

# DDS Interoperability Demo

## March 2011

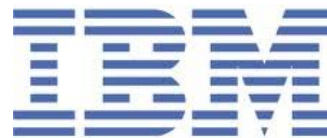
PrismTech

OpenSplice™ | DDS

TwinOaks  
Computing



IBM  
Corporation



Real-Time  
Innovations



Gallium Visual  
Systems



KONGSBERG



- Data Distribution Service for Real-Time Systems (DDS)
  - API for Data-Centric Publish-Subscribe distributed systems
  - Adopted in June 2003
  - Finalized in June 2004
  - Revised June 2005, June 2006
  - Spec version 1.2: <http://www.omg.org/spec/DDS/1.2/>
  - Adopted in July 2006
  - Revised in July 2007
  - Spec version 2.1: <http://www.omg.org/spec/DDS-RTPS/2.1/>
- Related specifications
  - DDS Extensible Topics
  - UML Profile for DDS
  - DDS for Light-Weight CCM
- Multiple (9+) Implementations



# Who is participating?



PrismTech

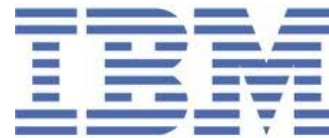
Real-Time  
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Corporation

Gallium Visual  
Systems



- #1 Interoperability works!
  
- #2 Multiple scenarios
  - You will see interoperability along many dimensions:
    - Discovery
    - Different platforms (Linux, Windows)
    - Not-trivial Data-Types with Keys
    - Unicast & Multicast, both reliable and best efforts
    - One to Many and Many to one communications
    - Different Topics
    - Different Qos: RELIABILITY, OWNERSHIP, DURABILITY
    - Filters: time, content, ...
  
- #3 Interoperability does not compromise performance
  - Direct communication. No bridges!!



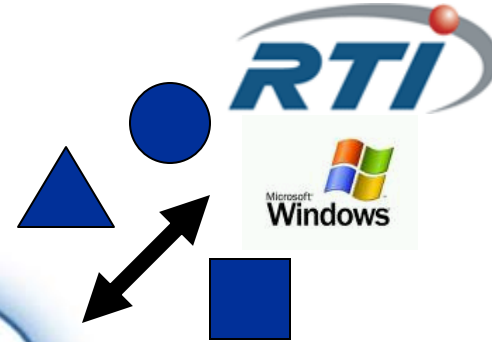
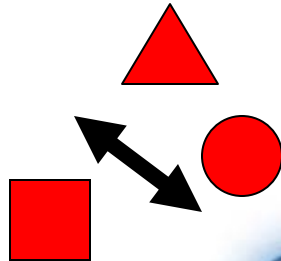
- Discovery & Basic connectivity
- Request / Offered QoS (RELIABILITY, OWNERSHIP)
- Network Interruption
- Multiple Topics & Instances
- Exclusive Ownership
- Time and Content Filters

**All this and more between multiple vendors  
across different platforms!!**

# Demo Setup



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Three DDS Topics:  
Square, Circle, Triangle

DDS Data type:

Shape:

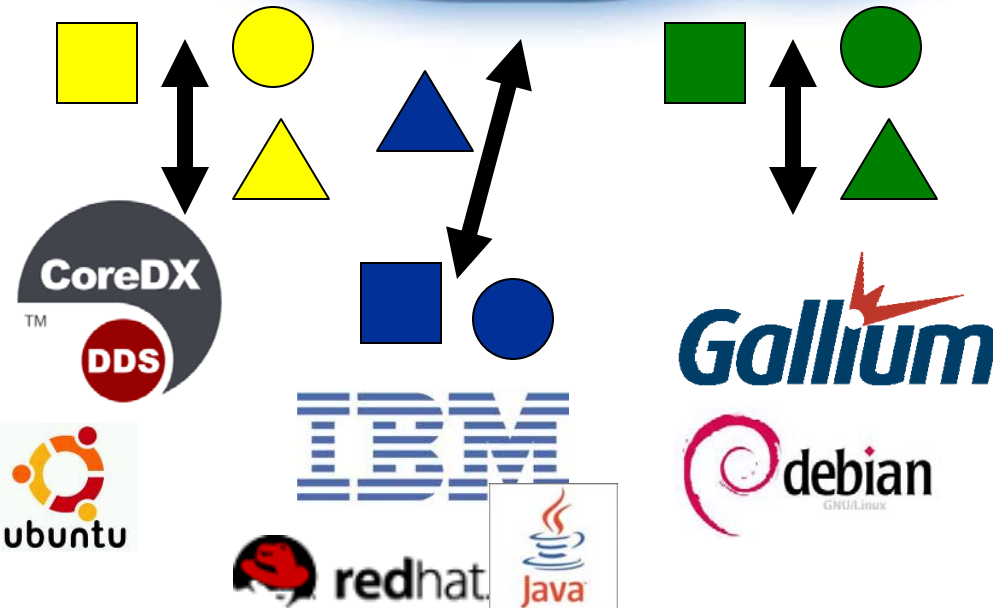
color : string

x : long

y : long

size : long

Color is instance **Key**



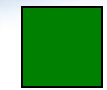
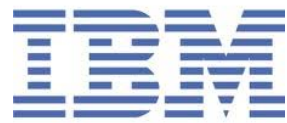
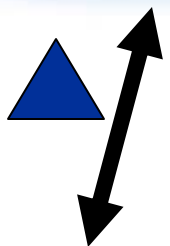
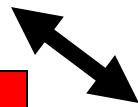
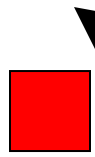
QoS:

- Deadline, Liveliness
- Reliability, Durability
- History, Partition
- Ownership

# 1. Discovery & Basic Connectivity



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Each vendor publishes one instance (color)

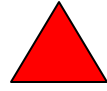
All vendors subscribe to Square and receive from everyone

- You will see:
- Discovery
  - Multi Platform
  - Data Interoperability

## 2. Request/Offered QoS (RELIABILITY)



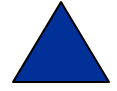
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BEST\_EFFORT



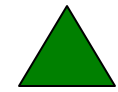
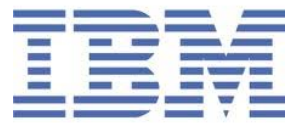
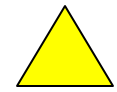
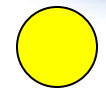
RELIABLE



Each vendor publishes one instance of each Topic

Square RELIABLE  
Circle BEST\_EFFORT  
Triangle BEST\_EFFORT

Everybody Subscribes to  
Square RELIABLE  
Circle BEST\_EFFORT  
Triangle RELIABLE



You will see:

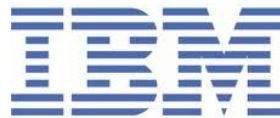
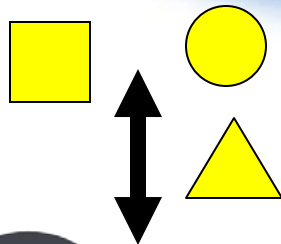
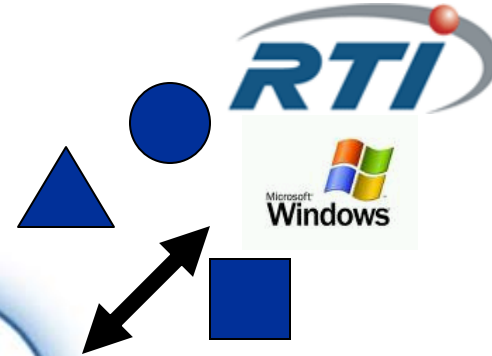
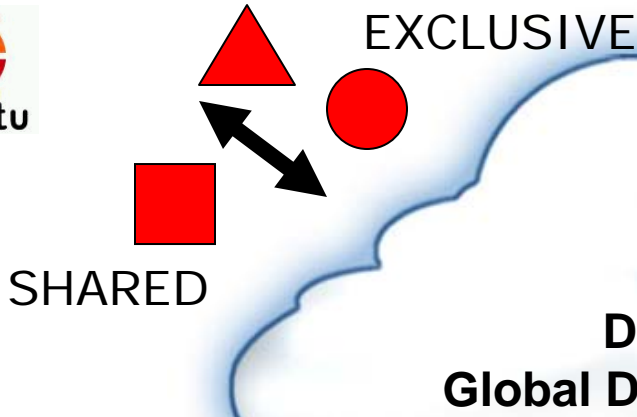
- Square MATCH
- Circle MATCH
- Triangle no MATCH



### 3. Request/Offered QoS (OWNERSHIP)



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Each vendor publishes one instance of Square, Circle, and Triangle

Squares SHARED  
Circles EXCLUSIVE  
Triangle EXCLUSIVE

Everybody Subscribes to  
Square SHARED  
to Circle EXCLUSIVE  
to Triangle SHARED

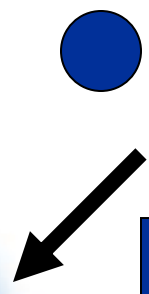
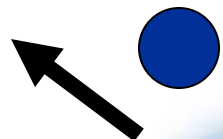
You will see:

- QoS mis-match
  - QoS agreement
- For OWNERSHIP

# 4. Durability



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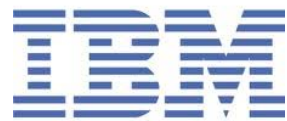
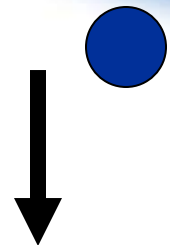


DDS  
Global Data Space

RTI publishes instance of

- Square with DURABILITY TRANSIENT, HISTORY 400
- Circle with DURABILITY TRANSIENT, HISTORY 400

Everybody else Subscribes  
HISTORY 200  
to Square VOLATILE  
to Circle TRANSIENT



You will see:

- No historical data for VOLATILE
- Historical data for TRANSIENT

# 5. Robustness to network interruption



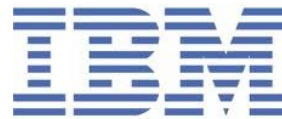
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Each vendor publishes one instance (color)

All vendors subscribe to Square and receive from everyone

Disconnect 2 nodes and then reconnect



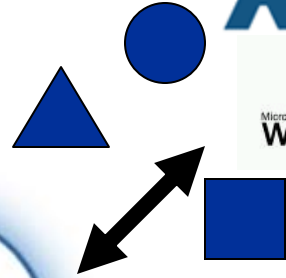
You will see:

- Connected nodes keep communicating
- Recovery after reconnect

# 6. PARTITION QoS



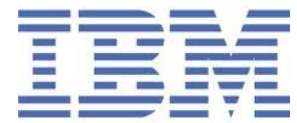
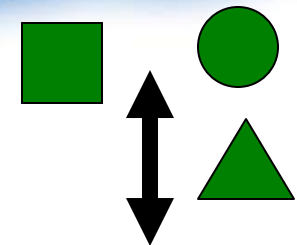
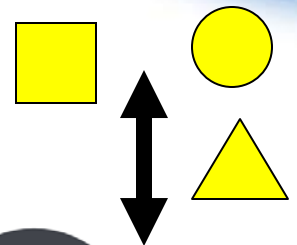
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Each vendor publishes one instance of Square, Circle, and Triangle

Squares PARTITION "A"  
Circles PARTITION "B"  
Triangle PARTITION "\*"

Everybody Subscribes to Square, Circle, Triangle all on PARTITION "A"



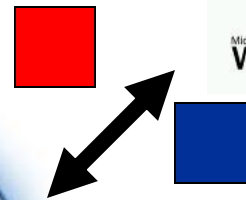
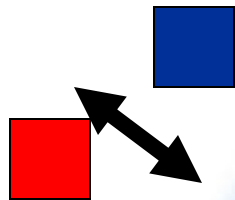
You will see:

- Square on ALL
- Circle on NONE
- Triangle on ALL

# 7. OWNERSHIP

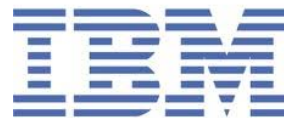
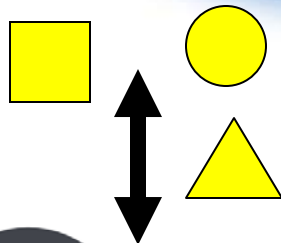


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All vendors subscribe to Square  
OWNERSHIP EXCLUSIVE

Each vendor successively  
Publishes MAGENTA  
Square EXCLUSIVE, each  
with increasing size and  
STRENGTH



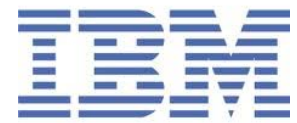
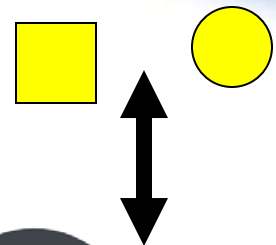
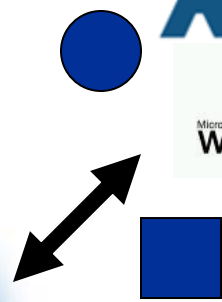
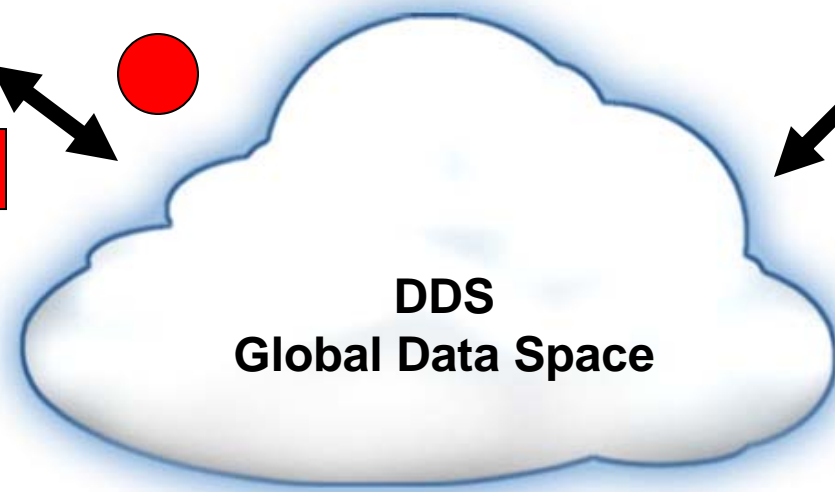
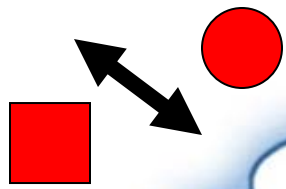
You will see:

- Take over when stronger writer appears
- Failover when stronger writer goes away

# 8. TIME\_BASED Filter



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Each vendor publishes one instance (color) of Square and Circle

All vendors subscribe to Square without FILTER Circle with TIME\_BASED filter

You will see:

- All Square samples
- Sub-sampled Circle

# 9. Content-Based Filter



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Each vendor publishes one instance (color) of Square

All vendors subscribe to Square with ContentBased Filter



You will see:

- Squares that pass the filter



Today we demonstrated interoperability between 4 vendors for:

- Discovery
- Different platforms (Windows, several Linux distros)
- Different Topics and Data-Types
- Different Qos (RELIABILITY, DURABILITY, OWNERSHIP)
- Unicast & Multicast, both reliable and best efforts
- One to Many and Many to one communications
- Robustness to network interruption
- Time Based Filters
- Content Based Filter



- DDS Interoperability Works
  - We will continue working on additional scenarios
  - Vendors are committed to interoperability
  
- The DDS Standard and DDS-RTPS Interoperability standards are complete and usable
  - Two non-OMG vendors were able to use the OMG standard documents and produce interoperable DDS products
  
- DDS is the only portable and interoperable publish-subscribe infrastructure
  
- Come see more at the booths!