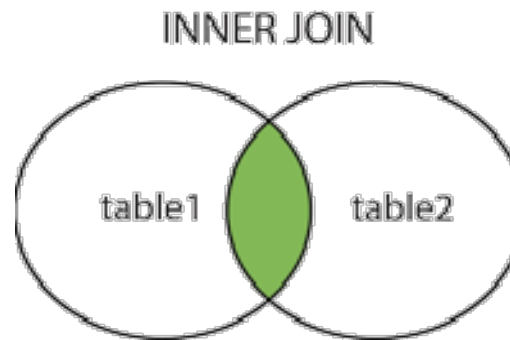# 1. SQL Joins

An SQL JOIN clause is used to combine rows from two or more tables, based on a common field between them.

1. JOIN (inner join)

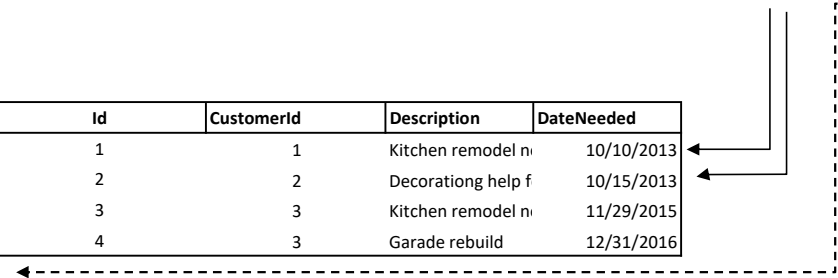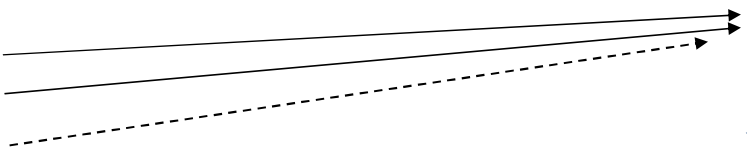The INNER JOIN keyword selects records that have matching values in both tables.

INNER JOIN

table1   table2

SELECT *
FROM HomePro.Customers
  join HomePro.Schedules
 on Customers.CustomerId = Schedules.CustomerId;

Customers									Schedules				
CustomerId	FirstName	LastName	Email	Phone	AtlPhone	FaxNumber	ZipCode	NewsLetter	Id	CustomerId	Description	DateNeeded	JobType
1 John		Smith	John@gmail.com	703-543-3302	703-543-3302		22201	1	1	1	Kitchen remodel needed	10/10/2013	Remodeling
2 Jeremy		Smith	Jeremy@gmail.com	723-543-3302			22203	0	2	2	Decorationg help for dinig room	10/15/2013	Decorating
3 Mark		Long	MarkLong@Yahoo.com	722-366-5588			22031	1	3	3	Kitchen remodel needed	11/29/2015	Remodeling
3 Mark		Long	MarkLong@Yahoo.com	722-366-5588			22031	1	4	3	Garade rebuild	12/31/2016	Rebuild
4 Bob		James	bob@microsoft.com	703-366-9632		703-455-9632	22221	0					
5 Adam		Marcos	adam@Marcos.com	703-566-0000		703-366-0000	22001	1					

CustomerId	FirstName	LastName
1	John	Smith
2	Jeremy	Smith
3	Mark	Long
4	Bob	James
5	Adam	Marcos

Id	CustomerId	Description	DateNeeded
1	1	Kitchen remodel needed	10/10/2013
2	2	Decorationg help for dinig room	10/15/2013
3	3	Kitchen remodel needed	11/29/2015
4	3	Garade rebuild	12/31/2016

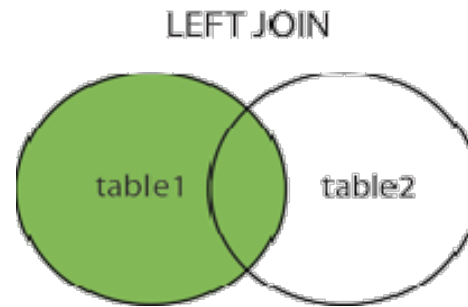| CustomerId	FirstName	LastName	Id	CustomerId	Description	DateNeeded
1	John	Smith	1	1	Kitchen remodel n	10/10/2013
2	Jeremy	Smith	2	2	Decorationg help f	10/15/2013
3	Mark	Long	3	3	Kitchen remodel n	11/29/2015
3	Mark	Long	4	3	Garade rebuild	12/31/2016
4	Bob	James				
5	Adam	Marcos				

2. Using table and column alias

SELECT

        a.CustomerId, a.FirstName as CustomerName, a.Lastname, a.Phone, b.Description as JobDescription, b.DateNeeded

FROM HomePro.Customers a

      join HomePro.Schedules b

        on a.CustomerId = b.CustomerId;

Customers				Schedules	
CustomerId	**CustomerName**	**LastName**	**Phone**	**JobDescription**	**DateNeeded**
1	John	Smith	703-543-3302	Kitchen remodel needed	10/10/2013
2	Jeremy	Smith	723-543-3302	Decorationg help for dinig room	10/15/2013
3	Mark	Long	722-366-5588	Kitchen remodel needed	11/29/2015
3	Mark	Long	722-366-5588	Garade rebuild	12/31/2016
4	Bob	James	703-366-9632		
5	Adam	Marcos	703-566-0000		

3. Left join

The LEFT JOIN keyword returns all rows from the left table (table1), with the matching rows in the right table (table2). The result is NULL in the right side when there is no match.

LEFT JOIN

SELECT a.CustomerId, a.FirstName, a.Lastname, a.Phone, b.Description, b.DateNeeded

FROM HomePro.Customers a

    left join HomePro.Schedules b

      on a.CustomerId = b.CustomerId;

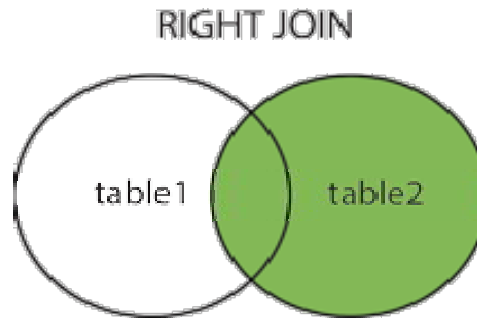| Customers				Schedules	
CustomerId	**FirstName**	**LastName**	**Phone**	**Description**	**DateNeeded**
1	John	Smith	703-543-3302	Kitchen remodel needed	10/10/2013
2	Jeremy	Smith	723-543-3302	Decorationg help for dinig room	10/15/2013
3	Mark	Long	722-366-5588	Kitchen remodel needed	11/29/2015
3	Mark	Long	722-366-5588	Garade rebuild	12/31/2016
4	Bob	James	703-366-9632	NULL	NULL
5	Adam	Marcos	703-566-0000	NULL	NULL

4. Find Customers without schedules

SELECT a.CustomerId, a.FirstName, a.Lastname, a.Phone, b.Description, b.DateNeeded

FROM HomePro.Customers a

left join HomePro.Schedules b

on a.CustomerId = b.CustomerId

where b.CustomerId is null;

Customers				Schedules	
CustomerId	**FirstName**	**LastName**	**Phone**	**Description**	**DateNeeded**
4	Bob	James	703-366-9632	NULL	NULL
5	Adam	Marcos	703-566-0000	NULL	NULL

5. Right join

The RIGHT JOIN keyword returns all rows from the right table (table2), with the matching rows in the left table (table1). The result is NULL in the left side when there is no match.
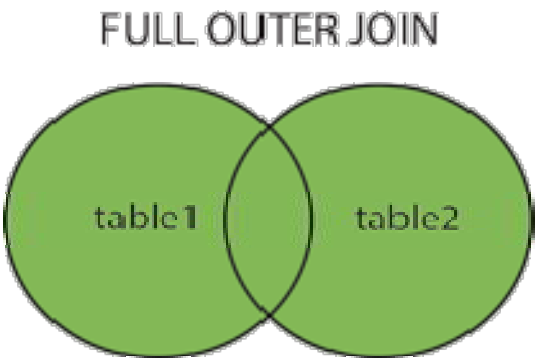
RIGHT JOIN

SELECT a.Phone, b.Description, b.DateNeeded, a.CustomerId, a.FirstName, a.Lastname,

FROM HomePro.Schedules b

      right join HomePro.Customers a

         on a.CustomerId = b.CustomerId;

Schedules		Customers			
Description	**DateNeeded**	**CustomerId**	**LastName**	**LastName**	**Phone**
Kitchen remodel needed	10/10/2013	1	John	Smith	703-543-3302
Decorationg help for dinig room	10/15/2013	2	Jeremy	Smith	723-543-3302
Kitchen remodel needed	11/29/2015	3	Mark	Long	722-366-5588
Garade rebuild	12/31/2016	3	Mark	Long	722-366-5588
NULL	NULL	4	Bob	James	703-366-9632
NULL	NULL	5	Adam	Marcos	703-566-0000

6. Full outer join

The FULL OUTER JOIN keyword combines the result of both LEFT and RIGHT joins.

FULL OUTER JOIN

table1   table2

SELECT
      a.CustomerId, a.FirstName, a.Lastname, a.Phone, b.id, b.CustomerId, b.Description, b.DateNeeded
FROM HomePro.Customers a
     full outer join HomePro.Schedules b
     on a.CustomerId = b.CustomerId;

Customers			Schedules			
CustomerId	**FirstName**	**LastName**	**Id**	**CustomerId**	**Description**	**DateNeeded**
1	John	Smith	1	1	Kitchen remode	10/10/2013
2	Jeremy	Smith	2	2	Decorationg he	10/15/2013
3	Mark	Long	3	3	Kitchen remode	11/29/2015
3	Mark	Long	4	3	Garade rebuild	12/31/2016
4	Bob	James	NULL	NULL	NULL	NULL
5	Adam	Marcos	NULL	NULL	NULL	NULL
NULL	NULL	NULL	5	6	Kitchen remode	10/10/2013

7. Three tables join

```sql
SELECT C.CustomerId, C.FirstName, C.Lastname, S.Description, S.DateNeeded, Q.Estimation
FROM HomePro.Customers C
    join HomePro.Schedules S
            on C.CustomerId =  S.CustomerId
    join HomePro.Quotes Q
            on C.CustomerId = Q.CustomerId;
```

Customers			Schedules			Quotes
CustomerId	FirstName	Lastname	CustomerId	Description	DateNeeded	Estimation
1	John	Smith	1	Kitchen remodel needed	10/10/2013	210.55
3	Mark	Long	3	Kitchen remodel needed	11/29/2015	875.55
3	Mark	Long	3	Kitchen remodel needed	11/29/2015	10000.00
3	Mark	Long	3	Garade rebuild	12/31/2016	875.55
3	Mark	Long	3	Garade rebuild	12/31/2016	10000.00

8. Three tables left join

SELECT C.CustomerId, C.FirstName, C.Lastname, S.Description, S.DateNeeded, Q.Estimation
FROM HomePro.Customers C
    left join HomePro.Schedules S
            on C.CustomerId = S.CustomerId
    left join HomePro.Quotes Q
            on C.CustomerId = Q.CustomerId;

Customers			Schedules		Quotes
CustomerId	FirstName	Lastname	Description	DateNeeded	Estimation
1	John	Smith	Kitchen remodel needed	10/10/2013	210.55
3	Mark	Long	Kitchen remodel needed	11/29/2015	875.55
3	Mark	Long	Garade rebuild	12/31/2016	875.55
3	Mark	Long	Kitchen remodel needed	11/29/2015	10000.00
3	Mark	Long	Garade rebuild	12/31/2016	10000.00
2	Jeremy	Smith	Decrationg help for dinig room	10/15/2013	
4	Bob	James			
5	Adam	Marcos			

Join processor steps

HomePro.Customers

CustomerId	FirstName	LastName
1	John	Smith
2	Jeremy	Smith
3	Mark	Long
4	Bob	James
5	Adam	Marcos

HomePro.Schedules

Id	CustomerId	Description	DateNeeded
1	1	Kitchen remodel needed	10/10/2013
2	2	Decorationg help for dinig room	10/15/2013
3	3	Kitchen remodel needed	11/29/2015
4	3	Garade rebuild	12/31/2016

HomePro.Quotes

Id	CustomerId	Estimation
1	1	210.55
2	3	875.55
3	3	10000

Step1 - Join Table HomePro.Customers and HomePro.Schedules to intermediate recordset

CustomerId	FirstName	LastName
1	John	Smith
2	Jeremy	Smith
3	Mark	Long
4	Bob	James
5	Adam	Marcos

Id	CustomerId	Description	DateNeeded
1	1	Kitchen remodel needed	10/10/2013
2	2	Decorationg help for dinig room	10/15/2013
3	3	Kitchen remodel needed	11/29/2015
4	3	Garade rebuild	12/31/2016

Intermediate recordset

CustomerId	FirstName	LastName	Id	CustomerId	Description	DateNeeded
1	John	Smith	1	1	Kitchen remodel needed	10/10/2013
2	Jeremy	Smith	2	2	Decorationg help for dinig room	10/15/2013
3	Mark	Long	3	3	Kitchen remodel needed	11/29/2015
3	Mark	Long	4	3	Garade rebuild	12/31/2016

Step2 - Join intermediate recordset to Table HomePro.Quotes

CustomerId	FirstName	LastName	Id	CustomerId	Description	DateNeeded
1	John	Smith	1	1	Kitchen remodel needed	10/10/2013
2	Jeremy	Smith	2	2	Decorationg help for dinig room	10/15/2013
3	Mark	Long	3	3	Kitchen remodel needed	11/29/2015
3	Mark	Long	4	3	Garade rebuild	12/31/2016

HomePro.Quotes

Id	CustomerId	Estimation
1	1	210.55
2	3	875.55
3	3	10000

CustomerId	FirstName	LastName	Id	CustomerId	Description	DateNeeded	Id	CustomerId	Estimation
1	John	Smith	1	1	Kitchen remodel needed	10/10/2013	1	1	210.55
3	Mark	Long	3	3	Kitchen remodel needed	11/29/2015	2	3	875.55
3	Mark	Long	4	3	Kitchen remodel needed	11/29/2015	3	3	10000
3	Mark	Long	3	3	Garade rebuild	12/31/2016	2	3	875.55
3	Mark	Long	4	3	Garade rebuild	12/31/2016	3	3	10000