Introduction

IMPROVING QUERY PERFORMANCE IN SQL SERVER

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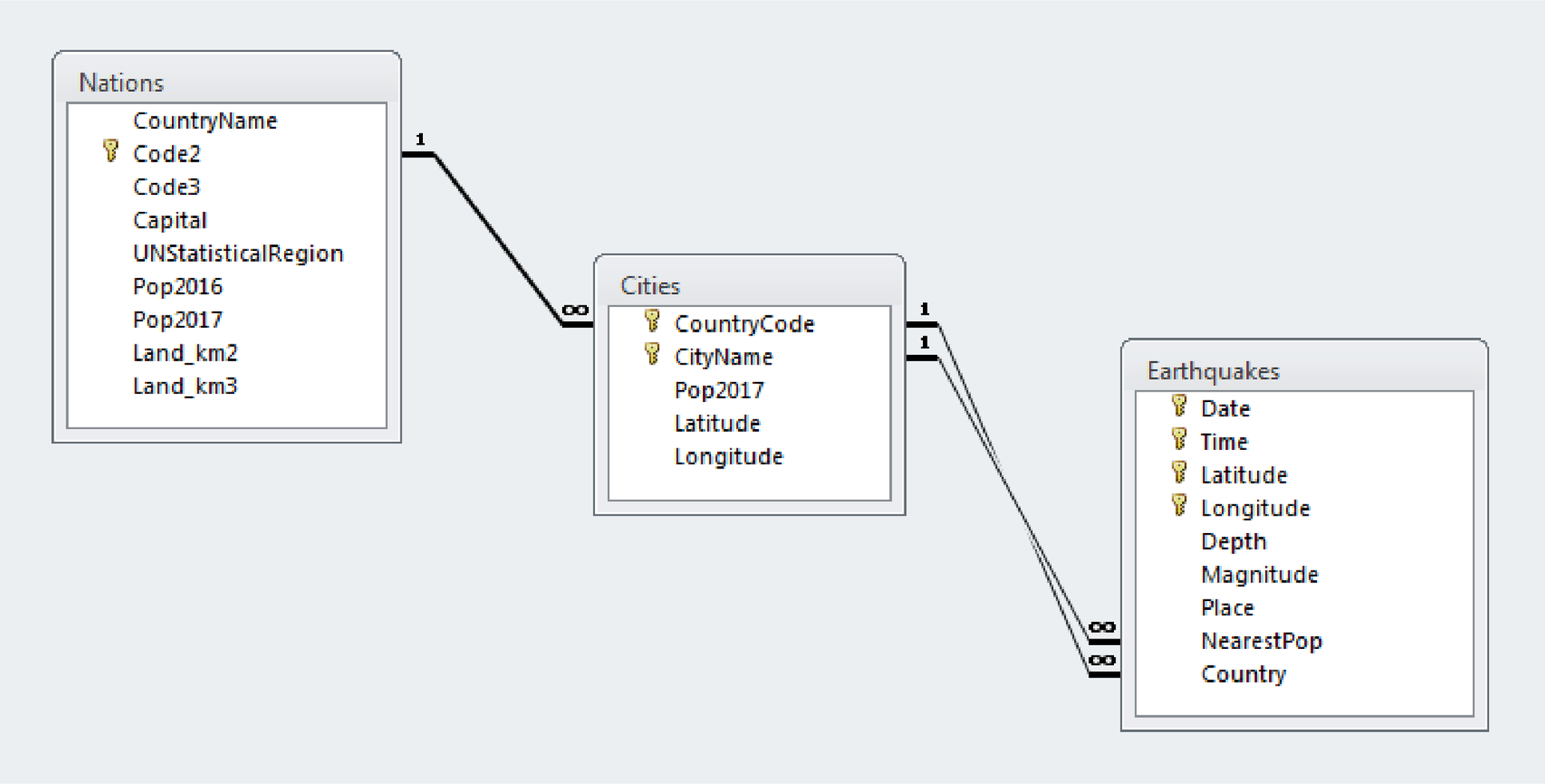
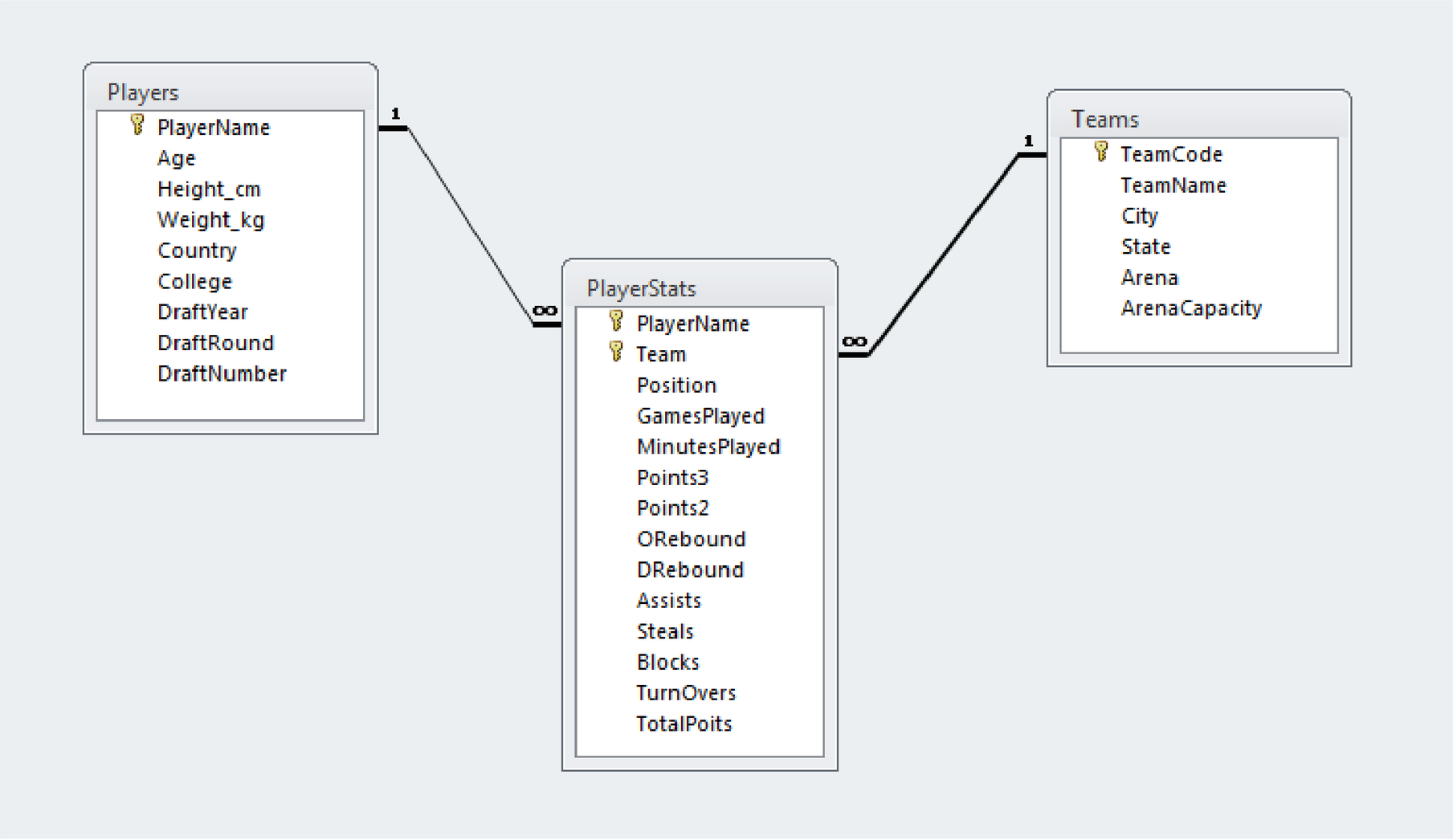
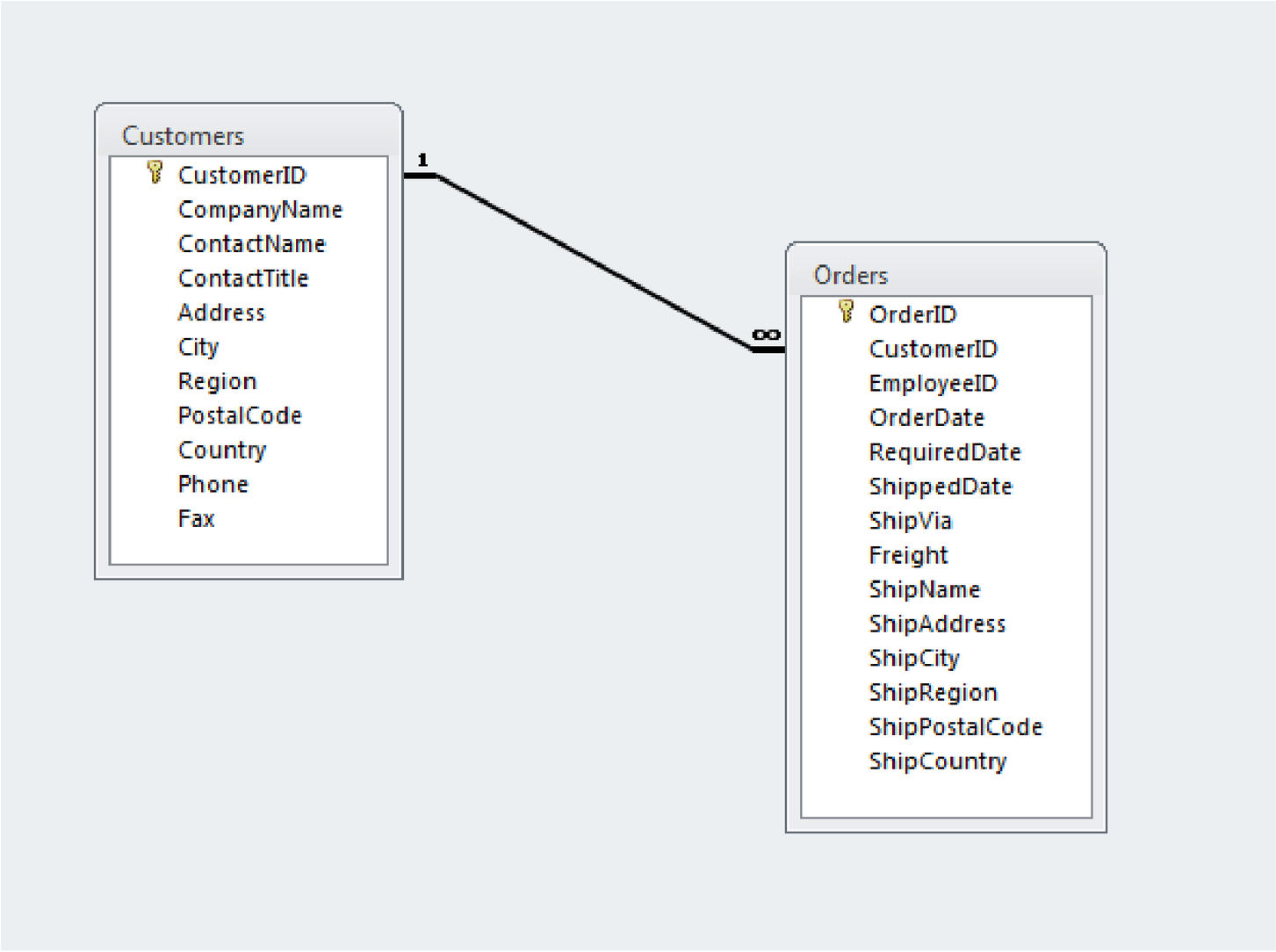
Earthquakes database



NBA Season 2017-2018 database



Customer Orders database



Is this easy to read?

```
Select ps.Team, count(p.PlayerName)
As NonNthAmerPlayers from
 PlayerStats ps inner
join (select PlayerName FROM Players
    WHERE Country <> 'USA' Or Country
 <> 'Canada' )
 p on p.PlayerName = ps.PlayerName
 group BY ps.Team
having Count(p.PlayerName)
>=24 Order by NonNthAmerPlayers desc
```

Team	NonNthAmerPlayers
HOU	24
LAL	24
MEM	24
MIL	24

Suggestions

- Be consistent
- Use UPPER CASE for all SQL syntax
- Create a new line for each major processing syntax: `SELECT`, `FROM`, `WHERE`, etc.
- Indent code:
  - Sub-queries
  - `ON` statements
  - `AND` / `OR` conditions
  - To avoid long single lines of code, for example, several column names
- Complete the query with a semi-colon (;)
- Alias where required, using `AS`

Much better...

From

```
Select ps.Team, count(p.PlayerName)
As NonNthAmerPlayers from
 PlayerStats ps inner
join (select PlayerName FROM Players
    WHERE Country <> 'USA' Or Country
 <> 'Canada' )
 p on p.PlayerName = ps.PlayerName
 group BY ps.Team
having Count(p.PlayerName)
>=24 Order by NonNthAmerPlayers desc
```

To

```
SELECT ps.Team,
    COUNT(p.PlayerName) NonNthAmerPlayers
FROM PlayerStats ps
INNER JOIN
        (SELECT PlayerName
         FROM Players
         WHERE Country <> 'USA'
                OR Country <> 'Canada' ) p
    ON p.PlayerName = ps.PlayerName
GROUP BY ps.Team
HAVING COUNT(p.PlayerName) >=24
ORDER BY NonNthAmerPlayers DESC;
```

Commenting blocks

```
/*
Returns a list of NBA teams with 24 or more non-North
American players on the team roster.
*/
SELECT ps.Team,
  COUNT(p.PlayerName) NonNthAmerPlayers
FROM PlayerStats ps
INNER JOIN
    (SELECT PlayerName
     FROM Players
     WHERE Country <> 'USA'
         OR Country <> 'Canada' ) p
    ON p.PlayerName = ps.PlayerName
GROUP BY ps.Team
HAVING COUNT(p.PlayerName) >=24
ORDER BY NonNthAmerPlayers DESC;
```

Use `/*` and `*/` to comment out a ***block*** of code or text

Commenting blocks

```
/*
Returns a list of NBA teams with 24 or more non-North
American players on the team roster.
*/
SELECT ps.Team,
  COUNT(p.PlayerName) NonNthAmerPlayers
FROM PlayerStats ps
INNER JOIN
    (SELECT PlayerName
     FROM Players
     WHERE Country <> 'USA'
         OR Country <> 'Canada' ) p
    ON p.PlayerName = ps.PlayerName
GROUP BY ps.Team
HAVING COUNT(p.PlayerName) >=24
ORDER BY NonNthAmerPlayers DESC;
```

Use `/*` and `*/` to comment out a ***block*** of code or text

Team	NonNthAmerPlayers
HOU	24
LAL	24
MEM	24
MIL	24

Commenting lines

Use -- to comment out a single ***line*** of code or text

```
SELECT ps.Team,
  COUNT(p.PlayerName) NonNthAmerPlayers
FROM PlayerStats ps

INNER JOIN
    (SELECT PlayerName
     FROM Players
     WHERE Country <> 'USA'
        OR Country <> 'Canada' ) p
    ON p.PlayerName = ps.PlayerName
GROUP BY ps.Team
HAVING COUNT(p.PlayerName) >=24

ORDER BY NonNthAmerPlayers DESC;
```

Commenting lines

Use -- to comment out a single ***line*** of code or text

```
SELECT ps.Team,
  COUNT(p.PlayerName) NonNthAmerPlayers -- Count of players
FROM PlayerStats ps

INNER JOIN
    (SELECT PlayerName
     FROM Players
     WHERE Country <> 'USA'
        OR Country <> 'Canada' ) p -- Indented qub-suery
    ON p.PlayerName = ps.PlayerName
GROUP BY ps.Team
HAVING COUNT(p.PlayerName) >=24

ORDER BY NonNthAmerPlayers DESC;
```

- Comment indicating that the new column is a count of players
- Comment indicating that the sub-query is indented

Commenting lines

Use -- to comment out a single ***line*** of code or text

```
SELECT ps.Team,
  COUNT(p.PlayerName) NonNthAmerPlayers -- Count of players
FROM PlayerStats ps
-- Inner join starts here
INNER JOIN
    (SELECT PlayerName
     FROM Players
     WHERE Country <> 'USA'
        OR Country <> 'Canada' ) p -- Indented qub-suery
    ON p.PlayerName = ps.PlayerName
GROUP BY ps.Team
HAVING COUNT(p.PlayerName) >=24
-- Remove the ORDER BY, it is not required
ORDER BY NonNthAmerPlayers DESC;
```

- Comment marking a break before the `INNER JOIN`
- Comment about the requirement of `ORDER BY`

Commenting lines

Use -- to comment out a single ***line*** of code or text

```
SELECT ps.Team,
  COUNT(p.PlayerName) NonNthAmerPlayers -- Count of players
FROM PlayerStats ps
-- Inner join starts here
INNER JOIN
    (SELECT PlayerName
     FROM Players
     WHERE Country <> 'USA'
        OR Country <> 'Canada' ) p -- Indented qub-suery
    ON p.PlayerName = ps.PlayerName
GROUP BY ps.Team
HAVING COUNT(p.PlayerName) >=24;
-- Remove the ORDER BY, it is not required
-- ORDER BY NonNthAmerPlayers DESC
```

- Commented out `ORDER BY` statement

Let's practice

IMPROVING QUERY PERFORMANCE IN SQL SERVER

Aliasing

IMPROVING QUERY PERFORMANCE IN SQL SERVER

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What is aliasing?

- Used in queries to identify:
  - Tables
  - Columns
  - Sub-queries
- Temporary, only applied when the query is run
- Makes the query easier to read
- May be required

Why use aliasing?

- Avoid repetitive use of long table or column names
- Easily identify joined tables and associated columns
- Identify new columns
- Identify sub-queries
- Avoid ambiguity when columns from joined tables share the same name
- Rename columns

Joined tables - ambiguous column name

```
SELECT CountryName,
       Code2,
       Capital,
       Pop2017
FROM Nations
INNER JOIN Cities
  ON Capital = CityName;
```

```
---------------------------------------------
-- ERROR, Pop2017 column is in
both the Nations and Cities tables

Ambiguous column name 'Pop2017'.
```

Joined tables - aliasing table names

```
-- Alias tables; Nations as n and Cities as c
SELECT n.CountryName,
       n.Code2,
       n.Capital,
       c.Pop2017 -- City population
FROM Nations AS n
INNER JOIN Cities AS c
  ON n.Capital = c.CityName;
```

CountryName	Code2	Capital	Pop2017
United Kingdom	GB	London	346774
Canada	CA	Ottawa	874433
France	FR	Paris	10437
Reunion	RE	Saint-Denis	1067
...	...	...	...

Renamed columns

```
-- Alias columns;
SELECT n.CountryName AS Country,
       n.Code2 AS CountryCode,
       n.Capital,
       c.Pop2017 AS Population
FROM Nations AS n
INNER JOIN Cities AS c
  ON n.Capital = c.CityName;
```

Country	CountryCode	Capital	Populatio
United Kingdom	GB	London	346774
Canada	CA	Ottawa	874433
France	FR	Paris	10437
Reunion	RE	Saint-Denis	1067
...	...	...	...

New columns

```
-- New colunm aliased as MaxMagnitude
SELECT Country,
       NearestPop AS City,
       MAX(Magnitude) AS MaxMagnitude
FROM Earthquakes
GROUP BY Country, NearestPop;
```

Country	City	MaxMagnitude
PE	Acar	7.1
US	Aguadilla	7.7
MX	Aguililla	7.2
PW	Airai	7.8
PG	Aitape	7.6
...	...	...

Sub-queries

```
SELECT n.CountryName AS Country,
       n.Capital,
       e.MaxMagnitude
FROM Nations n
INNER JOIN
        (SELECT Country, NearestPop AS City
                ,MAX(Magnitude) AS MaxMagnitude
        FROM Earthquakes
        GROUP BY Country, NearestPop) e
              -- Sub-query aliased as e
    ON n.Code2 = e.Country AND n.Capital = e.City;
```

Country	Capital	MaxMagnitude
Fiji	Suva	7.9
Guam	Hagatna	7.8
Peru	Lima	7.6
Turkmenistan	Ashgabat	7.3
...	...	...

Let's practice

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Query order

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Big earthquakes query

```
SELECT Country, Place, Magnitude
FROM Earthquakes
WHERE Magnitude >= 9
ORDER BY Magnitude DESC;
```

Country	Place	Magnitude
CL	Bio-Bio; Chile	9.5
US	Southern Alaska	9.2
ID	off the west coast of northern Sumatra	9.1
JP	near the east coast of Honshu; Japan	9.1
...	...	...

Syntax order

```
                                -- Syntax Order
SELECT Country, Place, Magnitude -- 1. SELECT
FROM Earthquakes
WHERE Magnitude >= 9
ORDER BY Magnitude DESC;
```

Syntax order

```
                                -- Syntax Order
SELECT Country, Place, Magnitude -- 1. SELECT
FROM Earthquakes                 -- 2. FROM
WHERE Magnitude >= 9
ORDER BY Magnitude DESC;
```

Syntax order

```
                                -- Syntax Order
SELECT Country, Place, Magnitude -- 1. SELECT
FROM Earthquakes                 -- 2. FROM
WHERE Magnitude >= 9             -- 3. WHERE
ORDER BY Magnitude DESC;
```

Syntax order

```
                                -- Syntax Order
SELECT Country, Place, Magnitude -- 1. SELECT
FROM Earthquakes                 -- 2. FROM
WHERE Magnitude >= 9             -- 3. WHERE
ORDER BY Magnitude DESC;         -- 4. ORDER BY
```

Processing order

```
                                -- Syntax Order | Processing Order
SELECT Country, Place, Magnitude -- 1. SELECT
FROM Earthquakes                 -- 2. FROM         1. FROM
WHERE Magnitude >= 9             -- 3. WHERE
ORDER BY Magnitude DESC;         -- 4. ORDER BY
```

Processing order

```
                                -- Syntax Order | Processing Order
SELECT Country, Place, Magnitude -- 1. SELECT
FROM Earthquakes                -- 2. FROM         1. FROM
WHERE Magnitude >= 9            -- 3. WHERE        2. WHERE
ORDER BY Magnitude DESC;        -- 4. ORDER BY
```

Processing order

```
                                -- Syntax Order | Processing Order
SELECT Country, Place, Magnitude -- 1. SELECT      3. SELECT
FROM Earthquakes                 -- 2. FROM        1. FROM
WHERE Magnitude >= 9             -- 3. WHERE       2. WHERE
ORDER BY Magnitude DESC;         -- 4. ORDER BY
```

Processing order

```
                                -- Syntax Order | Processing Order
SELECT Country, Place, Magnitude -- 1. SELECT      3. SELECT
FROM Earthquakes                 -- 2. FROM        1. FROM
WHERE Magnitude >= 9             -- 3. WHERE       2. WHERE
ORDER BY Magnitude DESC;         -- 4. ORDER BY    4. ORDER BY
```

Processing errors

```
SELECT Country,
       PlaceName,
       Magnitude
FROM LargeEarthquakes
WHERE Strength >= 9
ORDER BY Magnitud DESC;
```

Processing FROM

```
                        -- Processing Order
SELECT Country,
       PlaceName,
       Magnitude
FROM LargeEarthquakes   -- 1. FROM - table LargeEarthquakes does not exist
WHERE Strength >= 9
ORDER BY Magnitud DESC;
```

```
------------------------------------------------------------------------------
-- ERROR
Invalid object name 'LargeEarthquakes'.
```

Processing WHERE

```
                        -- Processing Order
SELECT Country,
       PlaceName,
       Magnitude
FROM Earthquakes
WHERE Strength >= 9      -- 2. WHERE - column Strength does not exist
ORDER BY Magnitud DESC;
```

```
-------------------------------------------------------------------------
-- ERROR
Invalid column name 'Strength'.
```

Processing SELECT

```
                        -- Processing Order
SELECT Country,
       PlaceName,       -- 3. SELECT - column PlaceName does not exist
       Magnitude
FROM Earthquakes
WHERE Magnitude >= 9
ORDER BY Magnitud DESC;
```

```
-------------------------------------------------------------------------
-- ERROR
Invalid column name 'PlaceName'.
```

Processing ORDER BY

```
                        -- Processing Order
SELECT Country,
       Place,
       Magnitude
FROM Earthquakes
WHERE Magnitude >= 9
ORDER BY Magnitud DESC;-- 4. ORDER BY - column misspelling
```

```
-----------------------------------------------------


-- ERROR
Invalid column name 'Magnitud'.
```

Error free

```
SELECT Country,
       Place,
       Magnitude
FROM Earthquakes
WHERE Magnitude >= 9
ORDER BY Magnitude DESC;
```

Country	Place	Magnitude
CL	Bio-Bio; Chile	9.5
US	Southern Alaska	9.2
ID	off the west coast of northern Sumatra	9.1
JP	near the east coast of Honshu; Japan	9.1
...	...	...

Logical processing order

1. FROM
2. ON
3. JOIN
4. WHERE
5. GROUP BY
6. HAVING

7. SELECT

8. DISTINCT
9. ORDER BY
10. TOP

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