Future-Proof Architecture for OT Data-Centric Microservices

MOVING FROM DEVICE-CENTRIC TO SCALABLE, DATA-CENTRIC FRAMEWORKS USING DDS

HIGHLIGHTS

Provides a data-centric framework for manufacturers to leverage their IIoT systems with interoperability, scalability and agility

Delivers real-time performance in large complex systems through flexible Quality of Service (QoS)

Enables automatic discovery and peer-to-peer connectivity: Build once and securely deploy anywhere

Offers low-latency and high-throughput for reliable and secure communication

Tools to accelerate design, development, testing and integration key enablers for DevSecOps

Connectivity is a critical component of IIoT and Industry 4.0, enabling the transport and sharing of data in near real-time for actionable decision-making. RTI Connext® supports this goal by providing the open, secure framework for interoperability and scalability for OT data-centric microservices, both on premise and in the cloud.

THE OT DATA-CENTRIC MICROSERVICE ARCHITECTURE

OT data-centric microservice is an architectural pattern similar to IT microservices, but with the added advantage of *data-centricity. Data-centricity* is an architectural pattern in which structured data is the primary and persistent asset in a system — a system built to accommodate the constant flow of data. OT data-centric microservice is specifically defined for the strict requirements of the OT world. Key characteristics of this architectural pattern include:

- Structured data are exposed as topics and the knowledge of the network is decoupled from the applications. Applications publish/subscribe structured data, not messages.

- State is decoupled from applications and is maintained by the system itself.

- The integrity of data is ensured through automated Quality of Service (QoS) rules. These rules ensure the spatial, temporal and flow properties of data are maintained. Built-in QoS parameters can include such information as the rate at which the samples or data will be republished, the reliability of the delivery, and the security of data flow.

- A shared data model eliminates data brokers or intermediaries, providing scalability and expandability through multi-layered databases that transmit the data between processors and other components.

- All applications, devices, modules and subsystems work together as one integrated system.

- The system remains secure through the DDS Security™ specification.

Until now, not every Industrial Internet of Things (IIoT) communication protocol was right for every deployment or device. Two common IIoT protocols used today are OPC UA (device-to-device communications) and MQTT (edge-to-cloud communications). However, neither support the transport of real-time data for decision making.

Find the connectivity standard that is right for your environment with the **Connectivity Standards Selection Tool** *— comparing DDS, OPC UA, MQTT, Apache Kafka and ROS.*

ENABLING OT DATA-CENTRIC MICROSERVICES

Fortunately, there is a way to achieve real-time data transport for OT data-centric microservices. The Data Distribution Service (DDS™) standard is the next-generation IIoT protocol that provides the foundation for OT data-centric microservice architectures.

Workflow View of a DevSecOps Setup
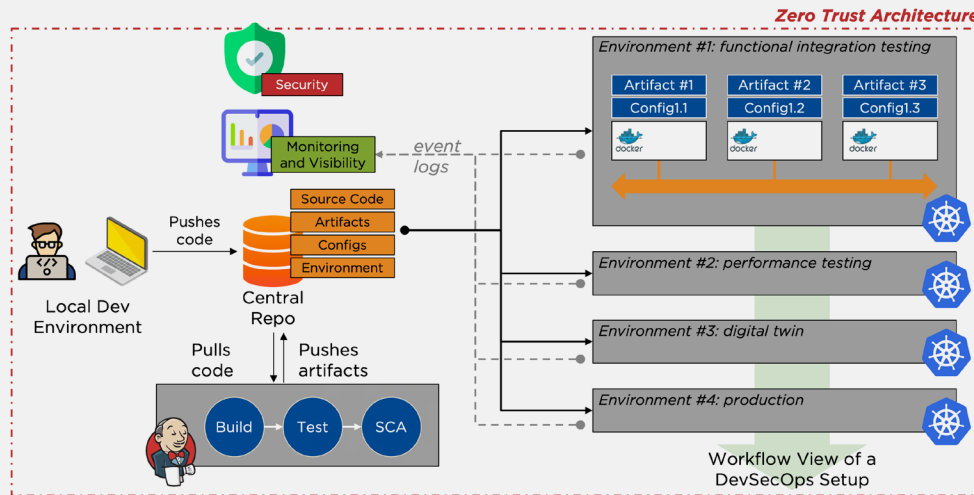
Built on DDS, RTI Connext takes this foundation further, providing a software framework that enables applications and devices to automatically discover each other and talk peer-to-peer, over any transport, across platforms, and across large-scale and geographically distributed systems. No message brokers or servers are required. The result:

- Similar to a database, there is a single source of truth
- Latency in the range of microseconds, even with many subscribers
- Throughput of millions of messages per second
- Non-stop availability with no single point of failure

CONVERGING IT/OT THROUGH DevSecOps

DevSecOps is quickly becoming the preferred methodology in OT software development. Security testing can be integrated at every stage of the software development process. It includes tools and processes that encourage collaboration between developers, security specialists and operation teams, while enabling continuous delivery/deployment and meeting the fault tolerant, scalable, low latency, safety and security needs of OT systems.

Reliable, robust and real-time communication is the foundation of any OT system. Traditional OT communication protocols and legacy IIoT protocols make integration of data flows in a system difficult and expensive, greatly reducing the effectiveness of DevSecOps.

Connext is a unique data-centric, plug-n-play communication framework, enabling developers to write code once and deploy anywhere (device, edge, cloud) as long as requirements are met. With Connext, end users can also leverage new IT technologies, such as containers and Kubernetes.

SECURITY FOR OT MICROSERVICES

The ability to fine tune data and data permissions provides the security needed for today's industrial systems. Built in to Connext, the features of DDS Security are not only highly effective at locking out external threats, but are also ideal for solving system vulnerabilities that could compromise security as regulatory and compliance efforts progress.

Connext provides security plugins for user and data authentication, access control, encryption, data tagging and event logging without modifying the existing DDS network infrastructure. This gives the system the necessary data confidentiality and integrity, while protecting information across multiple security domains from unauthorized access and tampering.

For development teams, this security minimizes the risk of data-sharing across distributed systems.

ABOUT RTI

Real-Time Innovations (RTI) is the largest software framework company for autonomous systems. RTI Connext® is the world's leading architecture for developing intelligent distributed systems. Uniquely, Connext shares data directly, connecting AI algorithms to real-time networks of devices to build autonomous systems.

RTI is the best in the world at ensuring our customers' success in deploying production systems. With over 1,800 designs, RTI software runs over 250 autonomous vehicle programs, controls the largest power plants in North America, coordinates combat management on U.S. Navy ships, drives a new generation of medical robotics, enables flying cars, and provides 24/7 intelligence for hospital and emergency medicine. RTI runs a smarter world.

RTI is the leading vendor of products compliant with the Object Management Group® (OMG®) Data Distribution Service (DDS™) standard. RTI is privately held and headquartered in Sunnyvale, California with regional offices in Colorado, Spain and Singapore.

Download a free 30-day trial of the latest, fully-functional Connext software today: https://www.rti.com/downloads.

Your systems. Working as one.

CORPORATE HEADQUARTERS

232 E. Java Drive, Sunnyvale, CA 94089
Telephone: +1 (408) 990-7400
Fax: +1 (408) 990-7402
info@rti.com

rti.com
rti_software
rtisoftware
company/rti
connextpodcast
rti_software