

Imtech ICT

## Imtech ICT Technical Systems

Real Time  
Data Distribution:  
SQLbus<sup>RT</sup>

KWALITEIT  
DOOR COMMITMENT  
EN CREATIVITEIT

Enschede, 03-11-2006

Bram Smulders

De technische automatiseerder van Imtech

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- Introduction
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- Contact, Q&A

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## Introduction – Context

### Example

- Research institutes
  - Handling a lot of data
  - Data needs to be analyzed
  - Use data directly to control measurement?

### In general

- Any situation where...
  - ...multiple parties produce data
  - ...multiple parties are interested in data
  - ...data needs to be available "real-time"
  - ...history data needs to be available

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## Introduction – Project Goal

### Finding answers to the following questions

1. "Can we include a database into a real-time data distribution system, to make the resulting system have the characteristics of the Blackboard Architecture Pattern?"
2. "Through the use of figures of merit, is it possible to predict the **Performance**, **Reliability** and **Scalability** of a system using the RT-DDS with Database?"

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## Introduction – Approach

- Create middleware for connecting...
  - ...data producers (Publishers)
  - ...data consumers (Subscribers)
- Use "of the shelf" components
  - ORTE
  - MySQL
- Set up tests which show behaviour of the system

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### Terminology – Blackboard

- Blackboard is shared storage space
  - Stores partial solutions
  - Stores control data
- Knowledge sources
  - Specialized in certain task
  - Provide partial solutions
- Control
  - Loops KS's
  - Manages data access

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### Terminology – Publish/Subscribe

#### Comparing two communication models

- Client Server model
  - Clients connect to server
  - Bidirectional
- Publish/Subscribe model
  - Publisher always publishes data, disregarding presence of subscribers
  - Subscribers can subscribe to the data they are interested in

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### Terminology – Real Time

#### Two (or three?) types of real time transactions

- Hard Real Time
- Soft Real Time
- Firm Real Time

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### Current status – Architecture

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### Current status – Coding


#### SQLbusRT

- Insertor
- Selector
- API
  - Sensor API
  - Request API

#### Test modules

- Example sensor
- Example client

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### Current status – Testing (1)


#### After creating a prototype

- Baseline values
  - Context switches make values unpredictable
- Network delays
  - One Way travel time difficult to measure
  - Setup is too different from first setup

#### Conclusion

- Results do not suffice to draw conclusions regarding
  - Performance
  - Reliability
  - Scalability

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### Current status – Testing (2)

#### Solution

- Make test setup more simplistic
- Use round trip times (ping pong)
- Compare results within a test, not among tests


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### Further Work – New tests

- Ping Pong messages on ORTE
  - Measure the throughput, lost messages
  - Alter setup to measure scalability
    - Message size
    - Network load
    - ...
- Similar tests on ORTE with Database


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## Contact


### Project website and blog

- [sqlbusrt.sourceforge.net](http://sqlbusrt.sourceforge.net)
- [sqlbusrt.blogspot.com](http://sqlbusrt.blogspot.com)

### E-Mail

- [bram.smulders@imtech.nl](mailto:bram.smulders@imtech.nl)


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## Q&A?

```
//Subscribing to questions
s = ORTESubscriptionCreate(
    d,
    IMMEDIATE,
    BEST_EFFORTS,
    "SQLbusRT",
    "question",
    &question2Recv,
    &deadline,
    &minimumSeparation,
    answerCallBack,
    NULL
);
```

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## Thank you

```
//Destroying subscription to questions
ORTESubscriptionDestroy(s);
```

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