SQL Basics

- SQL is a relatively simple language
  - Brief syntax, few commands
- SQL is a relatively powerful language
  - Just a few lines of code can accomplish a LOT of work

Running a Query

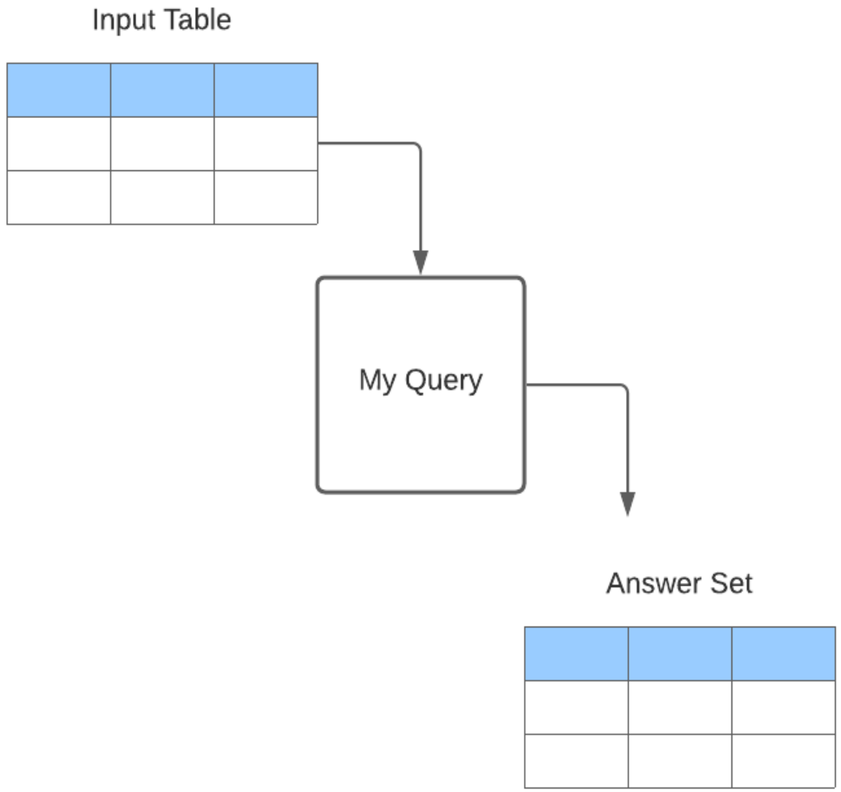
- SQL Developers refer to a SQL "program" as a "query"
- It is not really a "program"

SQL Basics

- SQL is NOT really a programming language – it is a ***QUERY*** language
- It is NOT ***PROCEDURAL***
  - That is, it does not execute one statement at a time in sequence, rather, it executes the entire query all at once
- All inputs to a SQL query are tables
- The output from a query is yet another table called the Answer Set
- Some queries may produce interim (temporary) answer sets

SQL Basics

Simple Query

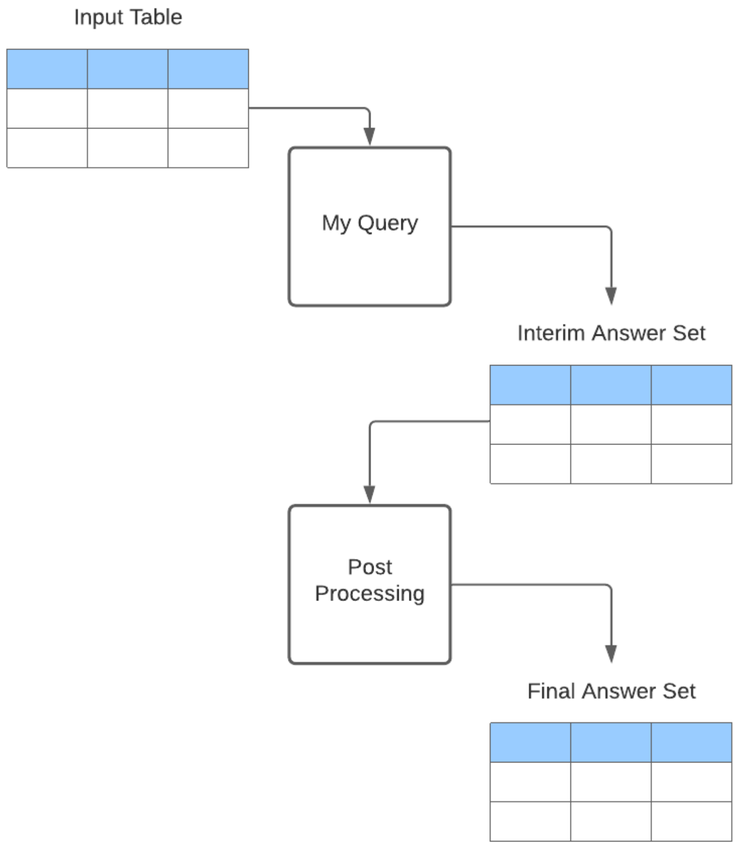


SQL Basics

More Complex Query

Post Processing:

- Calculate Subtotals
- Sort the Output
- Apply Certain Functions



Preparing SQL for Execution

- You can't just compile SQL and execute it on your computer like other languages (Java, etc.)
  - ➢ It does not create an executable file (.exe) that you can just run

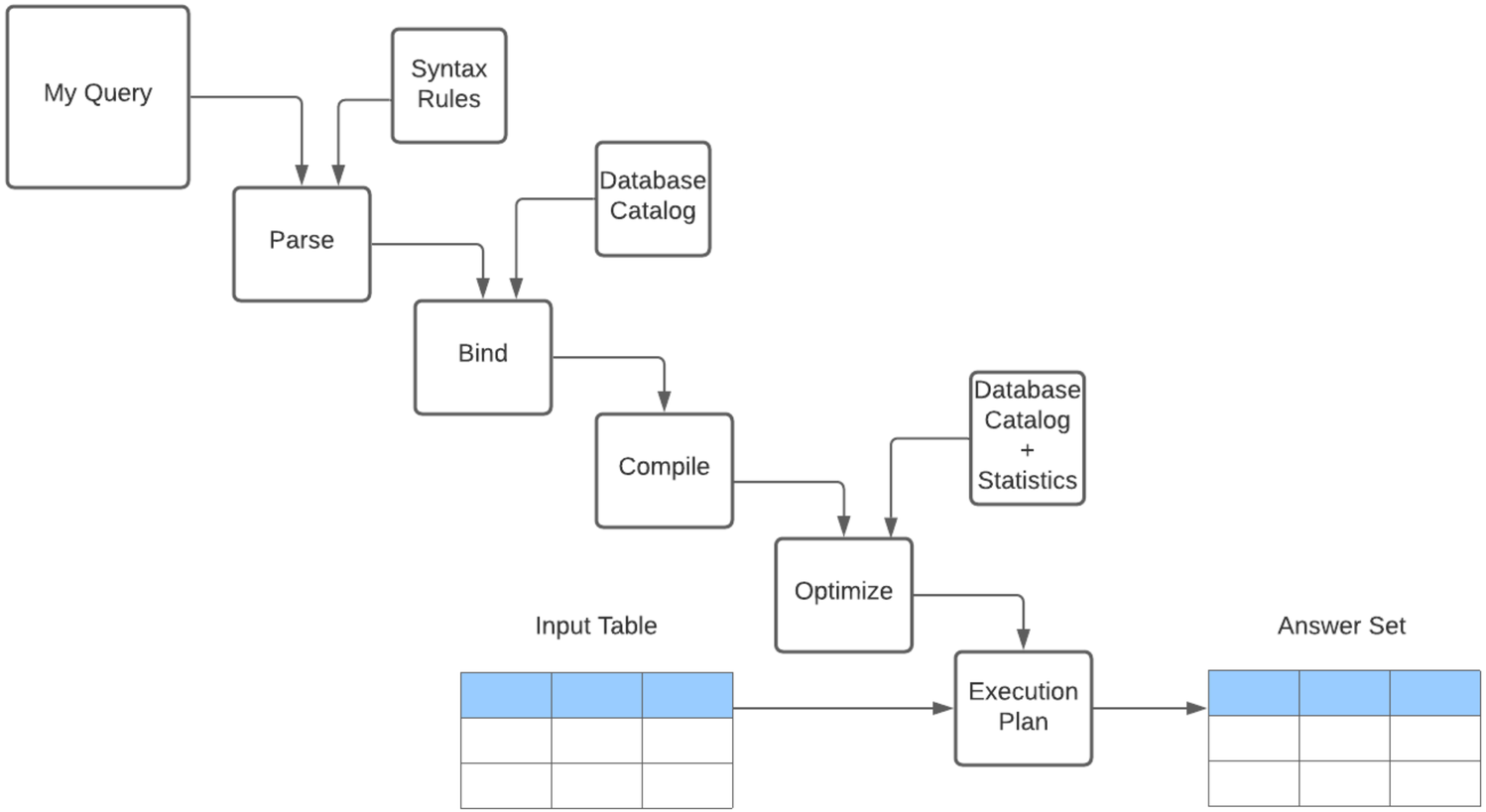
- SQL must be prepared for execution by the DBMS software

Preparing SQL for Execution

When you are ready to run your query, the DBMS must take the following steps:

1. It parses (syntax checks) the code
2. It binds the tables & columns
3. It creates an executable, hands it to the optimizer
4. The optimizer calculates an execution plan
5. The DBMS executes the execution plan

Preparing SQL for Execution



Overview of running a query

Your query must:

- Identify which table(s) is input to the query
- Define the columns in the answer set
- Define any selection criteria
  - Will this row appear in the answer set?

Overview of running a query

A note on Interim answer sets:

You don't see an interim answer set(s)

But it is there, and it consumes resources

Query Tuning

First:

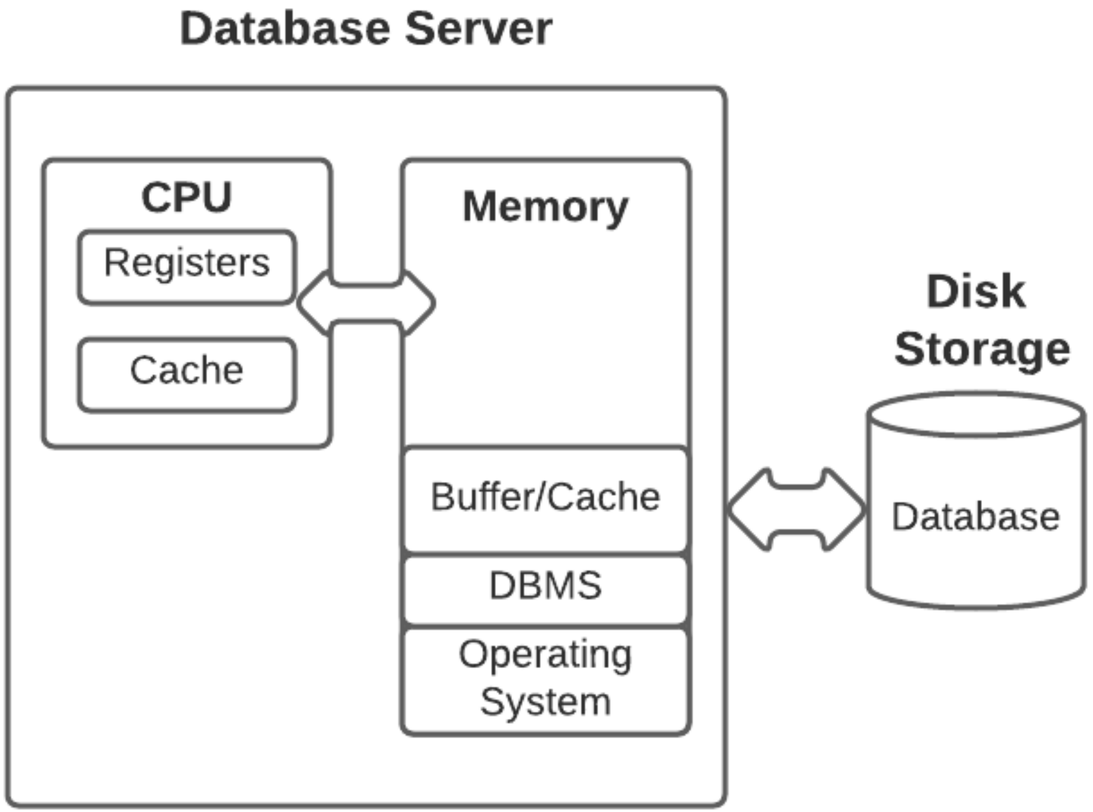
How does the DBMS really work?

CPU – Memory – Disk

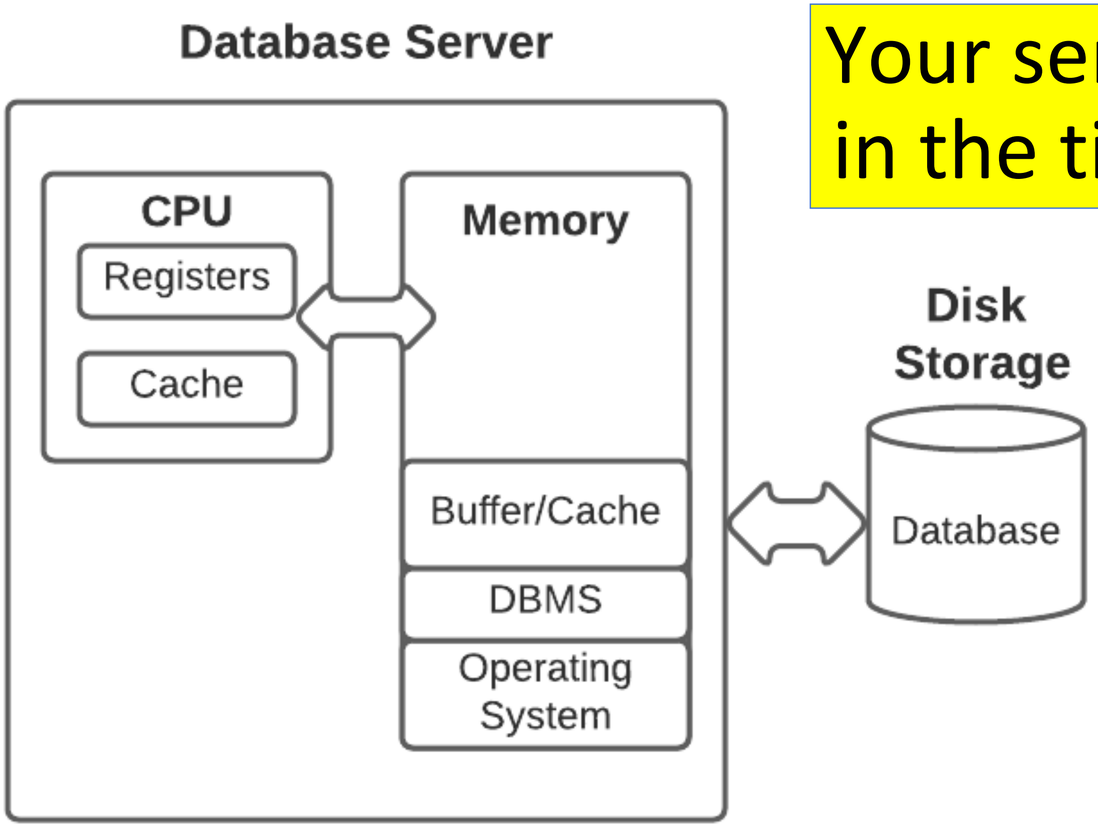
Relative Speeds:

- nanoseconds
- microseconds
- milliseconds

Query Tuning



Query Tuning



Your server can do a million CPU cycles in the time it takes to do ONE Disk I/O

Query Tuning

The optimizer calculates the LEAST COST execution plan.

Goals:

- Fastest run time
- Minimize use of server resources
- Minimize Disk I/O
- Use indexes if possible

Query Execution - Summary

When you run a query the DBMS will

1. Parse your query
2. Calculate the most efficient Execution Plan
3. Run your query (all at once, not line by line)
4. Produce an answer set (perhaps creating interim answer sets along the way...)