



ROBOTICS

ROS Lightning talk

IHMC Pub/Sub

RTPS/ROS2 communication protocol in realtime Java

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<https://github.com/ihmicrobotics/ihmc-pub-sub>

What does IHMC Pub/Sub do

- Lightweight wrapper around Fast-RTPS
 - No memory allocations for sending/receiving objects
 - Object orientated based on Fast-RTPS pub/sub interfaces
 - Could provide other back-ends (JRTPS?)
- Native Java IDL compiler
 - Every element is pre-allocated
 - No backing C/C++ code
 - Export data to YAML for long term storage
- RTPS Visualizer
 - Alpha quality

Domain: 1

Disconnect

Load data types

Topics

[Default partition]

▼ us/ihmc

▼ ChatBox

Chat::ChatMessage

Participants

▼ GUID Prefix: 010f0001ac17000000000000 Entity ID: 000

Pub: GUID Prefix: 010f0001ac17000000000000 Entity ID: 000

▼ GUID Prefix: 010f0001cb17000000000000 Entity ID: 000

Pub: GUID Prefix: 010f0001cb17000000000000 Entity ID: 000

▼ GUID Prefix: 010f00015017000000000000 Entity ID: 000

Pub: GUID Prefix: 010f00015017000000000000 Entity ID: 000

▼ SubscriberExample GUID Prefix: 010f00016e1700000000

Sub: GUID Prefix: 010f00016e17000000000000 Entity ID: 000

▼ GUID Prefix: 010f00018d17000000000000 Entity ID: 000

Sub: GUID Prefix: 010f00018d17000000000000 Entity ID: 000

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▼ Unicast locators

LOCATOR_KIND_UDPv4 127.0.0.1:7667

Multicast locators

Participant Guid: GUID Prefix: 010f0001ac1700000000

User defined id: 0

Max serialized size: 0

Topic kind: NO_KEY

▼ QoS

Reliability: RELIABLE

Partitions: [us/ihmc]

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Data

Timestamp	Sequence #	Bytes	Chang...
1505924510.92	128	36	ALIVE
1505924511.28	131	36	ALIVE
1505924511.65	139	36	ALIVE
1505924511.92	129	36	ALIVE
1505924512.28	132	36	ALIVE
1505924512.65	140	36	ALIVE
1505924512.92	130	36	ALIVE
1505924513.28	133	36	ALIVE
1505924513.65	141	36	ALIVE
1505924513.92	131	36	ALIVE
1505924514.28	134	36	ALIVE
1505924514.65	142	36	ALIVE
1505924514.92	132	36	ALIVE
1505924515.28	135	36	ALIVE
1505924515.65	143	36	ALIVE
1505924515.92	133	36	ALIVE
1505924516.28	136	36	ALIVE
1505924516.65	144	36	ALIVE
1505924516.92	134	36	ALIVE
1505924517.28	137	36	ALIVE

Sample kind: ALIVE

Data length: 36

Ownership Strength: -1

Source timestamp: 1505924463.62

Key: NO_KEY

Sample identity:

Sequence number: 78

GUID: GUID Prefix: 010f0001cb17000000000000 Entity ID: 00000103

Related sample identity:

Sequence number: -1.0

GUID: GUID Prefix: 000000000000000000000000 Entity ID: 00000000

Data:

Encapsulation: CDR_LE

00000000 05 00 00 00 4A 61 76 61 00 00 00 00 0F 00 00 00 ...Java.....

00000010 48 65 6C 6C 6F 20 57 6F 72 6C 64 20 37 37 00 00 Hello World 77..

00000020 00 00 00 00

Connected

Qos policy valid

Why custom Java implementation

- Real-time safe
 - No allocations necessary to send/receive
 - Native Java objects
 - No need to compile messages to C++ and then generate a Java wrapper
- Allow abstract implementations of .idl files
 - Re-use existing data types
 - Vector, Point etc
 - Backwards compatible with our codebase

First results

- Variable logging using IHMC Pub/Sub
 - 10000 64 bit variables (LZ4 compression)
 - 1 Khz
 - RTPS Best Effort
- Do not use Fast-RTPS write directly from Realtime thread
 - Blocking call
 - Use separate thread with lockless data sync.
- Share large models over history
 - Be careful to tune heartbeat period for large topics
 - Use newest Fast-RTPS

Further work

- Support for ROS 2 messages
- Compilation step between .msg ↔ .idl necessary?
- Proper topic names and partitions for ROS 2
- Stabilize IHMC RTPS Visualizer