

DDS Interoperability Demo December 2010

PrismTech

OpenSplice™ | DDS

Real-Time Innovations



TwinOaks Computing



Gallium Visual Systems

Gallium



KONGSBERG



- Data Distribution Service for Real-Time Systems
 - 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: formal/07-07-01
- Interoperability wire protocol
 - 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



PrismTech



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Gallium Visual Systems



PrismTech Corporation

The World Leader in Open Source High Performance Middleware

- Global presence with active business in 50+ countries
- Supporting some of the most critical deployments around the globe, in Telco, Defense & Aerospace, Transportation, and Financial
- 110 Tech Jedi, including several Internationally acknowledged Middleware Experts, working hard to deliver you **Performance, Openness, and Freedom!**



<http://www.opensplice.com>

HQ Sites

USA: Burlington, MA
EMEA: Edinburgh, Scotland

Engineering Centres

Newcastle, UK | Fort Wayne, IN
Berlin, Germany | Paris, France
Hengelo, Netherlands

Field Offices / Distributors

London, UK | Saddle Brook, NJ
Houston, TX | San Francisco, CA
Helsinki, Finland | Seoul, South Korea | Beijing, China



The Global Leader in DDS

- We are the DDS company
 - 100% focused on DDS
- Founded 1991 by researchers from Stanford Aerospace Robotics Lab
- Real-time middleware since 1996
- Over 500 unique applications
- Solid financials
 - Bootstrapped, no VC
 - History of profitability and growth
- <http://www.rti.com>



Defense, Security & Air Traffic Control Applications

- Supplier of software tools, turn key applications and services
 - DoD Common Operating Environment
 - Navy Open Architecture compliant
 - ISO 9001:2008 Certified

- Focused on mission-critical software applications
 - Pioneered mapping and tracking systems in early 1980s
 - Visualization products and services
 - Middleware Communications Software

- 20+ Year focus on COTS software for
 - Command & Control / Situational Awareness
 - Air and Missile Defense
 - Air Traffic Control
 - Security



KONGSBERG

- Small business based in Colorado
- Specializing in high-performance data communications
 - DDS, RTPS
 - Networking protocols
 - Device drivers
 - Embedded computing environments
 - Tactical data links
- CoreDX DDS implementation
 - Targeted at high-performance, space-constrained, embedded environments
- Staff with over 30 years experience developing and supporting DoD systems
- <http://www.twinoakscomputing.com>

TWIN OAKS COMPUTING, INC.
Practical Middleware Expertise



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Innovative Software Solutions

- #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!!

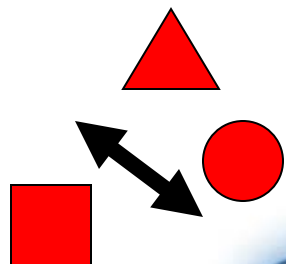
- Basic connectivity
- Request / Offered QoS (RELIABILITY, OWNERSHIP)
- Network Interruption
- Multiple Topics & Instances
- Exclusive Ownership
- Time and Content Filters

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

Demo Setup



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DDS
Global Data Space

Three DDS Topics:
Square, Circle, Triangle

DDS Data type:
Shape:

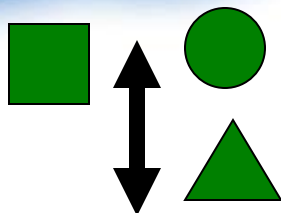
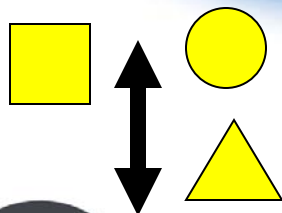
color : string

x : long

y : long

size : long

Color is instance **Key**

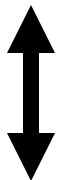
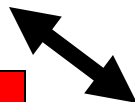


QoS:

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

1. Basic Connectivity

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Each vendor publishes one instance (color)

All vendors subscribe to Square and receive from everyone

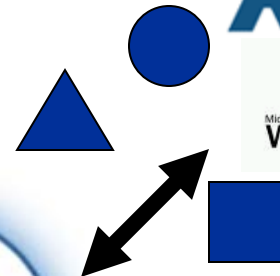
You will see:

- Discovery
- Multi Platform
- Data Interoperability

2. Request/Offered QoS (RELIABILITY)



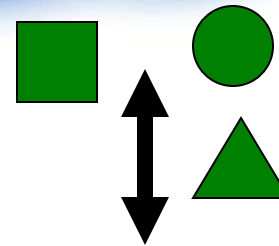
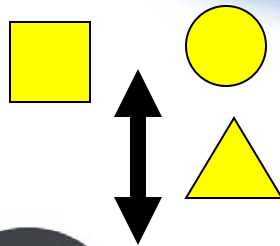
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Each vendor publishes one instance of each Topic

Square RELIABLE
Circle BEST_EFFORT
Triangle BEST_EFFORT

Everybody Subscribes to
Square RELIABLE
Circle BEST_EFFORT
Triangle RELIABLE



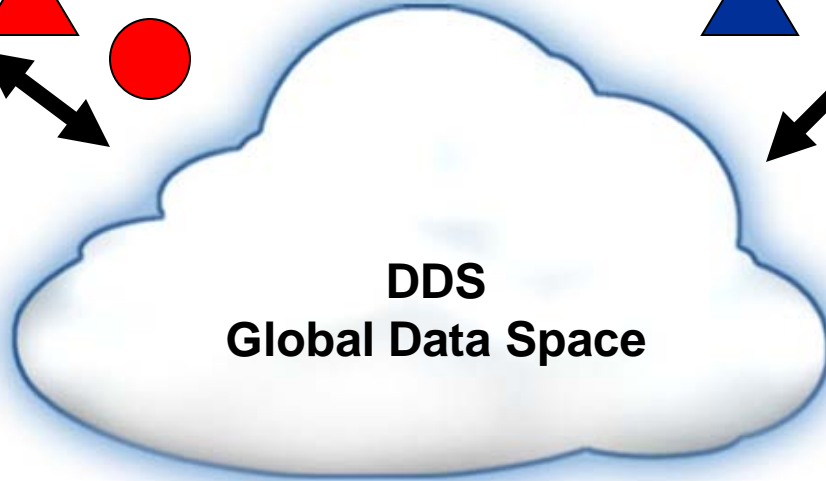
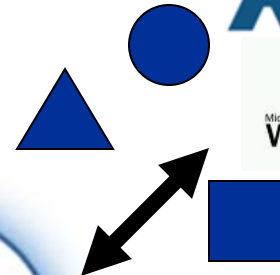
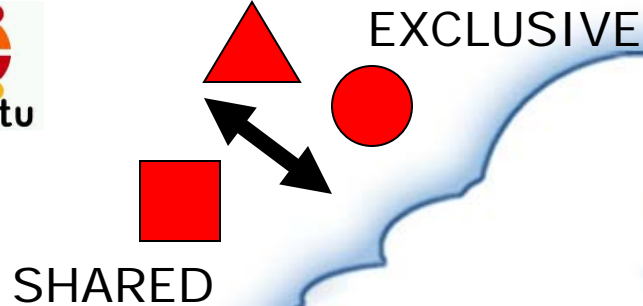
You will see:

- Square MATCH
- Circle MATCH
- Triangle no MATCH

3. Request/Offered QoS (OWNERSHIP)



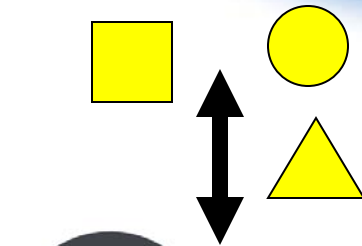
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Each vendor publishes one instance of Square, Circle, and Triangle

Squares SHARED
Circles EXCLUSIVE
Triangle EXCLUSIVE

Everybody Subscribes to
Square SHARED
to Circle EXCLUSIVE
to Triangle SHARED



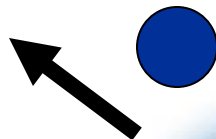
You will see:

- QoS mis-match
 - QoS agreement
- For OWNERSHIP

4. Durability



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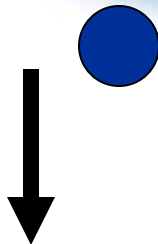


DDS
Global Data Space

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



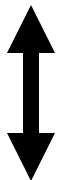
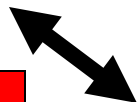
You will see:

- 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

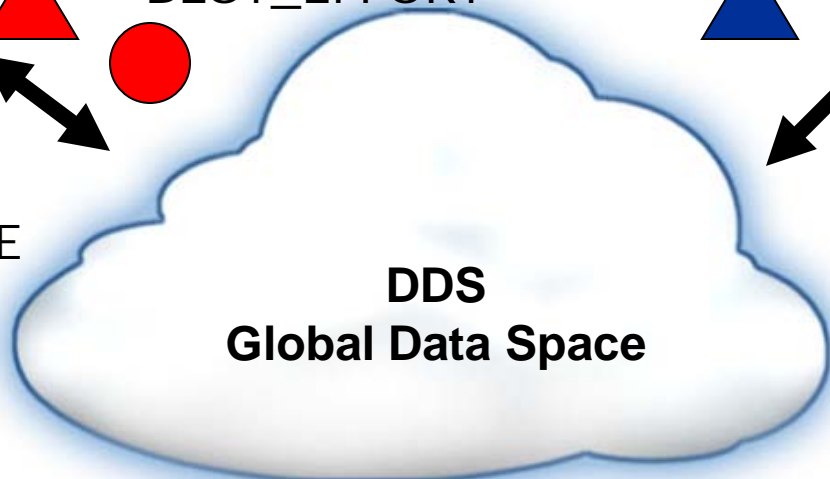
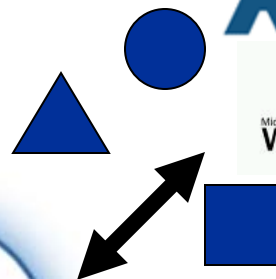
You will see:

- Connected nodes keep communicating
- Recovery after reconnect

6. PARTITION QoS



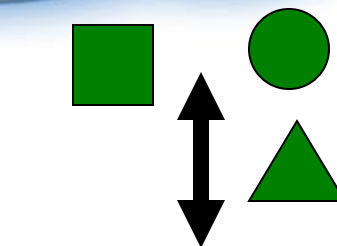
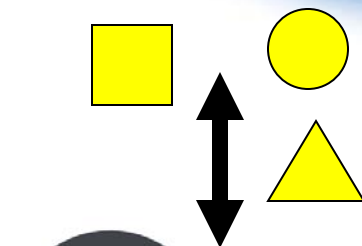
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Each vendor publishes one instance of Square, Circle, and Triangle

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

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



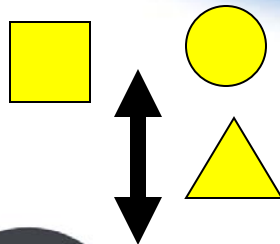
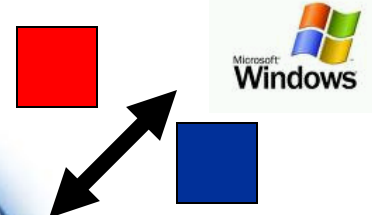
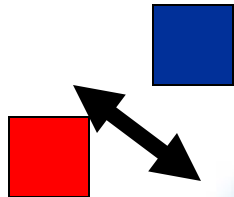
You will see:

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

7. OWNERSHIP



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Each vendor publishes one instance of Square OWNERSHIP EXCLUSIVE

Everybody Subscribes to Square EXCLUSIVE

Each vendor takes OWNERSHIP of the other vendor's square

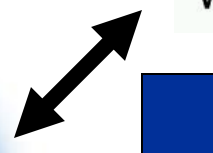
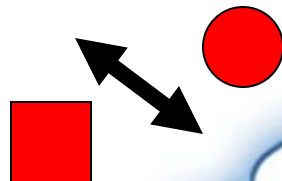
You will see:

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

8. TIME_BASED Filter

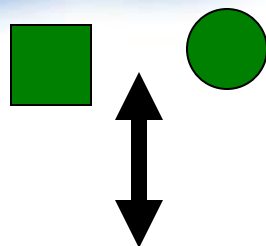
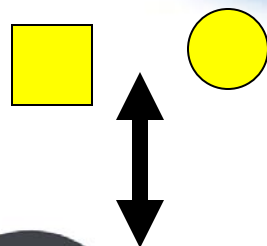


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Each vendor publishes one instance (color) of Square and Circle

All vendors subscribe to Square without FILTER Circle with TIME_BASED filter



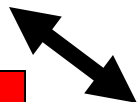
You will see:

- 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!