SQL JOINs

SQL

You will be able to...

- Explain Primary and Foreign keys
- Use SELECT, FROM, WHERE and JOIN
- Explain the differences between INNER, OUTER, LEFT and RIGHT joins
- Alias tables
- Use ORDER BY and COUNT

Example DB

Students

ID	Name	Age	Gender	Address
1	Nick D.	20	M	2
2	Andy D.	28	M	2
3	Beth M.	23	F	1
4	Lisa N.	20	F	4

Addresses

ID	Street	Zip	City	State
1	423 Main St.	60647	Chicago	IL
2	13 Main St	60655	Barrington	IL
3	15 Main St	60651	Elsewhere	IL
4	14 Main St	60650	Chicago	IL

All 20 Year Old Students

Students

ID	Name	Age	Gender	Address
1	Nick D.	20	M	2
2	Andy D.	28	M	2
3	Beth M.	23	F	1
4	Lisa N.	20	F	4

20 Year Old Students

ID	Name	Age
1	Nick D.	20
4	Lisa N.	20

```
SELECT ID, Name, Age
FROM Students
WHERE Age = 20;
```

Students

ID	Name	Age	Gender	Address
1	Nick D.	20	M	2
2	Andy D.	28	M	2
3	Beth M.	23	F	1
4	Lisa N.	20	F	4

Addresses

ID	Street	Zip	City	State
1	423 Main St.	60647	Chicago	IL
2	13 Main St.	60655	Barrington	IL
3	15 Main St.	60651	Elsewhere	IL
4	14 Main St.	60650	Chicago	IL

```
SELECT Students.ID, Name, Street, Zip, City
  FROM Students
JOIN Addresses
  ON Students.Address = Addresses.ID;
```

Students with Addresses

Student.ID	Name	Street	Zip	City
1	Nick D.	13 Main St.	60655	Barrington
2	Andy D.	13 Main St.	60655	Barrington
3	Beth M.	423 Main St.	60647	Chicago
4	Lisa N.	14 Main St.	60650	Chicago

Students

ID	Name	Age	Gender	Address
1	Nick D.	20	M	2
2	Andy D.	28	M	2
3	Beth M.	23	F	1
4	Lisa N.	20	F	4

Addresses

ID	Street	Zip	City	State
1	423 Main St.	60647	Chicago	IL
2	13 Main St.	60655	Barrington	IL
3	15 Main St.	60651	Elsewhere	IL
4	14 Main St.	60650	Chicago	IL

```
SELECT Students.ID, Name, Street, Zip, City
  FROM Students
JOIN Addresses
  ON Students.Address = Addresses.ID
WHERE Adresses.City = 'Chicago';
```

Students with Addresses

Student.ID	Name	Street	Zip	City
3	Beth M.	423 Main St.	60647	Chicago
4	Lisa N.	14 Main St.	60650	Chicago

Some Common SQL Keywords

Keyword	Action
SELECT	Which COLUMNS to include in output table (shrinks the result horizontally!)
FROM	Which TABLE to pull data from
JOIN	Another TABLE to glue / concatenate to the output
ON	What COLUMNS must match when joining two tables
WHERE	Which ROWS to include in the output table (shrinks the result vertically!)

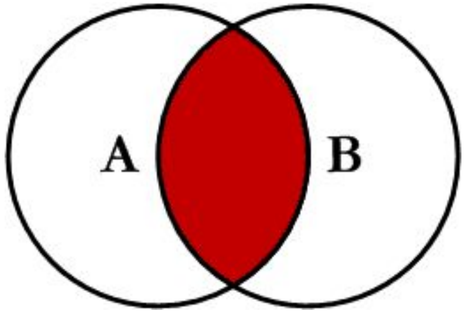
CRUD Operations

SQL is used to create/read/update/delete (CRUD) data from a database

- INSERT: Insert new rows into a table
- SELECT: Get data from a database
- UPDATE: Update existing rows in a table
- DELETE: Delete rows from a table

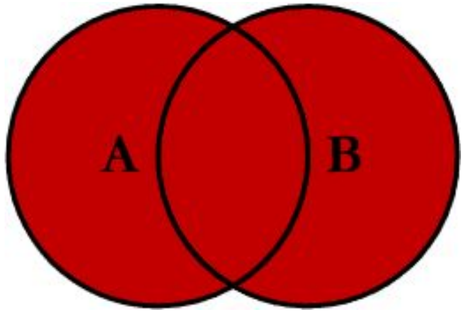
- CREATE / DROP: Make / delete new dbs/tables/views/indexes

Inner Join



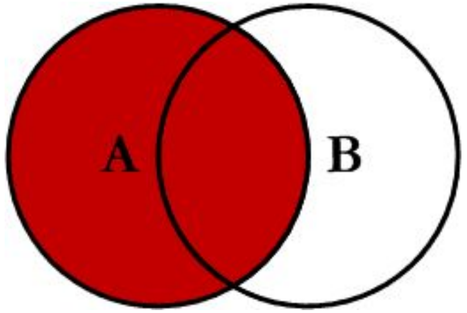

```
SELECT *
FROM A
INNER JOIN B
ON A.Key = B.Key
```

Outer Join



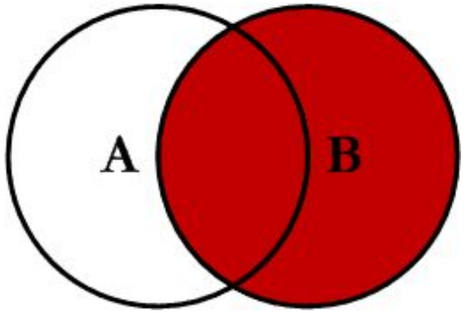

```
SELECT *
FROM A
FULL OUTER JOIN B
ON A.Key = B.Key
```

Left Join




```
SELECT *
FROM A
LEFT JOIN B
ON A.Key = B.Key
```

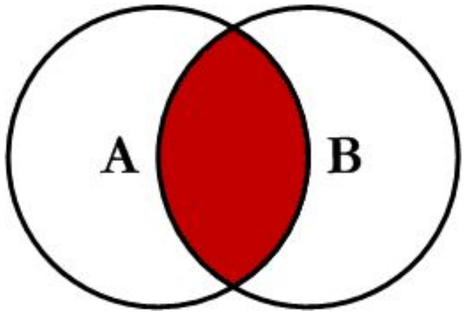
Right Join




```
SELECT *
FROM A
RIGHT JOIN B
ON A.Key = B.Key
```

http://www.codeproject.com/Articles/33052/Visual-Representation-of-SQL-Joins

Inner Join




```
SELECT pets.name, owners.name
FROM owners
INNER JOIN pets
ON pets.ownerID = owners.ID
```

OWNERS

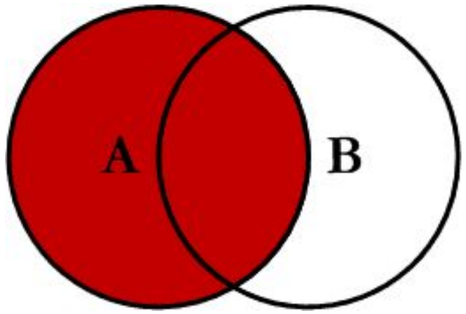
ID	name
1	Geordi
2	Janeway
3	Data
4	Spock

PETS

ID	ownerID	type	name
1	4	Monkey	Mittens
2	null	Lizard	Carol
3	1	Dog	Rufus
4	3	Cat	Spot

pets.name	owners.name
Mittens	Spock
Rufus	Geordi
Spot	Data

Left Join




```
SELECT pets.name, owners.name
FROM owners
LEFT JOIN pets
ON pets.ownerID = owners.ID
```

OWNERS

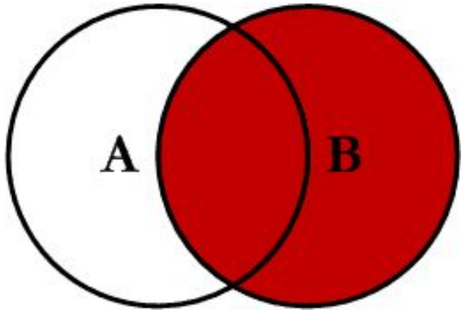
ID	name
1	Geordi
2	Janeway
3	Data
4	Spock

PETS

ID	ownerID	type	name
1	4	Monkey	Mittens
2	null	Lizard	Carol
3	1	Dog	Rufus
4	3	Cat	Spot

pets.name	owners.name
Mittens	Spock
Rufus	Geordi
null	Janeway
Spot	Data

Right Join




```
SELECT pets.name, owners.name
FROM owners
RIGHT JOIN pets
ON pets.ownerID = owners.ID
```

OWNERS

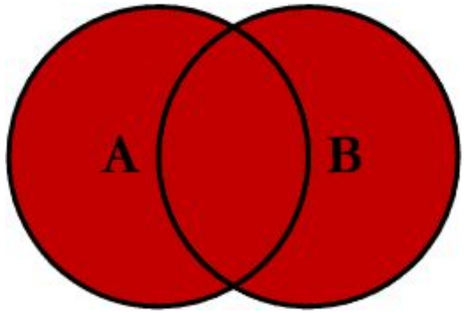
ID	name
1	Geordi
2	Janeway
3	Data
4	Spock

PETS

ID	ownerID	type	name
1	4	Monkey	Mittens
2	null	Lizard	Carol
3	1	Dog	Rufus
4	3	Cat	Spot

pets.name	owners.name
Mittens	Spock
Carol	null
Rufus	Geordi
Spot	Data

Outer Join




```
SELECT pets.name, owners.name
FROM owners
FULL OUTER JOIN pets
ON pets.ownerID = owners.ID
```

OWNERS

ID	name
1	Geordi
2	Janeway
3	Data
4	Spock

PETS

ID	ownerID	type	name
1	4	Monkey	Mittens
2	null	Lizard	Carol
3	1	Dog	Rufus
4	3	Cat	Spot

pets.name	owners.name
Mittens	Spock
Carol	null
Rufus	Geordi
null	Janeway
Spot	Data

AS

Student

ID	Name	Age
1	Bart S.	10
2	Lisa S.	8
3	Jim F.	13
4	Joan B.	15

Enrollment

StudentID	SchoolID
1	1
2	1
3	2
4	3

School

ID	Name	Level
1	Springfield Elementary	E
2	Brook Middle	M
3	Springbrook High	H
4	Springfield University	U

```
SELECT *
  FROM Student AS st
  INNER JOIN Enrollment AS e
    ON st.ID = e.StudentID
  INNER JOIN School AS sc
    ON e.SchoolID = sc.ID;
```

Result

st.ID	st.Name	Age	StudentID	SchoolID	sc.ID	sc.Name	Level
1	Bart S.	10	1	1	1	Springfield Elementary	E
2	Lisa S.	8	2	1	1	Springfield Elementary	E
3	Jim F.	13	3	2	2	Brook Middle	M
4	Joan B.	15	4	3	3	Springbrook High	H

GROUP BY + COUNT

Student

ID	Name	Age
1	Bart S.	10
2	Lisa S.	8
3	Jim F.	13
4	Joan B.	15

Enrollment

StudentID	SchoolID
1	1
2	1
3	2
4	3

School

ID	Name	Level
1	Springfield Elementary	E
2	Brook Middle	M
3	Springbrook High	H
4	Springfield University	U

```
SELECT Name, COUNT(*)
  FROM School
  INNER JOIN Enrollment
    ON School.ID = Enrollment.SchoolID
  GROUP BY Name;
```

Result

Name	COUNT(*)
Springfield Elementary	2
Brook Middle	1
Springbrook High	1
Springfield University	0

ORDER BY

Student

ID	Name	Age
1	Bart S.	10
2	Lisa S.	8
3	Jim F.	13
4	Joan B.	15

Enrollment

StudentID	SchoolID
1	1
2	1
3	2
4	3

School

ID	Name	Level
1	Springfield Elementary	E
2	Brook Middle	M
3	Springbrook High	H
4	Springfield University	U

```
SELECT *
  FROM Student
  ORDER BY Age DESC;
```

Result

ID	Name	Age
4	Joan B.	15
3	Jim F.	13
1	Bart S.	10
2	Lisa S.	8

SUB-QUERIES

Student

ID	Name	Age
1	Bart S.	10
2	Lisa S.	8
3	Jim F.	13
4	Joan B.	15

Enrollment

StudentID	SchoolID
1	1
2	1
3	2
4	3

School

ID	Name	Level
1	Springfield Elementary	E
2	Brook Middle	M
3	Springbrook High	H
4	Springfield University	U

```
SELECT ID, Name, Age
  FROM Student
  INNER JOIN Enrollment
    ON Student.ID = Enrollment.StudentID
  INNER JOIN (
    SELECT SchoolID
      FROM Student
      WHERE Student.Name = 'Lisa S.'
      INNER JOIN Enrollment
        ON Student.ID = Enrollment.StudentID
  ) AS LisaSchools
    ON LisaSchools.SchoolID = Enrollment.SchoolID
  WHERE Name != 'Lisa S.';
```

Result

ID	Name	Age
1	Bart S.	10

You will be able to...

- Explain Primary and Foreign keys
- Use SELECT, FROM, WHERE and JOIN
- Explain the differences between INNER, OUTER, LEFT and RIGHT joins
- Alias tables
- Use ORDER BY and COUNT

WORKSHOP