EXPERIMENT – 7

AIM: How to retrieve data from two or more tables Inner join, self-join, join a table in another db, join more than two tables, outer join, How to use USING, NATURAL Keywords, joins using UNION & SET OPERATORS.

MYSQL Types Of Joins:

1. Simple or inner join:

It is the most common type of join. Inner join return all rows from multiple tables where the join condition is met.

Syntax:

```
SELECT * FROM table1, table2;
SELECT * FROM table1 JOIN table2 ON
table1.column_name=table2.column_name;
SELECT * FROM table1 JOIN table2 USING (column_name);
```

Examples:

```
select * from project_91 inner join department_91 on dnum=Dnumber;
```

Output :

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno	Essn	Dependent_name	Sex	Bdate	Relationship
John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	Alice	F	1988-12-30	Daughter
John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	Elizabeth	F	1967-05-05	Spouse
John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	Michael	M	1988-01-04	Son
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	Alice	F	1986-04-05	Daughter
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	Joy	F	1958-05-03	Spouse
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	Theodore	M	1983-10-25	Son
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry,Bellaire,TX	F	43000.00	888665555	4	987654321	Abner	M	1942-02-08	Spouse

Example :

```
SELECT * FROM EMPLOYEE_91 INNER JOIN DEPENDENT_91
ON SSN=ESSN;
```

Output :

Pname	Pnumber	Plocation	Dnum	Dname	Dnumber	Mgr_ssn	Mgr_start_date
Reorganization	20	Houston	1	Headquarters	1	888665555	1981-06-19
NULL	40	NULL	1	Headquarters	1	888665555	1981-06-19
Computerization	10	Stafford	4	Adminstration	4	987654321	1995-01-01
Newbenefits	30	Stafford	4	Adminstration	4	987654321	1995-01-01
ProductX	1	Bellaire	5	Research	5	333445555	1988-05-22
ProductY	2	Sugarland	5	Research	5	333445555	1988-05-22
ProductZ	3	Houston	5	Research	5	333445555	1988-05-22

2. Natural Join:

NATURAL JOIN is structured in such a way that, columns with same name of associate tables will appear once only.

Syntax:

SELECT * FROM table1 NATURAL JOIN table2;

Example:

select * from works_on_91 natural join dependent_91;

Output:

essn	pno	hours	Dependent_name	Sex	Bdate	Relationship
123456789	1	32.50	Alice	F	1988-12-30	Daughter
123456789	2	7.50	Alice	F	1988-12-30	Daughter
123456789	1	32.50	Elizabeth	F	1967-05-05	Spouse
123456789	2	7.50	Elizabeth	F	1967-05-05	Spouse
123456789	1	32.50	Michael	M	1988-01-04	Son
123456789	2	7.50	Michael	M	1988-01-04	Son
333445555	2	10.00	Alice	F	1986-04-05	Daughter
333445555	3	10.00	Alice	F	1986-04-05	Daughter
333445555	10	10.00	Alice	F	1986-04-05	Daughter
333445555	20	10.00	Alice	F	1986-04-05	Daughter
333445555	2	10.00	Joy	F	1958-05-03	Spouse
333445555	3	10.00	Joy	F	1958-05-03	Spouse
333445555	10	10.00	Joy	F	1958-05-03	Spouse
333445555	20	10.00	Joy	F	1958-05-03	Spouse
333445555	2	10.00	Theodore	M	1983-10-25	Son
333445555	3	10.00	Theodore	M	1983-10-25	Son
333445555	10	10.00	Theodore	M	1983-10-25	Son
333445555	20	10.00	Theodore	M	1983-10-25	Son
987654321	20	15.00	Abner	M	1942-02-08	Spouse
987654321	30	20.00	Abner	M	1942-02-08	Spouse

Example :

select * from department_91 natural join dept_locations_91;

Output :

Dnumber	Dname	Mgr_ssn	Mgr_start_date	Dlocation
1	Headquarters	888665555	1981-06-19	Houston
4	Adminstration	987654321	1995-01-01	Stafford
5	Research	333445555	1988-05-22	Bellaire
5	Research	333445555	1988-05-22	Houston
5	Research	333445555	1988-05-22	Sugarland

3. Left Join:

This join returns result table with matched data of two tables and then remaining rows of left table and NULL for right table columns.

Syntax:

SELECT * FROM table1 LEFT JOIN table2 ON table1.id=table2.id;
SELECT * FROM table1 LEFT JOIN table2 USING (id);
SELECT * FROM table1 LEFT JOIN table2 ON table1.id=table2.id
LEFT JOIN table3 ON table2.id=table3.id;

Example:

```
select * from works_on_91 left outer join dependent_91 on
works_on_91.essn=dependent_91.essn;
```

Output:

essn	pno	hours	Essn	Dependent_name	Sex	Bdate	Relationship
123456789	1	32.50	123456789	Alice	F	1988-12-30	Daughter
123456789	1	32.50	123456789	Elizabeth	F	1967-05-05	Spouse
123456789	1	32.50	123456789	Michael	M	1988-01-04	Son
123456789	2	7.50	123456789	Alice	F	1988-12-30	Daughter
123456789	2	7.50	123456789	Elizabeth	F	1967-05-05	Spouse
123456789	2	7.50	123456789	Michael	M	1988-01-04	Son
333445555	2	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	2	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	2	10.00	333445555	Theodore	M	1983-10-25	Son
333445555	3	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	3	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	3	10.00	333445555	Theodore	M	1983-10-25	Son
333445555	10	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	10	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	10	10.00	333445555	Theodore	M	1983-10-25	Son
333445555	20	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	20	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	20	10.00	333445555	Theodore	M	1983-10-25	Son
453453453	1	20.00	NULL	NULL	NULL	NULL	NULL
453453453	2	20.00	NULL	NULL	NULL	NULL	NULL
666884444	3	40.00	NULL	NULL	NULL	NULL	NULL
888665555	20	NULL	NULL	NULL	NULL	NULL	NULL
987654321	20	15.00	987654321	Abner	M	1942-02-08	Spouse
987654321	30	20.00	987654321	Abner	M	1942-02-08	Spouse
987987987	10	35.00	NULL	NULL	NULL	NULL	NULL
987987987	30	5.00	NULL	NULL	NULL	NULL	NULL
999887777	10	10.00	NULL	NULL	NULL	NULL	NULL
999887777	30	30.00	NULL	NULL	NULL	NULL	NULL

Example :

SELECT * FROM employee_91 LEFT JOIN works_on_91 ON ssn=essn;

Output :

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno	essn	pno	hours
John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	1	32.50
John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	2	7.50
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	2	10.00
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	3	10.00
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	10	10.00
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	20	10.00
Joyce	A	English	453453453	1972-07-31	5631 Rice,Houston,TX	F	25000.00	333445555	5	453453453	1	20.00
Joyce	A	English	453453453	1972-07-31	5631 Rice,Houston,TX	F	25000.00	333445555	5	453453453	2	20.00
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak,Humble,TX	M	38000.00	333445555	5	666884444	3	40.00
James	E	Bong	888665555	1937-11-10	450 Stone,Houston,TX	M	55000.00	NULL	1	888665555	20	NULL
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry,Bellaire,TX	F	43000.00	888665555	4	987654321	20	15.00
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry,Bellaire,TX	F	43000.00	888665555	4	987654321	30	20.00
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas,Houston,TX	M	25000.00	987654321	4	987987987	10	35.00
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas,Houston,TX	M	25000.00	987654321	4	987987987	30	5.0
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle,Spring,TX	F	25000.00	987654321	4	999887777	10	10.00
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle,Spring,TX	F	25000.00	987654321	4	999887777	30	30.00

5.00

4. Right Join:

This join returns result table with matched data of two tables and then remaining rows of right table and NULL for left table columns.

Syntax:

SELECT * FROM table1 RIGHT JOIN table2 ON table1.column=table2.column;

Example:

select * from works_on_91 right outer join dependent_91 on works_on_91.essn=dependent_91.essn;

Output:

essn	pno	hours	Essn	Dependent_name	Sex	Bdate	Relationship
123456789	1	32.50	123456789	Alice	F	1988-12-30	Daughter
123456789	2	7.50	123456789	Alice	F	1988-12-30	Daughter
123456789	1	32.50	123456789	Elizabeth	F	1967-05-05	Spouse
123456789	2	7.50	123456789	Elizabeth	F	1967-05-05	Spouse
123456789	1	32.50	123456789	Michael	M	1988-01-04	Son
123456789	2	7.50	123456789	Michael	M	1988-01-04	Son
333445555	2	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	3	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	10	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	20	10.00	333445555	Alice	F	1986-04-05	Daughter
333445555	2	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	3	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	10	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	20	10.00	333445555	Joy	F	1958-05-03	Spouse
333445555	2	10.00	333445555	Theodore	M	1983-10-25	Son
333445555	3	10.00	333445555	Theodore	M	1983-10-25	Son
333445555	10	10.00	333445555	Theodore	M	1983-10-25	Son
333445555	20	10.00	333445555	Theodore	M	1983-10-25	Son
987654321	20	15.00	987654321	Abner	M	1942-02-08	Spouse
987654321	30	20.00	987654321	Abner	M	1942-02-08	Spouse

Example :

SELECT * FROM employee_91 right JOIN works_on_91 ON ssn=essn;

Output :

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno	essn	pno	hours
John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	1	32.50
John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	2	7.50
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	2	10.00
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	3	10.00
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	10	10.00
Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	20	10.00
Joyce	A	English	453453453	1972-07-31	5631 Rice,Houston,TX	F	25000.00	333445555	5	453453453	1	20.00
Joyce	A	English	453453453	1972-07-31	5631 Rice,Houston,TX	F	25000.00	333445555	5	453453453	2	20.00
Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak,Humble,TX	M	38000.00	333445555	5	666884444	3	40.00
James	E	Bong	888665555	1937-11-10	450 Stone,Houston,TX	M	55000.00	NULL	1	888665555	20	NULL
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry,Bellaire,TX	F	43000.00	888665555	4	987654321	20	15.00
Jennifer	S	Wallace	987654321	1941-06-20	291 Berry,Bellaire,TX	F	43000.00	888665555	4	987654321	30	20.00
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas,Houston,TX	M	25000.00	987654321	4	987987987	10	35.00
Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas,Houston,TX	M	25000.00	987654321	4	987987987	30	5.00
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle,Spring,TX	F	25000.00	987654321	4	999887777	10	10.00
Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle,Spring,TX	F	25000.00	987654321	4	999887777	30	30.00

5. UNION:

UNION operator is used to combine the result sets of 2 or more SELECT statements. It removes duplicate rows between the various SELECT statements. Each SELECT statement within the UNION operator must have the same number of fields in the result sets with similar data types.

Syntax:

SELECT * FROM table1,table2,… UNION SELECT * FROM table1,table2,…WHERE conditions;

Example:

```
SELECT PNAME FROM PROJECT_91, DEPARTMENT_91, EMPLOYEE_91
WHERE DNUM=DNUMBER AND MGR_SSN=SSN AND LNAME='Smith'
UNION
SELECT PNAME FROM PROJECT_91, WORKS_ON_91, EMPLOYEE_91
WHERE PNUMBER=PNO AND ESSN=SSN AND LNAME='Smith';
```

Output:

PNAME
ProductX
ProductY

6. INTERSECT:

An INTERSECT operator returns the intersection of 2 or more datasets. If a record exists in both data sets, it will be included in the INTERSECT results. However, if a record exists in one data set and not in the other, it will be omitted from the INTERSECT results. Intersection operation is done by using joins.

Syntax:

SELECT a.column1, b.column2 FROM table_a JOIN table_b
ON a.column1 = b.column1 AND a.column2 = b.column2;

Example:

SELECT pnumber,dnumber from project_91 INNER JOIN department_91 ON dnum=Dnumber;

Output:

	pnumber	dnumber
▶	1	5
	2	5
	3	5
	20	1
	40	1
	10	4
	30	4

7. MINUS:

MINUS operator is used to return all rows in the first SELECT statement that are not returned by the second SELECT statement. Each SELECT statement will define a dataset. The MINUS operator will retrieve all records from the first dataset and then remove from the results all records from the second dataset.

Syntax:

SELECT a. column1, a. column2 FROM table_a LEFT JOIN table b
ON a. column1 = b column1 AND a. column2 = b. column2
WHERE b. column1 IS NULL;

Example:

SELECT * FROM employee_91 LEFT JOIN works_on_91 ON ssn=essn;

Output:

	Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno	essn	pno	hours
▶	John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	1	32.50
	John	B	Smith	123456789	1965-01-09	731 Fondren,Houston,TX	M	30000.00	333445555	5	123456789	2	7.50
	Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	2	10.00
	Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	3	10.00
	Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	10	10.00
	Franklin	T	Wong	333445555	1965-12-08	638 Voss,Houston,TX	M	40000.00	888665555	5	333445555	20	10.00
	Joyce	A	English	453453453	1972-07-31	5631 Rice,Houston,TX	F	25000.00	333445555	5	453453453	1	20.00
	Joyce	A	English	453453453	1972-07-31	5631 Rice,Houston,TX	F	25000.00	333445555	5	453453453	2	20.00
	Ramesh	K	Narayan	666884444	1962-09-15	975 Fire Oak,Humble,TX	M	38000.00	333445555	5	666884444	3	40.00
	James	E	Bong	888665555	1937-11-10	450 Stone,Houston,TX	M	55000.00	NULL	1	888665555	20	NULL
	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry,Bellaire,TX	F	43000.00	888665555	4	987654321	20	15.00
	Jennifer	S	Wallace	987654321	1941-06-20	291 Berry,Bellaire,TX	F	43000.00	888665555	4	987654321	30	20.00
	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas,Houston,TX	M	25000.00	987654321	4	987987987	10	35.00
	Ahmad	V	Jabbar	987987987	1969-03-29	980 Dallas,Houston,TX	M	25000.00	987654321	4	987987987	30	5.(5.00
	Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle,Spring,TX	F	25000.00	987654321	4	999887777	10	10.00
	Alicia	J	Zelaya	999887777	1968-01-19	3321 Castle,Spring,TX	F	25000.00	987654321	4	999887777	30	30.00

8. USING:

If several columns have the same names but the datatypes do not match, the natural join clause can be modified with the USING clause to specify the columns that should be used for an equijoin.

Syntax:

SELECT * FROM table_name JOIN table_name USING (column_name);

Example:

SELECT * FROM department_91 left JOIN dept_locations_91 USING(dnumber);

Output:

Dnumber	Dname	Mgr_ssn	Mgr_start_date	Dlocation
1	Headquarters	888665555	1981-06-19	Houston
4	Adminstration	987654321	1995-01-01	Stafford
5	Research	333445555	1988-05-22	Bellaire
5	Research	333445555	1988-05-22	Houston
5	Research	333445555	1988-05-22	Sugarland

Example :

select * from works_on_91 inner join dependent_91 using(essn);

Output :

essn	pno	hours	Dependent_name	Sex	Bdate	Relationship
123456789	1	32.50	Alice	F	1988-12-30	Daughter
123456789	2	7.50	Alice	F	1988-12-30	Daughter
123456789	1	32.50	Elizabeth	F	1967-05-05	Spouse
123456789	2	7.50	Elizabeth	F	1967-05-05	Spouse
123456789	1	32.50	Michael	M	1988-01-04	Son
123456789	2	7.50	Michael	M	1988-01-04	Son
333445555	2	10.00	Alice	F	1986-04-05	Daughter
333445555	3	10.00	Alice	F	1986-04-05	Daughter
333445555	10	10.00	Alice	F	1986-04-05	Daughter
333445555	20	10.00	Alice	F	1986-04-05	Daughter
333445555	2	10.00	Joy	F	1958-05-03	Spouse
333445555	3	10.00	Joy	F	1958-05-03	Spouse
333445555	10	10.00	Joy	F	1958-05-03	Spouse
333445555	20	10.00	Joy	F	1958-05-03	Spouse
333445555	2	10.00	Theodore	M	1983-10-25	Son
333445555	3	10.00	Theodore	M	1983-10-25	Son
333445555	10	10.00	Theodore	M	1983-10-25	Son
333445555	20	10.00	Theodore	M	1983-10-25	Son
987654321	20	15.00	Abner	M	1942-02-08	Spouse
987654321	30	20.00	Abner	M	1942-02-08	Spouse