ROS 1 to ROS 2

Overcoming the Challenges of **Developing and Deploying** a Swarm of AMRs



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The Future of AMR: Swarm Autonomy

A swarm of autonomous mobile robots (AMRs) is able to carry out their jobs with zero to minimal oversight by human operators. Facilities such as schools, hospitals, shopping malls, and factories in particular can use a swarm of AMRs to improve operational efficiency and quality of life. Using Data Distribution Service (DDS) as a backbone, the second-generation Robot Operating System (ROS 2) provides a uniform data exchange environment, like a data river, for AMRs to communicate with each other. Additional equipment that adopts DDS technology can also use the data river to collectively share data.





The Challenges of Developing and Deploying a Swarm of AMRs

Complexity

- No integrated hardware and software system
- No real-time capability
- No dedicated ROS 2 QoS

Scalability

- Low accuracy and high error rate
- High cost of development and deployment
- Need for easy and safe deployment on large scale

Upgradability

- ROS 1 to ROS 2 migration
- Lack of good support
- High cost to upgrade

ADLINK
Value Proposition

Simplified system integration

Enhanced decentralized performance

Quality assurance

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Simplify to Amplify

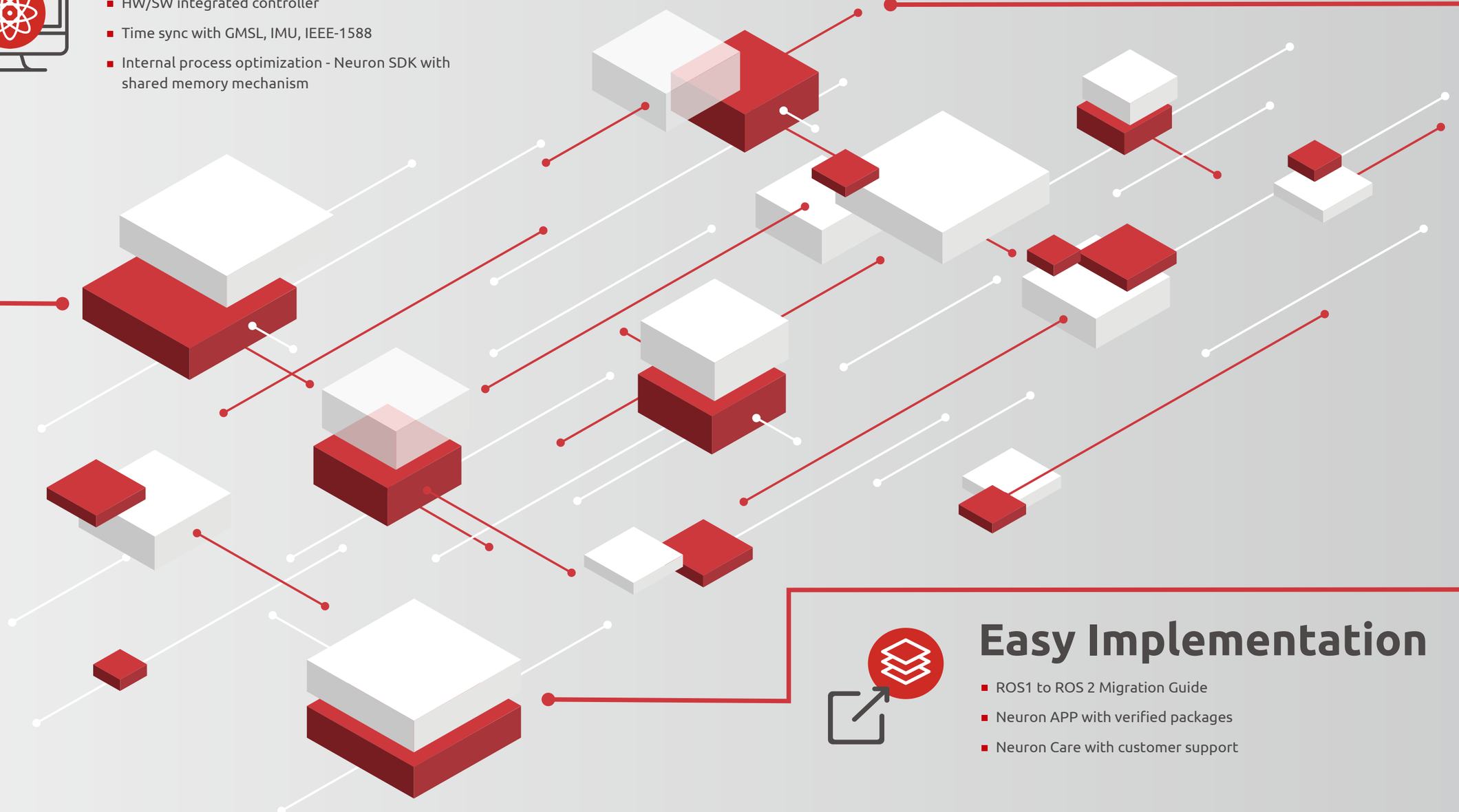
ADLINK ROS 2 Solutions, Optimized for AMR Navigation

Decentralization

- Neuron SDK with optimized DDS performance
- SWARM & fault tolerance: DDS supported
- Redundancy: DDS OWNERSHIP Qos Policy supported

Optimization

- HW/SW integrated controller
- Time sync with GMSL, IMU, IEEE-1588
- Internal process optimization - Neuron SDK with shared memory mechanism



Easy Implementation

- ROS1 to ROS 2 Migration Guide
- Neuron APP with verified packages
- Neuron Care with customer support

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ROS 2 Real-time Controller and Demo Kit

Learn More

AI

PRO

DEV

PoC



ROScube–X

High-performance AI computing for intelligent robot

- High-performance AI computing
- Low energy consumption
- Real-time capability



w/ expansion box



ROScube–I

High-performance CPU computing for AMRs

- Supports complex algorithms
- Diverse I/O
- Real-time capability



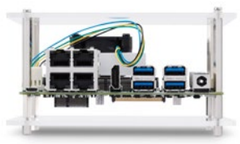
w/ expansion box



ROScube Pico

Module-based kits for rapid development and cost-efficient deployment

- SMARC and Jetson platforms
- Robot development and deployment kit
- Power management capability



Jetson NX/Nano



NeuronBot

Demo Kit for robotics companies and educational institutes

- Integrated vision, control, AI and motion modules
- Designed for rapid prototyping
- Powerful open source ROS libraries



w/ front bracket

ROS 2 / DDS Development Platform

Neuron SDK

Neuron DDS+
Ensures real-time, reliable communications and enhances system performance

Neuron RT
High-performance, low-latency real-time system architecture for specialized applications.

Neuron Booster
ADLINK commercial shared memory mode provides ultra-low latency and high throughput

Neuron IDE
Web-based visualization development interface and package management platform

Neuron APP

Neuron Extension
New extension function for customer use

Third-party Widget
Verified, open-source ROS packages that run on ADLINK ROS controller

Neuron Care

Customer Portal
Web-based user portal that allows customers to ask questions about ROScube and Neuron SDK

Neuron Update
Allows customers to continually update their Neuron SDK

ACRN

Real-time Hypervisor for flexible, reliable and scalable development of AI-based robotic applications

Learn More

Profile 1	Profile 2	Profile 3		
		Service OS	User OS	Real-time OS
ROS 2 on Ubuntu	ROS 2 on Xenomai	ROS 2 on Ubuntu	ROS 2 on Ubuntu	ROS 2 on Xenomai
		ACRN		
ROScube–I	ROScube–I	ROScube–I		



ROS Migration Guide

How to migrate from ROS 1 to ROS 2

- Why migrate from ROS 1 to ROS 2?
- Who should consider migrating to ROS 2?
- Challenges of migrating
- Solutions and recommendations for migrating
- Gazebo ROS migration
- ROS 2 C++ source code migration example

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