

ROS 2 Gateway to 24/7 Applications

ROSCon2024



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ROS vs. Industrial PLC Systems

What they do and don't do for us?

ROS

Industrial Fieldbus Connectivity

Deployment Pipeline for Industrial Equipment

Complexity



No Simple Logic Programming

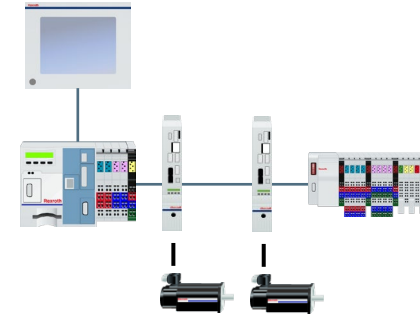
Every Setup is Unique Setup

Linux Focused Toolchains

High-Level Programming is Complex

High Effort for Security Hardening

Industrial PLC System



EtherCAT

Fieldbus Connectivity



Scalable Hardware Portfolio



Industrial Grade Long Term Availability



PLC Programming



Certified Safety (IEC 61508)



Sensors, Actuators, Input/Output Devices

ROS vs. Industrial PLC Systems

What they do and don't do for us?

ROS



State of the Art Algorithms
(E.g. Perception, Motion Planning)



Physics Simulation



Visualization of Complex Data



Rich Hardware Driver Ecosystem



Simple Inter-Process Communication on Complex Data

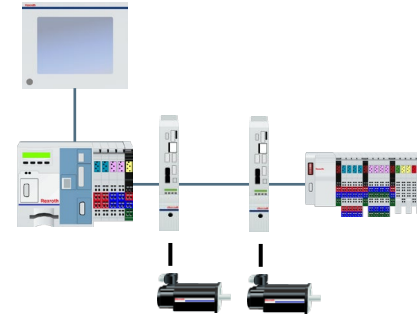


Machine Learning Integration



Complex Data Logging

Industrial PLC System



Windows Engineering Tools

Proprietary Interfaces

PLC not Capable for Sophisticated Programs

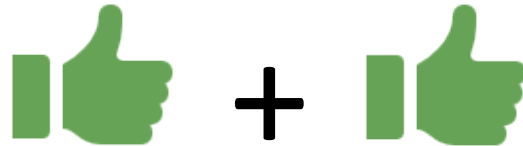


Scientific Data Handling Limited

Vendor Lock-In

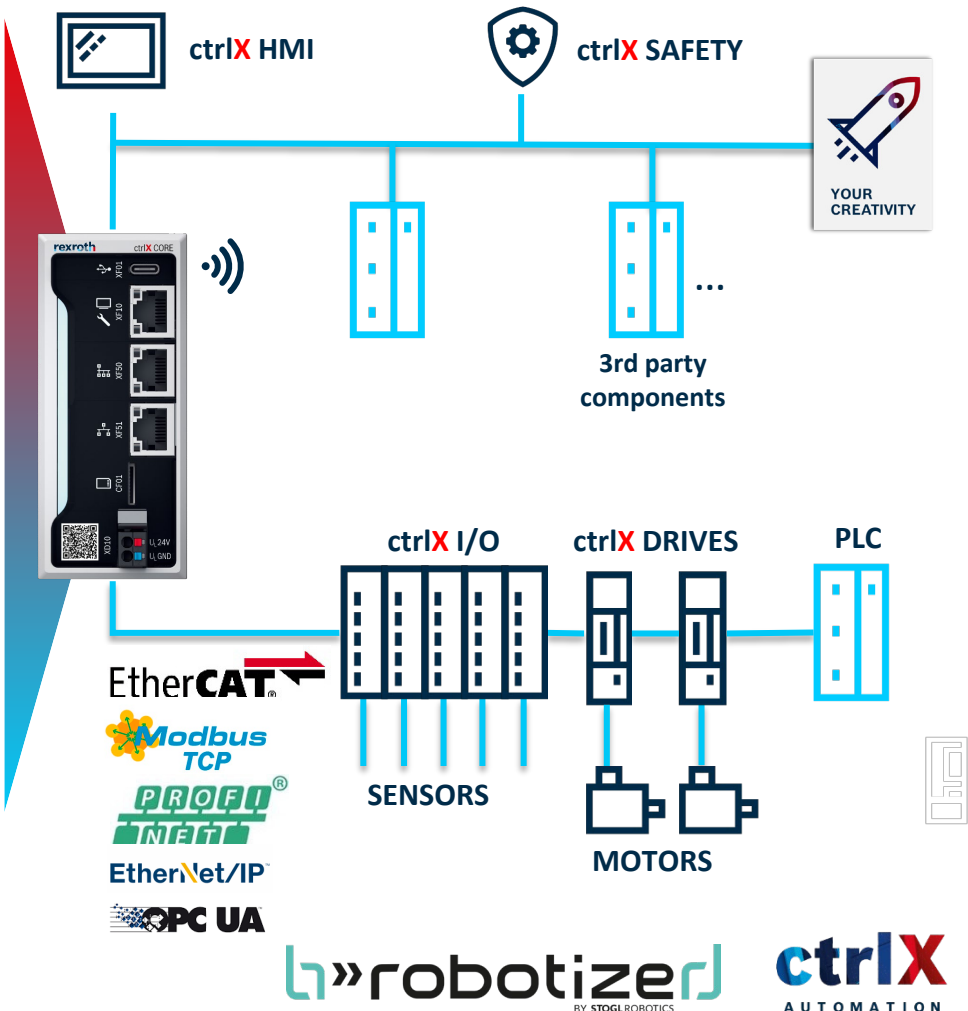
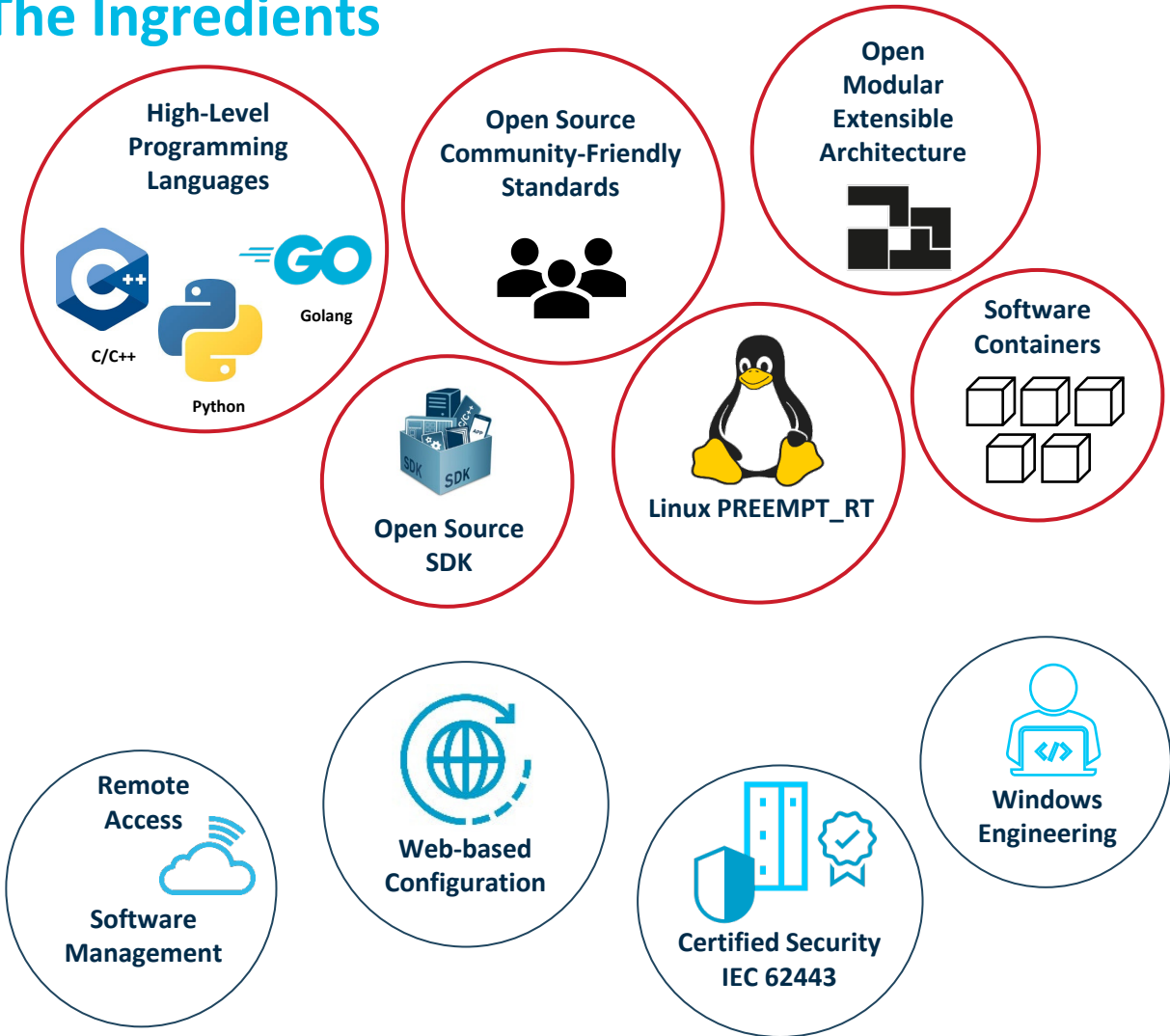
IEC 61131-3 not Popular (Lack of Developers)

How to combine both worlds?



A ROS 2 friendly Open Automation Platform

The Ingredients



A ROS 2 friendly Open Automation Platform

The Architecture

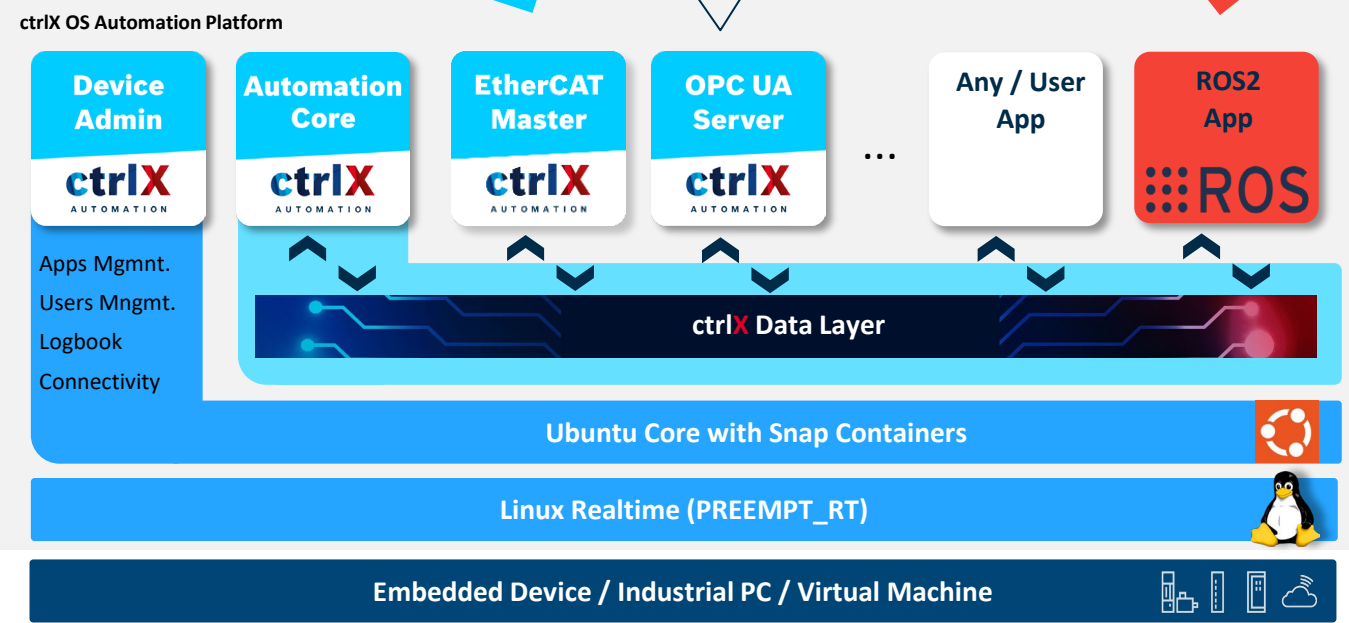
Install ready-to-use Industrial Apps from a Repository (EtherCAT, Soft PLC runtime, OPC UA, Vision, Security, IoT, Factory IT, Engineering ...)



Apps packaged as Ubuntu Snap Containers for easy and secure deployment



Extend with your own ROS 2 apps based on Open Source SDK* and Application Samples



Realtime capable, secure message broker to route between different Apps (e.g. ROS2, Fieldbus, PLC data)

Run ctrlX OS on different industrial grade devices or virtualized (e.g. for automated testing or CI)



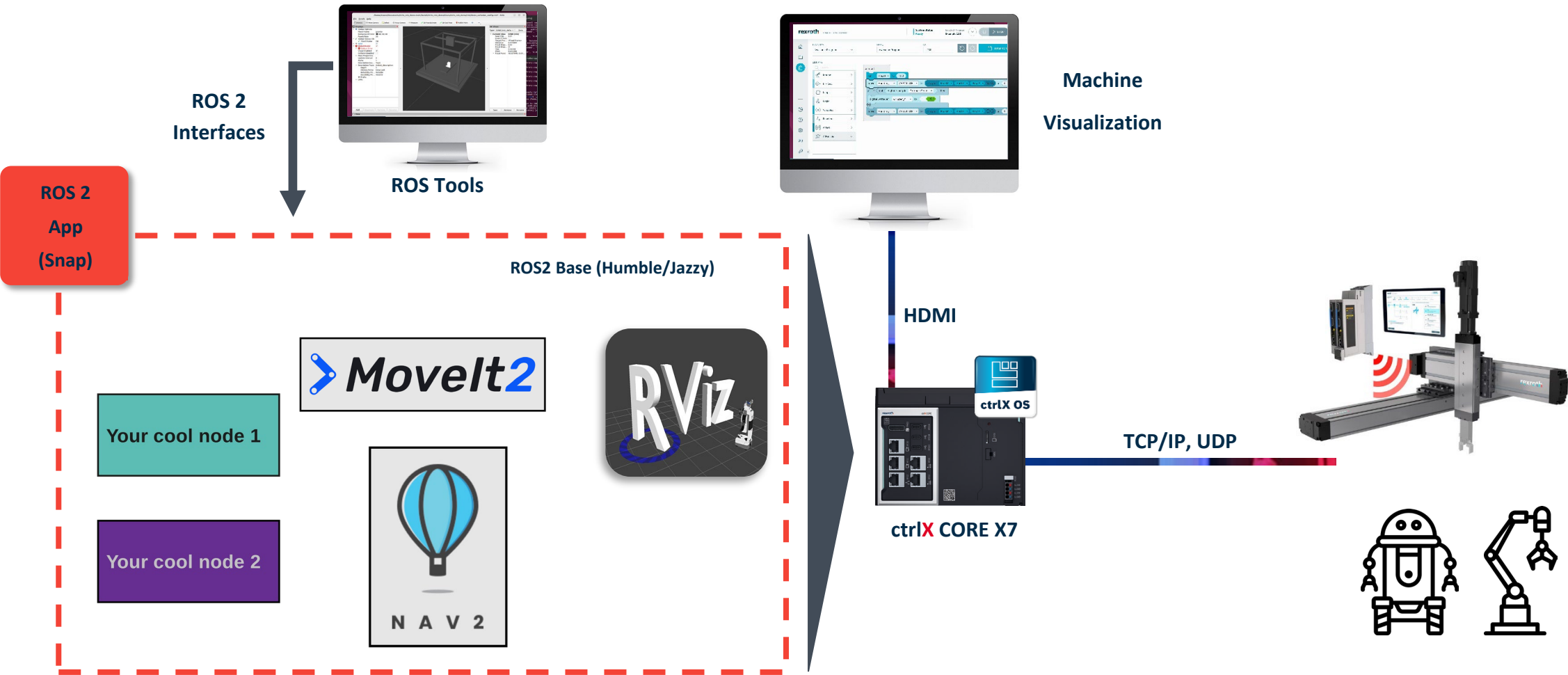
3 Examples

#1: Deploy Your ROS 2 App to an Industrial Control

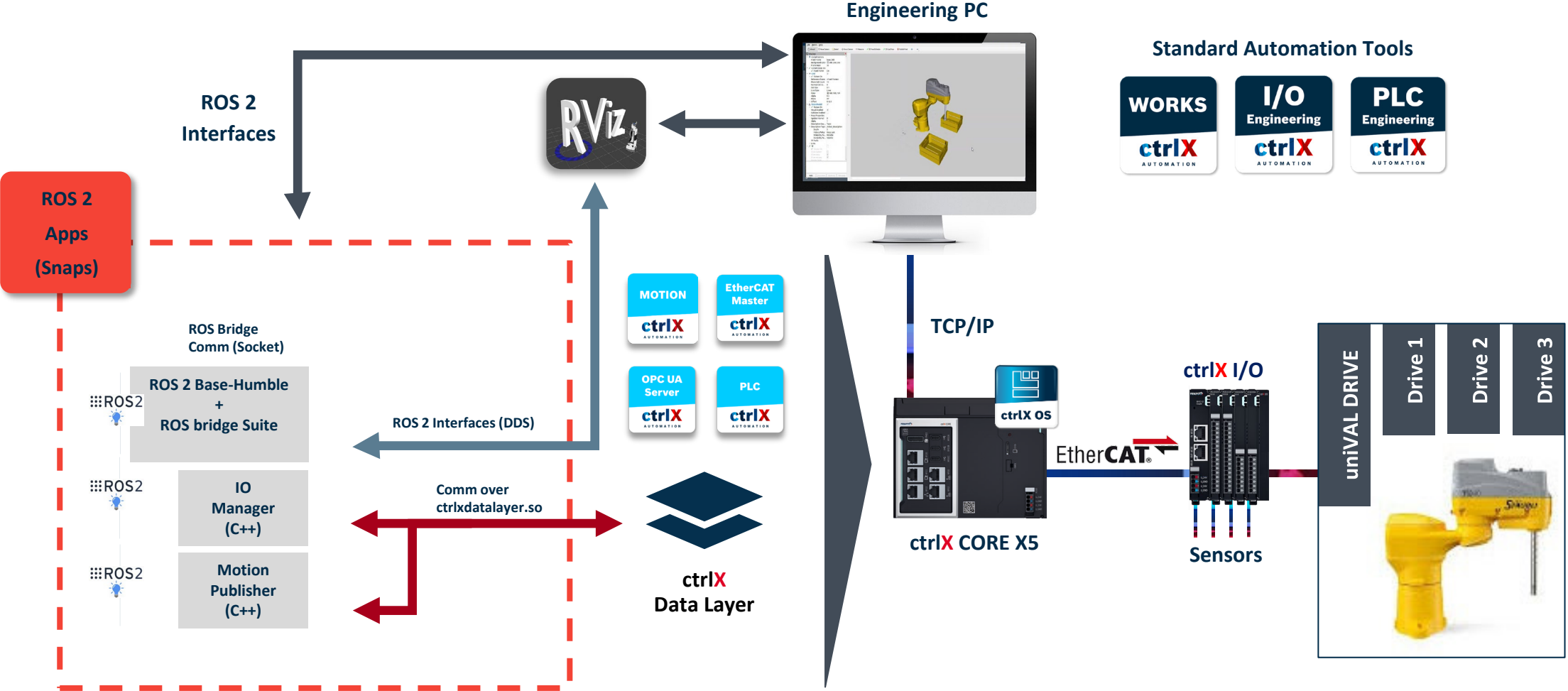
#2: Connect to an Industrial Robot from your ROS 2 App

#3: Control a Kuka Robot in Hard-Realtime using ros2_control

#1: Deploy Your ROS 2 App to an Industrial Control (ctrlX CORE)

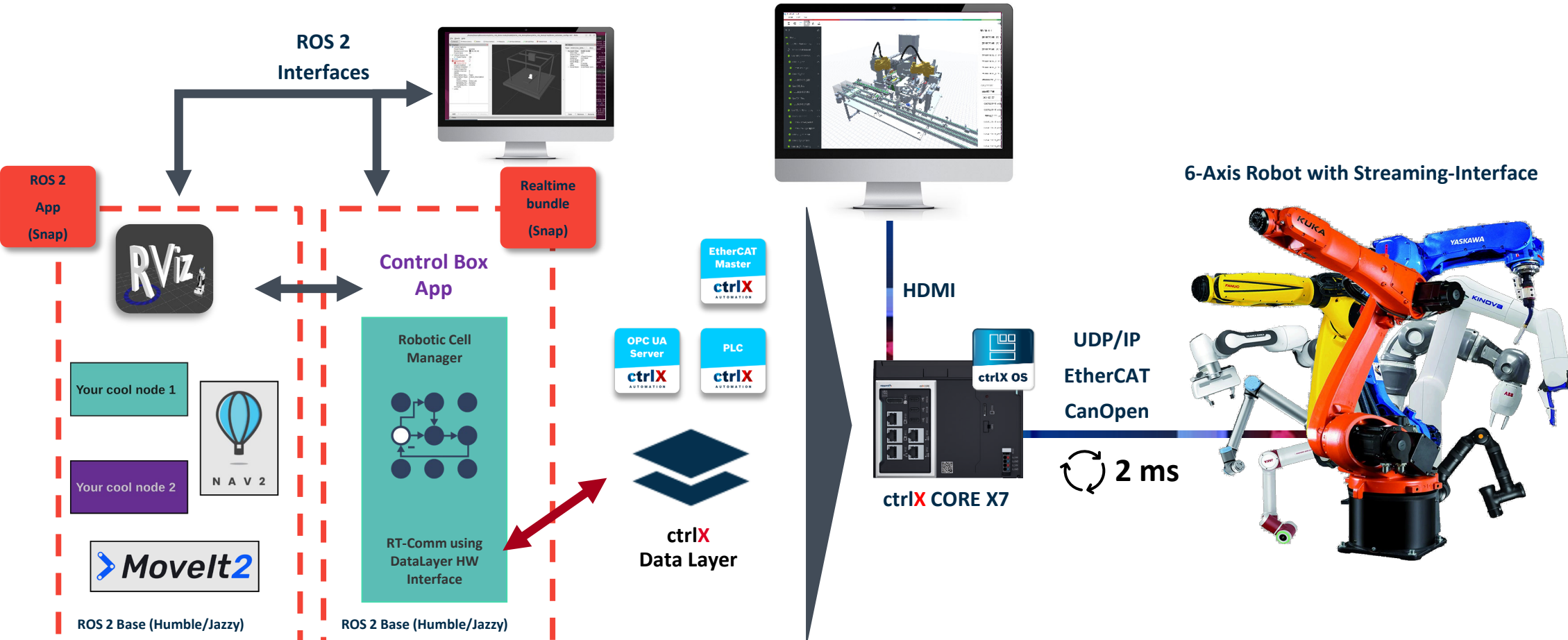


#2: Connect to an Industrial Robot from your ROS 2 App



#3: Control a Kuka Robot in Hard-Realtime

SR Control Box for real-time control with ros2_control



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Conclusion, Outlook and More

- ROS 2 and Industrial Equipment can nicely work together



- Find out more:
 - On github: <https://github.com/boschrexroth>
 - In our Community: <https://developer.community.boschrexroth.com>
 - Here at ROSCon: Booth 11, Canonical
 - Speak with us! 