

Location-based Information Delivery Using Stream Processing Engine StreamSpinner

Shinichi Yamada, Yousuke Watanabe, Hiroyuki Kitagawa, Toshiyuki Amagasa (University of Tsukuba, Japan)

Introduction

Network and sensor device technologies are advancing
We can easily obtain real-world information as data streams

Example of data streams:

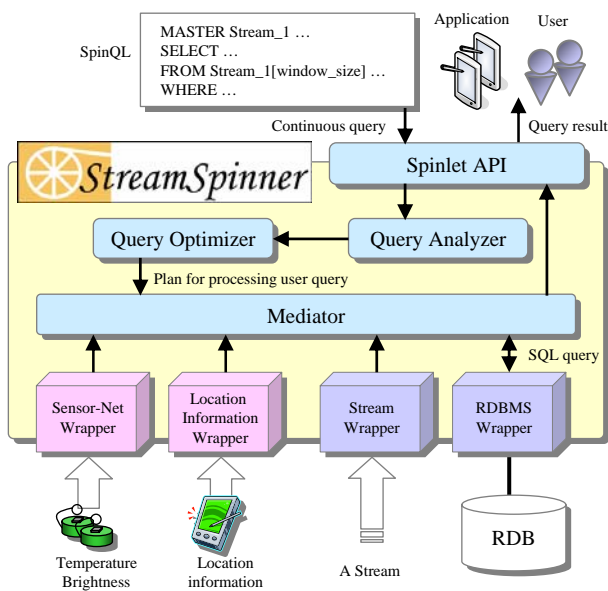
- Location information of moving objects
- Temperature and brightness monitored by sensor devices

StreamSpinner is a stream processing engine we are developing

Features of StreamSpinner:

- Query processing over data streams
- Integration of data streams and databases
- Event driven continuous query execution
- Novel multiple query optimization technique
- Java API for application development

StreamSpinner Architecture



Stream Wrapper

- Detects arrivals of new data units and transforms them into tuples
- Notifies Mediator of arrival events

Mediator

- Evaluates continuous queries associated with the event from wrappers

SpinQL

Data streams are modeled as unbounded relations

SpinQL is our event driven continuous query language

```
MASTER Sensor
SELECT Sensor.Light, Seat.X, Seat.Y
FROM Sensor[1msec], Seat
WHERE Seat.NodeId = Sensor.NodeId
```

MASTER clause gives master information sources

Data arrivals from master information sources trigger activation of the query

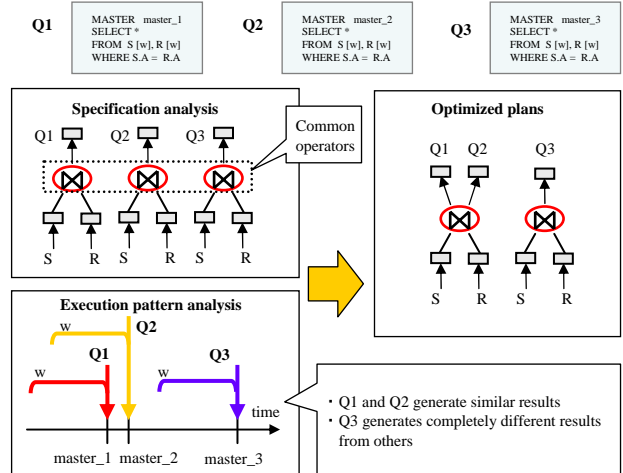
FROM clause can define a window for each data stream

Tuples arriving within the windows are used to generate the results

Multiple Query Optimization

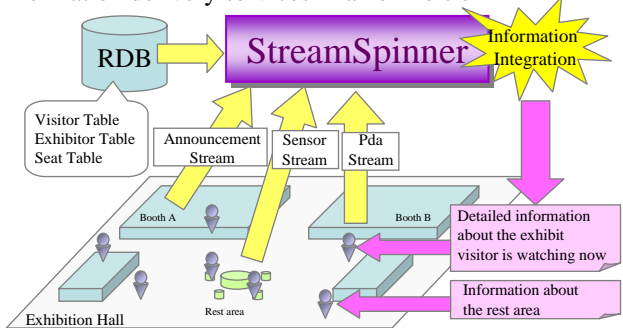
Optimizer derives query plans sharing common operators

Our method takes execution timings of queries into account to optimize multiple event driven continuous queries



Demonstration System

Using StreamSpinner, we have developed location-based information delivery services in an exhibition

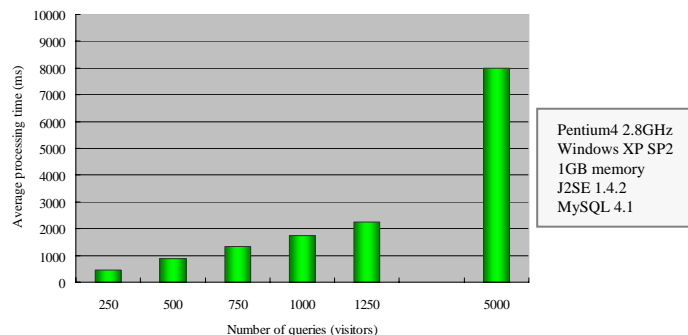


Visitors move around in the hall with a portable terminal
The terminal displays the information delivered from the system

Experimental Evaluation

The virtual exhibition hall has 500 seats in rest areas.

Each sensor sends brightness of the seat at 10-second intervals



Related work

[1] Y. Watanabe and H. Kitagawa.

A Multiple Continuous Query Optimization Method Based on Query Execution Pattern Analysis. *Proc. DASFAA*, pages 443–456, 2004.

[2] Y. Watanabe and H. Kitagawa.

Adaptive Query Optimization Method for Multiple Continuous Queries. *Proc. SWOD*, pages 92–95, 2005.