

# Outline

1. What is a Query? Query Language?
2. Example Database Tables
3. SQL Overview: 3 Components
4. SELECT statement with 1 table
5. Multi-table SELECT statements
6. Why spatial extensions are needed?
7. 1-table spatial queries
8. Multi-table spatial queries
9. Trends



# Learning Objectives

- Upon completion of this module, students will be able to
  - Determine output of a multi-table SQL query
  - Compose a simple multi-table SQL query

# Two-Table Query

Query: List **capital cities** and populations of countries whose GDP exceeds one trillion dollars.

COUNTRY	Name	Cont	Pop (millions)	GDP(billions)	Life-Exp	Shape
	Canada	NAM	30.1	658.0	77.08	Polygonid-1
	Mexico	NAM	107.5	694.3	69.36	Polygonid-2
	Brazil	SAM	183.3	1004.0	65.60	Polygonid-3
	Cuba	NAM	11.7	16.9	75.95	Polygonid-4
	USA	NAM	270.0	8003.0	75.75	Polygonid-5
	Argentina	SAM	36.3	348.2	70.75	Polygonid-6

Q? How do we find capital city for countries?

# World Database Data Tables: City

The **CITY** table has 5 columns, Name, Country, Population (Pop), Capital and Shape, Shape is a point.

CITY	Name	Country	Pop (millions)	Capital	Shape
	Havana	Cuba	2.1	Y	Pointid-1
	Washington, D.C.	USA	3.2	Y	Pointid-2
	Monterrey	Mexico	2.0	N	Pointid-3
	Toronto	Canada	3.4	N	Pointid-4
	Brasilia	Brazil	1.5	Y	Pointid-5
	Rosario	Argentina	1.1	N	Pointid-6
	Ottawa	Canada	0.8	Y	Pointid-7
	Mexico City	Mexico	14.1	Y	Pointid-8
	Buenos Aires	Argentina	10.75	Y	Pointid-9

# Two-Table Query

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How do we find capital city for countries?

Join City table with Country table using    City.Country = Country.Name  
AND (City.Capital='Y')

# Two-Table Query

Query: List **capital cities** and populations of countries whose **GDP exceeds one trillion dollars**.

```
SELECT Ci.Name, Co.Pop
FROM City Ci, Country Co
WHERE Ci.Country = Co.Name
AND Co.GDP > 1000.0
AND Ci.Capital='Y'
```

Ci.Name	Co.Pop
Brasilia	183.3
Washington, D.C.	270.0

# Composing Multi-table Query

## Three Meta-Questions

- A. Which tables are needed?
- B. How are the tables joined together?
- C. Do result rows aggregate rows of input tables?

**Example:** What is the name and population of the **capital city** of the **country** where the St. Lawrence **River** originates?

- A. **City**, **Country**, **River**
- B. (River.Origin = Country.Name) **AND** (Country.Name = City.Country)
- C. No.

# Multi-table Query Composition

Query: What is the name and population of the **capital** city of the country where the **St. Lawrence** River originates?

```
SELECT Ci.Name, Ci.Pop  
FROM City Ci, Country Co, River R  
WHERE R.Origin = Co.Name  
AND Co.Name = Ci.Country  
AND R.Name = 'St. Lawrence'  
AND Ci.Capital = 'Y'
```



# Nested Multi-Table Queries

Query: List the countries whose Gross Domestic Product (GDP) is greater than **that of Canada**.

```
SELECT Co.Name
FROM Country Co
WHERE Co.GDP > ANY (
    SELECT Co1.GDP
    FROM Country Co1
    WHERE Co1.Name = 'Canada')
```