dl04gh3456
	d101	ka01ab1234
	d102	ka02cd5678
	d103	mh03ef9012
*	d105	tn05ij7890
*	HULL	HULL

On the right, there is a vertical sidebar with three icons: 'Result Grid' (selected), 'Form Editor', and 'Field Types'. Below the icons are up and down arrows.

insert into participated values

```
('d101','ka01ab1234',101,30000),
```

```
('d102','ka02cd5678',102,15000),
```

```
('d103','mh03ef9012',103,40000),
```

('d104','d104gh3456',104,20000),

('d105','tn05ij7890',105,35000);

Select \* from participated;

The screenshot shows a MySQL Workbench interface with a result grid titled 'Result Grid'. The table has four columns: driver\_id, reg\_num, report\_num, and damage\_amount. The data is as follows:

	driver_id	reg_num	report_num	damage_amount
▶	d101	ka01ab1234	101	30000
	d102	ka02cd5678	102	15000
	d103	mh03ef9012	103	40000
	d104	d104gh3456	104	20000
*	d105	tn05ij7890	105	35000
	NULL	NULL	NULL	NULL

## Queries Display accident date and location

select accident\_date, location from accident;

The screenshot shows a MySQL Workbench interface with a result grid titled 'Result Grid'. The table has two columns: accident\_date and location. The data is as follows:

	accident_date	location
▶	2008-02-12	bangalore
	2009-05-20	delhi
	2008-08-15	mumbai
	2010-03-10	chennai
	2008-11-25	kolkata

Update the damage amount to 25000 for the car with a specific reg\_num (example 'K A053408') for which the accident report number was 12.

Update participated set damage\_amount = 25000 where reg\_num = 'KA053408' and report\_num=12

### Add a new accident to the database

```
insert into accident values (15, '2023-06-18', 'Hyderabad');
```

### Display accident date and location

```
Select accident_date,location from accident;
```

	accident_date	location
▶	2023-06-18	Hyderabad
	2008-02-12	bangalore
	2009-05-20	delhi
	2008-08-15	mumbai
	2010-03-10	chennai
	2008-11-25	kolkata

Result Grid   Form Editor   Field Types

### Display driver id who did accident with damage amount greater than or equal to Rs.25000

```
select distinct driver_id from participated where damage_amount >= 25000;
```

Result Grid | Filter Rows: \_\_\_\_\_ | Export: | Wrap Cell Content: |

Result Grid

Form Editor

Field Types

driver_id
d101
d103
d105

## Experiment 2: More Queries on Insurance Database

**Display the entire car relation in ascending order of manufacturing year** select \* from car order by year asc;

**Find the number of accidents involving cars of a specific model (example: 'lancer')** select count(\*) as total\_accidents from participated p, car where p.reg\_num = c.reg\_num and c.model = 'lancer';

**find the total number of people who owned cars involved in accidents in 2008** select count(distinct o.driver\_id) as total\_people from owns o, participated p, accident a where o.reg\_num = p.reg\_num and p.report\_num = a.report\_num and extract(year from a.accident\_date) = 2008;

The screenshot shows a database query results grid. The top bar includes 'Result Grid' and 'Filter Rows: \_\_\_\_\_'. Below the grid, there are buttons for 'Export' and 'Wrap Cell Content'. A vertical sidebar on the right has icons for 'Result Grid' (selected), 'Form Editor', and 'Field Types'. At the bottom, there are tabs for 'accident 9' and 'Result 10' (with a close button), and a 'Read Only' status indicator.

total_people
3

**List the entire participated relation in descending order of damage amount** select \* from participated order by damage\_amount desc;

The screenshot shows a database query results grid. The top bar includes 'Result Grid' and 'Filter Rows: \_\_\_\_\_'. Below the grid, there are buttons for 'Edit' and 'Export/Import'. A vertical sidebar on the right has icons for 'Result Grid' (selected), 'Form Editor', and 'Field Types'. At the bottom, there are tabs for 'accident 9' and 'Result 10' (with a close button), and a 'Read Only' status indicator.

driver_id	reg_num	report_num	damage_amount
d103	mh03ef9012	103	40000
d105	tn05ij7890	105	35000
d101	ka01ab1234	101	30000
d104	dl04gh3456	104	20000
d102	ka02cd5678	102	15000
*	NULL	NULL	NULL

## **find the average damage amount**

select avg(damage\_amount) as average\_damage from participated;

Result Grid	
average_damage	
▶ 28000.0000	

## **Delete the tuples whose damage amount is below the average damage amount**

delete from participated where damage\_amount

```
< ( select avg(damage_amount)
    from participated
);
```

## **List the names of drivers whose damage is greater than the average damage amount**

select distinct p.name from person p, participated pa  
where p.driver\_id = pa.driver\_id and pa.damage\_amount > (  
 select avg(damage\_amount) from participated);

Result Grid	
name	
▶ rahul	
neha	
arjun	

## **Find the maximum damage amount**

select max(damage\_amount) as maximum\_damage from participated;

Result Grid | Filter Rows: \_\_\_\_\_ | Export: Wrap Cell Content:

maximum\_damage

40000

Result 15 | Read Only

Result Grid

Form Editor

Field Types

The screenshot shows a database result grid with a single row. The first column is labeled 'maximum\_damage' and contains the value '40000'. The interface includes a toolbar at the top with buttons for 'Result Grid', 'Form Editor', and 'Field Types'. A sidebar on the right provides access to these features. Navigation buttons like 'Result 15' and 'Read Only' are also present.

# **EXPERIMENT 3: BANK DATABASE**

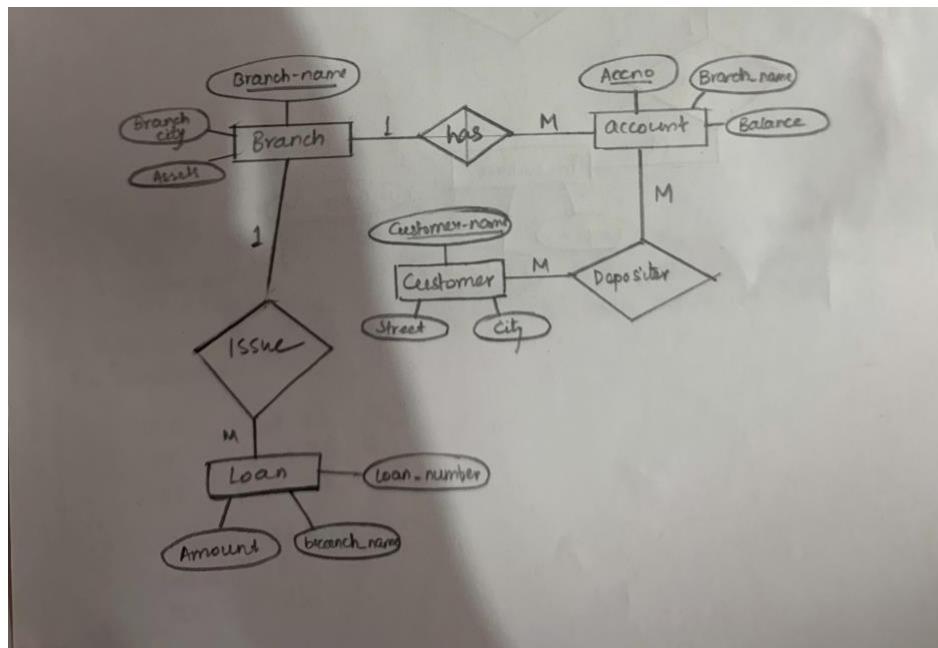
## **Specification of Bank Database Application**

The banking system must store information about branches, bank accounts, customers, deposit relationships, and loans so that branch details (identified by branch name together with city and total assets) are linked to accounts and loans, each account (identified by an account number) records the branch it belongs to and the current balance, customers are recorded with their name, street and city, and a depositor relationship associates a customer with an account; loans are recorded by a unique loan number together with the branch name that issued the loan and the loan amount.

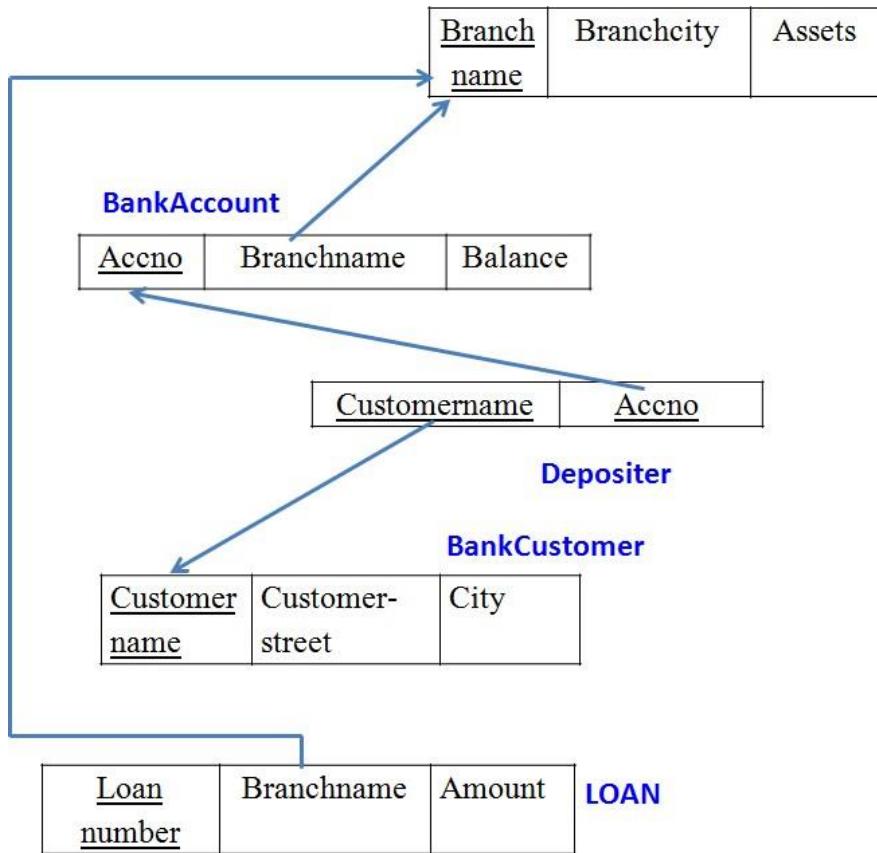
Account numbers and loan numbers must be unique identifiers, branch names are used to associate accounts and loans to a branch, and customer names (as modeled) are used to identify customers referenced by depositor entries; every depositor entry must reference an existing customer and an existing account so that ownership and access relationships are always valid, and duplicate depositor records linking the same customer and account are disallowed. The system must maintain referential integrity so accounts cannot reference a non-existent branch, depositor rows cannot reference missing customers or accounts, and loans must reference an existing branch; deletion of a branch, account, or customer that is referenced by dependent records should be controlled (either disallowed or handled by archival/controlled reassignment) to preserve historical transaction and loan consistency. Numeric and temporal constraints must be enforced: account balances should be constrained to valid values (for example non-negative where overdraft is not allowed), branch assets and loan amounts must be non-negative and within specified business limits, and updates to balance or loan amounts should be auditable. Cardinality rules implied by the schema are enforced: a branch may host many accounts and issue many loans, an account belongs to exactly one branch, a customer may be linked to many accounts through depositor relationships, and an account may have many depositors if joint accounts are permitted by policy. Implementation must prevent orphaned records, ensure uniqueness where required, and rely on application logic or database-level triggers to enforce complex rules such as cascading effects on deletion, business rules about allowed balance operations or overdrafts, and any required validation when transferring accounts between branches or when converting a customer's identifying details; the database

should thus reliably support queries for branch-wise account lists, customer account ownership, account balances, and loan portfolios while preserving historical and referential integrity for auditing and regulatory reporting.

### ENTITY RELATIONSHIP DIAGRAM:



### SCHEMA DIAGRAM:



**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)**

- i. Create the above tables by properly specifying the primary keys and the foreign keys.
- ii. Enter at least five tuples for each relation.
- iii. Display the branch name and assets from all branches in lakhs of rupees and rename the assets column to 'assets in lakhs'.
- iv. Find all the customers who have at least two accounts at the same branch (ex. SBI\_ResidencyRoad).
- v. Create a view which gives each branch the sum of the amount of all the loans at the branch

### **CREATION OF DATABASE:**

```

create database
bank_db; use bank_db;
    
```

## **1.Creation of table with primary key and foreign key**

```
create table branch (
    branch_name
    varchar(30),
    branch_city varchar(30),
    assets real,    primary
    key (branch_name)
);
```

```
create table bankaccount
(    accno int,
    branch_name
    varchar(30),
    balance real,    primary key (accno),    foreign key
    (branch_name) references branch(branch_name)
);
```

```
create table bankcustomer (
    customer_name varchar(30),
    customer_street varchar(30),
    customer_city varchar(30),
    primary key (customer_name)
);
```

```
create table depositer (
    customer_name varchar(30),
    accno int,
    primary key (customer_name, accno),    foreign key
    (customer_name) references bankcustomer(customer_name),
    foreign key (accno) references bankaccount(accno)
);
```

```
create table loan (    loan_number int,
    branch_name varchar(30),    amount real,    primary
    key (loan_number),    foreign key (branch_name)
    references branch(branch_name)
);
```

## ii. inserting at least five tuples into each relation

insert into branch values

```
('sbi_residencyroad','bangalore',50000000),  
('sbi_jayanagar','bangalore',35000000),  
('sbi_mgroad','bangalore',60000000),  
('sbi_andheri','mumbai',45000000),  
('sbi_saltlake','kolkata',40000000);
```

```
Select * from branch;
```

branch_name	branch_city	assets
sbi_andheri	mumbai	45000000
sbi_jayanagar	bangalore	35000000
sbi_mgroad	bangalore	60000000
sbi_residencyroad	bangalore	50000000
sbi_saltlake	kolkata	40000000

## Structure of the table

```
desc branch;
```

	Field	Type	Null	Key	Default	Extra
▶	branchname	varchar(30)	NO	PRI	NULL	
▶	branchcity	varchar(30)	YES		NULL	
	assets	double	YES		NULL	

```
desc bankaccount;
```

	Field	Type	Null	Key	Default	Extra
▶	accno	int(11)	NO	PRI	NULL	
▶	branchname	varchar(30)	YES	MUL	NULL	
	balance	double	YES		NULL	

```
desc bankcustomer;
```

Result Grid | Filter Rows:  Export: Wrap

	Field	Type	Null	Key	Default	Extra
▶	customername	varchar(30)	NO	PRI	NULL	
	customerstreet	varchar(30)	YES		NULL	
	customercity	varchar(30)	YES		NULL	

desc depositer;

Result Grid | Filter Rows:  Export: Wrap

	Field	Type	Null	Key	Default	Extra
▶	customername	varchar(30)	NO	PRI	NULL	
	accno	int(11)	NO	PRI	NULL	

desc loan;

Result Grid | Filter Rows:  Export: Wrap

	Field	Type	Null	Key	Default	Extra
▶	loannumber	int(11)	NO	PRI	NULL	
	branchname	varchar(30)	YES	MUL	NULL	
	amount	double	YES		NULL	

insert into bankaccount values  
 (101,'sbi\_residencyroad',250000),  
 (102,'sbi\_residencyroad',180000),  
 (103,'sbi\_jayanagar',300000),  
 (104,'sbi\_mgroad',400000),  
 (105,'sbi\_andheri',220000);

Select from \* bankaccount;

Result Grid | Filter Rows:  Edit: Export/Import:



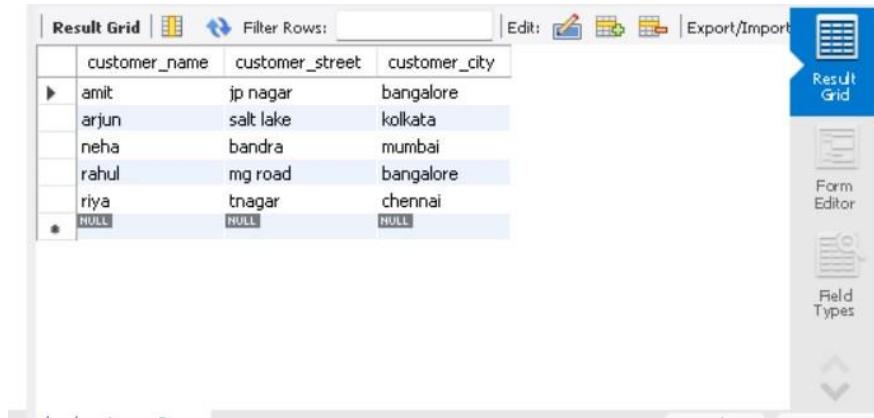
	accno	branch_name	balance
▶	101	sbi_residencyroad	250000
	102	sbi_residencyroad	180000
	103	sbi_jayanagar	300000
	104	sbi_mgroad	400000
	105	sbi_andheri	220000
*	NULL	NULL	NULL

```

insert into bankcustomer values
('rahul','mg road','bangalore'),
('amit','jp nagar','bangalore'),
('neha','bandra','mumbai'),
('riya','tnagar','chennai'),
('arjun','salt lake','kolkata');

```

Select \* from bankcustomer;



	customer_name	customer_street	customer_city
▶	amit	jp nagar	bangalore
	arjun	salt lake	kolkata
	neha	bandra	mumbai
	rahul	mg road	bangalore
*	riya	tnagar	chennai
	NULL	NULL	NULL

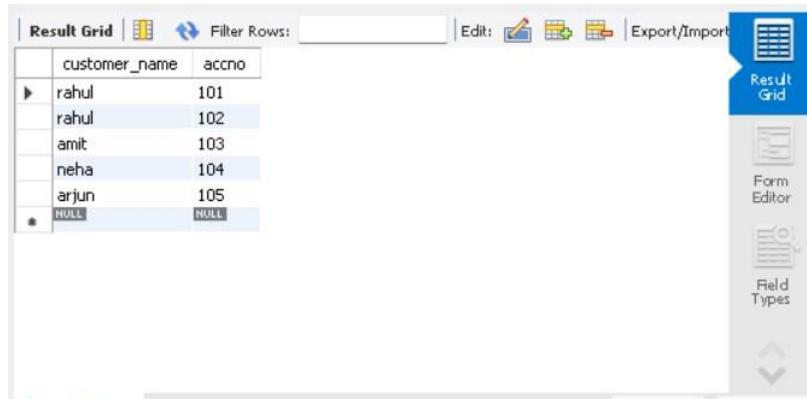
insert into depositer values

```

('rahul',101),
('rahul',102),
('amit',103),
('neha',104),
('arjun',105);

```

Select from depositor values;



	customer_name	accno
▶	rahul	101
	rahul	102
	amit	103
	neha	104
	arjun	105
*	NULL	NULL

insert into loan values

```

(201,'sbi_residencyroad',800000),
(202,'sbi_residencyroad',600000),

```

(203,'sbi\_jayanagar',500000),  
 (204,'sbi\_mgroad',900000),  
 (205,'sbi\_andheri',700000);

Select \* from loan;

	loan_number	branch_name	amount
▶	201	sbi_residencyroad	800000
	202	sbi_residencyroad	600000
	203	sbi_jayanagar	500000
	204	sbi_mgroad	900000
*	205	sbi_andheri	700000
	HULL	HULL	HULL

**Display branch name and assets in lakhs of rupees select branch\_name, assets/100000 as "assets in lakhs" from branch;**

	branch_name	assets in lakhs
▶	sbi_andheri	450
	sbi_jayanagar	350
	sbi_mgroad	600
	sbi_residencyroad	500
	sbi_saltlake	400

**Find customers who have at least two accounts at the same branch** select d.customer\_name from depositer d, bankaccount b where d.accno = b.accno and b.branch\_name = 'sbi\_residencyroad' group by d.customer\_name having count(d.accno) >= 2;

customer_name
rahul

**Create a view that shows each branch and the total loan amount at that branch** create view branch\_loan\_total as select branch\_name, sum(amount) as total\_loan\_amount from loan group by branch\_name;

**To display the view:** select

\* from branch\_loan\_total;

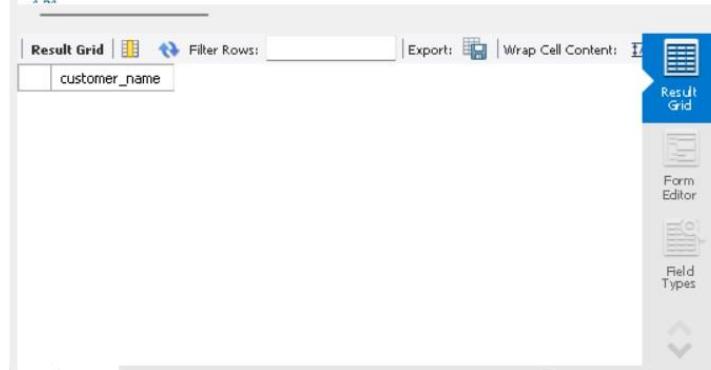
	branch_name	total_loan_amount
▶	sbi_andheri	700000
	sbi_jayanagar	500000
	sbi_mgroad	900000
	sbi_residencyroad	1400000

## **EXPERIMENT 4: MORE QUERIES ON BANK DATABASE**

**i)Find all customers who have an account at all branches located in a specific city (example: delhi)**

```
select d.customer_name  
from depositer d, bankaccount b,  
branch br where d.accno = b.accno  
and b.branch_name =  
br.branch_name  
and br.branch_city = 'delhi' group  
by d.customer_name having  
count(distinct b.branch_name) = (  
select count(*)  
from branch where branch_city = 'delhi'
```

```
);
```



**ii)Find all customers who have a loan but do not have**

**an account** select distinct c.customer\_name from  
bankcustomer c, loan l where c.customer\_name not in (  
select d.customer\_name  
from depositer d

```
);
```

Result Grid		Filter Rows:	Export:	Wrap Cell Content:	
	customer_name				Result Grid

riya

**iii)Find all customers who have both an account and a loan at the bangalore branch** select distinct d.customer\_name from depositer d, bankaccount b, loan l, branch br  
 where d.accno = b.accno and  
 b.branch\_name =  
 br.branch\_name and  
 l.branch\_name =  
 br.branch\_name and  
 br.branch\_city = 'bangalore';

Result Grid		Filter Rows:	Export:	Wrap Cell Content:	
	customer_name				Result Grid

amit  
neha  
rahul

**iv. find names of branches whose assets are greater than all branches located in Bangalore**

```
select branch_name from
branch where assets > all (
select assets   from branch
where branch_city =
'bangalore'
);
```

Result Grid		Filter Rows:	Edit:	Export/Import
	branch_name			
*	HULL			

v)Delete all account tuples at branches located in a specific city (example: **bombay**)

```
delete from bankaccount
where branch_name in (
select branch_name   from
branch   where
branch_city = 'bombay'
);
```

vi)update the balance of all accounts by 5% update  
bankaccount set balance =  
balance \* 1.05;

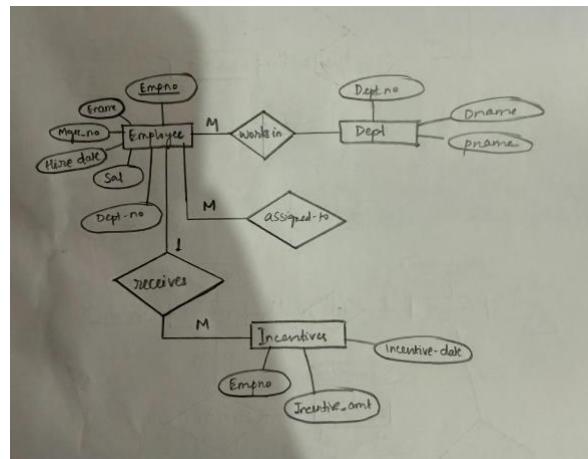
# **EXPERIMENT 5: EMPLOYEE DATABASE**

## **Specification of Employee Database Application**

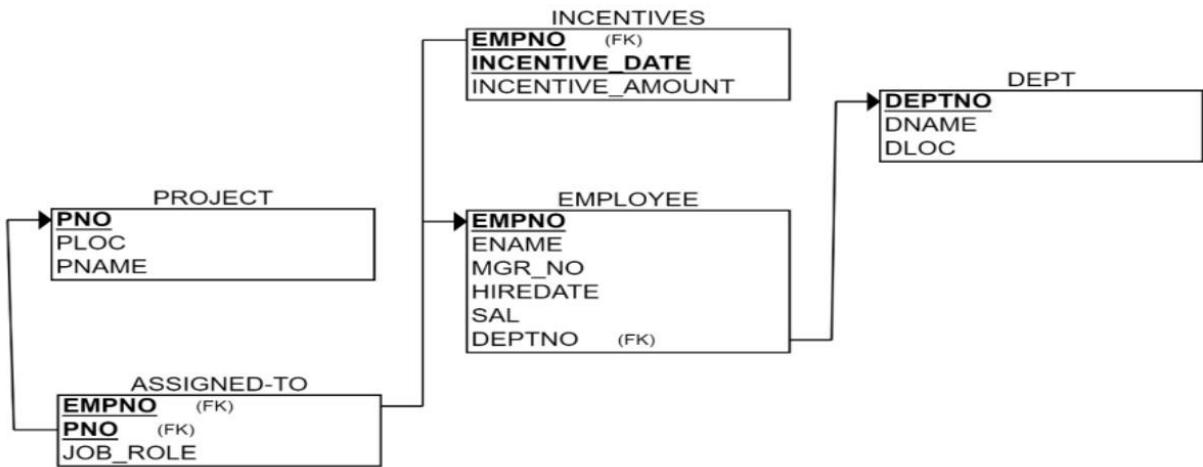
The employee database must record each employee's identifying number, name, manager reference, hire date, salary, and department affiliation while also tracking departmental details, project assignments (including the role an employee plays on a project), and any incentive payments given to employees. Every employee is represented by a unique employee number and has a hire date and salary that must be valid; the manager field is a self-referencing link that must, if present, point to an existing employee and must never create a circular management chain or reference the employee themselves. Departments are identified by a unique department number and include a department name and location; every department referenced by an employee or by other structures must exist in the department table, and departments may contain zero or many employees. Projects are recorded with a unique project number, project name and project location; employees may be assigned to multiple projects and each project may have many employees, with each assignment carrying the employee's job role for that project — duplicate assignments of the same employee to the same project are disallowed. Incentive payments are recorded with the employee reference, the incentive date and the incentive amount; an incentive entry must reference an existing employee and incentive amounts must be non-negative and dated on or after the employee's hire date. Referential integrity must be enforced so that employee records cannot reference non-existent departments, projects, or managers, and assignment and incentive records cannot exist without corresponding employee, project, or department records as appropriate. Salary, incentive amounts, and any monetary fields must be constrained to valid numeric ranges and hire/ incentive dates must be valid calendar dates (and typically not future-dated unless business rules permit). Deletion and update policies must preserve historical consistency: deleting an employee who appears as a manager, as a project assignee, or in incentive records should be prevented or should be handled via controlled archival, reassignment, or soft-delete flags rather than hard deletion to preserve audit trails; similarly, changing a department or project identifier must either be disallowed if it would orphan historical records or handled by introducing immutable surrogate keys. Business rules include preventing circular manager chains, ensuring an employee's manager (if specified) cannot be the employee themselves, disallowing duplicate project-assignments, requiring that incentive dates fall within the employee's employment window, and optionally requiring at least one project assignment or at least one incentive record depending on policy for

reporting. Implementation should use primary-key and foreign-key constraints for identity and linkage, unique constraints to prevent duplicate assignments, check constraints for monetary and date ranges, and application logic or triggers for complex temporal or graph constraints (like cycle detection in management relationships and enforcing non-overlap or other schedule-related rules if assignments gain temporal attributes later). The system must therefore reliably support queries such as employee reporting lines, department staffing lists, project rosters with job roles, incentive payment histories, salary analyses, and audit reports while maintaining data integrity, preventing inconsistent deletions, and preserving a complete historical record for HR and compliance needs

#### ENTITY RELATIONSHIP DIAGRAM:



#### SCHEMA DIAGRAM:



## CREATION OF DATABASE:

Create database  
employee; Use employee;

## CREATION OF TABLE:

Using Scheme diagram, create tables by properly specifying the primary keys and the foreign keys

```
create table dept (
    deptno int primary
key, dname
varchar(50),
    dloc varchar(50)
);
```

```
create table employee ( empno int
primary key, ename varchar(50),
mgr_no int, hiredate date, sal
decimal(10,2), deptno int, foreign
key (deptno) references dept(deptno)
);
```

```
create table project (
pno int primary key,
ploc varchar(50),
pname varchar(50)
```

);

```
create table assigned_to (  empno int,
pno int,  job_role varchar(50),  primary
key (empno, pno),  foreign key (empno)
references employee(empno),  foreign key
(pno) references project(pno)
);
create table incentives (  empno
int,  incentive_date date,
incentive_amount decimal(10,2),
primary key (empno,
incentive_date),
foreign key (empno) references employee(empno)
);
```

## Structure of the Table

Desc employee;

	Field	Type	Null	Key	Default	Extra
▶	emp_id	int(11)	NO	PRI	NULL	
	emp_name	varchar(50)	YES		NULL	
	dept_id	int(11)	YES	MUL	NULL	
	manager_id	int(11)	YES	MUL	NULL	
	job_role	varchar(50)	YES		NULL	
	salary	int(11)	YES		NULL	
	net_pay	int(11)	YES		NULL	

Desc department;

	Field	Type	Null	Key	Default	Extra
▶	dept_id	int(11)	NO	PRI	NULL	
	dept_name	varchar(50)	YES		NULL	
	dept_location	varchar(50)	YES		NULL	
	top_manager_id	int(11)	YES		NULL	

desc project;

	Field	Type	Null	Key	Default	Extra
▶	project_id	int(11)	NO	PRI	NULL	
	project_name	varchar(50)	YES		NULL	
	project_location	varchar(50)	YES		NULL	

desc assigned\_to;

	Field	Type	Null	Key	Default	Extra
▶	emp_id	int(11)	NO	PRI	NULL	
	project_id	int(11)	NO	PRI	NULL	
	job_role	varchar(50)	YES		NULL	

desc incentives;

	Field	Type	Null	Key	Default	Extra
▶	emp_id	int(11)	YES	MUL	NULL	
	incentive_amount	int(11)	YES		NULL	
	incentive_date	date	YES		NULL	

-insert 5 values into each tuple

```
insert into dept values  
(10, 'hr', 'bengaluru'),  
(20, 'finance', 'hyderabad'),  
(30, 'it', 'mysuru'),  
(40, 'marketing', 'chennai'),  
(50, 'sales', 'delhi'),  
(60, 'operations', 'hyderabad');  
Select * from dept;
```

Result Grid | Filter Rows: \_\_\_\_\_ | Edit: Export/Import

The screenshot shows a database result grid with the following data:

deptno	dname	dloc
10	hr	bengaluru
20	finance	hyderabad
30	it	mysuru
40	marketing	chennai
50	sales	delhi
60	operations	hyderabad
NULL	NULL	NULL

Result Grid | Form Editor | Field Types

### insert into employee values

```
(1001, 'amit', 2001, '2020-01-10', 50000, 10),
(1002, 'neha', 2001, '2019-06-12', 55000, 20),
(1003, 'ravi', 2001, '2021-02-20', 60000, 30),
(1004, 'priya', 2002, '2020-09-15', 52000, 10),
(1005, 'suresh', 2003, '2022-01-10', 48000,
40), (1006, 'meena', 2002, '2021-08-10',
62000, 30); select * from employee;
```

Result Grid | Filter Rows: \_\_\_\_\_ | Edit: Export/Import

The screenshot shows a database result grid with the following data:

empno	ename	mgr_no	hiredate	sal	deptno
1001	amit	2001	2020-01-10	50000.00	10
1002	neha	2001	2019-06-12	55000.00	20
1003	ravi	2001	2021-02-20	60000.00	30
1004	priya	2002	2020-09-15	52000.00	10
1005	suresh	2003	2022-01-10	48000.00	40
1006	meena	2002	2021-08-10	62000.00	30
NULL	NULL	NULL	NULL	NULL	NULL

Result Grid | Form Editor | Field Types

### insert into project values

```
(501, 'bengaluru', 'payroll
system'),
(502, 'hyderabad', 'audit tracker'),
(503, 'mysuru', 'e-commerce app'),
(504, 'chennai', 'ad campaign'),
(505, 'delhi', 'crm system'),
(506, 'hyderabad', 'erp migration');
Select * from project;
```

Result Grid | Filter Rows: Edit: Export/Import

	pno	ploc	pname
▶	501	bengaluru	payroll system
	502	hyderabad	audit tracker
	503	mysuru	e-commerce app
	504	chennai	ad campaign
	505	delhi	crm system
	506	hyderabad	erp migration
●	HULL	HULL	HULL

Result Grid Form Editor Field Types

### Insert into assigned\_to values

```
(1001, 501, 'analyst'),(1002, 502, 'auditor'),
(1003, 503, 'developer'),
(1004, 504, 'coordinator'),
(1005, 505, 'sales rep'),
(1006, 503, 'tester');
```

Select \* from assigned\_to;

Result Grid | Filter Rows: Edit: Export/Import

	empno	pno	job_role
▶	1001	501	analyst
	1002	502	auditor
	1003	503	developer
	1004	504	coordinator
	1005	505	sales rep
	1006	503	tester
●	HULL	HULL	HULL

Result Grid Form Editor Field Types

### Insert into incentives values

```
(1001, '2024-02-10', 5000),
(1002, '2024-03-12', 3000),
(1003, '2024-01-15', 4000),
(1004, '2024-02-20', 2500),
(1006, '2024-04-10', 3500);
```

Select \* from incentives;

Result Grid | Filter Rows: | Edit: | Export/Import

	empno	incentive_date	incentive_amount
1	1001	2024-02-10	5000.00
2	1002	2024-03-12	3000.00
3	1003	2024-01-15	4000.00
4	1004	2024-02-20	2500.00
5	1006	2024-04-10	3500.00
*	HULL	HULL	HULL

- Retrieve the employee numbers of all employees who work on project located in Bengaluru,

Hyderabad, or Mysuru

select distinct a.empno

from assigned\_to a join

project p on a.pno =

p.pno

where p.ploc in ('bengaluru', 'hyderabad', 'mysuru');

Result Grid | Filter Rows: | Export: | Wrap Cell Content: |

	empno
▶	1001
▶	1002
▶	1003
▶	1006

-Get Employee ID's of those employees who didn't receive incentives select e.empno from employee e

where e.empno not in (select empno from incentives);

Result Grid | Filter Rows: | Edit: | Export/Import

	empno
▶	1005
*	HULL

**-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 e.ename,
e.empno,
e.deptno,
a.job_role,
d.dloc as department_location,
p.ploc as project_location
from employee e join dept d on
e.deptno = d.deptno join
assigned_to a on e.empno =
a.empno
join project p on a.pno = p.pno
where d.dloc = p.ploc;
```

result Grid | Filter Rows: | Export: | Wrap Cell Content: |

The screenshot shows a database query results interface. On the left, there is a vertical sidebar with three icons: 'Result Grid' (selected), 'Form Editor', and 'Field Types'. The main area displays a result grid with the following data:

ename	empno	deptno	job_role	department_location	project_location
amit	1001	10	analyst	bengaluru	bengaluru
neha	1002	20	auditor	hyderabad	hyderabad
ravi	1003	30	developer	mysuru	mysuru
meena	1006	30	tester	mysuru	mysuru
				mysuru	

## EXPERIMENT 6: MORE QUERIES ON EMPLOYEE DATABASE

**List the names of managers with the maximum number of employees**

```
select m.empno, m.ename from employee m join
employee e on m.empno = e.mgr_no group by m.empno,
m.ename having count(*) = ( select max(cnt)
```

```
    from (      select
count(*) as cnt
from employee
        group by mgr_no
    )
);
```

The screenshot shows a database interface with a results grid. The grid has two columns: 'empno' and 'ename'. There is one row of data in the grid. At the top of the interface, there are buttons for 'Result Grid' (which is selected), 'Form Editor', and 'Field Types'. There are also buttons for 'Filter Rows', 'Export', and 'Wrap Cell Content'. A vertical toolbar on the right side of the interface lists 'Result Grid', 'Form Editor', and 'Field Types'.

empno	ename
7839	KING

**Find the name of the second top level managers of each department**

```
select deptno, empno, ename
```

```
from (      select
m.deptno,
m.empno,
        m.ename,
dense_rank() over (
partition by m.deptno
order by count(e.empno) desc
) as rnk
    from employee m    join
employee e on m.empno = e.mgr_no
group by m.deptno, m.empno,
m.ename
) t
```

where rnk = 2;

Result Grid		
deptno	empno	ename

**Find employee details who got the second maximum incentive in january 2019** select e.empno, e.ename, i.incentive\_amount from employee e

```
join incentives i on e.empno = i.empno
where extract(year from i.incentive_date)
= 2019 and extract(month from
i.incentive_date) = 1 and
i.incentive_amount = ( select
max(incentive_amount) from
incentives where incentive_amount < (
select max(incentive_amount)
from incentives where extract(year
from incentive_date) = 2019
and extract(month from incentive_date) = 1
)
);
```

Result Grid		
empno	ename	incentive_amount

**Display employees who are working in the same department as their manager** select e.empno, e.ename, e.deptno from employee e

```
join employee m on e.mgr_no =  
m.empno where e.deptno = m.deptno;
```

The screenshot shows a software interface for viewing database query results. At the top, there are several buttons: 'Result Grid' (highlighted in blue), 'Form Editor', and 'Field Types'. Below these are buttons for 'Filter Rows', 'Export', and 'Wrap Cell Content'. A vertical sidebar on the right lists the columns of the result grid: 'empno', 'ename', and 'deptno'. The main area displays a blank table with three columns and no rows.

empno	ename	deptno

# Experiment 7: Supplier Database

## Specification of Supplier Database Application

The supplier-parts catalog database must maintain information about suppliers, the parts they supply, and the prices charged by each supplier for specific parts. Each supplier in the system is uniquely identified by a supplier ID (sid), along with additional details such as supplier name and address. Each part in the system is uniquely identified by a part ID (pid) and includes descriptive attributes such as part name and color.

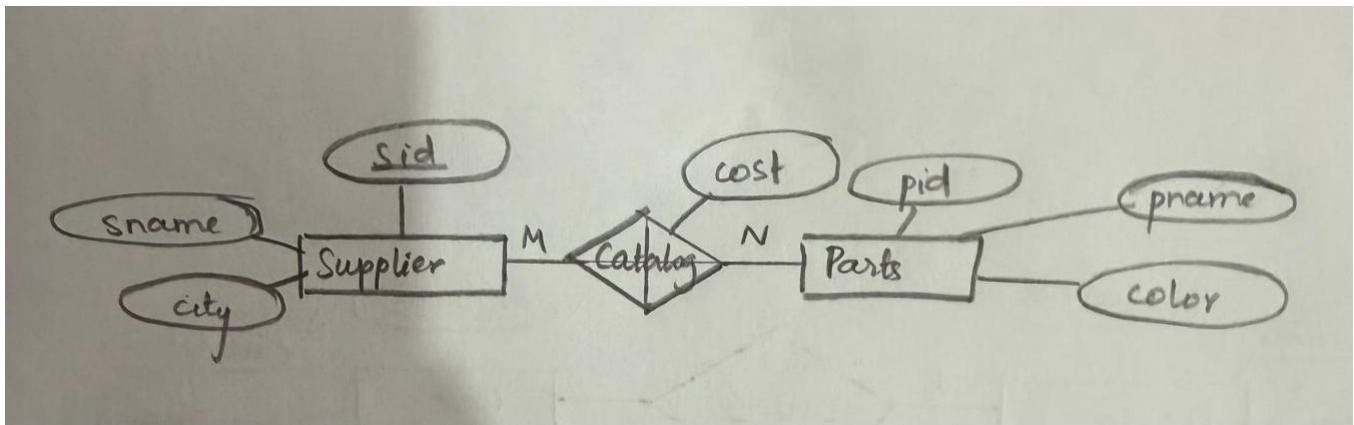
The database must record pricing information through a catalog relationship that links suppliers and parts. This relationship captures the cost at which a particular supplier supplies a specific part. A supplier may supply multiple parts, and a part may be supplied by multiple suppliers, resulting in a many-to-many relationship between suppliers and parts. This relationship is resolved using the CATALOG relation.

Each catalog entry must reference an existing supplier and an existing part. The combination of supplier ID and part ID must be unique in the catalog, ensuring that no duplicate price entries exist for the same supplier-part combination. The cost attribute must be a nonnegative real value representing the price charged by the supplier for that part.

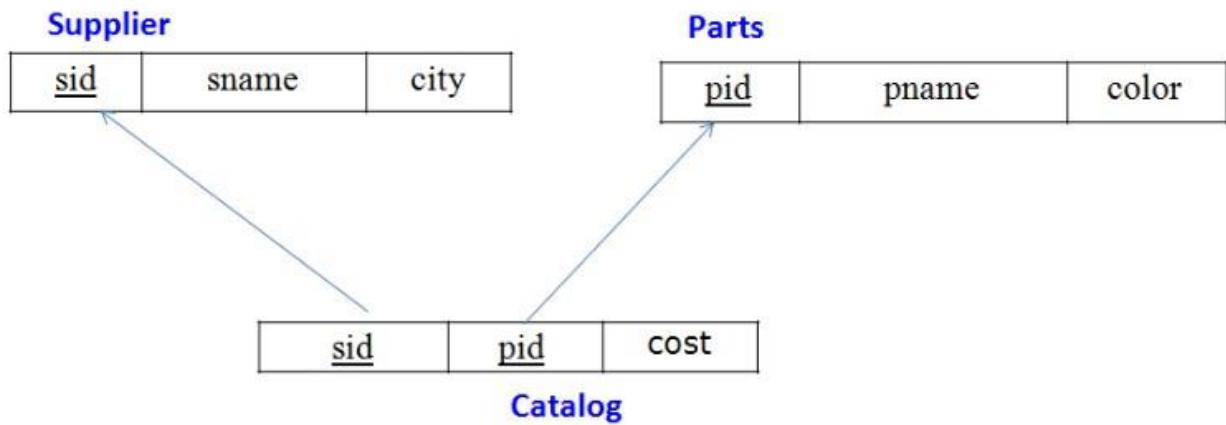
The database must enforce referential integrity such that no catalog record can exist unless the corresponding supplier and part records are already present in the system. Deletion of supplier or part records that are referenced in the catalog must be restricted or handled using controlled cascading or archival mechanisms to preserve historical pricing consistency.

Overall, the system must maintain accurate and consistent relationships between suppliers, parts, and catalog entries, enabling reliable retrieval of supplier details, part information, and pricing data for procurement, inventory management, and administrative purposes.

ENTITY RELATIONSHIP DIAGRAM:



SCHEMA DIAGRAM:



SUPPLIERS(sid: integer, sname: string, address: string)

PARTS(pid: integer, pname: string, color: string)

CATALOG(sid: integer, pid: integer, cost: real)

The Catalog relation lists the prices charged for parts by Suppliers.

## Create database

create database

supplierdb; use

supplierdb; **Create**

## Tables:

create table suppliers

( sid int primary

```
key,    sname  
varchar(50),  
    city varchar(50)  
);
```

```
create table parts (  
pid int primary  
key,    pname  
varchar(50),  
    color varchar(20)  
);
```

```
create table  
catalog (    sid  
int,    pid int,  
    cost int,  
    foreign key (sid) references suppliers(sid),  
    foreign key (pid) references parts(pid)  
);
```

### Structure of the table

```
desc suppliers;
```

	Field	Type	Null	Key	Default	Extra
▶	sid	int(11)	NO	PRI	NULL	
	sname	varchar(50)	YES		NULL	
	city	varchar(50)	YES		NULL	

```
desc parts;
```

	Field	Type	Null	Key	Default	Extra
▶	pid	int(11)	NO	PRI	NULL	
	pname	varchar(50)	YES		NULL	
	color	varchar(20)	YES		NULL	

```
desc catalog;
```

Result Grid			Filter Rows:	Export:		
	Field	Type	Null	Key	Default	Extra
▶	sid	int(11)	YES	MUL	NULL	
	pid	int(11)	YES	MUL	NULL	
	cost	int(11)	YES		NULL	

**Inserting Values to the table** insert  
into suppliers (sid, sname, city)  
values

```
(10001, 'Acme Widget', 'Bangalore'),
(10002, 'Johns', 'Kolkata'),
(10003, 'Vimal', 'Mumbai'),
(10004, 'Reliance', 'Delhi');
select * from suppliers;
```

Result Grid				Filter Rows:		
	sid	sname	city			
▶	10001	Acme Widget	Bangalore			
	10002	Johns	Kolkata			
	10003	Vimal	Mumbai			
	10004	Reliance	Delhi			

insert into parts (pid, pname, color) values  
(20001, 'Book', 'Red'),  
(20002, 'Pen', 'Red'),  
(20003, 'Pencil', 'Green'),  
(20004, 'Mobile', 'Green'),  
(20005, 'Charger', 'Black');  
select \* from parts;

Result Grid				Filter Rows:		
	pid	pname	color			
▶	20001	Book	Red			
	20002	Pen	Red			
	20003	Pencil	Green			
	20004	Mobile	Green			
	20005	Charger	Black			

insert into catalog (sid, pid, cost) values

```
(10001, 20001, 10),
(10001, 20002, 10),
(10001, 20003, 30),
(10001, 20004, 30),
(10001, 20005, 10),
(10002, 20001, 20),
(10002, 20002, 20),
(10003, 20002, 30),
(10003, 20003, 20),
(10004, 20003, 40);
```

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

### Query 1:

**Find the pnames of parts for which there is some supplier.** select distinct p.pname from parts p join catalog c on p.pid = c.pid;

	pname
▶	Book
	Pen
	Pencil
	Mobile
	Charger

### Query 2:

**Find the snames of suppliers who supply every part.** select s.sname from suppliers s join catalog c on s.sid = c.sid group by s.sid, s.sname having count(distinct c.pid) = (select count(\*) from parts);

Result Grid		Filter Rows:
	sname	
▶	Acme Widget	

### Query 3:

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

select s.sname from suppliers s join catalog c on s.sid = c.sid where c.pid in (select pid from parts where color = 'Red') group by s.sid, s.sname having count(distinct c.pid) = (select count(\*) from parts where color = 'Red');

Result Grid		Filter Rows:
	sname	
▶	Acme Widget	
	Johns	

### Query 4:

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

select p.pname from parts p where p.pid in (select pid from catalog where sid = 10001 and pid not in (select pid from catalog where sid <> 10001));

Result Grid		Filter Rows:
	pname	
▶	Mobile	
	Charger	

### Query 5:

**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 distinct c.sid from catalog c join (select pid, avg(cost) as avg_cost from catalog group by pid) x on c.pid = x.pid where c.cost > x.avg_cost;
```

Result Grid	
	sid
▶	10002
	10003
	10004

### Query 6:

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

```
select p.pname, s.sname from parts p join catalog c on p.pid  
= c.pid join suppliers s on c.sid = s.sid where (c.pid, c.cost) in  
(select pid, max(cost) from catalog group by pid);
```

Result Grid		
	pname	sname
▶	Mobile	Acme Widget
	Charger	Acme Widget
	Book	Johns
	Pen	Vimal
	Pencil	Reliance

## Experiment 8: More Queries on Supplier Database

### Queries:

#### Query 1:

**Find the most expensive part overall and the supplier who supplies it.**

```
select s.sname, p.pname, c.cost from catalog c join suppliers s on c.sid = s.sid join parts p on c.pid = p.pid where c.cost = (select max(cost) from catalog);
```

	sname	pname	cost
▶	Reliance	Pencil	40

#### Query 2:

**Find suppliers who do NOT supply any red parts.**

```
select s.* from suppliers s where s.sid not in (select c.sid from catalog c join parts p on c.pid = p.pid where p.color = 'Red');
```

	sid	sname	city
▶	10004	Reliance	Delhi

#### Query 3:

**Show each supplier and total value of all parts they supply.**

```
select s.sname, sum(c.cost) as totalvalue from suppliers s join catalog c on s.sid = c.sid group by s.sid;
```

	sname	totalvalue
▶	Acme Widget	90
	Johns	40
	Vimal	50
	Reliance	40

#### Query 4:

**Find suppliers who supply at least 2 parts cheaper than ₹20.**

```
select s.sid, s.sname from suppliers s join catalog c on s.sid = c.sid where c.cost < 20  
group by s.sid having count(c.pid) >= 2;
```

Result Grid		Filter Rows:
	sid	sname
▶	10001	Acme Widget

#### Query 5:

**List suppliers who offer the cheapest cost for each part.**

```
select s.sname, p.pname, c.cost from catalog c join suppliers s on c.sid = s.sid join parts  
p on c.pid = p.pid where c.cost = (select min(c2.cost) from catalog c2 where c2.pid =  
c.pid);
```

	sname	pname	cost
▶	Acme Widget	Book	10
	Acme Widget	Pen	10
	Acme Widget	Mobile	30
	Acme Widget	Charger	10
	Vimal	Pencil	20

#### Query 6:

**Create a view showing suppliers and the total number of parts they supply.**

```
create view supplier_part_count as select s.sid, s.sname, count(c.pid) as totalparts  
from suppliers s left join catalog c on s.sid = c.sid group by s.sid; select * from  
supplier_part_count;
```

Result Grid		Filter Rows:	
	sid	sname	totalparts
▶	10001	Acme Widget	5
	10002	Johns	2
	10003	Vimal	2
	10004	Reliance	1

### **Query 7:**

**Create a view of the most expensive supplier for each part.**

```
create view most_expensive_supplier as select s.sname, p.pname, c.cost from catalog c
join suppliers s on c.sid = s.sid join parts p on c.pid = p.pid where c.cost = (select
max(c2.cost) from catalog c2 where c2.pid = c.pid);
```

Result Grid			
	sname	pname	cost
▶	Acme Widget	Mobile	30
	Acme Widget	Charger	10
	Johns	Book	20
	Vimal	Pen	30
	Reliance	Pencil	40

### **Query 8:**

**Create a Trigger to prevent inserting a Catalog cost below 1.**

```
DELIMITER //
create trigger
prevent_low_cost before
insert on catalog for each
row begin
    if new.cost < 1 then      signal sqlstate '45000' set
message_text = 'Cost must be at least 1';    end if; end;
//
DELIMITER ;
```

### **Query 9:**

**Create a trigger to set to default cost if not provided.**

```
DELIMITER //
create trigger
set_default_cost before
insert on catalog for
each row begin    if
new.cost is null then
set new.cost = 100;
end if;
end;
```

```
//  
DELIMITER ;
```

# Experiment 9: NO SQL Student Database

## Create Database

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

## Inserting values

```
test> db.student.insert({RollNo:1, Age:21, Cont:9876, email:"antara.de9@gmail.com"});
DeprecationWarning: Collection.insert() is deprecated. Use insertOne, insertMany, or bulkWrite.
{
  acknowledged: true,
  insertedIds: { '_0': ObjectId('6936655093569dc27263b112') }
}
test> db.student.insert({RollNo:2, Age:22, Cont:9976, email:"anushka.de9@gmail.com"});
{
  acknowledged: true,
  insertedIds: { '_0': ObjectId('6936656893569dc27263b113') }
}
test> db.student.insert({RollNo:3, Age:21, Cont:5576, email:"anubhav.de9@gmail.com"});
{
  acknowledged: true,
  insertedIds: { '_0': ObjectId('6936658293569dc27263b114') }
}
test> db.student.insert({RollNo:4, Age:20, Cont:4476, email:"pani.de9@gmail.com"});
{
  acknowledged: true,
  insertedIds: { '_0': ObjectId('6936659a93569dc27263b115') }
}
test> db.student.insert({RollNo:10, Age:23, Cont:2276, email:"rekha.de9@gmail.com"});
{
  acknowledged: true,
  insertedIds: { '_0': ObjectId('693665af93569dc27263b116') }
}
```

## View values

```
test> db.student.find()
[
  {
    _id: ObjectId('6936655093569dc27263b112'),
    RollNo: 1,
    Age: 21,
    Cont: 9876,
    email: 'antara.de9@gmail.com'
  },
  {
    _id: ObjectId('6936656893569dc27263b113'),
    RollNo: 2,
    Age: 22,
    Cont: 9976,
    email: 'anushka.de9@gmail.com'
  },
  {
    _id: ObjectId('6936658293569dc27263b114'),
    RollNo: 3,
    Age: 21,
    Cont: 5576,
    email: 'anubhav.de9@gmail.com'
  },
  {
    _id: ObjectId('6936659a93569dc27263b115'),
    RollNo: 4,
    Age: 20,
    Cont: 4476,
    email: 'pani.de9@gmail.com'
  },
  {
    _id: ObjectId('693665af93569dc27263b116'),
    RollNo: 10,
    Age: 23,
    Cont: 2276,
    email: 'rekha.de9@gmail.com'
  }
]
```

## Queries:

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

```
test> db.student.update({ RollNo: 10 }, { $set: { email: "Abhinav@gmail.com" } })
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
```

### 2. Replace the student name from “ABC” to “FEM” of rollno 11.

```
test> db.student.insert({RollNo:11,Age:22,Name:"ABC",Cont:2276,email:"rea.de9@gmail.com"});  
{  
  acknowledged: true,  
  insertedIds: { '_id': ObjectId('6936690093569dc27263b118') }  
} 2 |  
  
test> db.Student.update({RollNo:11,Name:"ABC"},{$set:{Name:"FEM"}});  
{  
  acknowledged: true,  
  insertedId: null,  
  matchedCount: 1,  
  modifiedCount: 1,  
  upsertedCount: 0  
}  
[  
  {  
    _id: ObjectId('6936690093569dc27263b118'),  
    RollNo: 11,  
    Age: 22,  
    Name: 'FEM',  
    Cont: 2276,  
    email: 'rea.de9@gmail.com'  
  }  
]
```

### 3. Drop the table

```
test> db.student.drop();  
true  
test> db.student.find();
```

# Experiment 10: NO SQL Customer Database

## Create Database

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

## Create table

```
test> db.customer.insert({"Cust_id":1,"Acc_Bal":5000,"Acc_Type":"Savings"});
DeprecationWarning: Collection.insert() is deprecated. Use insertOne, insertMany, or bulkWrite.
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('693faa69c75a2a4b111e2626') }
}
test> db.customer.insert({"Cust_id":2,"Acc_Bal":7500,"Acc_Type":"Savings"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('693faa75c75a2a4b111e2627') }
}
test> db.customer.insert({"Cust_id":3,"Acc_Bal":200,"Acc_Type":"Transactions"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('693faaa4c75a2a4b111e2628') }
}
test> db.customer.insert({"Cust_id":4,"Acc_Bal":10000,"Acc_Type":"Savings"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('693faabac75a2a4b111e2629') }
}
test> db.customer.insert({"Cust_id":5,"Acc_Bal":1000,"Acc_Type":"Transactions"});
{
  acknowledged: true,
  insertedIds: { '0': ObjectId('693faacbc75a2a4b111e262a') }
}
```

## Queries

1. Write a query to display those records whose total account balance is greater than 1200 of account type 'Z' for each customer\_id.

```

Atlas atlas-3acvm6-shard-0 [primary] DBME_DEMO> db.Customers.find({ Acc_Bal: { $gt: 1200 }, Acc_Type: "Z" })
[
  {
    _id: ObjectId('693f8376701108f7231e262c'),
    Cust_id: 1,
    Acc_Bal: 1500,
    Acc_Type: 'Z'
  },
  {
    _id: ObjectId('693f8376701108f7231e262e'),
    Cust_id: 3,
    Acc_Bal: 2000,
    Acc_Type: 'Z'
  },
  {
    _id: ObjectId('693f8376701108f7231e2630'),
    Cust_id: 5,
    Acc_Bal: 1800,
    Acc_Type: 'Z'
  }
]

```

## 2. Determine Minimum and Maximum account balance for each customer\_id.

```

Atlas atlas-3acvm6-shard-0 [primary] DBME_DEMO> db.Customers.aggregate([
...   {
...     $group: {
...       _id: "$Cust_id",
...       Min_Bal: { $min: "$Acc_Bal" },
...       Max_Bal: { $max: "$Acc_Bal" }
...     }
...   }
... ])
...
[{
  _id: 5, Min_Bal: 1800, Max_Bal: 1800 },
  { _id: 2, Min_Bal: 800, Max_Bal: 800 },
  { _id: 4, Min_Bal: 500, Max_Bal: 500 },
  { _id: 3, Min_Bal: 2000, Max_Bal: 2000 },
  { _id: 1, Min_Bal: 1500, Max_Bal: 1500 }
]

```

## 3. Export the created collection into local file system

```

C:\Users\BMSCECSE-L3-27>mongoexport --uri="mongodb+srv://annapurna_cs24_user:anusm060706@cluster0.eavktnp.mongodb.net/DBME_DEMO" --collection=New_Customer --type=csv --fields=Cust_id,Acc_Bal,Acc_Type --out="C:\Users\BMSCECSE-L3-27\Downloads\New_Customer_Export.csv"
2025-12-15T09:35:30.774+0530      connected to: mongodb+srv://[*REDACTED*]@cluster0.eavktnp.mongodb.net/DBME_DEMO
2025-12-15T09:35:30.856+0530      exported 5 records

```

## 4. Drop the table

```

Atlas atlas-3acvm6-shard-0 [primary] DBME_DEMO> db.Customers.drop()
true

```

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

```
C:\Users\BMSCECSE-L3-27>mongoimport --uri="mongodb+srv://annapurna_cs24_user:anusm060706@cluster0.eavktnp.mongodb.net/DBME_DEMO" --collection=New_Customer --type=csv --headerline --file="C:\Users\BMSCECSE-L3-27\Downloads\New_Customer_Export.csv"
2025-12-15T09:35:58.160+0530    connected to: mongodb+srv://[**REDACTED**]@cluster0.eavktnp.mongodb.net/DBME_DEMO
2025-12-15T09:35:58.234+0530    5 document(s) imported successfully. 0 document(s) failed to import.
```

# EXPERIMENT 11: NO SQL RESTAURANT DATABASE

## Create Database

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

## Inserting Values

```
test> db.restaurants.insertMany([
... { name: "Meghna Foods", town: "Jayanagar", cuisine: "Indian", score: 8, address: { zipcode: "10001", street: "Jayanagar" },
... },
... { name: "Empire", town: "MG Road", cuisine: "Indian", score: 7, address: { zipcode: "10100", street: "MG Road" } },
... { name: "Chinese WOK", town: "Indiranagar", cuisine: "Chinese", score: 12, address: { zipcode: "20000", street: "Indiranagar" } },
... { name: "Kyotos", town: "Majestic", cuisine: "Japanese", score: 9, address: { zipcode: "10300", street: "Majestic" } },
... { name: "WOW Momos", town: "Malleshwaram", cuisine: "Indian", score: 5, address: { zipcode: "10400", street: "Malleshwaram" } }
... ])
{
  acknowledged: true,
  insertedIds: {
    '0': ObjectId('693fa0ac01c1a3091e1e2621'),
    '1': ObjectId('693fa0ac01c1a3091e1e2622'),
    '2': ObjectId('693fa0ac01c1a3091e1e2623'),
    '3': ObjectId('693fa0ac01c1a3091e1e2624'),
    '4': ObjectId('693fa0ac01c1a3091e1e2625')
  }
}
```

## Queries:

1. Write a MongoDB query to display all the documents in the collection restaurants.

```
test> db.restaurants.find({})
[  
  {  
    _id: ObjectId('693fa0ac01c1a3091e1e2621'),  
    name: 'Meghna Foods',  
    town: 'Jayanagar',  
    cuisine: 'Indian',  
    score: 8,  
    address: { zipcode: '10001', street: 'Jayanagar' }  
  },  
  {  
    _id: ObjectId('693fa0ac01c1a3091e1e2622'),  
    name: 'Empire',  
    town: 'MG Road',  
    cuisine: 'Indian',  
    score: 7,  
    address: { zipcode: '10100', street: 'MG Road' }  
  },  
  {  
    _id: ObjectId('693fa0ac01c1a3091e1e2623'),  
    name: 'Chinese WOK',  
    town: 'Indiranagar',  
    cuisine: 'Chinese',  
    score: 12,  
    address: { zipcode: '20000', street: 'Indiranagar' }  
  },  
  {  
    _id: ObjectId('693fa0ac01c1a3091e1e2624'),  
    name: 'Kyotos',  
    town: 'Majestic',  
    cuisine: 'Japanese',  
    score: 9,  
    address: { zipcode: '10300', street: 'Majestic' }  
  },  
  {  
    _id: ObjectId('693fa0ac01c1a3091e1e2625'),  
    name: 'WOW Momos',  
    town: 'Malleshwaram',  
    cuisine: 'Indian',  
    score: 5,  
    address: { zipcode: '10400', street: 'Malleshwaram' }  
  }  
]
```

**2. Write a MongoDB query to arrange the name of the restaurants in descending along with all the columns.**

```

test> db.restaurants.find({}).sort({ name: -1 })
[
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2625'),
    name: 'WOW Momos',
    town: 'Malleeshwaram',
    cuisine: 'Indian',
    score: 5,
    address: { zipcode: '10400', street: 'Malleeshwaram' }
  },
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2621'),
    name: 'Meghna Foods',
    town: 'Jayanagar',
    cuisine: 'Indian',
    score: 8,
    address: { zipcode: '10001', street: 'Jayanagar' }
  },
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2624'),
    name: 'Kyotos',
    town: 'Majestic',
    cuisine: 'Japanese',
    score: 9,
    address: { zipcode: '10300', street: 'Majestic' }
  },
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2622'),
    name: 'Empire',
    town: 'MG Road',
    cuisine: 'Indian',
    score: 7,
    address: { zipcode: '10100', street: 'MG Road' }
  },
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2623'),
    name: 'Chinese WOK',
    town: 'Indiranagar',
    cuisine: 'Chinese',
    score: 12,
    address: { zipcode: '20000', street: 'Indiranagar' }
  }
]

```

### 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.

```

test> db.restaurants.find({ "score": { $lte: 10 } }, { _id: 1, name: 1, town: 1, cuisine: 1 })
[
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2621'),
    name: 'Meghna Foods',
    town: 'Jayanagar',
    cuisine: 'Indian'
  },
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2622'),
    name: 'Empire',
    town: 'MG Road',
    cuisine: 'Indian'
  },
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2624'),
    name: 'Kyotos',
    town: 'Majestic',
    cuisine: 'Japanese'
  },
  {
    _id: ObjectId('693fa0ac01c1a3091e1e2625'),
    name: 'WOW Momos',
    town: 'Malleeshwaram',
    cuisine: 'Indian'
  }
]
test>

```

### 4. Write a MongoDB query to find the average score for each restaurant.

```
5 |
test> db.restaurants.aggregate([ { $group: { _id: "$name", average_score: { $avg: "$score" } } }
... ])
[
  { _id: 'Kyotos', average_score: 9 },
  { _id: 'Meghna Foods', average_score: 8 },
  { _id: 'Chinese WOK', average_score: 12 },
  { _id: 'Empire', average_score: 7 },
  { _id: 'WOW Momos', average_score: 5 }
]
test>
```

5. Write a MongoDB query to find the name and address of the restaurants that have a zipcode that starts with '10'.

```
test> db.restaurants.find({ "address.zipcode": /^10/ }, { name: 1, "address.street": 1, _id: 0 })
[
  { name: 'Meghna Foods', address: { street: 'Jayanagar' } },
  { name: 'Empire', address: { street: 'MG Road' } },
  { name: 'Kyotos', address: { street: 'Majestic' } },
  { name: 'WOW Momos', address: { street: 'Malleshwaram' } }
]
test>
```

## LEETCODE PRACTICE QUESTION-1

Table: Products

</> Code

MySQL ▾ 🔒 Auto

```
1 # Write your MySQL query statement below
2 SELECT sell_date,
3        COUNT(DISTINCT product) AS num_sold,
4        GROUP_CONCAT(DISTINCT product ORDER BY product ASC) AS products
5 FROM Activities
6 GROUP BY sell_date
7 ORDER BY sell_date;
```

product_id	int
order_date	date
unit	int

This table may have duplicate rows.  
product\_id is a foreign key (reference column) to the Products table.  
unit is the number of products ordered in order\_date.

Write a solution to get the names of products that have at least 100 units ordered in February 2020 and their amount.

Return the result table in **any order**.

## OUTPUT

</> Code

MySQL ▾ 🔒 Auto

```
1 # Write your MySQL query statement below
2 SELECT sell_date,
3        COUNT(DISTINCT product) AS num_sold,
4        GROUP_CONCAT(DISTINCT product ORDER BY product ASC) AS products
5 FROM Activities
6 GROUP BY sell_date
7 ORDER BY sell_date;
```

## LEETCODE PRACTICE QUESTION -2

Table Activities:

Column Name	Type
sell_date	date
product	varchar

There is no primary key (column with unique values) for this table. It may contain duplicates.  
Each row of this table contains the product name and the date it was sold in a market.

Write a solution to find for each date the number of different products sold and their names.

The sold products names for each date should be sorted lexicographically.

Return the result table ordered by `sell_date`.

## OUTPUT

`</> Code`

MySQL ▾ Auto

```
1 # Write your MySQL query statement below
2 SELECT p.product_name, SUM(o.unit) AS unit
3 FROM Orders o
4 JOIN Products p ON o.product_id = p.product_id
5 WHERE o.order_date BETWEEN '2020-02-01' AND '2020-02-29'
6 GROUP BY o.product_id, p.product_name
7 HAVING SUM(o.unit) >= 100;
```