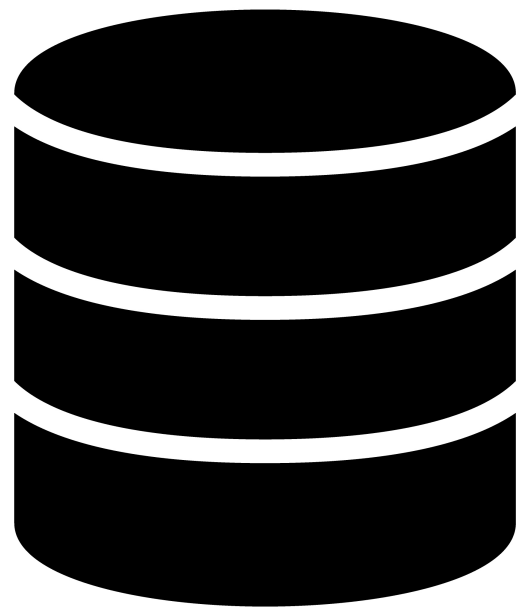


Welcome

INTRODUCTION TO SQL SERVER



John MacKintosh
Instructor



Structured
Query
Language

SQL Server & Transact-SQL

- SQL Server - relational database system developed by Microsoft
- Transact-SQL (T-SQL) - Microsoft's implementation of SQL, with additional functionality
- In this course: Master the fundamentals of T-SQL
- Learn how to write queries

LET'S GET
STARTED

Querying 101

- SQL-Server: the *store* containing databases and tables
- Queries: how we *pick* different items, from different aisles, and load up our cart
- `SELECT` : key term for retrieving data



```
SELECT description
FROM grid;
```

```
+-----+
| description |
+-----+
| Severe Weather Thunderstorms |
| Severe Weather Thunderstorms |
| Severe Weather Thunderstorms |
| Fuel Supply Emergency Coal |
| Physical Attack Vandalism |
| Physical Attack Vandalism |
| Physical Attack Vandalism |
| Severe Weather Thunderstorms |
| Severe Weather Thunderstorms |
| Suspected Physical Attack |
| Physical Attack Vandalism |
| ... |
+-----+
```

Selecting more than one column

```
SELECT
  artist_id,
  artist_name
FROM
  artist;
```

```
+-----+-----+
| artist_id | artist_name      |
+-----+-----+
| 1         | AC/DC            |
| 2         | Accept           |
| 3         | Aerosmith        |
| 4         | Alanis Morissette |
| 5         | Alice In Chains  |
| 6         | Antônio Carlos Jobim |
| 7         | Apocalyptica     |
| 8         | Audioslave       |
| 9         | BackBeat         |
| 10        | Billy Cobham     |
+-----+-----+
```

Query formatting

```
SELECT description, event_year, event_date  
FROM grid;
```

```
SELECT  
    description,  
    event_year,  
    event_date  
FROM  
    grid;
```


Select TOP ()

-- Return 5 rows

```
SELECT TOP(5) artist
FROM artists;
```

-- Return top 5% of rows

```
SELECT TOP(5) PERCENT artist
FROM artists;
```

```
+-----+
| artist |
+-----+
| AC/DC  |
| Accept |
| Aerosmith |
| Alanis Morissette |
| Alice in Chains |
+-----+
```

Select DISTINCT

-- Return all rows in the table

```
SELECT nerc_region  
FROM grid;
```

```
+-----+  
| nerc_region |  
+-----+  
| RFC        |  
| RFC        |  
| MRO        |  
| MRO        |  
| ....      |  
+-----+
```

-- Return unique rows

```
SELECT DISTINCT nerc_region  
FROM grid;
```

```
+-----+  
| nerc_region |  
+-----+  
| NPCC        |  
| NPCC RFC    |  
| RFC         |  
| ERCOT       |  
| ...         |  
+-----+
```

Select *

```
-- Return all rows  
SELECT *  
FROM grid;
```

- **NOT** suitable for large tables

Aliasing column names with AS

```
SELECT demand_loss_mw AS lost_demand
FROM grid;
```

```
+-----+
| lost_demand |
|-----|
| 424         |
| 217         |
| 494         |
| 338         |
| 3900        |
| 3300        |
+-----+
```

```
SELECT description AS cause_of_outage
FROM grid;
```

```
+-----+
| cause_of_outage |
|-----|
| Severe Weather Thunderstorms |
| Fuel Supply Emergency Coal   |
| Physical Attack Vandalism    |
| Suspected Physical Attack    |
| Electrical System Islanding  |
+-----+
```

Let's write some T-SQL!

INTRODUCTION TO SQL SERVER

Ordering and Filtering

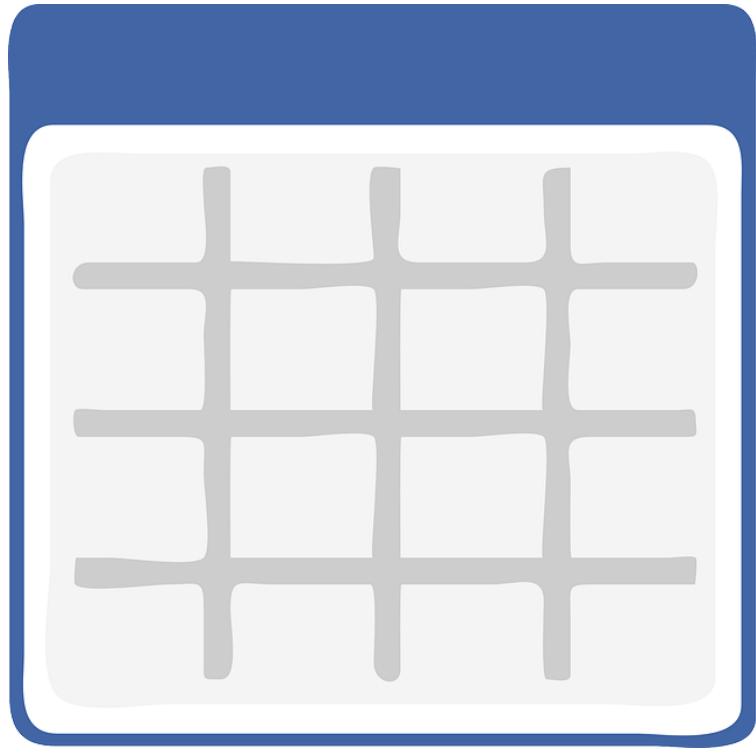
INTRODUCTION TO SQL SERVER



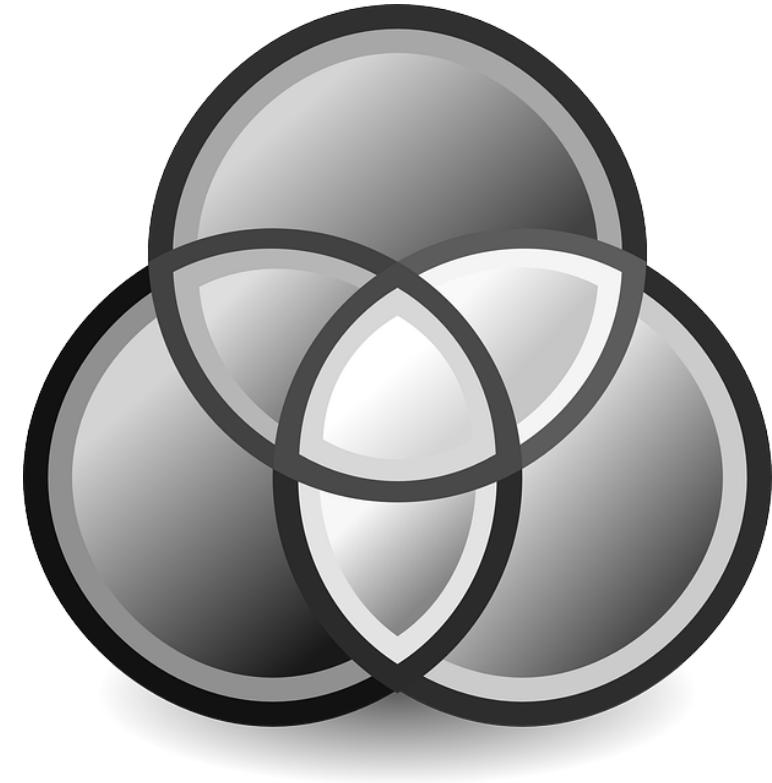
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Order! Order!

- Tables comprise of rows and columns
- Queries return *sets*, or *subsets*



- Sets have no inherent order
- If order is important, use `ORDER BY`



```
SELECT TOP (10) prod_id, year_intro
FROM products
-- Order in ascending order
ORDER BY year_intro, product_id;
```

```
+-----+-----+
| product_id | year_intro |
+-----+-----+
| 36         | 1981      |
| 37         | 1982      |
| 38         | 1983      |
| 39         | 1984      |
| 40         | 1984      |
| 41         | 1984      |
| 52         | 1985      |
| 43         | 1986      |
| 44         | 1987      |
| 54         | 1987      |
+-----+-----+
```

```
SELECT TOP (10) product_id, year_intro
FROM products
-- Order year_intro in descending order
ORDER BY year_intro DESC, product_id;
```

```
+-----+-----+
| product_id | year_intro |
+-----+-----+
| 158        | 2015      |
| 173        | 2015      |
| 170        | 2014      |
| 171        | 2014      |
| 172        | 2014      |
| 144        | 2013      |
| 146        | 2013      |
| 147        | 2013      |
| 148        | 2013      |
| 149        | 2013      |
+-----+-----+
```

```
SELECT
  TOP (10) channels,
  year_intro
FROM products
-- Order in different directions
ORDER BY
  year_intro DESC,
  channels;
```

channels	year_intro
35	2015
74	2015
29	2014
45	2014
48	2014
12	2013
13	2013
14	2013
22	2013
24	2013

```
SELECT
  TOP (10) channels,
  year_intro
FROM products
-- Both columns in descending order
ORDER BY
  year_intro DESC,
  channels DESC;
```

channels	year_intro
74	2015
35	2015
48	2014
45	2014
29	2014
837	2013
642	2013
561	2013
491	2013
198	2013


```
SELECT city_id, name_alias
FROM invoice
-- Ordering text (Ascending order)
ORDER BY name_alias;
```

city_id	name_alias
48	Amsterdam
59	Bangalore
36	Berlin
38	Berlin
42	Bordeaux
23	Boston
13	Brasília
8	Brussels
45	Budapest
56	Buenos Aires

```
SELECT city_id, name_alias
FROM invoice
-- Ordering text (Descending order)
ORDER BY name_alias DESC;
```

city_id	name_alias
33	Yellowknife
32	Winnipeg
49	Warsaw
7	Vienne
15	Vancouver
27	Tucson
29	Toronto
2	Stuttgart
51	Stockholm
55	Sydney

What if we only wanted to return rows that met certain criteria?

```
SELECT customer_id, total
FROM invoice
WHERE total > 15;
```

First 3 customers with invoice value > 15

```
+-----+-----+
| customer_id | total   |
+-----+-----+
| 57          | 17.91   |
| 7           | 18.86   |
| 45          | 21.86   |
+-----+-----+
```

```
-- Rows with points greater than 10
WHERE points > 10

-- Rows with points less than 10
WHERE points < 10

-- Rows with points greater than or equal to 10
WHERE points >= 10

-- Rows with points less than or equal to 20
WHERE points <= 20

-- Character data type
WHERE country = 'Spain'

-- Date data type
WHERE event_date = '2012-01-02'
```

```
SELECT customer_id, total
FROM invoice
-- Testing for non-equality
WHERE total <> 10;
```

```
+-----+-----+
| customerid | total |
+-----+-----+
| 2          | 1.98  |
| 4          | 3.96  |
| 8          | 5.94  |
| 14         | 8.91  |
| 23         | 13.86 |
| 37         | 0.99  |
+-----+-----+
```

Between

```
SELECT customer_id, total
FROM invoice
WHERE total BETWEEN 20 AND 30;
```

customerid	total
45	21.86
46	21.86
26	23.86
6	25.86

```
SELECT customer_id, total
FROM invoice
WHERE total NOT BETWEEN 20 AND 30;
```

customerid	total
2	1.98
4	3.96
8	5.94
14	8.91

What is NULL?

- NULL indicates there is no value for that record
- NULLs help highlight gaps in our data

SELECT

TOP (6) total,
billing_state

FROM invoice

WHERE billing_state **IS NULL**;

```
+-----+-----+
| total | billing_state |
+-----+-----+
| 1.98  | NULL         |
| 3.96  | NULL         |
| 5.94  | NULL         |
| 0.99  | NULL         |
| 1.98  | NULL         |
| 1.98  | NULL         |
+-----+-----+
```

SELECT

TOP (6) total,
billing_state

FROM invoice

WHERE billing_state **IS NOT NULL**;

```
+-----+-----+
| total | billing_state |
+-----+-----+
| 8.91  | AB            |
| 13.96 | MA            |
| 5.94  | Dublin        |
| 0.99  | CA            |
| 1.98  | WA            |
| 1.98  | CA            |
+-----+-----+
```

Let's sort it!

INTRODUCTION TO SQL SERVER

WHERE the wild things are

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```
SELECT song, artist
FROM songlist
WHERE
    artist = 'AC/DC';
```

```
+-----+-----+
| song          | artist |
+-----+-----+
| Baby, Please Don't Go | AC/DC  |
| Back In Black  | AC/DC  |
| Big Gun        | AC/DC  |
| CAN'T STOP ROCK'N'ROLL | AC/DC  |
| Girls Got Rhythm | AC/DC  |
| Hard As A Rock  | AC/DC  |
| Have a Drink On Me | AC/DC  |
| Hells Bells     | AC/DC  |
+-----+-----+
```

```
SELECT song, artist
FROM songlist
WHERE
    artist = 'AC/DC'
    AND release_year < 1980;
```

```
+-----+-----+
| song          | artist |
+-----+-----+
| Dirty Deeds Done Dirt Cheap | AC/DC  |
| Highway To Hell              | AC/DC  |
| It's A Long Way To The Top  | AC/DC  |
| Let There Be Rock            | AC/DC  |
| Night Prowler                | AC/DC  |
| T.N.T.                      | AC/DC  |
| Touch Too Much               | AC/DC  |
| Whole Lotta Rosie            | AC/DC  |
+-----+-----+
```

AND again

- Returns 3 rows:

```
SELECT *  
FROM songlist  
WHERE  
    release_year = 1994  
    AND artist = 'Green Day';
```

- Returns 1 row:

```
SELECT *  
FROM songlist  
WHERE  
    release_year = 1994  
    AND artist = 'Green Day'  
    AND song = 'Basket Case';
```

```
SELECT
  song,
  artist,
  release_year
FROM songlist
WHERE release_year = 1994;
```

```
+-----+-----+-----+
| song          | artist          | release_year |
+-----+-----+-----+
| Black Hole Sun | Soundgarden     | 1994         |
| Fell On Black Days | Soundgarden   | 1994         |
| Spoonman       | Soundgarden     | 1994         |
| Big Empty      | Stone Temple Pilots | 1994        |
| Interstate Love Song | Stone Temple Pilots | 1994        |
| Vaseline       | Stone Temple Pilots | 1994        |
+-----+-----+-----+
```

```
SELECT
  song,
  artist,
  release_year
FROM songlist
WHERE
  release_year = 1994
  OR release_year > 2000;
```

```
+-----+-----+-----+
| song          | artist          | release_year |
+-----+-----+-----+
| Doom And Gloom | Rolling Stones  | 2012         |
| Remedy         | Seether         | 2005         |
| 45             | Shinedown       | 2003         |
| Black Hole Sun | Soundgarden     | 1994         |
| Fell On Black Days | Soundgarden   | 1994         |
| Spoonman       | Soundgarden     | 1994         |
| It's Been Awhile | Staind         | 2001         |
| Big Empty      | Stone Temple Pilots | 1994       |
| Interstate Love Song | Stone Temple Pilots | 1994       |
| Vaseline       | Stone Temple Pilots | 1994       |
+-----+-----+-----+
```

```
SELECT song
FROM songlist
WHERE
    artist = 'Green Day'
    AND release_year = 1994;
```

```
+-----+
| song          |
+-----+
| Basket Case   |
| Longview      |
| When I Come Around |
+-----+
```

```
SELECT song
FROM songlist
WHERE
    artist = 'Green Day'
    AND release_year > 2000;
```

```
+-----+
| song          |
+-----+
| Boulevard Of Broken Dreams |
| Holiday (Live)             |
| Holiday                   |
+-----+
```

```
SELECT song
FROM songlist
WHERE
    artist = 'Green Day'
    AND release_year = 1994
    OR release_year > 2000;
```

```
+-----+
| song                                     |
+-----+
| Doom And Gloom                         |
| Remedy                                 |
| 45                                     |
| It's Been Awhile                       |
| Goodbye Daughters of the Revolution    |
| Gold On The Ceiling                   |
| Lonely Boy                             |
| Seven Nation Army                     |
| Get Together                           |
| Vertigo                                |
| When I'm Gone                          |
| ...                                    |
| ...                                    |
+-----+
```

What went wrong?

```
SELECT *  
FROM songlist  
WHERE  
    artist = 'Green Day'  
    AND release_year = 1994  
    OR release_year > 2000;
```

```
SELECT *  
FROM songlist  
WHERE  
    artist = 'Green Day'  
    AND release_year = 1994;
```

OR

```
SELECT *  
FROM songlist  
WHERE  
    release_year > 2000;
```

```
SELECT song
FROM songlist
WHERE
  artist = 'Green Day'
  AND (
    release_year = 1994
    OR release_year > 2000
  );
```

Another way of writing the query:

```
SELECT song
FROM songlist
WHERE
  (
    artist = 'Green Day'
    AND release_year = 1994
  )
  OR (
    artist = 'Green Day'
    AND release_year > 2000
  );
```

```
+-----+
| song                                     |
|-----|
| Basket Case                             |
| Boulevard Of Broken Dreams              |
| Holiday (Live)                          |
| Holiday / Boulevard of Broken Dreams   |
| Longview                                |
| When I Come Around                      |
+-----+
```



```
SELECT song, artist
FROM songlist
WHERE
    artist IN ('Van Halen', 'ZZ Top')
ORDER BY song;
```

song	artist
(Oh) Pretty Woman	Van Halen
1984/jump	Van Halen
A Fool for Your Stockings	ZZ Top
Ain't Talkin' 'bout Love	Van Halen
And the Cradle Will Rock...	Van Halen
Arrested For Driving While Blind	ZZ Top
Atomic Punk	Van Halen

```
SELECT song, release_year
FROM songlist
WHERE
    release_year IN (1985, 1991, 1992);
```

song	release_year
Addicted to Love	1985
Don't You	1985
Come As You Are	1991
Money for Nothing	1985
Walk of Life	1985
Man On the Moon	1992
Breaking the Girl	1992
You Belong to the City	1985
Enter Sandman	1991
In Bloom	1991

```
SELECT song
FROM songlist
WHERE song LIKE 'a%';
```

```
+-----+
| song   |
|-----|
| Addicted to Love |
| Ain't Too Proud to Beg |
+-----+
```

```
SELECT artist
FROM songlist
WHERE artist LIKE 'f%';
```

```
+-----+
| artist |
|-----|
| Faces  |
| Faith No More |
+-----+
```

Let's practice!
INTRODUCTION TO SQL SERVER