Picasso
Database Query Optimizer Visualizer

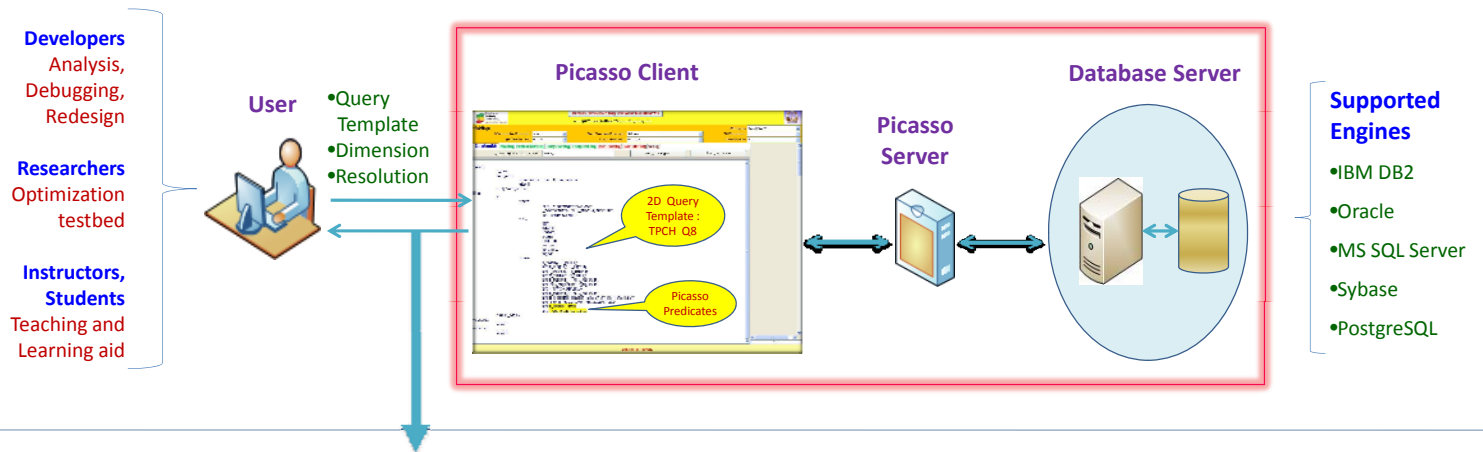**Database Systems Laboratory** — Indian Institute of Science

Introduction

Picasso[1] is a graphical tool for visualizing the behavior of modern database query optimizers.

Picasso takes as input a 'query template' that defines a relational selectivity space, and an optimizer, and generates a suite of diagrams that characterize the behavior of the optimizer over this space.
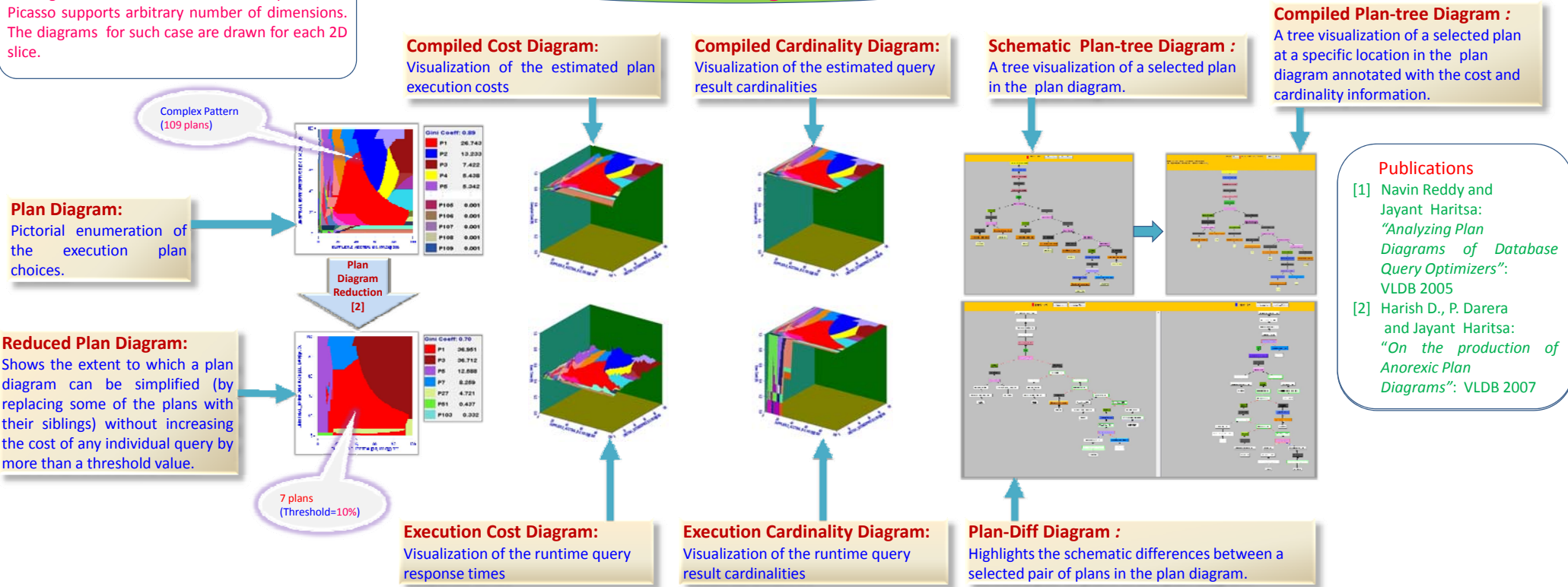
The diagrams produced on decision support query templates have provided a variety of interesting insights, often challenging the conventional wisdom.

Three Tier Architecture of Picasso

Developers — Analysis, Debugging, Redesign

Researchers — Optimization testbed

Instructors, Students — Teaching and Learning aid

User
- Query Template
- Dimension
- Resolution

Picasso Client

2D Query Template : TPCH Q8

Picasso Predicates

Picasso Server

Database Server

Supported Engines
- IBM DB2
- Oracle
- MS SQL Server
- Sybase
- PostgreSQL

All diagrams shown here are for 2D templates, but Picasso supports arbitrary number of dimensions. The diagrams for such case are drawn for each 2D slice.

Picasso Diagrams

Plan Diagram:
Pictorial enumeration of the execution plan choices.

Complex Pattern (109 plans)

Gini Coeff: 0.89	
P1	26.743
P2	13.233
P3	7.422
P4	8.438
P5	5.342
P105	0.001
P106	0.001
P107	0.001
P108	0.001
P109	0.001

Plan Diagram Reduction [2]

Reduced Plan Diagram:
Shows the extent to which a plan diagram can be simplified (by replacing some of the plans with their siblings) without increasing the cost of any individual query by more than a threshold value.

7 plans (Threshold=10%)

Gini Coeff: 0.70	
P1	36.961
P3	36.712
P5	12.888
P7	8.269
P27	4.721
P61	0.437
P103	0.332

Compiled Cost Diagram:
Visualization of the estimated plan execution costs

Execution Cost Diagram:
Visualization of the runtime query response times

Compiled Cardinality Diagram:
Visualization of the estimated query result cardinalities

Execution Cardinality Diagram:
Visualization of the runtime query result cardinalities

Schematic Plan-tree Diagram :
A tree visualization of a selected plan in the plan diagram.

Compiled Plan-tree Diagram :
A tree visualization of a selected plan at a specific location in the plan diagram annotated with the cost and cardinality information.

Plan-Diff Diagram :
Highlights the schematic differences between a selected pair of plans in the plan diagram.

Publications

[1] Navin Reddy and Jayant Haritsa: *"Analyzing Plan Diagrams of Database Query Optimizers"*: VLDB 2005

[2] Harish D., P. Darera and Jayant Haritsa: *"On the production of Anorexic Plan Diagrams"*: VLDB 2007

Project Website: http://dsl. serc.iisc.ernet.in/PICASSO/picasso.html