The *NILE* Data Stream Management System

http://www.cs.purdue.edu/Nile/

PURDUE UNIVERSITY

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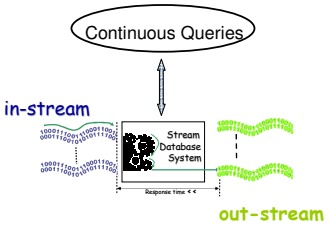
Architecture

NILE Data Stream Management System			
PREDATOR Database Management System	➢Continuous Window Queries	On-line Data Mining	Context Awareness
Abstract data types	Stream data Type		
SQL Language	WINDOW *<predicate>*		
Query processor	**+/ u /-** Tuples		
Query optimizer	Smart Load Shedding Shared Execution		
Storage engine	Stream_Scan Operator		

NILE Features

- ✓Stream-In Stream-Out
- ✓Negative Tuples
- ✓Predicate-window Queries
- ✓Smart Load-shedding via Promising Tuples
- ❑Context-aware Query Processing
- ❑Built-in Online Data Mining Operators
- ❑Shared Execution
- ❑Shared Summaries
- ❑Admission Control (for streams and queries) and QoS Support

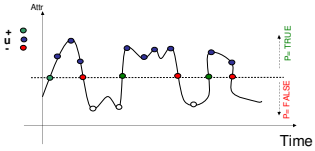
Stream-in Stream-out



Predicate-window Queries

The window-of-interest of the predicate-window ***W*** includes only tuples qualifying the window predicate ***P(Attr)***

- ❑As an object O changes its value of Attr, O can:
  - ❑Qualify P(Attr) and enter W **(+)**
  - ❑Change the value of Attr while still inside W **(u)**
  - ❑Disqualify P(Attr) and expire from W ***(-)***

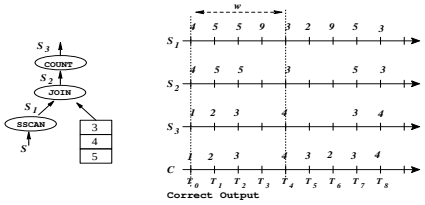


Behavior of Object O

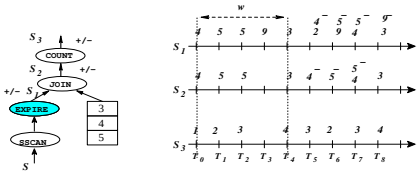
Tuples expire from the predicate-window in an out-of-order fashion

Negative Tuples

Negative tuples reduces the response time of the query



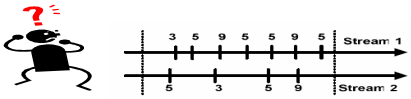
The Input-triggered Approach



The Negative Tuples Approach

Promising Tuples

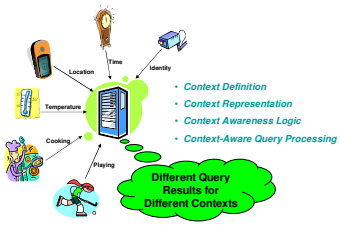
Use the limited resources to process only the *promising* tuples



Which tuples to process to produce the best query answer given that I can process only 3 tuples?

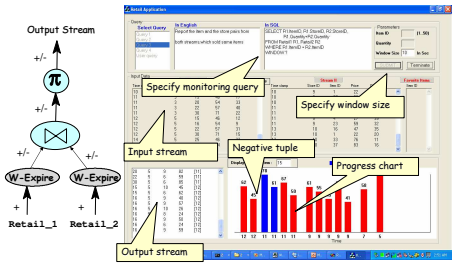
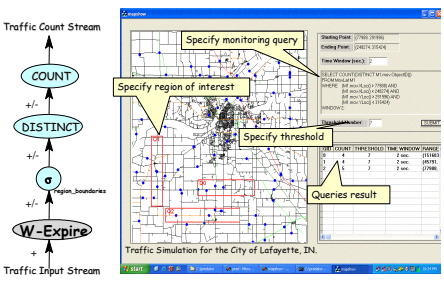
- ❑*Maximum Number of Output Tuples*:
  - ❑Process the three tuples with value 5 from Stream 1
- ❑Random Sample of the Correct Output:
  - ❑Process two tuples with value 5 and one tuple with value 9 from Stream1
- ❑Outlier Tuples:
  - ❑Process the tuple with value 3 from Stream 2

Context Awareness



Applications

Monitoring On-Line Transactions



Traffic Monitoring