

Query Processing & Query Decomposition

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Query Processing

Query Processing

Query processing is a set of all activities starting from query placement to displaying the results of the query.

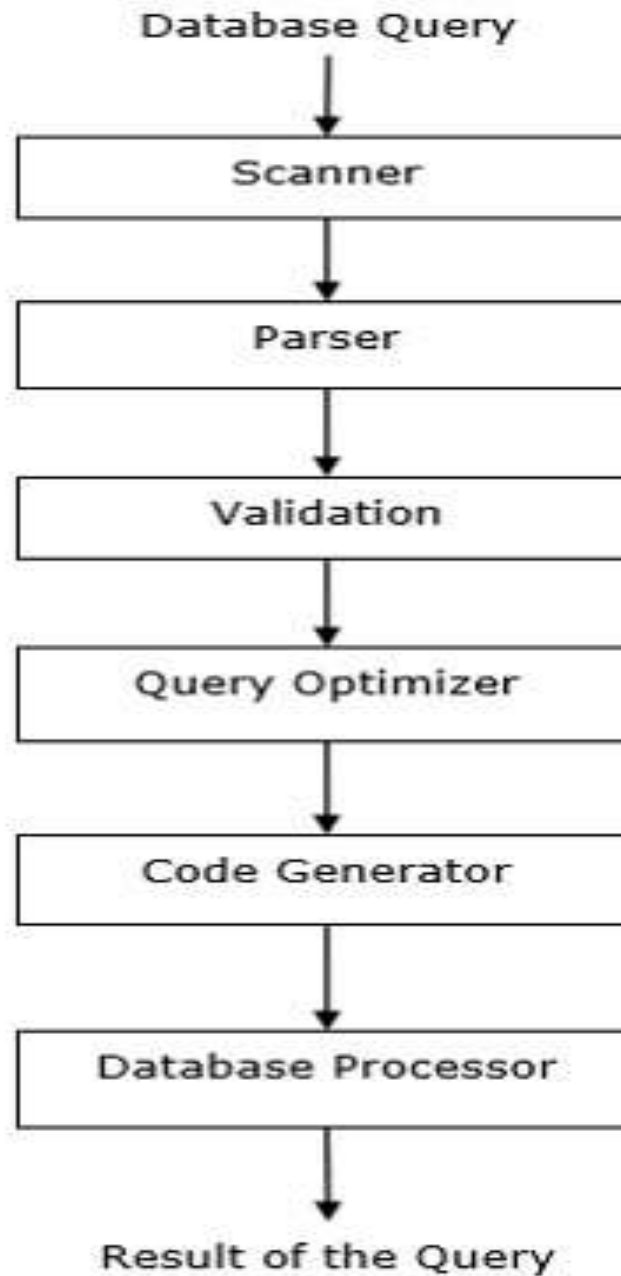
Basic Steps involved in Query Processing:

- **Query Parsing and Translation**
- **Query Optimization**
- **Evaluation**

When a query is placed, it is at first scanned, parsed and validated. An internal representation of the query is then created such as a query tree or a query graph. Then alternative execution strategies are devised for retrieving results from the database tables. The process of choosing the most appropriate execution strategy for query processing is called query optimization.



Query Processing



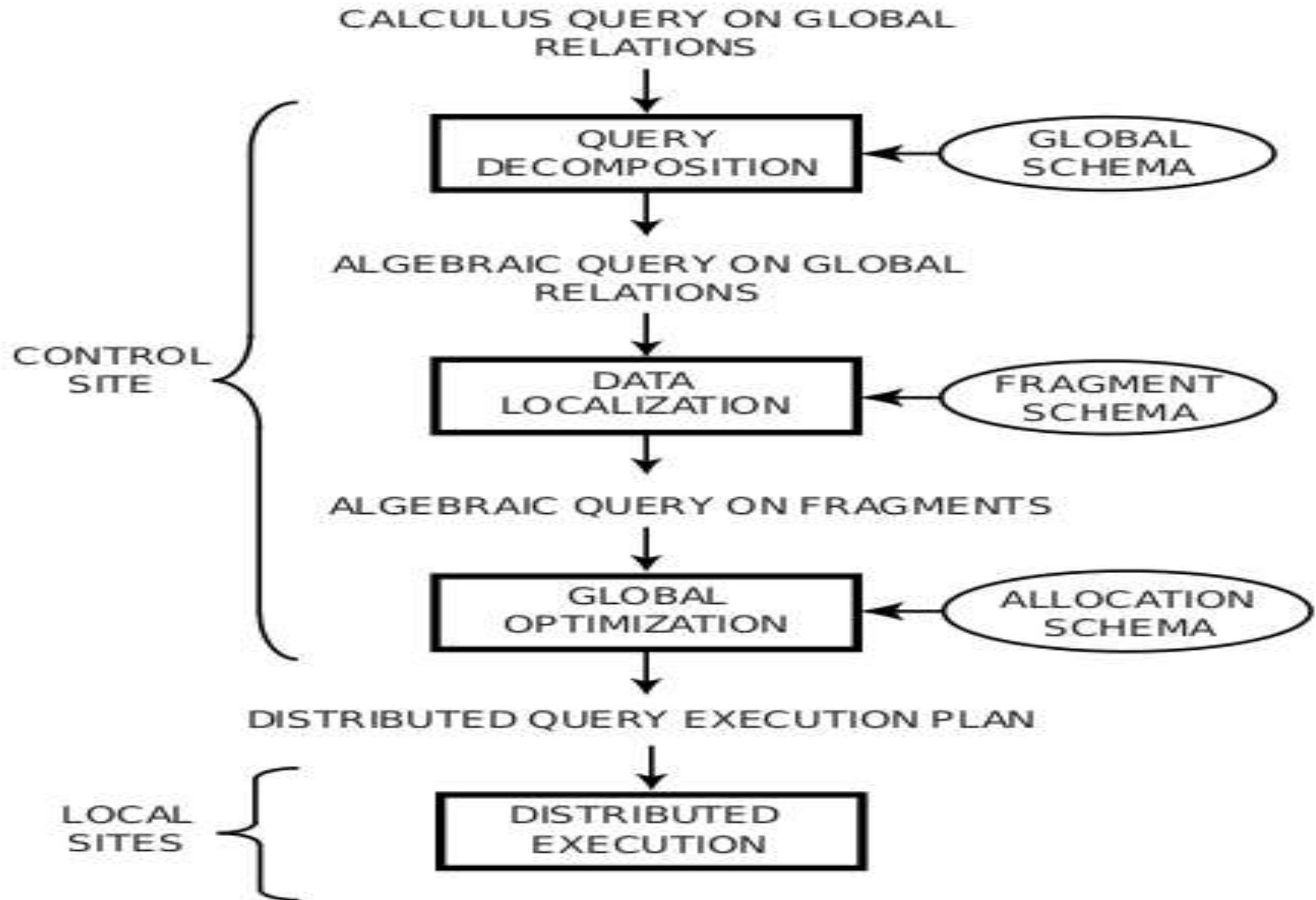
Query Processing

Query Optimization Issues

- 1) Types of Optimization : Exhaustive Search ,Heuristic
- 2) Optimization Granularity : Single Query at a time , multiple query at a time
- 3) Optimization Timing : Satic (compile time), Dynamic (execution time), hybrid (compile using static algorithm ,if error optimize at runtime)
- 4) Statistics : using histograms and attribute values are used
- 5) Descision Site : Single Site , All sites Involved , Hybrid
- 6) Exploitation of Network Topology : WAN [communication cost will matter], LAN [communication cost will not matter]
- 7) Exploitation using Replicated Fragments
- 8) Using Semijoins



Layers of Query Processing



Layers of Query Processing

➤ Query Decomposition

Normalization : query in CNF and DNF then example

Analysis : removal of incorrect query

Simplification : redundancy remove

Rewriting : converting calculus into relational algebra

➤ Query Graph

Nodes : result relation , operand relation

Edges : Join or Projection

➤ Localization of Distributed Data

Reduction Fragmentation

➤ Optimization of Distributed Queries

Query Optimization based on amount of data being shipped , cost of transmitting data back to the site , relation processing speed at the site



Query Decomposition

Query Decomposition:

Query decomposition transforms an SQL (relational calculus) query into relational algebra query on global relations. The information needed for this transformation is found in the global conceptual schema.

Steps in query decomposition

It consists of four phases:

1. Normalization
2. Analysis
3. Simplification
4. Rewriting



Query Decomposition

1) Normalization:

Input query can be complex depending on the facilities provided by the language. The goal of normalization is to transform the query to a normalized form to facilitate further processing. This process includes the lexical and analytical analysis and the treatment of WHERE clause. There are two possible normal forms.

Conjunctive NF

Disjunctive NF



Query Decomposition

2) Analysis:

Query analysis enables rejection of normalized queries for which further processing is either impossible or necessary. The main reasons for rejection are:

Type incorrect

- If any of its attribute or relation names are not defined in the global schema
- If operations are applied to attributes of the wrong type

Semantically incorrect

- Components do not contribute in any way to the generation of the result
- Only a subset of relational calculus queries can be tested for correctness
- Those that do not contain disjunction and negation
- To detect through Connection graph (query graph) and Join graph



Query Decomposition

3) Elimination of redundancy:

A user query expressed on a view may be enriched with several predicates to achieve view-relation correspondence and ensure semantic integrity and security. The enriched query qualification may then contain redundant predicates.



Query Decomposition

4) Rewriting:

This process is divided into two steps:

- Straightforward transformation of query from relational calculus into relational algebra
- Restructuring of relational algebra to improve performance Operator tree is used to represent the algebra query graphically.



THANK YOU

ANY QUERY???

