

DBMS LAB

SQL is a standard language for storing, manipulating and retrieving data in databases.

Our SQL tutorial will teach you how to use SQL in: MySQL, SQL Server, MS Access, Oracle, Sybase, Informix, Postgres, and other database systems.

What is SQL?

SQL stands for Structured Query Language

SQL lets you access and manipulate databases

SQL became a standard of the American National Standards Institute (ANSI) in 1986, and of the International Organization for Standardization (ISO) in 1987

What Operation can SQL do?

SQL can execute queries against a database

SQL can retrieve data from a database

SQL can insert records in a database

SQL can update records in a database

SQL can delete records from a database

SQL can create new databases

SQL can create new tables in a database

SQL can create stored procedures in a database

SQL can create views in a database

SQL can set permissions on tables, procedures, and views

Database Tables

A database most often contains one or more tables. Each table is identified by a name (e.g. "Customers" or "Orders"). Tables contain records (rows) with data.

In this tutorial we will use the well-known Northwind sample database (included in MS Access and MS SQL Server).

Below is a selection from the "Customers" table:

SQL Statements

Most of the actions you need to perform on a database are done with SQL statements.

The following SQL statement selects all the records in the "Customers" table:

	id	company	last_name	first_name	email_address	job_title	business_phone	home_phone	mobile_phone	fax_number	address	city
ite 1		Company A	Bedecs	Anna	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 1st Street	Seattle
ite 2		Company B	Gratacos Solsona	Antonio	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 2nd Street	Boston
ite 3		Company C	Axen	Thomas	NULL	Purchasing Representative	(123)555-0100	NULL	NULL	(123)555-0101	123 3rd Street	Los Angeles
ite 4		Company D	Lee	Christina	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 4th Street	New York
ite 5		Company E	O'Donnell	Martin	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 5th Street	Minneapolis
ite 6		Company F	Pérez-Olaeta	Francisco	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 6th Street	Milwaukee
ite 7		Company G	Xie	Ming-Yang	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 7th Street	Boise
ite 8		Company H	Andersen	Elizabeth	NULL	Purchasing Representative	(123)555-0100	NULL	NULL	(123)555-0101	123 8th Street	Portland
ite 9		Company I	Mortensen	Sven	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 9th Street	Salt Lake City
ite 10		Company J	Wacker	Roland	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 10th Street	Chicago
ite 11		Company K	Kirschne	Peter	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 11th Street	Miami

The SQL SELECT Statement

The **SELECT** statement is used to select data from a database.

The data returned is stored in a result table, called the result-set.

SELECT Syntax

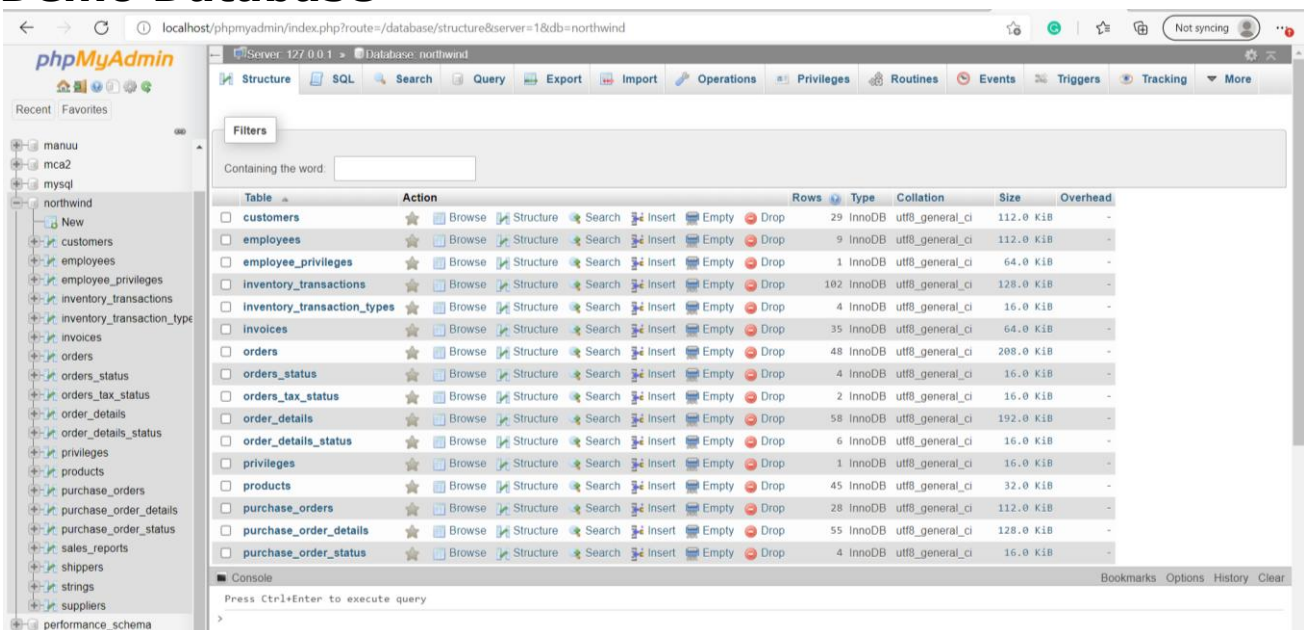
```
SELECT column1, column2, ...  
FROM table_name;
```

Here, column1, column2, ... are the field names of the table you want to select data from.

If you want to select all the fields available in the table, use the following syntax:

```
SELECT * FROM table_name;
```

Demo Database



Below is a selection from the "Customers" table in the Northwind sample database:

		id	company	last_name	first_name	email_address	job_title	business_phone	home_phone	mobile_phone	fax_number	address	city
<input type="checkbox"/>	Edit	1	Company A	Bedecs	Anna	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 1st Street	Seattle
<input type="checkbox"/>	Edit	2	Company B	Gratacos	Antonio	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 2nd Street	Boston
<input type="checkbox"/>	Edit	3	Company C	Axen	Thomas	NULL	Purchasing Representative	(123)555-0100	NULL	NULL	(123)555-0101	123 3rd Street	Los Angeles
<input type="checkbox"/>	Edit	4	Company D	Lee	Christina	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 4th Street	New York
<input type="checkbox"/>	Edit	5	Company E	O'Donnell	Martin	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 5th Street	Minneapolis
<input type="checkbox"/>	Edit	6	Company F	Pérez-Olaeta	Francisco	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 6th Street	Milwaukee
<input type="checkbox"/>	Edit	7	Company G	Xie	Ming-Yang	NULL	Owner	(123)555-0100	NULL	NULL	(123)555-0101	123 7th Street	Boise
<input type="checkbox"/>	Edit	8	Company H	Andersen	Elizabeth	NULL	Purchasing Representative	(123)555-0100	NULL	NULL	(123)555-0101	123 8th Street	Portland
<input type="checkbox"/>	Edit	9	Company I	Mortensen	Sven	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 9th Street	Salt Lake City
<input type="checkbox"/>	Edit	10	Company J	Wacker	Roland	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 10th Street	Chicago
<input type="checkbox"/>	Edit	11	Company K	Krschne	Peter	NULL	Purchasing Manager	(123)555-0100	NULL	NULL	(123)555-0101	123 11th Street	Miami

Write SELECT Column Example

The following SQL statement selects the "CustomerName" and "City" columns from the "Customers" table:

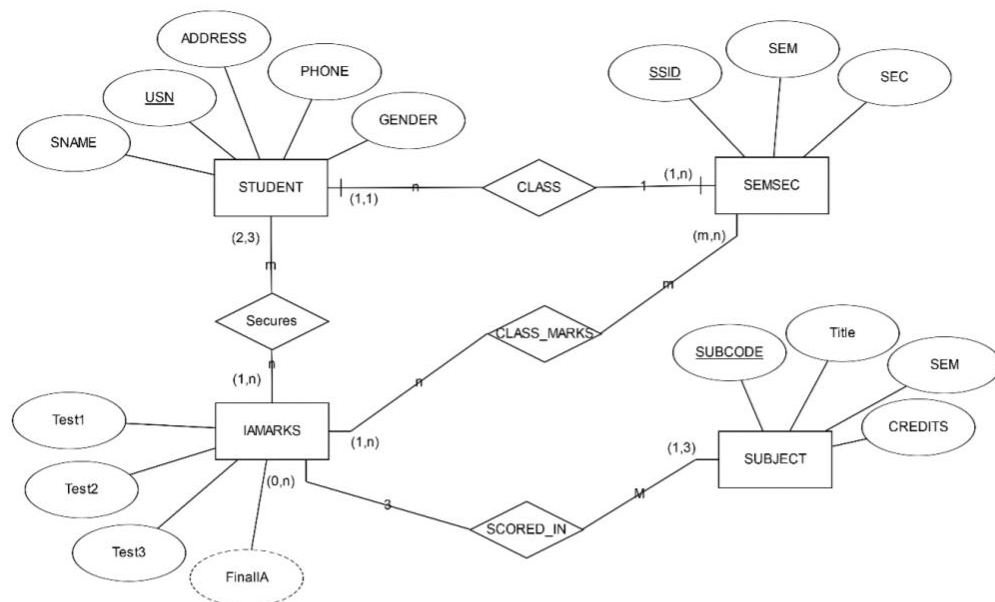
Experiment 1

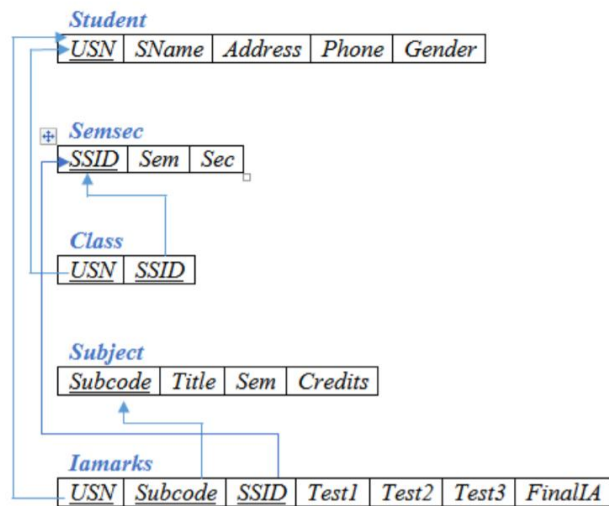
Consider following databases and draw ER diagram and convert entities and relationships to relation table for a given scenario.

1. COLLEGE DATABASE:
STUDENT (USN, SName, Address, Phone, Gender)
SEMSEC (SSID, Sem, Sec)
CLASS (USN, SSID)
SUBJECT (Subcode, Title, Sem, Credits)
IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)
2. COMPANY DATABASE:
EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (DNo, DLoc)
PROJECT (PNo, PName, PLocation, DNo)
WORKS_ON (SSN, PNo, Hours)

Solution:

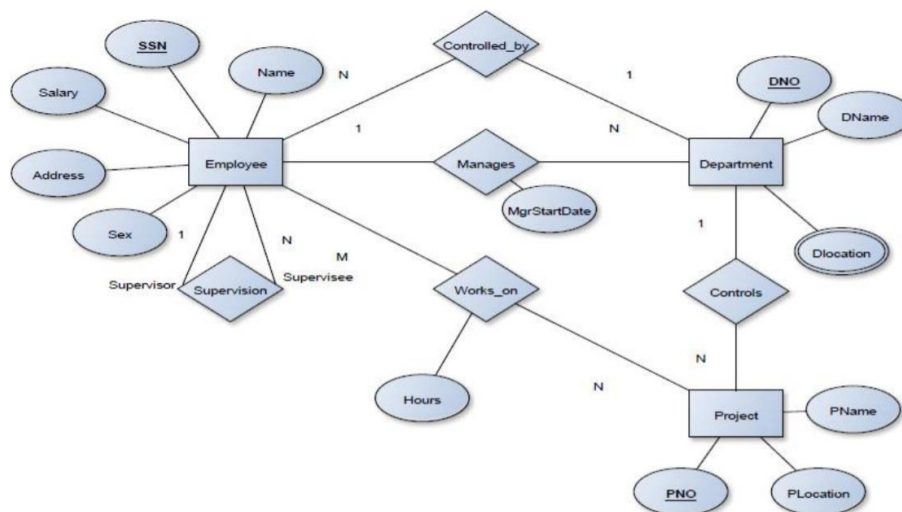
College Database: E-R Diagram



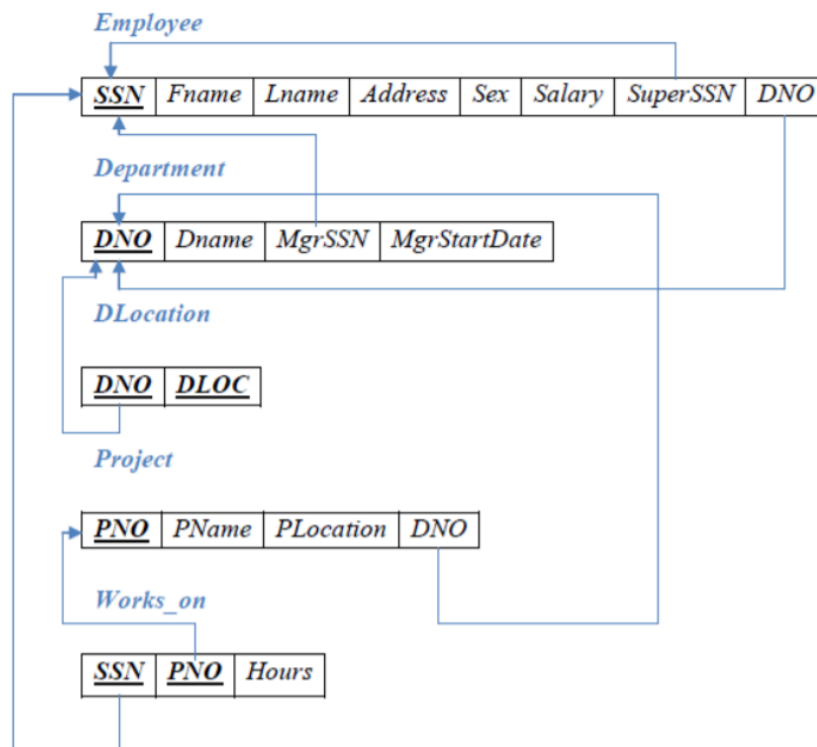


Mapping entities and relationships to relation table (Schema Diagram)

E-R Diagram



Schema Diagram



Experiment 2

Consider the MOVIE DATABASE

Movies				Actors	
title	director	myear	rating	actor	ayear
Fargo	Coen	1996	8.2	Cage	1964
Raising Arizona	Coen	1987	7.6	Hanks	1956
Spiderman	Raimi	2002	7.4	Maguire	1975
Wonder Boys	Hanson	2000	7.6	McDormand	1957

Acts		Directors	
actor	title	director	dyear
Cage	Raising Arizona	Coen	1954
Maguire	Spiderman	Hanson	1945
Maguire	Wonder Boys	Raimi	1959
McDormand	Fargo		
McDormand	Raising Arizona		
McDormand	Wonder Boys		

Write following relational algebra queries for a given set of relations.

1. Find movies made after 1997
2. Find movies made by Hanson after 1997
3. Find all movies and their ratings
4. Find all actors and directors
5. Find Coen's movies with McDormand

SOLUTION:

Common notations of Relational Algebra

Operation	Purpose
Select(σ)	The SELECT operation is used for selecting a subset of the tuples according to a given selection condition
Projection(π)	The projection eliminates all attributes of the input relation but those mentioned in the projection list.
Union Operation(\cup)	UNION is symbolized by symbol. It includes all tuples that are in tables A or in B.
Set Difference($-$)	- Symbol denotes it. The result of $A - B$, is a relation which includes all tuples that are in A but not in B.

Intersection(\cap)		Intersection defines a relation consisting of a set of all tuple that are in both A and B.
Cartesian Product(\times)	\times	Cartesian operation is helpful to merge columns from two relations.
Inner Join		Inner join, includes only those tuples that satisfy the matching criteria.
Theta Join(θ)		The general case of JOIN operation is called a Theta join. It is denoted by symbol θ .
EQUI Join		When a theta join uses only equivalence condition, it becomes a equi join.
Natural Join(\bowtie)		Natural join can only be performed if there is a common attribute (column) between the relations.
Outer Join		In an outer join, along with tuples that satisfy the matching criteria.
Left Outer Join(\bowtie_{\leftarrow})		In the left outer join, operation allows keeping all tuple in the left relation.
Right Outer join(\bowtie_{\rightarrow})		In the right outer join, operation allows keeping all tuple in the right relation.
Full Outer Join(\bowtie_{full})		In a full outer join, all tuples from both relations are included in the result irrespective of the matching condition.

1. Find movies made after 1997

$\sigma_{\text{myear} > 1997}(\text{Movies})$

Movies	title	director	myear	rating
	Fargo	Coen	1996	8.2
	Raising Arizona	Coen	1987	7.6
	Spiderman	Raimi	2002	7.4
	Wonder Boys	Hanson	2000	7.6

$\sigma_{\text{myear} > 1997}(\text{Movies})$

title	director	myear	rating
Spiderman	Raimi	2002	7.4
Wonder Boys	Hanson	2000	7.6

2. Find all movies and their

ratings $\pi_{\text{title}, \text{rating}}$

$\pi_{\text{title}, \text{rating}}(\text{Movies})$

Movies	title	director	myear	rating
	Fargo	Coen	1996	8.2
	Raising Arizona	Coen	1987	7.6
	Spiderman	Raimi	2002	7.4
	Wonder Boys	Hanson	2000	7.6

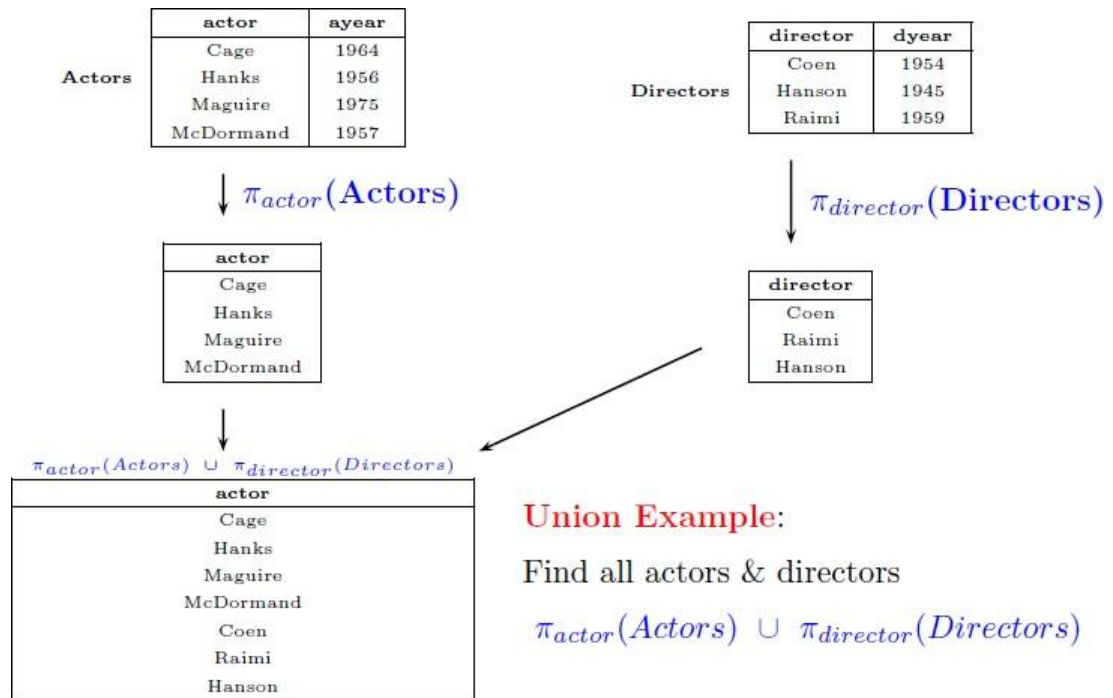
$\pi_{\text{title}, \text{rating}}(\text{Movies})$

title	rating
Fargo	8.2
Raising Arizona	7.6
Spiderman	7.4
Wonder Boys	7.6

3. Find all actors and directors

$\pi_{actor}(Actors) \cup$

$\pi_{director}(Directors)$

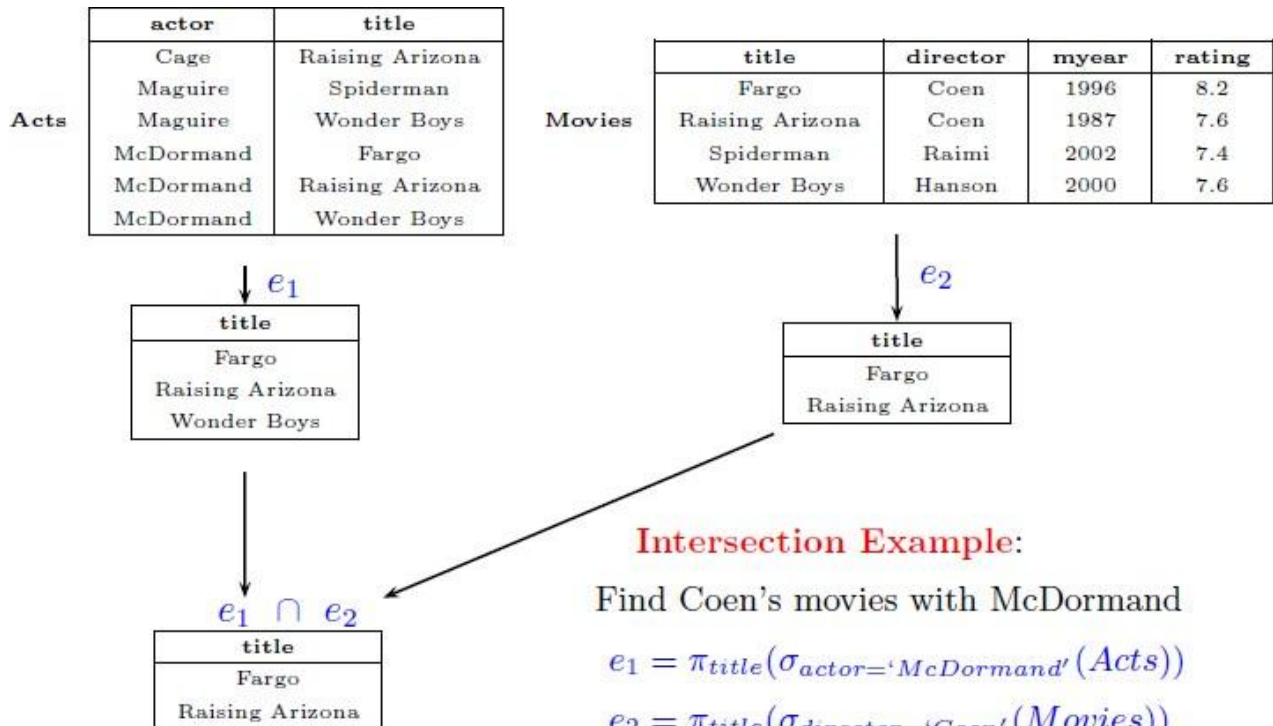


4. Find Coen's movies with McDormand

$e_1 = \pi_{\text{title}}(\sigma_{\text{actor}='McDormand'}(\text{Acts}))$

$e_2 = \pi_{\text{title}}(\sigma_{\text{director}='Coen'}(\text{Movies}))$

$\text{result} = e_1 \cap e_2$



Intersection Example:

Find Coen's movies with McDormand

$e_1 = \pi_{\text{title}}(\sigma_{\text{actor}='McDormand'}(\text{Acts}))$

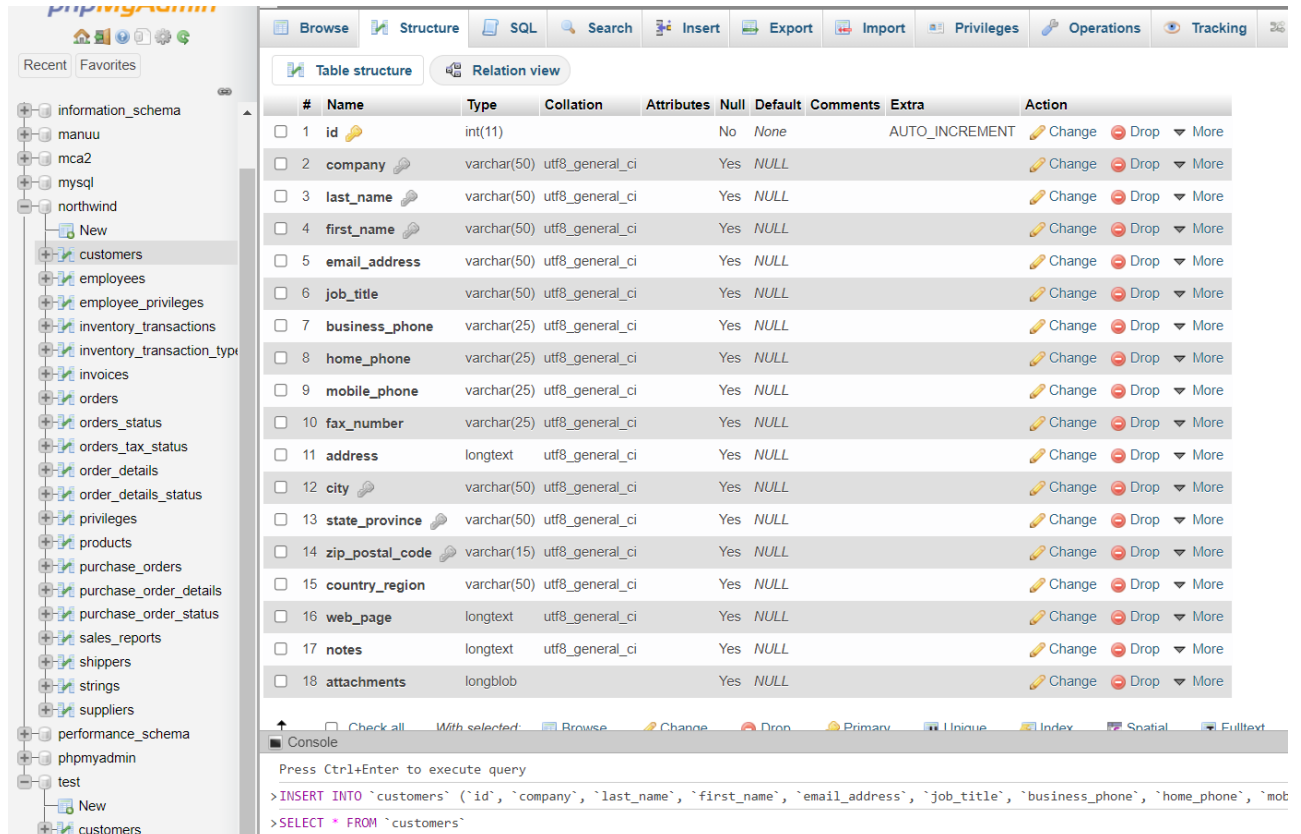
$e_2 = \pi_{\text{title}}(\sigma_{\text{director}='Coen'}(\text{Movies}))$

$\text{result} = e_1 \cap e_2$

Experiment 3

Consider the northwind database with following tables

1. customers

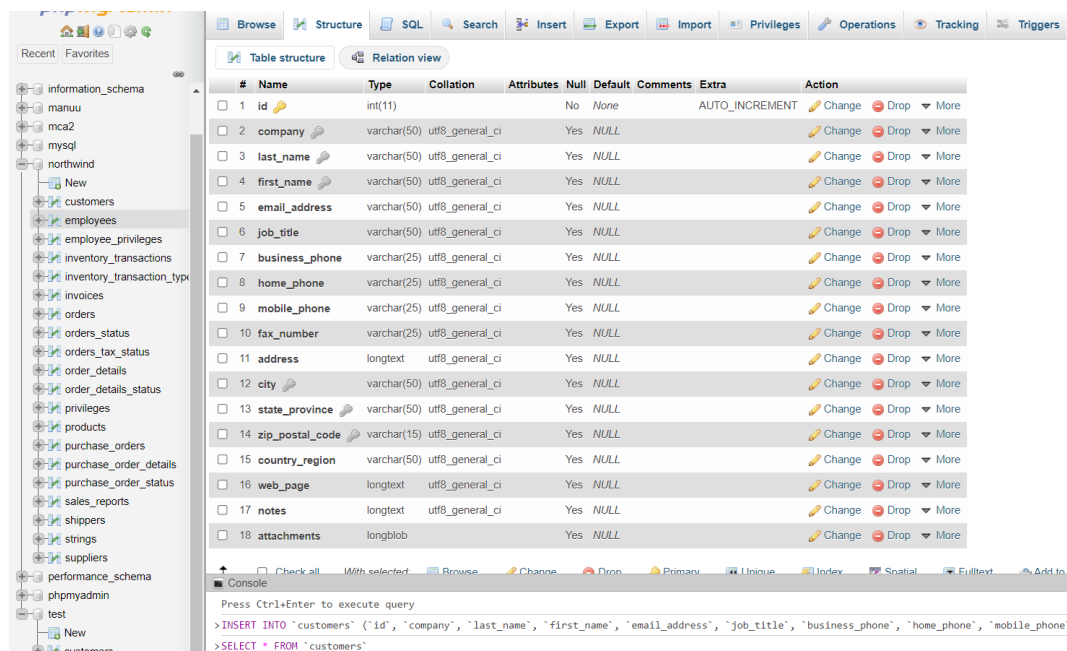


The screenshot shows the phpMyAdmin interface with the 'northwind' database selected. The 'Table structure' tab is active, displaying the schema for the 'customers' table. The table has 18 columns: id (int(11), primary key, AUTO_INCREMENT), company, last_name, first_name, email_address, job_title, business_phone, home_phone, mobile_phone, fax_number, address, city, state_province, zip_postal_code, country_region, web_page, notes, and attachments. The 'Console' tab is also visible, showing the following SQL queries:

```
>INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`, `email_address`, `job_title`, `business_phone`, `home_phone`, `mobile_phone`, `fax_number`, `address`, `city`, `state_province`, `zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`) VALUES ();
```

```
>SELECT * FROM `customers`;
```

2. employees



The screenshot shows the phpMyAdmin interface with the 'northwind' database selected. The 'Table structure' tab is active, displaying the schema for the 'employees' table. The table has 18 columns: id (int(11), primary key, AUTO_INCREMENT), company, last_name, first_name, email_address, job_title, business_phone, home_phone, mobile_phone, fax_number, address, city, state_province, zip_postal_code, country_region, web_page, notes, and attachments. The 'Console' tab is also visible, showing the following SQL queries:

```
>INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`, `email_address`, `job_title`, `business_phone`, `home_phone`, `mobile_phone`, `fax_number`, `address`, `city`, `state_province`, `zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`) VALUES ();
```

```
>SELECT * FROM `employees`;
```

Perform the following:

1. Create northwind database
2. Viewing all databases
3. Viewing all Tables in a northwind Database,
4. Creating above said Tables (With and Without Constraints)
5. Inserting in a Table

SOLUTION:

1. Creating a Database

```
CREATE DATABASE northwind;
```

Database

company

information_schema

manuu

mca2

mysql

northwind

northwind2

performance_schema

phpmyadmin

test

2. Viewing all

databases

```
SHOW
```

```
DATABASES;
```

3. Viewing all Tables in a

```
Database,SHOW tables;
```

Tables_in_test

customers

department

employees

4. Creating Tables customers and employees

```
CREATE TABLE IF NOT EXISTS `northwind`.`customers` (  
  `id` INT(11) NOT NULL AUTO_INCREMENT,  
  `company` VARCHAR(50) NULL DEFAULT NULL,  
  `last_name` VARCHAR(50) NULL DEFAULT NULL,  
  `first_name` VARCHAR(50) NULL DEFAULT NULL,  
  `email_address` VARCHAR(50) NULL DEFAULT NULL,  
  `job_title` VARCHAR(50) NULL DEFAULT NULL,  
  `business_phone` VARCHAR(25) NULL DEFAULT NULL,  
  `home_phone` VARCHAR(25) NULL DEFAULT NULL,  
  `mobile_phone` VARCHAR(25) NULL DEFAULT NULL,  
  `fax_number` VARCHAR(25) NULL DEFAULT NULL,  
  `address` LONGTEXT NULL DEFAULT NULL,  
  `city` VARCHAR(50) NULL DEFAULT NULL,  
  `state_province` VARCHAR(50) NULL DEFAULT NULL,  
  `zip_postal_code` VARCHAR(15) NULL DEFAULT NULL,  
  `country_region` VARCHAR(50) NULL DEFAULT NULL,  
  `web_page` LONGTEXT NULL DEFAULT NULL,  
  `notes` LONGTEXT NULL DEFAULT NULL,  
  `attachments` LONGBLOB NULL DEFAULT NULL,  
  PRIMARY KEY (`id`),  
  INDEX `city` (`city` ASC),  
  INDEX `company` (`company` ASC),  
  INDEX `first_name` (`first_name` ASC),  
  INDEX `last_name` (`last_name` ASC),  
  INDEX `zip_postal_code` (`zip_postal_code` ASC),  
  INDEX `state_province` (`state_province` ASC));
```

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	auto_increment
company	varchar(50)	YES	MUL	NULL	
last_name	varchar(50)	YES	MUL	NULL	
first_name	varchar(50)	YES	MUL	NULL	
email_address	varchar(50)	YES		NULL	
job_title	varchar(50)	YES		NULL	
business_phone	varchar(25)	YES		NULL	
home_phone	varchar(25)	YES		NULL	
mobile_phone	varchar(25)	YES		NULL	
fax_number	varchar(25)	YES		NULL	
address	longtext	YES		NULL	

Field	Type	Null	Key	Default	Extra
city	varchar(50)	YES	MUL	NULL	
state_province	varchar(50)	YES	MUL	NULL	
zip_postal_code	varchar(15)	YES	MUL	NULL	
country_region	varchar(50)	YES		NULL	
web_page	longtext	YES		NULL	
notes	longtext	YES		NULL	
attachments	longblob	YES		NULL	

```
CREATE TABLE IF NOT EXISTS `northwind`.`employees` (
  `id` INT(11) NOT NULL AUTO_INCREMENT,
  `company` VARCHAR(50) NULL DEFAULT NULL,
  `last_name` VARCHAR(50) NULL DEFAULT NULL,
  `first_name` VARCHAR(50) NULL DEFAULT NULL,
  `email_address` VARCHAR(50) NULL DEFAULT NULL,
  `job_title` VARCHAR(50) NULL DEFAULT NULL,
  `business_phone` VARCHAR(25) NULL DEFAULT NULL,
  `home_phone` VARCHAR(25) NULL DEFAULT NULL,
  `mobile_phone` VARCHAR(25) NULL DEFAULT NULL,
  `fax_number` VARCHAR(25) NULL DEFAULT NULL,
  `address` LONGTEXT NULL DEFAULT NULL,
  `city` VARCHAR(50) NULL DEFAULT NULL,
  `state_province` VARCHAR(50) NULL DEFAULT NULL,
  `zip_postal_code` VARCHAR(15) NULL DEFAULT NULL,
  `country_region` VARCHAR(50) NULL DEFAULT NULL,
  `web_page` LONGTEXT NULL DEFAULT NULL,
  `notes` LONGTEXT NULL DEFAULT NULL,
  `attachments` LONGBLOB NULL DEFAULT NULL,
  PRIMARY KEY (`id`),
  INDEX `city` (`city` ASC),
  INDEX `company` (`company` ASC),
  INDEX `first_name` (`first_name` ASC),
  INDEX `last_name` (`last_name` ASC),
  INDEX `zip_postal_code` (`zip_postal_code` ASC),
  INDEX `state_province` (`state_province` ASC));
```

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	auto_increment
company	varchar(50)	YES	MUL	NULL	

Field	Type	Null	Key	Default	Extra
last_name	varchar(50)	YES	MUL	NULL	
first_name	varchar(50)	YES	MUL	NULL	
email_address	varchar(50)	YES		NULL	
job_title	varchar(50)	YES		NULL	
business_phone	varchar(25)	YES		NULL	
home_phone	varchar(25)	YES		NULL	
mobile_phone	varchar(25)	YES		NULL	
fax_number	varchar(25)	YES		NULL	
address	longtext	YES		NULL	
city	varchar(50)	YES	MUL	NULL	
state_province	varchar(50)	YES	MUL	NULL	
zip_postal_code	varchar(15)	YES	MUL	NULL	
country_region	varchar(50)	YES		NULL	
web_page	longtext	YES		NULL	
notes	longtext	YES		NULL	
attachments	longblob	YES		NULL	

5. Inserting data in a above Table

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (1, 'Company A', 'Bedecs', 'Anna', NULL, 'Owner', '(123)555-0100',
NULL, NULL, '(123)555-0101', '123 1st Street', 'Seattle', 'WA', '99999', 'USA',
NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (2, 'Company B', 'Gratacos Solsona', 'Antonio', NULL, 'Owner',
'(123)555-0100', NULL, NULL, '(123)555-0101', '123 2nd Street', 'Boston', 'MA',
'99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
```



```
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (3, 'Company C', 'Axen', 'Thomas', NULL, 'Purchasing Representative',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '123 3rd Street', 'Los Angelas',  
'CA', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (4, 'Company D', 'Lee', 'Christina', NULL, 'Purchasing Manager',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '123 4th Street', 'New York',  
'NY', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (5, 'Company E', 'O'Donnell', 'Martin', NULL, 'Owner', '(123)555-0100',  
NULL, NULL, '(123)555-0101', '123 5th Street', 'Minneapolis', 'MN', '99999',  
'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (6, 'Company F', 'Pérez-Olaeta', 'Francisco', NULL, 'Purchasing  
Manager', '(123)555-0100', NULL, NULL, '(123)555-0101', '123 6th Street',  
'Milwaukee', 'WI', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (7, 'Company G', 'Xie', 'Ming-Yang', NULL, 'Owner', '(123)555-0100',  
NULL, NULL, '(123)555-0101', '123 7th Street', 'Boise', 'ID', '99999', 'USA',  
NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (8, 'Company H', 'Andersen', 'Elizabeth', NULL, 'Purchasing  
Representative', '(123)555-0100', NULL, NULL, '(123)555-0101', '123 8th  
Street', 'Portland', 'OR', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
```

```
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (9, 'Company I', 'Mortensen', 'Sven', NULL, 'Purchasing Manager',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '123 9th Street', 'Salt Lake  
City', 'UT', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (10, 'Company J', 'Wacker', 'Roland', NULL, 'Purchasing Manager',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '123 10th Street', 'Chicago',  
'IL', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (11, 'Company K', 'Krschne', 'Peter', NULL, 'Purchasing Manager',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '123 11th Street', 'Miami', 'FL',  
'99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (12, 'Company L', 'Edwards', 'John', NULL, 'Purchasing Manager',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '123 12th Street', 'Las Vegas',  
'NV', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (13, 'Company M', 'Ludick', 'Andre', NULL, 'Purchasing Representative',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '456 13th Street', 'Memphis',  
'TN', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (14, 'Company N', 'Grilo', 'Carlos', NULL, 'Purchasing Representative',  
'(123)555-0100', NULL, NULL, '(123)555-0101', '456 14th Street', 'Denver',  
'CO', '99999', 'USA', NULL, NULL, "");
```

```
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,  
`email_address`, `job_title`, `business_phone`, `home_phone`,  
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,  
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)  
VALUES (15, 'Company O', 'Kupkova', 'Helena', NULL, 'Purchasing Manager',
```

```

'(123)555-0100', NULL, NULL, '(123)555-0101', '456 15th Street', 'Honolulu',
'HI', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (16, 'Company P', 'Goldschmidt', 'Daniel', NULL, 'Purchasing
Representative', '(123)555-0100', NULL, NULL, '(123)555-0101', '456 16th
Street', 'San Francisco', 'CA', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (17, 'Company Q', 'Bagel', 'Jean Philippe', NULL, 'Owner', '(123)555-
0100', NULL, NULL, '(123)555-0101', '456 17th Street', 'Seattle', 'WA', '99999',
'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (18, 'Company R', 'Autier Miconi', 'Catherine', NULL, 'Purchasing
Representative', '(123)555-0100', NULL, NULL, '(123)555-0101', '456 18th
Street', 'Boston', 'MA', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (19, 'Company S', 'Eggerer', 'Alexander', NULL, 'Accounting Assistant',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 19th Street', 'Los
Angelas', 'CA', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (20, 'Company T', 'Li', 'George', NULL, 'Purchasing Manager',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 20th Street', 'New York',
'NY', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (21, 'Company U', 'Tham', 'Bernard', NULL, 'Accounting Manager',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 21th Street', 'Minneapolis',
'MN', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,

```

```

`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (22, 'Company V', 'Ramos', 'Luciana', NULL, 'Purchasing Assistant',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 22th Street', 'Milwaukee',
'WI', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (23, 'Company W', 'Entin', 'Michael', NULL, 'Purchasing Manager',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 23th Street', 'Portland',
'OR', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (24, 'Company X', 'Hasselberg', 'Jonas', NULL, 'Owner', '(123)555-
0100', NULL, NULL, '(123)555-0101', '789 24th Street', 'Salt Lake City', 'UT',
'99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (25, 'Company Y', 'Rodman', 'John', NULL, 'Purchasing Manager',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 25th Street', 'Chicago',
'IL', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (26, 'Company Z', 'Liu', 'Run', NULL, 'Accounting Assistant', '(123)555-
0100', NULL, NULL, '(123)555-0101', '789 26th Street', 'Miami', 'FL', '99999',
'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (27, 'Company AA', 'Toh', 'Karen', NULL, 'Purchasing Manager',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 27th Street', 'Las Vegas',
'NV', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (28, 'Company BB', 'Raghav', 'Amritansh', NULL, 'Purchasing Manager',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 28th Street', 'Memphis',
'TN', '99999', 'USA', NULL, NULL, "");
INSERT INTO `customers` (`id`, `company`, `last_name`, `first_name`,

```

```
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (29, 'Company CC', 'Lee', 'Soo Jung', NULL, 'Purchasing Manager',
'(123)555-0100', NULL, NULL, '(123)555-0101', '789 29th Street', 'Denver',
'CO', '99999', 'USA', NULL, NULL, '')
```

Insert data in Employees table

```
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (1, 'Northwind Traders', 'Freehafer', 'Nancy',
'nancy@northwindtraders.com', 'Sales Representative', '(123)555-0100',
'(123)555-0102', NULL, '(123)555-0103', '123 1st Avenue', 'Seattle', 'WA',
'99999', 'USA', '#http://northwindtraders.com#', NULL, '');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (2, 'Northwind Traders', 'Cencini', 'Andrew',
'andrew@northwindtraders.com', 'Vice President, Sales', '(123)555-0100',
'(123)555-0102', NULL, '(123)555-0103', '123 2nd Avenue', 'Bellevue', 'WA',
'99999', 'USA', 'http://northwindtraders.com#http://northwindtraders.com/#',
'Joined the company as a sales representative, was promoted to sales manager
and was then named vice president of sales.', '');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (3, 'Northwind Traders', 'Kotas', 'Jan', 'jan@northwindtraders.com',
'Sales Representative', '(123)555-0100', '(123)555-0102', NULL, '(123)555-
0103', '123 3rd Avenue', 'Redmond', 'WA', '99999', 'USA',
'http://northwindtraders.com#http://northwindtraders.com/#', 'Was hired as a
sales associate and was promoted to sales representative.', '');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (4, 'Northwind Traders', 'Sergienko', 'Mariya',
'mariya@northwindtraders.com', 'Sales Representative', '(123)555-0100',
'(123)555-0102', NULL, '(123)555-0103', '123 4th Avenue', 'Kirkland', 'WA',
'99999', 'USA', 'http://northwindtraders.com#http://northwindtraders.com/#',
NULL, '');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
```

```

`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (5, 'Northwind Traders', 'Thorpe', 'Steven',
'steven@northwindtraders.com', 'Sales Manager', '(123)555-0100', '(123)555-
0102', NULL, '(123)555-0103', '123 5th Avenue', 'Seattle', 'WA', '99999', 'USA',
'http://northwindtraders.com#http://northwindtraders.com/#', 'Joined the
company as a sales representative and was promoted to sales manager. Fluent
in French.', '');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (6, 'Northwind Traders', 'Neipper', 'Michael',
'michael@northwindtraders.com', 'Sales Representative', '(123)555-0100',
'(123)555-0102', NULL, '(123)555-0103', '123 6th Avenue', 'Redmond', 'WA',
'99999', 'USA', 'http://northwindtraders.com#http://northwindtraders.com/#',
'Fluent in Japanese and can read and write French, Portuguese, and Spanish.',
'');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (7, 'Northwind Traders', 'Zare', 'Robert',
'robert@northwindtraders.com', 'Sales Representative', '(123)555-0100',
'(123)555-0102', NULL, '(123)555-0103', '123 7th Avenue', 'Seattle', 'WA',
'99999', 'USA', 'http://northwindtraders.com#http://northwindtraders.com/#',
NULL, '');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (8, 'Northwind Traders', 'Giussani', 'Laura',
'laura@northwindtraders.com', 'Sales Coordinator', '(123)555-0100', '(123)555-
0102', NULL, '(123)555-0103', '123 8th Avenue', 'Redmond', 'WA', '99999',
'USA', 'http://northwindtraders.com#http://northwindtraders.com/#', 'Reads
and writes French.', '');
INSERT INTO `employees` (`id`, `company`, `last_name`, `first_name`,
`email_address`, `job_title`, `business_phone`, `home_phone`,
`mobile_phone`, `fax_number`, `address`, `city`, `state_province`,
`zip_postal_code`, `country_region`, `web_page`, `notes`, `attachments`)
VALUES (9, 'Northwind Traders', 'Hellung-Larsen', 'Anne',
'anne@northwindtraders.com', 'Sales Representative', '(123)555-0100',
'(123)555-0102', NULL, '(123)555-0103', '123 9th Avenue', 'Seattle', 'WA',
'99999', 'USA', 'http://northwindtraders.com#http://northwindtraders.com/#',
'Fluent in French and German.', '');

```

Experiment 4

Consider Dept table

<u>DEPTNO</u>	DNAME	LOC
---------------	-------	-----

Perform the following:

1. Rename the table dept as department
2. Add a new column PINCODE with not null constraints to the existing table DEPT
3. Drop coloumn LOC
4. Rename the column DNAME to DEPT_NAME in dept table
5. Change the data type of column pincode as CHAR with size 10
6. Delete table

SOLUTION:

Create Table:

```
CREATE TABLE DEPT(DEPTNO INTEGER, DNAME VARCHAR(10),LOCVARCHAR(4),  
PRIMARY KEY(DEPTNO));
```

1. Rename the table dept as department

```
ALTER TABLE DEPT RENAME TO DEPARTMENT;
```

Table altered.

2. Add a new column PINCODE with not null constraints to the existing table DEPT

```
ALTER TABLE DEPARTMENT ADD(PINCODE integer NOT NULL);
```

Table altered.

```
DESC DEPARTMENT;
```

```
DEPTNO  int(11)      NO  PRI  
      NULL
```

```
DNAME   varchar(10)  YES  
      NULL
```

```
LOC      varchar(4)   YES  
      NULL
```

```
pincode  int(11) NO  
      NULL
```

3.

```
ALTER TABLE DEPARTMENT DROP column LOC ;
```


Table altered.

Field	Type	Null	Key	Default	Extra
-------	------	------	-----	---------	-------

Field	Type	Null	Key	Default	Extra
DEPTNO	int(11)	NO	PRI	NULL	
DNAME	varchar(10)	YES		NULL	
pincode	int(11)	NO		NULL	

- Rename the column DNAME to DEPT_NAME in dept table

```
alter table department change DNAME Dept_Name varchar(100);
```

Table altered.

```
SQL> DESC DEPARTMENT;
```

Field	Type	Null	Key	Default	Extra
DEPTNO	int(11)	NO	PRI	NULL	
Dept_Name	varchar(100)	YES		NULL	
pincode	int(11)	NO		NULL	

- Change the datatype of column pincode as CHAR with size 10

```
ALTER TABLE department
MODIFY COLUMN pincode char(10);
```

Field	Type	Null	Key	Default	Extra
DEPTNO	int(11)	NO	PRI	NULL	
Dept_Name	varchar(100)	YES		NULL	
pincode	char(10)	YES		NULL	

- Delete table

```
DROP TABLE DEPARTMENT;
```

Table dropped.

Experiment 5

Consider Employee table

rows: 25

Filter rows: Search this table

Sort by key: None

EMPNO	EMP_NAME	DEPT	salary	DOJ	branch
E101	Amit	production	45000	NULL	Bangalore
E102	Amit	HR	70000	NULL	Bangalore
E103	sunita	management	120000	NULL	mysore
E104	sunita	IT	67000	NULL	Bangalore
E105	mahesh	Civil	145000	NULL	mumbai
E106	Amit	IT	67000	NULL	Bangalore

Perform the following

1. Display all the fields of employee table
2. Retrieve employee number and their salary
3. Retrieve average salary of all employee
4. Retrieve number of employee
5. Retrieve total salary of employee group by employee name and count similar names
6. Retrieve total salary of employee which is greater than >120000
7. Display name of employee in descending order
8. Display name of employee in ascending order
9. Display details of employee whose name is AMIT and salary greater than 50000;

```
CREATE TABLE EMPLOYEE
(EMPNO varchar(20) PRIMARY KEY,
EMP_NAME VARCHAR (20),
DEPT varchar (20),
salary integer,
DOJ date,
branch varchar(20));
```

```
INSERT INTO employee( EMPNO, EMP_NAME,DEPT,salary,DOJ,branch) VALUES('E101','Amit',
'production',45000,date('12-Mar-00'),'Bangalore');
```

```
INSERT INTO employee( EMPNO,EMP_NAME,DEPT,salary,DOJ,branch) VALUES('E102', 'Amit', 'HR',
70000, date('03-Jul-19'), 'Bangalore');
```

```
INSERT INTO employee( EMPNO,EMP_NAME,DEPT,salary,DOJ,branch) VALUES('E103', 'sunita',
'management', 120000, date('11-Jan-19'), 'mysore');
```

```
INSERT INTO employee( EMPNO,EMP_NAME,DEPT,salary,DOJ,branch) VALUES('E104', 'sunita','IT',
67000, date('01-Aug-20'), 'Bangalore');
```

```
INSERT INTO employee( EMPNO,EMP_NAME,DEPT,salary,DOJ,branch) VALUES('E105', 'mahesh',
'Civil', 145000, date('12-sep-20'), 'mumbai');
```

```
INSERT INTO employee( EMPNO,EMP_NAME,DEPT,salary,DOJ,branch) VALUES('E106', 'Amit', 'IT',
67000, date('12-Mar-20'), 'Bangalore');
```

1. Display all the fields of employees table

SQL> select * from employee;

Rows:	25	Filter rows:	Search this table	Sort by key:	None
EMPNO	EMP_NAME	DEPT	salary	DOJ	branch
E101	Amit	production	45000	NULL	Bangalore
E102	Amit	HR	70000	NULL	Bangalore
E103	sunita	management	120000	NULL	mysore
E104	sunita	IT	67000	NULL	Bangalore
E105	mahesh	Civil	145000	NULL	mumbai
E106	Amit	IT	67000	NULL	Bangalore

2. Retrieve employees number and their salary

Sql > Select EMPNO, salary from employee;

EMPNO	salary
E101	45000
E102	70000
E103	120000
E104	67000
E105	145000
E106	67000

3. Retrieve average salary of all employee

SQL> select avg(salary) from employee;

+ Options

avg(salary)

85666.6667

4. Retrieve number of employee

```
SQL> select count(*) from employee;
```

```
Count(*)  
6 -----
```

5. Retrieve total salary of employee group by employee name and count similar names

```
SELECT EMP_NAME, SUM(SALARY),COUNT(*) FROM EMPLOYEE GROUP BY(EMP_NAME);
```

EMP_NAME	SUM(SALARY)	COUNT(*)
Amit	182000	3
mahesh	145000	1
sunita	187000	2

6. Retrieve total salary of employee which is greater than >145000

```
SELECT EMP_NAME, SUM(SALARY) FROM EMPLOYEE GROUP BY(EMP_NAME) HAVING  
SUM(SALARY)>145000;
```

EMP_NAME	SUM(SALARY)
Amit	182000
sunita	187000

7. Display name of employee in descending order

```
select emp_name from employee order by emp_name desc;
```

emp_name	1
sunita	
sunita	
mahesh	
Amit	
Amit	
Amit	

8. Display name of employee in ascending order

```
select emp_name from employee order by emp_name ASC;
```

emp_name
Amit
Amit
Amit
maresh
sunita
sunita

9. Display details of employee whose name is AMIT and salary greater than 50000;

```
select * from employee where emp_name='Amit' and salary>50000;
```

EMPNO	EMP_NAME	DEPT	salary	DOJ	branch
E102	Amit	HR	70000	NULL	Bangalore
E106	Amit	IT	67000	NULL	Bangalore

Experiment 6

Perform the String Functions supported by mysql?

1. Returns the ASCII value for the first character of name of the employee?

```
SELECT EMP_NAME, ASCII(EMP_NAME) AS NumCodeOfFirstChar  
FROM employee;
```

EMP_NAME	NumCodeOfFirstCh
Amit	65
Amit	65
sunita	115
sunita	115
maresh	109
Amit	65

2. Return length of string in characters?

```
SELECT CHAR_LENGTH("Maulana Azad National Urdu University") AS LengthOfString;
```

37

```
SELECT CHARACTER_LENGTH("Maulana Azad National Urdu University") AS LengthOfString;
```

37

3. Concat() function

```
SELECT CONCAT("Maulana ", "Azad ", "National ", "Urdu ", "University") AS ConcatenatedString;
```

Maulana Azad National Urdu University

4. Add several expressions together, and add a "-" separator between them:

Syntax

```
CONCAT_WS(separator, expression1, expression2, expression3,...)
```

5. Add three columns (and add a space between them) into one "Address" column from customer table of Northwind database (using CONCAT_WS)

```
SELECT first_name, CONCAT_WS(" ", address, zip_postal_code, City) AS Address  
FROM Customers;
```

first_name	Address
Anna	123 1st Street 99999 Seattle
Antonio	123 2nd Street 99999 Boston
Thomas	123 3rd Street 99999 Los Angeles
Christina	123 4th Street 99999 New York
Martin	123 5th Street 99999 Minneapolis
Francisco	123 6th Street 99999 Milwaukee
Ming-Yang	123 7th Street 99999 Boise
Elizabeth	123 8th Street 99999 Portland
Sven	123 9th Street 99999 Salt Lake City
Roland	123 10th Street 99999 Chicago
Peter	123 11th Street 99999 Miami
John	123 12th Street 99999 Las Vegas
Andre	456 13th Street 99999 Memphis
Carlos	456 14th Street 99999 Denver
Helena	456 15th Street 99999 Honolulu
Daniel	456 16th Street 99999 San Francisco
Jean Philippe	456 17th Street 99999 Seattle
Catherine	456 18th Street 99999 Boston
Alexander	789 19th Street 99999 Los Angeles
George	789 20th Street 99999 New York
Bernard	789 21th Street 99999 Minneapolis
Luciana	789 22th Street 99999 Milwaukee

6. Mysql LOWER()

```
SELECT LOWER("MAULANA AZAD NATIONAL URDU UNIVERSITY") AS LowercaseText;
```

LowercaseText
maulana azad national urdu university

7. Mysql UPPER()

```
SELECT UPPER("dept of computer science and information technology") AS UppercaseText;
```

UppercaseText

DEPT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOG...
