

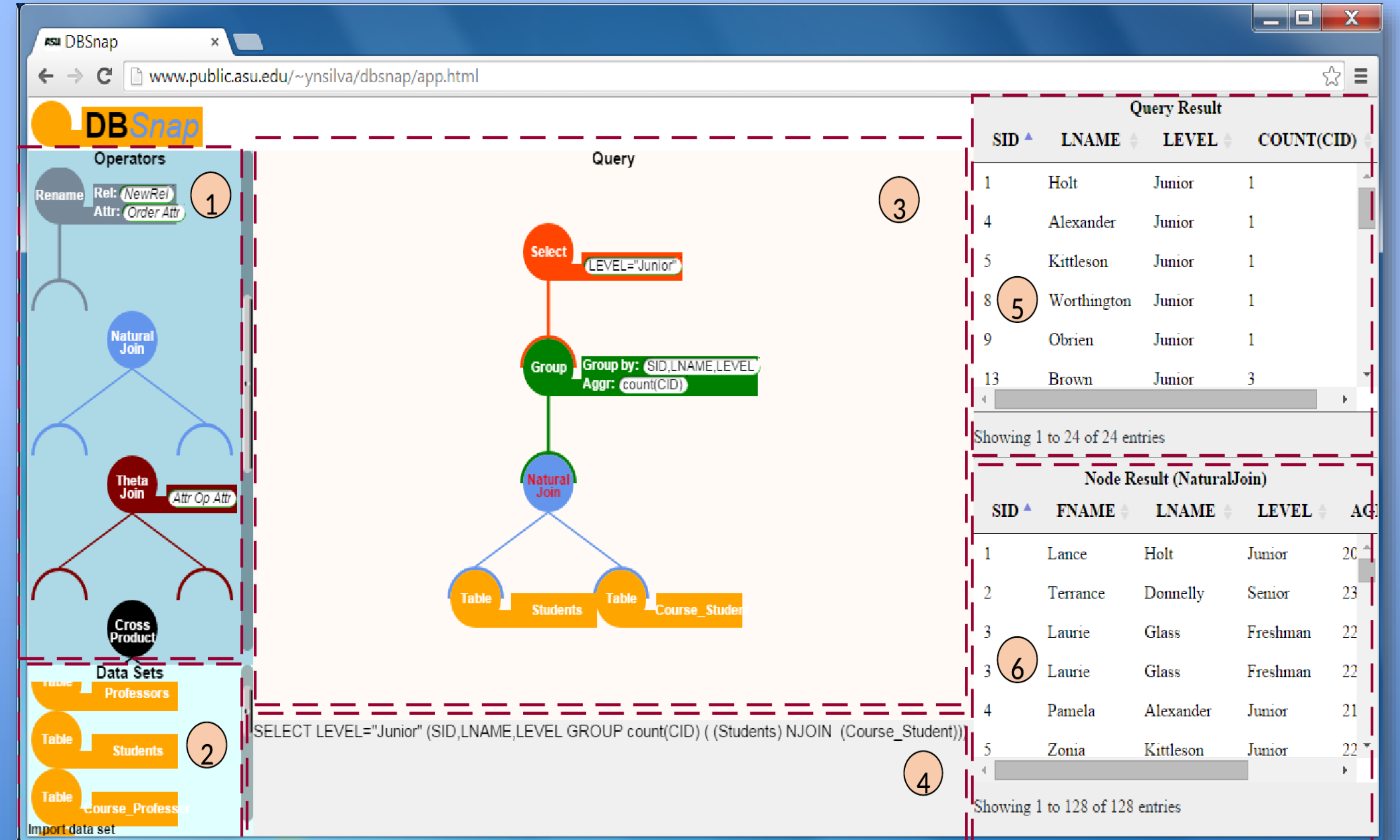
Yasin Silva, Jaime Chon  
Arizona State University

## Overview

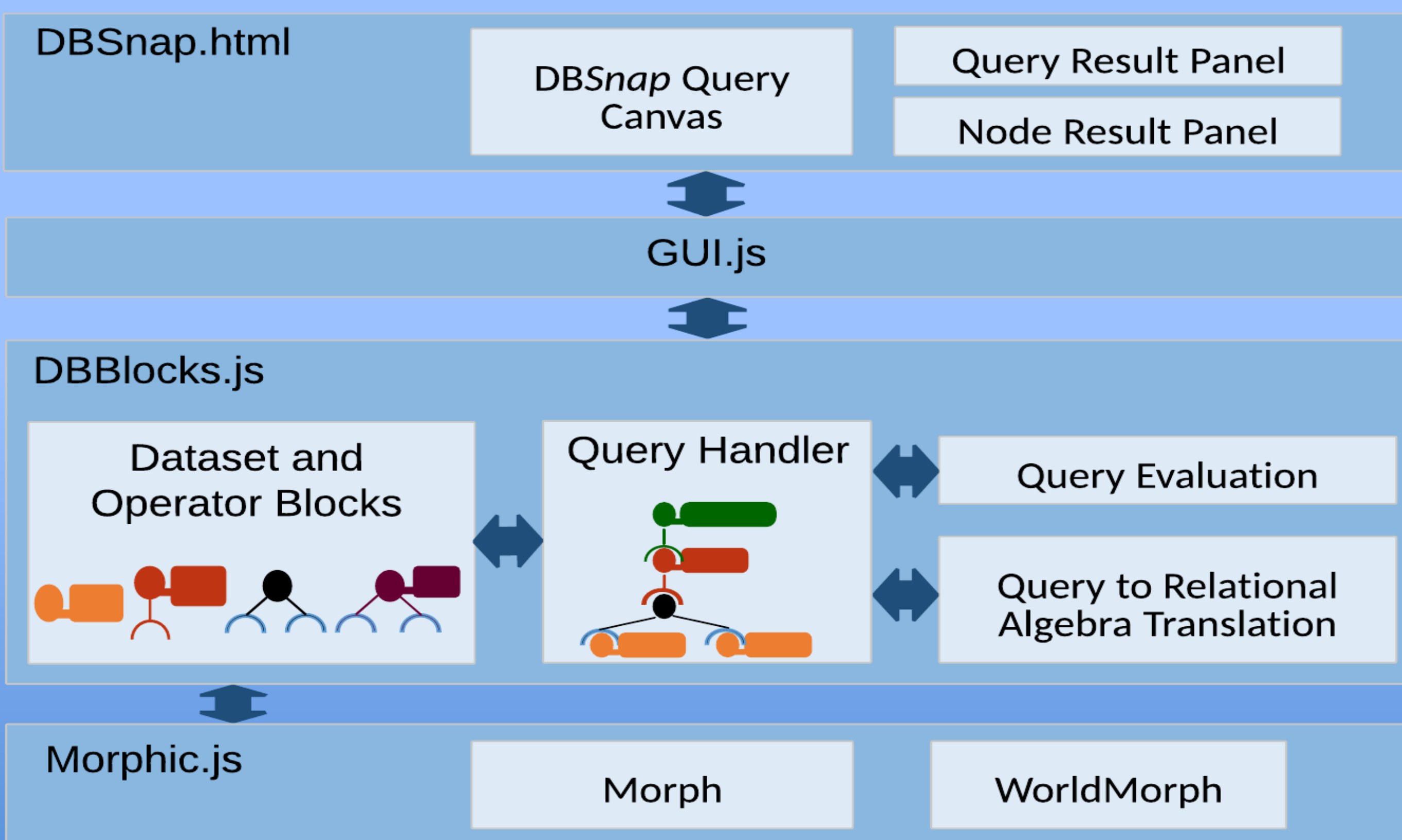
Computer Science Education has focused on studying block-based programming. In this approach, computer programs are created by connecting blocks and the blocks' shapes determine the permitted connections. The focus is on the program's logic instead of its syntax. DBSnap is a web-based application to build database queries, particularly relational algebra queries, by snapping blocks. DBSnap aims to have the same transformational effect on database learning as previous block-based systems had on traditional programming learning.

### DBSnap key features:

- Highly Dynamic Web App
- Intuitive Query Blocks
- Construction of Intuitive Database Query Trees
- Intermediate Node Inspection
- Shows the Query Results as the Query is Being Built
- Publicly Available & Open Source



## Architecture



## Operator Blocks

	<b>Selection:</b> $\sigma_{\theta}(R)$ . This operator selects all the records of relation R that satisfy the predicate $\theta$ .		<b>Cross Product:</b> $R \times S$ . This binary operator pairs each record of R with each record of S.
	<b>Projection:</b> $\pi_{a_1, \dots, a_n}(R)$ . This operator removes all the attributes of R not contained in $a_1, \dots, a_n$ .		<b>Theta-join (<math>\theta</math>-join):</b> $R \bowtie_{\theta} S$ . Returns a similar result than the Cross Product but selecting only the rows that satisfy the predicate $\theta$ .
	<b>Rename:</b> $\rho_{(i_1 \rightarrow b_1, \dots, i_k \rightarrow b_k)}(R)$ . This operator changes the name of relation R to S and the name of the attribute at position $i_j$ to $b_j$ .		<b>Natural Join:</b> $R \bowtie S$ . This operator is similar to the $\theta$ -join where the $\theta$ predicate is the equality of all the common attributes between R and S.
	<b>Aggregation:</b> $g_1, \dots, g_m, G_{f_1(a_1), \dots, f_k(a_k)}(R)$ . This operator groups the records of R forming a group for each unique occurring permutation of the grouping attributes $g_1, \dots, g_m$ . For each group, the operator computes the aggregation functions $f_1(a_1), \dots, f_k(a_k)$ where $a_1, \dots, a_k$ are attributes of R and the supported functions are sum, count, average, maximum and minimum.		<b>Set operators:</b> DBSnap also supports common set operations such as Set Union ( $R \cup S$ ), Set Difference ( $R - S$ ) and Set Intersection ( $R \cap S$ ).

## Example Queries

