

Assignment: Inner/Left/Right/Cross Join Operations

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1. Create two tables (with more than two columns), perform all the join operations and display the output.

```
mysql> show databases;
+-----+
| Database |
+-----+
| assignment |
| dataset |
| information_schema |
| module |
| mysql |
| performance_schema |
| sys |
+-----+
7 rows in set (0.01 sec)

mysql> use assignment;
Database changed
mysql> show tables;
+-----+
| Tables_in_assignment |
+-----+
| school |
+-----+
1 row in set (0.00 sec)

mysql> create table Departments(Dept_Id varchar(5),
-> Dept_Name set('Finance', 'IT', 'Marketing', 'Sales', 'Tax'),
-> Location set('Atlanta', 'Boston', 'Chicago'),
-> primary key(Dept_Id));
Query OK, 0 rows affected (0.02 sec)

mysql> create table Employees(Emp_Id smallint unsigned auto_increment,
-> Last_Name varchar(15) not null,
-> First_Name varchar(15) not null,
-> Gender set('Male', 'Female'),
-> Dept_Id varchar(5) not null,
-> Year_Join year,
-> Salary integer unsigned not null,
-> primary key(Emp_Id),
-> foreign key(Dept_Id) references Departments(Dept_Id));
Query OK, 0 rows affected (1.59 sec)

mysql> show tables;
+-----+
| Tables_in_assignment |
+-----+
| Departments |
| Employees |
| school |
+-----+
3 rows in set (0.00 sec)

mysql>
```

```
mysql> describe Departments;
+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+
| Dept_Id | varchar(5) | NO | PRI | NULL | |
| Dept_Name | set('Finance', 'IT', 'Marketing', 'Sales', 'Tax') | YES | | NULL | |
| Location | set('Atlanta', 'Boston', 'Chicago') | YES | | NULL | |
+-----+
3 rows in set (0.00 sec)

mysql> insert into Departments values
-> ('FIN34', 'Finance', 'Chicago'),
-> ('ITN47', 'IT', 'Atlanta'),
-> ('MKN39', 'Marketing', 'Boston'),
-> ('SLN52', 'Sales', 'Boston'),
-> ('TXN41', 'Tax', 'Chicago');
Query OK, 5 rows affected (0.11 sec)
Records: 5 Duplicates: 0 Warnings: 0

mysql> describe Employees;
+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+
| Emp_Id | smallint unsigned | NO | PRI | NULL | auto_increment |
| Last_Name | varchar(15) | NO | | NULL | |
| First_Name | varchar(15) | NO | | NULL | |
| Gender | set('Male', 'Female') | YES | | NULL | |
| Dept_Id | varchar(5) | NO | MUL | NULL | |
| Year_Join | year | YES | | NULL | |
| Salary | int unsigned | NO | | NULL | |
+-----+
7 rows in set (0.00 sec)

mysql> alter table Employees auto_increment=3001;
Query OK, 0 rows affected (0.20 sec)
Records: 0 Duplicates: 0 Warnings: 0

mysql> insert into Employees (Last_Name, First_Name, Gender, Dept_Id, Year_Join, Salary) values
-> ('Brown', 'William', 'Male', 'FIN34', 2008, 83000),
-> ('Kenneth', 'Andrew', 'Male', 'SLN52', 2010, 62500),
-> ('Ralph', 'Larry', 'Male', 'ITN47', 2011, 95000),
-> ('Bryan', 'Kayla', 'Female', 'MKN39', 2013, 50300),
-> ('Gerald', 'Ethan', 'Male', 'TXN41', 2013, 71000),
-> ('Nathan', 'Ashley', 'Female', 'SLN52', 2014, 62500),
-> ('Gregory', 'Linda', 'Female', 'ITN47', 2015, 95000),
-> ('Richard', 'Henry', 'Male', 'MKN39', 2016, 50300),
-> ('Eugene', 'Ann', 'Female', 'TXN41', 2017, 71000);
Query OK, 9 rows affected (0.14 sec)
Records: 9 Duplicates: 0 Warnings: 0

mysql>
```

Inner Join

```
mysql> select * from Departments;
+-----+-----+-----+
| Dept_Id | Dept_Name | Location |
+-----+-----+-----+
| FIN34   | Finance   | Chicago  |
| ITN47   | IT        | Atlanta  |
| MKN39   | Marketing | Boston   |
| SLN52   | Sales     | Boston   |
| TXN41   | Tax       | Chicago  |
+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> select * from Employees;
+-----+-----+-----+-----+-----+-----+
| Emp_Id | Last_Name | First_Name | Gender | Dept_Id | Year_Join | Salary |
+-----+-----+-----+-----+-----+-----+
| 3001   | Brown    | William    | Male   | FIN34   | 2008      | 83000  |
| 3002   | Kenneth  | Andrew     | Male   | SLN52   | 2010      | 62500  |
| 3003   | Ralph    | Larry      | Male   | ITN47   | 2011      | 95000  |
| 3004   | Bryan    | Kayla      | Female | MKN39   | 2013      | 59300  |
| 3005   | Gerald   | Ethan      | Male   | TXN41   | 2013      | 71000  |
| 3006   | Nathan   | Ashley     | Female | SLN52   | 2014      | 62500  |
| 3007   | Gregory  | Linda      | Female | ITN47   | 2015      | 95000  |
| 3008   | Richard  | Henry      | Male   | MKN39   | 2016      | 59300  |
| 3009   | Eugene    | Ann        | Female | TXN41   | 2017      | 71000  |
+-----+-----+-----+-----+-----+-----+
9 rows in set (0.00 sec)

mysql> # inner join
mysql> select Emp_Id, First_Name, Dept_Name, Year_Join, Salary, Location
-> from Employees inner join Departments
-> on Employees.Dept_Id = Departments.Dept_Id;
+-----+-----+-----+-----+-----+-----+
| Emp_Id | First_Name | Dept_Name | Year_Join | Salary | Location |
+-----+-----+-----+-----+-----+-----+
| 3001   | William    | Finance   | 2008      | 83000  | Chicago  |
| 3003   | Larry      | IT        | 2011      | 95000  | Atlanta  |
| 3004   | Kayla      | Marketing | 2013      | 59300  | Boston   |
| 3008   | Henry      | Marketing | 2016      | 59300  | Boston   |
| 3002   | Andrew     | Sales     | 2010      | 62500  | Boston   |
| 3006   | Ashley     | Sales     | 2014      | 62500  | Boston   |
| 3005   | Ethan      | Tax       | 2013      | 71000  | Chicago  |
| 3009   | Ann        | Tax       | 2017      | 71000  | Chicago  |
+-----+-----+-----+-----+-----+-----+
9 rows in set (0.00 sec)

mysql> █
```

Left Join

```
mysql> select * from Departments;
+-----+-----+-----+
| Dept_Id | Dept_Name | Location |
+-----+-----+-----+
| FIN34   | Finance   | Chicago  |
| ITN47   | IT        | Atlanta  |
| MKN39   | Marketing | Boston   |
| SLN52   | Sales     | Boston   |
| TXN41   | Tax       | Chicago  |
+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> select * from Employees;
+-----+-----+-----+-----+-----+-----+
| Emp_Id | Last_Name | First_Name | Gender | Dept_Id | Year_Join | Salary |
+-----+-----+-----+-----+-----+-----+
| 3001   | Brown    | William    | Male   | FIN34   | 2008      | 83000  |
| 3002   | Kenneth  | Andrew     | Male   | SLN52   | 2010      | 62500  |
| 3003   | Ralph    | Larry      | Male   | ITN47   | 2011      | 95000  |
| 3004   | Bryan    | Kayla      | Female | MKN39   | 2013      | 59300  |
| 3005   | Gerald   | Ethan      | Male   | TXN41   | 2013      | 71000  |
| 3006   | Nathan   | Ashley     | Female | SLN52   | 2014      | 62500  |
| 3007   | Gregory  | Linda      | Female | ITN47   | 2015      | 95000  |
| 3008   | Richard  | Henry      | Male   | MKN39   | 2016      | 59300  |
| 3009   | Eugene    | Ann        | Female | TXN41   | 2017      | 71000  |
+-----+-----+-----+-----+-----+-----+
9 rows in set (0.01 sec)

mysql> # left join
mysql> select Emp_Id, First_Name, Dept_Name, Year_Join, Salary, Location
-> from Employees left join Departments
-> on Employees.Dept_Id = Departments.Dept_Id;
+-----+-----+-----+-----+-----+-----+
| Emp_Id | First_Name | Dept_Name | Year_Join | Salary | Location |
+-----+-----+-----+-----+-----+-----+
| 3001   | William    | Finance   | 2008      | 83000  | Chicago  |
| 3002   | Andrew     | Sales     | 2010      | 62500  | Boston   |
| 3003   | Larry      | IT        | 2011      | 95000  | Atlanta  |
| 3004   | Kayla      | Marketing | 2013      | 59300  | Boston   |
| 3005   | Ethan      | Tax       | 2013      | 71000  | Chicago  |
| 3006   | Ashley     | Sales     | 2014      | 62500  | Boston   |
| 3007   | Linda      | IT        | 2015      | 95000  | Atlanta  |
| 3008   | Henry      | Marketing | 2016      | 59300  | Boston   |
| 3009   | Ann        | Tax       | 2017      | 71000  | Chicago  |
+-----+-----+-----+-----+-----+-----+
9 rows in set (0.00 sec)

mysql> █
```

Right Join

```
mysql> select * from Departments;
+-----+-----+-----+
| Dept_Id | Dept_Name | Location |
+-----+-----+-----+
| FIN34   | Finance   | Chicago  |
| ITN47   | IT        | Atlanta  |
| MKN39   | Marketing | Boston   |
| SLN52   | Sales     | Boston   |
| TXN41   | Tax       | Chicago  |
+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> select * from Employees;
+-----+-----+-----+-----+-----+-----+
| Emp_Id | Last_Name | First_Name | Gender | Dept_Id | Year_Join | Salary |
+-----+-----+-----+-----+-----+-----+
| 3001   | Brown    | William    | Male   | FIN34   | 2008      | 83000  |
| 3002   | Kenneth  | Andrew     | Male   | SLN52   | 2010      | 62500  |
| 3003   | Ralph    | Larry      | Male   | ITN47   | 2011      | 95000  |
| 3004   | Bryan    | Kayla      | Female | MKN39   | 2013      | 59300  |
| 3005   | Gerald   | Ethan      | Male   | TXN41   | 2013      | 71000  |
| 3006   | Nathan   | Ashley     | Female | SLN52   | 2014      | 62500  |
| 3007   | Gregory  | Linda      | Female | ITN47   | 2015      | 95000  |
| 3008   | Richard  | Henry      | Male   | MKN39   | 2016      | 59300  |
| 3009   | Eugene   | Ann        | Female | TXN41   | 2017      | 71000  |
+-----+-----+-----+-----+-----+-----+
9 rows in set (0.01 sec)

mysql> # right join
mysql> select Emp_Id, First_Name, Dept_Name, Year_Join, Salary, Location
-> from Employees right join Departments
-> on Employees.Dept_Id = Departments.Dept_Id;
+-----+-----+-----+-----+-----+-----+
| Emp_Id | First_Name | Dept_Name | Year_Join | Salary | Location |
+-----+-----+-----+-----+-----+-----+
| 3001   | William    | Finance   | 2008      | 83000  | Chicago  |
| 3003   | Larry      | IT        | 2011      | 95000  | Atlanta  |
| 3007   | Linda      | IT        | 2015      | 95000  | Atlanta  |
| 3004   | Kayla      | Marketing | 2013      | 59300  | Boston   |
| 3008   | Henry      | Marketing | 2016      | 59300  | Boston   |
| 3002   | Andrew     | Sales     | 2010      | 62500  | Boston   |
| 3006   | Ashley     | Sales     | 2014      | 62500  | Boston   |
| 3005   | Ethan      | Tax       | 2013      | 71000  | Chicago  |
| 3009   | Ann        | Tax       | 2017      | 71000  | Chicago  |
+-----+-----+-----+-----+-----+-----+
9 rows in set (0.00 sec)

mysql> █
```

Cross Join

```
mysql> select Emp_Id, First_Name, Dept_Name, Year_Join, Salary, Location
-> from Employees cross join Departments;
+-----+-----+-----+-----+-----+-----+
| Emp_Id | First_Name | Dept_Name | Year_Join | Salary | Location |
+-----+-----+-----+-----+-----+-----+
| 3001   | William    | Tax       | 2008      | 83000  | Chicago  |
| 3001   | William    | Sales     | 2008      | 83000  | Boston   |
| 3001   | William    | Marketing | 2008      | 83000  | Boston   |
| 3001   | William    | IT        | 2008      | 83000  | Atlanta  |
| 3001   | William    | Finance   | 2008      | 83000  | Chicago  |
| 3002   | Andrew     | Tax       | 2010      | 62500  | Chicago  |
| 3002   | Andrew     | Sales     | 2010      | 62500  | Boston   |
| 3002   | Andrew     | Marketing | 2010      | 62500  | Boston   |
| 3002   | Andrew     | IT        | 2010      | 62500  | Atlanta  |
| 3002   | Andrew     | Finance   | 2010      | 62500  | Chicago  |
| 3003   | Larry      | Tax       | 2011      | 95000  | Chicago  |
| 3003   | Larry      | Sales     | 2011      | 95000  | Boston   |
| 3003   | Larry      | Marketing | 2011      | 95000  | Boston   |
| 3003   | Larry      | IT        | 2011      | 95000  | Atlanta  |
| 3003   | Larry      | Finance   | 2011      | 95000  | Chicago  |
| 3004   | Kayla      | Tax       | 2013      | 59300  | Chicago  |
| 3004   | Kayla      | Sales     | 2013      | 59300  | Boston   |
| 3004   | Kayla      | Marketing | 2013      | 59300  | Boston   |
| 3004   | Kayla      | IT        | 2013      | 59300  | Atlanta  |
| 3004   | Kayla      | Finance   | 2013      | 59300  | Chicago  |
| 3005   | Ethan      | Tax       | 2013      | 71000  | Chicago  |
| 3005   | Ethan      | Sales     | 2013      | 71000  | Boston   |
| 3005   | Ethan      | Marketing | 2013      | 71000  | Boston   |
| 3005   | Ethan      | IT        | 2013      | 71000  | Atlanta  |
| 3005   | Ethan      | Finance   | 2013      | 71000  | Chicago  |
| 3006   | Ashley     | Tax       | 2014      | 62500  | Chicago  |
| 3006   | Ashley     | Sales     | 2014      | 62500  | Boston   |
| 3006   | Ashley     | Marketing | 2014      | 62500  | Boston   |
| 3006   | Ashley     | IT        | 2014      | 62500  | Atlanta  |
| 3006   | Ashley     | Finance   | 2014      | 62500  | Chicago  |
| 3007   | Linda      | Tax       | 2015      | 95000  | Chicago  |
| 3007   | Linda      | Sales     | 2015      | 95000  | Boston   |
| 3007   | Linda      | Marketing | 2015      | 95000  | Boston   |
| 3007   | Linda      | IT        | 2015      | 95000  | Atlanta  |
| 3007   | Linda      | Finance   | 2015      | 95000  | Chicago  |
| 3008   | Henry      | Tax       | 2016      | 59300  | Chicago  |
| 3008   | Henry      | Sales     | 2016      | 59300  | Boston   |
| 3008   | Henry      | Marketing | 2016      | 59300  | Boston   |
| 3008   | Henry      | IT        | 2016      | 59300  | Atlanta  |
| 3008   | Henry      | Finance   | 2016      | 59300  | Chicago  |
| 3009   | Ann        | Tax       | 2017      | 71000  | Chicago  |
| 3009   | Ann        | Sales     | 2017      | 71000  | Boston   |
| 3009   | Ann        | Marketing | 2017      | 71000  | Boston   |
| 3009   | Ann        | IT        | 2017      | 71000  | Atlanta  |
| 3009   | Ann        | Finance   | 2017      | 71000  | Chicago  |
+-----+-----+-----+-----+-----+-----+
45 rows in set (0.00 sec)

mysql> █
```

Group by

```
mysql> # group by
mysql> select max(Emp_Id) as Max_Emp_Id, max(Salary) as Max_Salary from Employees group by Dept_Id;
+-----+-----+
| Max_Emp_Id | Max_Salary |
+-----+-----+
| 3001      | 83000     |
| 3007      | 95000     |
| 3008      | 59300     |
| 3006      | 62500     |
| 3009      | 71000     |
+-----+-----+
5 rows in set (0.00 sec)

mysql> select max(Emp_Id) as Max_Emp_Id, Dept_Id from Employees group by Dept_Id;
+-----+-----+
| Max_Emp_Id | Dept_Id |
+-----+-----+
| 3001      | FIN34   |
| 3007      | ITN47   |
| 3008      | MKN39   |
| 3006      | SLN52   |
| 3009      | TXN41   |
+-----+-----+
5 rows in set (0.00 sec)

mysql> select Gender, count(Emp_Id) as Count from Employees group by Gender;
+-----+-----+
| Gender | Count |
+-----+-----+
| Male   | 5     |
| Female | 4     |
+-----+-----+
2 rows in set (0.00 sec)

mysql> select Location, count(Dept_Name) as Count from Departments group by Location;
+-----+-----+
| Location | Count |
+-----+-----+
| Chicago  | 2     |
| Atlanta  | 1     |
| Boston   | 2     |
+-----+-----+
3 rows in set (0.00 sec)

mysql> select Dept_Id, sum(Salary) as Sum_Pay from Employees where Salary>80000 group by Dept_Id;
+-----+-----+
| Dept_Id | Sum_Pay |
+-----+-----+
| FIN34   | 83000   |
| ITN47   | 190000  |
+-----+-----+
2 rows in set (0.00 sec)

mysql>
```

Having clause

```
mysql> # having clause
mysql> select max(Emp_Id) as Max_Emp_Id, max(Salary) as Max_Salary from Employees where Gender='Female' group by Dept_Id having max(Emp_Id) > 3005;
+-----+-----+
| Max_Emp_Id | Max_Salary |
+-----+-----+
| 3007      | 95000     |
| 3006      | 62500     |
| 3009      | 71000     |
+-----+-----+
3 rows in set (0.00 sec)

mysql> select Emp_Id, First_Name, Year_Join from Employees group by Emp_Id having Year_Join > 2014;
+-----+-----+-----+
| Emp_Id | First_Name | Year_Join |
+-----+-----+-----+
| 3007   | Linda     | 2015     |
| 3008   | Henry     | 2016     |
| 3009   | Ann       | 2017     |
+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> select Emp_Id, First_Name, Year_Join from Employees group by Emp_Id having Year_Join > 2014 order by First_Name asc;
+-----+-----+-----+
| Emp_Id | First_Name | Year_Join |
+-----+-----+-----+
| 3009   | Ann       | 2017     |
| 3008   | Henry     | 2016     |
| 3007   | Linda     | 2015     |
+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> select Emp_Id, First_Name, Dept_Id, Year_Join from Employees group by Emp_Id having Dept_Id = 'ITN47';
+-----+-----+-----+-----+
| Emp_Id | First_Name | Dept_Id | Year_Join |
+-----+-----+-----+-----+
| 3003   | Larry     | ITN47   | 2011     |
| 3007   | Linda     | ITN47   | 2015     |
+-----+-----+-----+-----+
2 rows in set (0.01 sec)

mysql> select Dept_Id, Dept_Name, Location from Departments where Dept_Id != 'MKN39' having Location != 'Boston' order by Location asc;
+-----+-----+-----+
| Dept_Id | Dept_Name | Location |
+-----+-----+-----+
| ITN47   | IT        | Atlanta  |
| FIN34   | Finance   | Chicago  |
| TXN41   | Tax       | Chicago  |
+-----+-----+-----+
3 rows in set (0.00 sec)

mysql>
```