

WINDRVR

WIND RIVER TECHNOLOGY FORUM 2023

Accelerating Customer Outcomes from Edge to Cloud

- Wind River product updates

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Wind River



Agenda

1
Bridging Edge to Cloud:
Wind River Product Portfolio

2
Edge Products

3
Cloud Products

4
Services

5
Use Cases

SIMILAR CHALLENGES ACROSS INDUSTRIES

SIMILAR CHALLENGES ACROSS INDUSTRIES



COMPLEXITY

Manage in-house software projects across the enterprise; shortage of skilled software developers



AFFORDABILITY

Manage costs for software development, deployment, and operations while enabling flexibility



MODERNIZATION

Upgrade legacy systems and infrastructure; implement a secure and efficient DevSecOps pipeline



SAFETY & SECURITY

Meet existing safety and security regulations; update for new and emerging regulatory requirements

Wind River Portfolio

CLOUD-NATIVE MIDDLEWARE AND END-TO-END DEVOPS PLATFORM TO ENABLE SOFTWARE-DEFINED FUTURE

EDGE SOFTWARE



VxWorks RTOS



Wind River Helix
Virtualization Platform



Wind River Linux

Edge

DEVELOPER



Wind River Studio
Gallery



Wind River Studio
Pipeline Manager



Wind River Studio Test
Automation Framework



System Simulation

Studio

OPERATOR



Wind River Studio Cloud
Platform



Wind River Studio
Conductor



Wind River Studio
Digital Feedback Loop



Wind River Studio
Analytics

SERVICES



Custom
Development



Managed
Services



Safety and
Certification



Lifecycle
Management



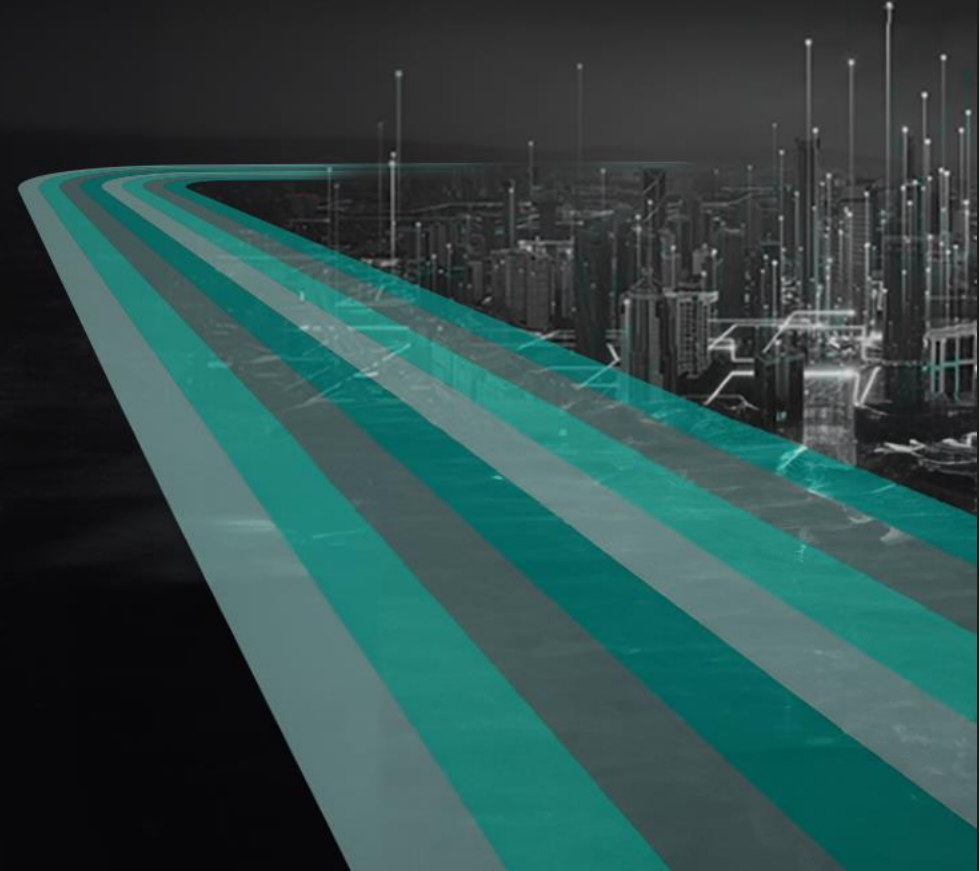
Education



Customer
Support

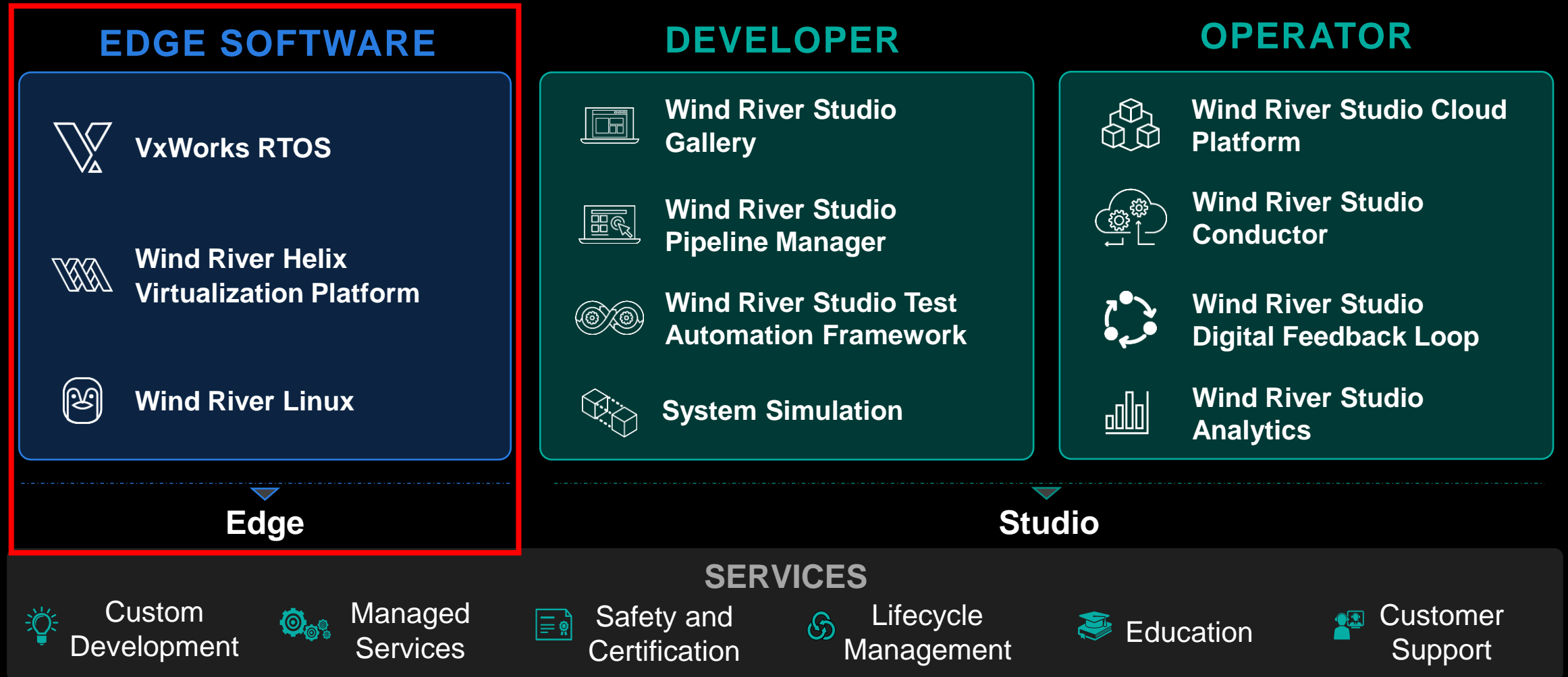


EDGE PRODUCTS



Wind River Portfolio

CLOUD-NATIVE MIDDLEWARE AND END-TO-END DEVOPS PLATFORM TO ENABLE SOFTWARE-DEFINED FUTURE



MISSION-CRITICAL SOFTWARE ON THE EDGE

MISSION-CRITICAL APPLICATIONS REQUIRE RELIABLE, SECURE, AND DETERMINISTIC SOLUTIONS

THE WIND RIVER EDGE SOFTWARE PORTFOLIO HAS SIGNIFICANT ADVANTAGES IN MISSION-CRITICAL APPLICATIONS

EDGE SOFTWARE



Edge

IMPORTANCE

A real-time operating system has two key features: predictability and determinism.

Virtualization enables software-defined architectures to support consolidation of multiple applications.

An open source OS can manage and maintain code base over the entire software lifecycle for non-safety-critical applications.

ADVANTAGES

An RTOS is small, fast, responsive, and deterministic.

Flexible virtualization platforms support open standards-based software-defined architectures to meet safety certification requirements.

Enables the development, deployment, and operation of embedded solutions that are robust, reliable, and secure.

VXWORKS INVESTMENTS

- **New features:**
 - Deterministic build support
 - RISC-V architecture support
 - Python NumPy
- **Performance improvements:**
 - TSN 802.1Qbu and expanded hardware: Intel, NXP, and Renesas
- **Safety and security improvements:**
 - 802.1X support
 - Address year 2038 problem

2020

- **New features:**
 - Containers (OCI compliant)
 - Microsoft Azure IoT embedded SDK
 - AI/ML frameworks: Python 3.9 Pandas, TensorFlow Lite
 - LLVM/Clang 12.0.0 upgrade
- **Performance improvements:**
 - OS kernel performance improvement
 - OPC-UA open62541 over VxWorks TSN
- **Safety and security improvements:**
 - Kernel address sanitizer (KASAN)
 - Stack-smashing protection

2021

- **New features:**
 - Cloud AWS IoT Device SDK,
 - AWS Graviton2 EC2 support
 - OCI container enhancements
 - AI/ML Python and TensorFlow Lite upgrade
 - Harmonized LLVM/Clang 13.0.1 for all processor architecture support
 - New hardware enablement (NXP, TI, Xilinx, TI, Intel, and SiFive)
 - U.S. DoD Iron Bank–approved builder
- **Performance improvements:**
 - Gigabit network throughput improvement
 - TSN hardware enablement
 - OPC-UA open62541 version 1.3.1
- **Safety and security improvements:**
 - OpenSSL 3.0.5
 - SBOM Add-on

2022

- **New features:**
 - OCI container signing support
 - VxWorks K8 orchestration
 - AUTOSAR integration and MCAL layer
 - LLVM 16 upgrade
 - C++ Boost library upgrade
 - AI/ML digital feedback loop
- **Performance improvements**
 - File system updates
 - TSN profile, config, and advancements
 - OPC-UA enhancements
- **Safety and security improvements:**
 - DO-178C DAL-A Cert (Armv8 & Intel 64)
 - ISO 26262 ASIL-D certification
 - OpenSSL 3.1 upgrade and FIPS module
 - SBOM enhancements

Current Investments

WIND RIVER LINUX INVESTMENTS

Yocto Project 3.0 (Zeus)

- Kernel: 5.2
- Toolchain: 9.2

Technology updates

- OSTree support (basic)

Hardware support

- Intel Comet Lake-S
- Marvel OCTEON TX3
- AMD Snowy Owl

2020

Yocto Project 3.3 (Hardknott)

- Kernel: 5.10 LTS
- Toolchain: 10.2

Technology updates

- Linux Assembly Tool
- TensorFlow, OpenVINO
- Pre-built binary distribution
- RISC-V architecture (qemuriscv)

Hardware support

- Intel Elkhart Lake/Tiger Lake
- NXP S32G EVB/RDB2
- TI Jacinto 7 (TDA4x/DRA829)

2021

Yocto Project 4.0 LTS (Kirkstone)

- Kernel: 5.15 LTS
- Toolchain: 11.3
- Glibc: 2.35

Technology updates

- Rust 1.59
- nftables replace iptables
- Qt6 toolkit
- Kernel improvements and enhancements
- Security fixes and recipe upgrades
- Wind River Linux Distro

Hardware Support

- Intel Snow Ridge / Grand Ridge
- Intel Agilex-F
- NXP i.MX8 QuadMax

2022

Yocto Project 4.2 (Mickledore)

- Kernel: 6.1 LTS for Wind River Linux LTS 23
- Yearly release cycle for Wind River Linux LTS

Technology updates

- OpenSCAP and Security Guide
- SBOM product
- Signed containers
- AUTOSAR Adaptive enablement
- Kernel improvements and enhancements
- Security fixes and recipe upgrades
- Wind River Linux Distro

Hardware support

- Intel Grand Ridge
- Intel Cascade Lake
- Intel Coffee Lake
- TI TDA4VH
- Xilinx Versal

Current Investments

HELIX VIRTUALIZATION PLATFORM INVESTMENTS

■ New features:

- Direct interrupt support
- Prebuilt VSBs
- Introduced safe IPC layer for Wind River Linux
- New system viewer and system debugger

2020

■ New features:

- FACE 3.1
- Support for multiple guests
- New hardware enablement (NXP)
- RTNET preview
- Updated guest support

■ Performance improvements:

- Updated LLVM compiler

■ Safety and security improvements:

- ARINC 653 Part 1, Supplement 5
- ARINC 653 Part 2, Supplement 4
- Ongoing DO-178C certification efforts

2021

■ New features:

- Intel development platform (Tiger Lake, Ice Lake)
- Initial VirtIO support
- New hardware enablement (Aptiv, Xilinx, NXP)
- Updated guest support

■ Performance improvements:

- Updated LLVM compiler
- Moved handling of emulated devices out of hypervisor and into host tools

■ Safety and security improvements:

- Development to follow Wind River secure development lifecycle
- Ongoing DO-178C certification efforts

2022

■ New features:

- FACE 3.1 conformance
- Updated Wind River Linux LTS guest support
- VirtIO support
- Watchdogs support
- Multi VNETs/VNICs support
- Visual configuration
- System/multi-guest analysis

■ Performance improvements:

- Boot profiling analysis and performance optimization
- Continuous enhancements for Intel 64 support

■ Safety and security improvements:

- DO-178C DAL-A Cert (Armv8 & Intel 64)
- ISO26262 ASIL-D certification

Current Investments

CLOUD PRODUCTS

Wind River Portfolio

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SERVICES


 Custom
Development

 Managed
Services

 Safety and
Certification

 Lifecycle
Management

 Education

 Customer
Support

WIND RIVER STUDIO & WIND RIVER EDGE

THE INDUSTRY'S FIRST END-TO-END CLOUD-NATIVE SOLUTION,
ENABLING SOFTWARE-DEFINED DEVICES AT REDUCED COST



LIFECYCLE MANAGEMENT VIA A SINGLE PANE OF GLASS

- ✓ Flexible and automated development platform promotes collaboration among teams and **speeds up development.**
- ✓ Wind River Edge enables containerization, **reducing interdependencies** and **improving upgradability.**
- ✓ Detecting anomalies early with full visibility into software performance **reduces defects.**
- ✓ Data is leveraged to improve **feature quality** and performance in subsequent iterations.

WIND RIVER STUDIO AS A DEVSECOPS SOLUTION

STUDIO DEVELOPER REDUCES COMPLEXITY AND COST DURING APPLICATION DEVELOPMENT

DEVELOPER



Wind River Studio
Gallery



Wind River Studio
Pipeline Manager

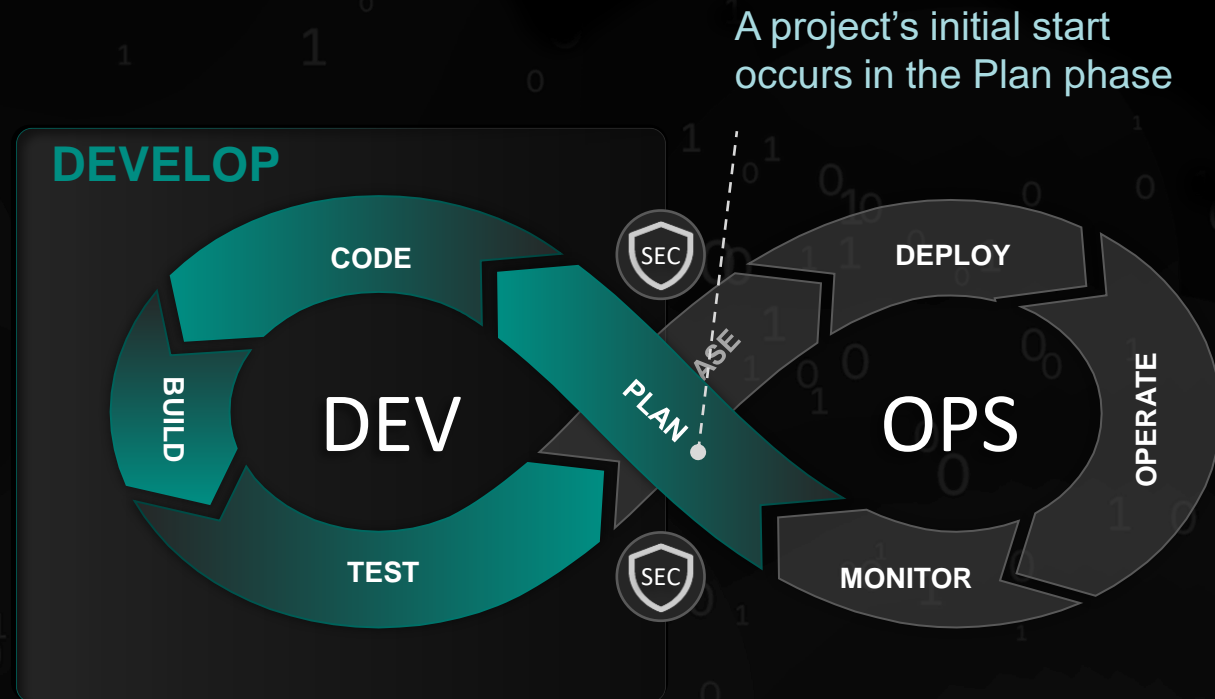


Wind River Studio Test
Automation Framework



System Simulation

STUDIO



WIND RIVER STUDIO AS A DEVSECOPS SOLUTION

STUDIO OPERATOR MANAGES AND AUTOMATES APPLICATION DEPLOYMENT IN A LARGE-SCALE DISTRIBUTED ENVIRONMENT

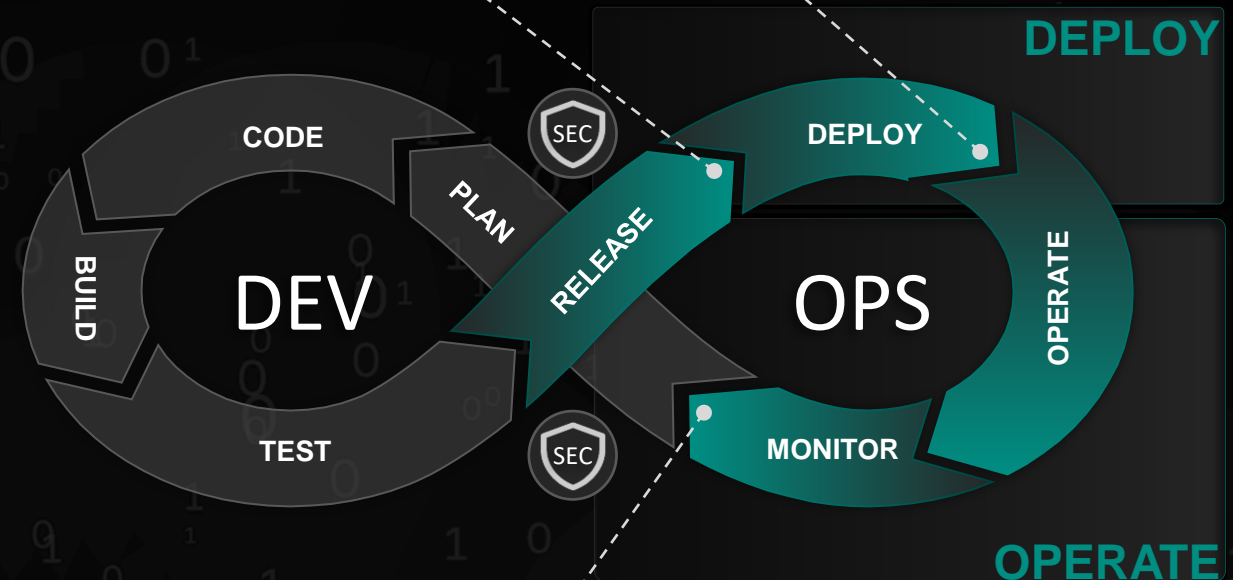
OPERATOR

-  Wind River Studio Cloud Platform
-  Wind River Studio Conductor
-  Wind River Studio Digital Feedback Loop
-  Wind River Studio Analytics

STUDIO

A released software artifact is handed to the deploy capabilities

An initial running system / product / device is handed to the operate capabilities



The loop closes to enable digital twin, product updates, and security changes to reenter the development cycle

SERVICES

WIND RIVER PRODUCTS AND PROFESSIONAL SERVICES HELP SOLVE THESE CHALLENGES

New Delivery Mandates

Skills Gaps

Budget Squeeze

Aggressive Program Schedules

Longer Deployment Lifecycles

Supply Chain Issues

More Safety Requirements

Maximizing of Investments

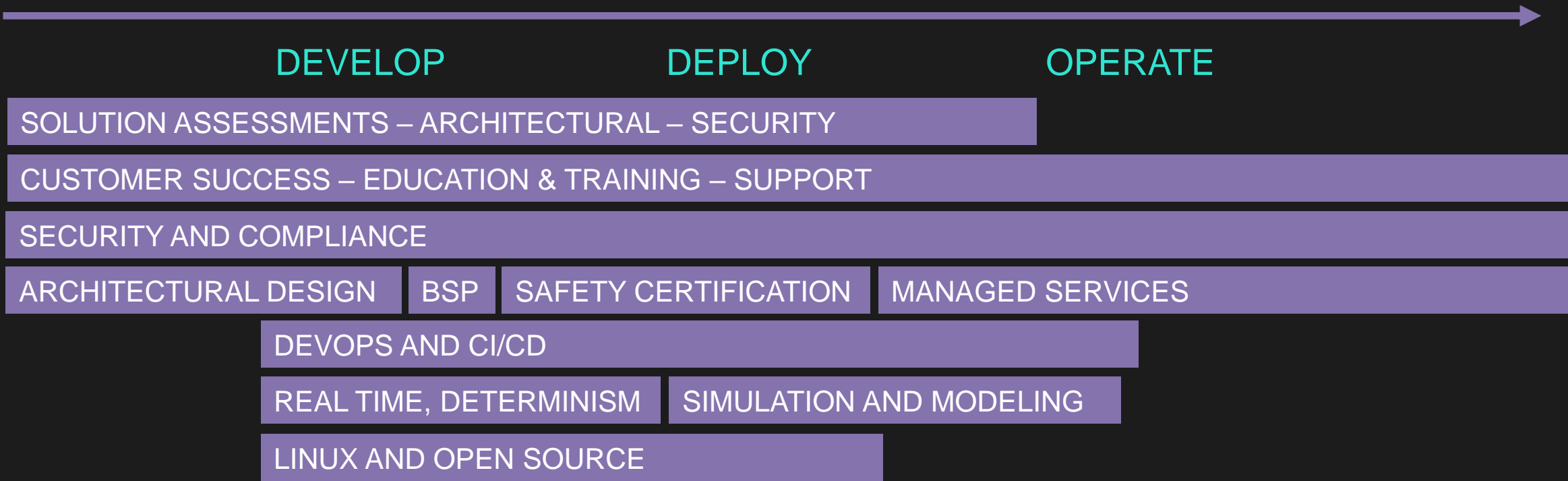
Growing Complexity

Technology Shifts

Utilization of Digital Twins

Increase in Security Threats

FULL LIFECYCLE SERVICES ACROSS THE PORTFOLIO



VxWorks



Helix Platform



Wind River Linux



**Wind River Studio
Developer**



**Wind River Studio
Operator**



Simics

UNPARALLELED OUTCOMES

280+
PROJECTS
A YEAR

3X FASTER PROJECT
DELIVERY WITH
ACCELERATED
TIME-TO-VALUE



**50% FASTER PATH TO
SAFETY, SECURITY, AND
COMPLIANCE
REQUIREMENTS**



**MORE THAN 600 SUCCESSFUL
CERTIFIED PROJECTS IN AVIATION,
AUTOMOTIVE, INDUSTRIAL CONTROLS,
MEDICAL, TRANSPORTATION**

#1 DELIVERY
OF VXWORKS
AND LINUX
BSPS

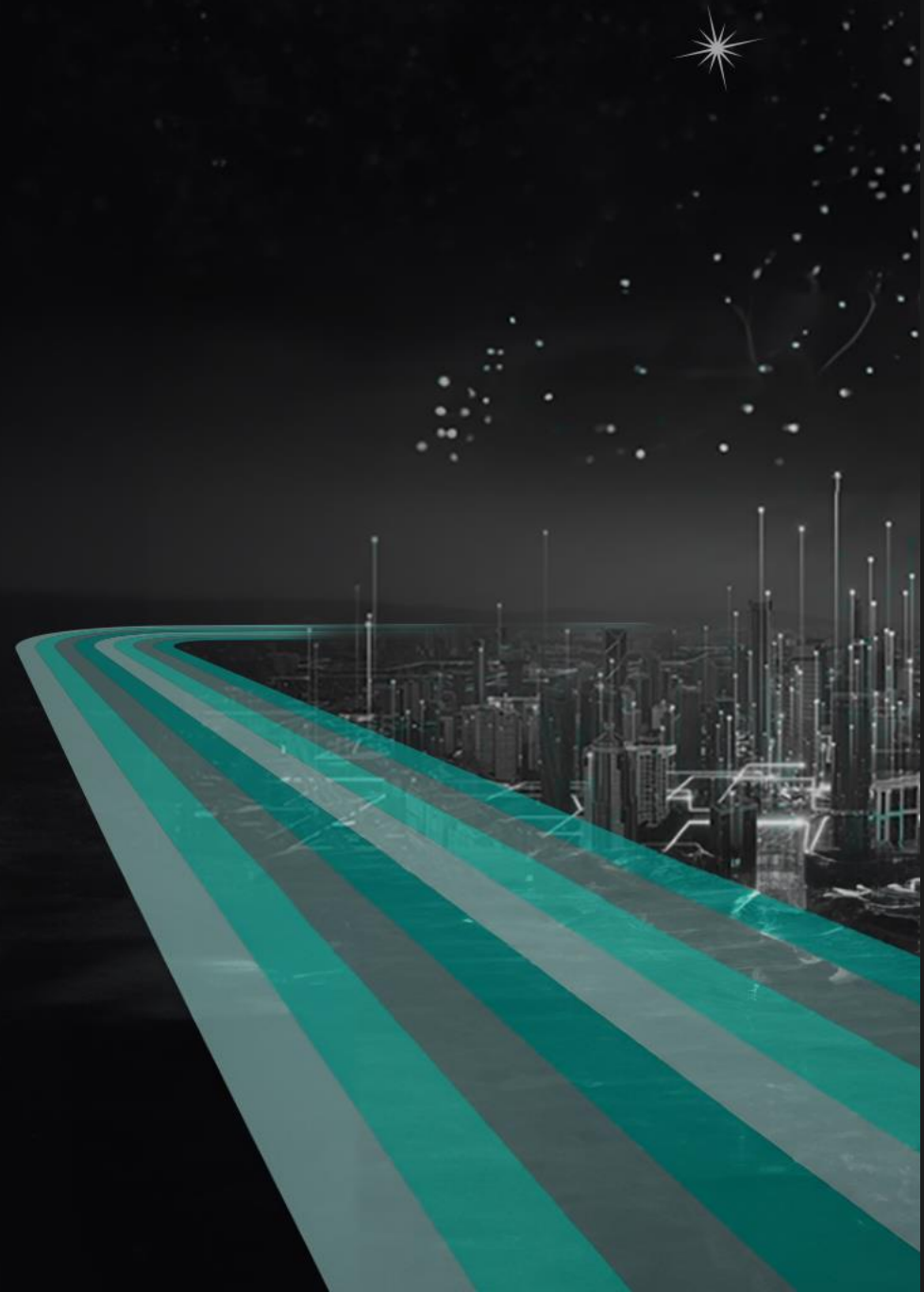
**THOUSANDS OF
SUCCESSFUL PROJECTS**



**99% PROJECT
ACCEPTANCE RATE**



USE CASES



/ INDUSTRIAL

ROCKWELL AUTOMATION INDUSTRIAL POWER SYSTEM

/ CHALLENGE:

Lack of resources to deliver new version of product with virtualization and safety certification

/ SOLUTION:

Helix Platform with VxWorks and Wind River Linux

Safety certification services

/ RESULT:

Ability to accelerate software development cycle, high reuse of existing software, and fast migration to new hardware



/ A&D

AIRBUS AIR-TO-AIR REFUELING SYSTEM

/ CHALLENGE:

High software testing costs
and short time-to-market

/ SOLUTION:

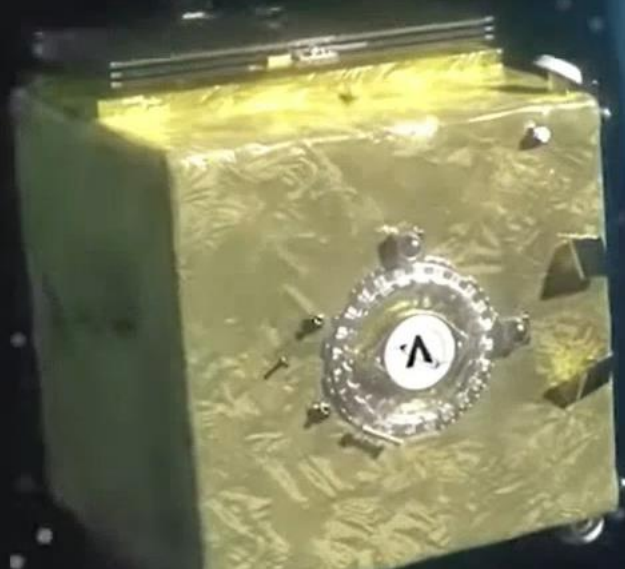
VxWorks with DO-178C
DAL A certification evidence

Wind River system
simulation tools

/ RESULT:

Automation
eliminates
risk of delays

Release schedule is
more predictable



/ A&D

ASTROSCALE SUSTAINABLE SPACE SYSTEM

/ **CHALLENGE:**

Capture and safely dispose of space debris and multiple retired satellites

/ **SOLUTION:**

VxWorks 7

/ **RESULT:**

High precision robotics and maneuvering in space

/ AUTOMOTIVE

GLOBAL TIER 1 AUTO PROVIDER BUILDING AN L2/L3 ADAS PLATFORM

/ CHALLENGE:

Complexity of new ADAS system and new hardware, and a short timeline

/ SOLUTION:

VxWorks 7 for TI TDA4 SoC
Strong local support and safety certification experience

/ RESULT:

Increased efficiency reduces time-to-market and overall software costs

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