



# The *NILE* Data Stream Management System

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

M.H. Ali W.G. Aref A.Elmagarmid H.Elmongui M.Eltabakh T.Ghanem M.Hammad M.Mokbel X. Xiong  
 Computer Science Department, Purdue University

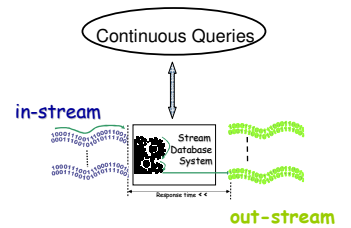
## Architecture

NILE Data Stream Management System		On-line Data Mining	Context Awareness
<b>PREDATOR</b> Database Management System	Continuous Window Queries		
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

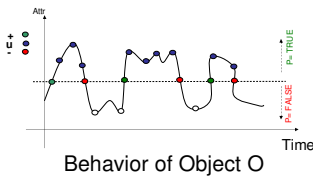
## Stream-in Stream-out



## Predicate-window Queries

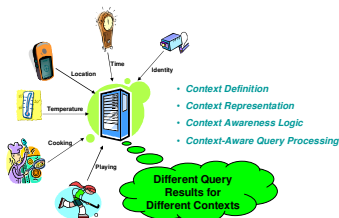
The window-of-interest of the predicate-window  $W$  includes only tuples qualifying the window predicate  $P(Attr)$

- 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  $W$  (-)



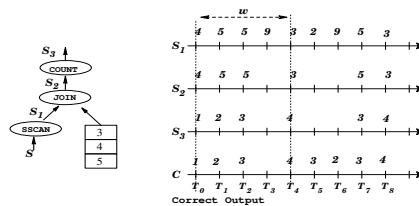
Tuples expire from the predicate-window in an *out-of-order* fashion

## Context Awareness

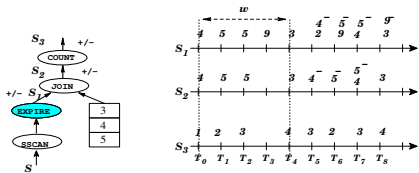


## Negative Tuples

Negative tuples reduces the **response time** of the query



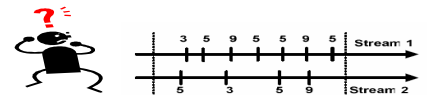
The Input-triggered Approach



The Negative Tuples Approach

## Promising Tuples

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

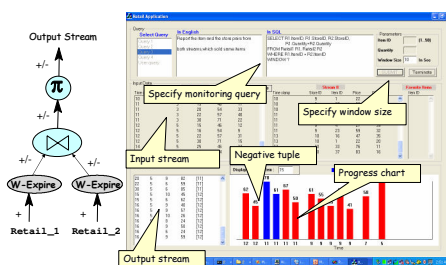


Which tuples to process to produce the **best** query answer given that I can process only 3 tuples?

- **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 Stream 1
- **Outlier Tuples:**
  - Process the tuple with value 3 from Stream 2

## Applications

### Monitoring On-Line Transactions



### Traffic Monitoring

