LYNX

Lynx Certifiable Compute Portfolio on Intel® Architecture

Mixed-Criticality CPU and GPU Platforms

Executive Overview

Modern aerospace and defense systems demand a difficult balance: high performance compute, advanced graphics, AI acceleration, system consolidation, all while maintaining rigorous safety standards without increasing certification risks. Lynx delivers a complete Intel platform solution for safety- and mission-critical systems by combining:

- **LYNX MOSA.ic™:** DO-178C DAL A certifiable multicore runtime
- **LynxSecure™:** A type 1 separation kernel hypervisor providing the foundation for isolation
- **LynxOS-178® & LynxElement™:** High-assurance operating environments
- **CoreSuite™ 2.0:** A certifiable GPU graphics and compute stack
- **Screened Intel SoCs:** Extended temperature support and Dynamic Temperature Range (DTR)
- **Engineered for Reliability:** Long lifecycle, supply assurance, and engineering services

By pairing Intel's industry-leading performance with Lynx's safety expertise, we deliver a fully integrated, certifiable CPU + GPU compute platform. This unified solution empowers avionics and mission systems with high-speed processing and a streamlined path to certification, ensuring end-to-end assurance from the initial design through long-term deployment.

What Lynx Enables on Intel®

- Mixed-criticality consolidation on multicore CPUs
- DO-178C DAL A deployments
- Multicore interference mitigation
- Safety-critical graphics (OpenGL SC 1/2, Vulkan SC)
- Deterministic GPU compute (AI, BLAS, FFT, NN primitives)
- Controlled I/O and DMA behavior
- Secure partitioning of heterogeneous workloads
- Long lifecycle BSP and platform sustainment

LynxSecure

LynxSecure is a separation kernel type 1 hypervisor that provides robust isolation for mixed-criticality workloads.

Features

- Hardware-assisted virtualization (VT-x)
- DMA isolation (VT-d)
- SR-IOV device partitioning
- Strong time and space separation
- Reduced Trusted Computing Base (TCB)
- VirtIO support

Supported Guest Operating Environments

- LynxOS-178® (DO-178C certifiable RTOS)
- LynxElement® (unikernel-based runtime)
- Linux® (mission / non-safety partitions)
- Third-party RTOS support (e.g., Zephyr®, commercial RTOS)

Making Multicore Intel Practical for Certification

While Intel multicore processors offer significant performance, shared resources introduce interference and determinism challenges for certification. Lynx addresses this with a separation kernel type 1 hypervisor architecture and hardware-backed control mechanisms.

Hardware-Assisted Isolation

LynxSecure leverages Intel technologies including:

- VT-x for efficient virtualization
- Nested CPU Control (Ring -1)
- VT-d for DMA remapping and device isolation
- SR-IOV for safe, high-performance device partitioning

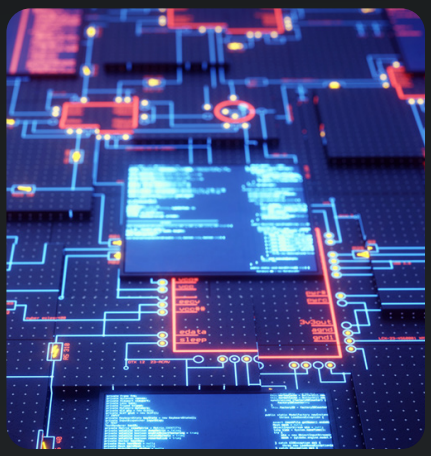
Benefits

- Clear separation between safety-critical and mission workloads
- Controlled access to shared devices
- Reduced reliance on complex software-only mitigation
- Smaller and more defensible certification boundary
- Enables rapid technology insertion and software reuse by isolating hardware-specific dependencies within partitioned environments

LYNX MOSA.ic: The Framework for Modular Integration

LYNX MOSA.ic is the integration framework that realizes the Modular Open Systems Approach (MOSA) on Intel architecture. Rather than relying on a traditional, massive RTOS to manage all system resources, MOSA.ic allows architects to decompose the system into independent “rooms” or partitions.

- **Distributed Architecture:** Decentralizes resource management, allowing each partition (Unikernel, RTOS, Bare Metal, or Linux) to manage its own resources
- **Complexity Reduction:** By isolating applications into smaller, independent stacks, it significantly reduces the lines of code that must be analyzed for DAL A certification
- **Seamless Integration:** Acting as an “Integration Center” (.ic), it provides the tools and build environments to unify LynxSecure, LynxElement, LynxOS-178, and third-party guests into a single boot



LYNX

Cache and Shared Resource Control

LynxSecure utilizes Intel Resource Director Technology (RDT) and Cache Allocation Technology (CAT) to:

- Allocate defined LLC regions to workloads
- Reduce cache contention
- Improve execution predictability
- Strengthen Worst-Case Execution Time (WCET) analysis evidence

These capabilities are critical for multicore avionics certification strategies.

I/O Determinism and Device Management

Intel virtualization features allow Lynx to:

- Preserve isolation during high-performance networking
- Safely share devices across partitions
- Control DMA behavior
- Manage interrupt routing predictably

This reduces integration complexity while supporting certification objectives.

CoreSuite on Intel GPUs

Extending Certification into Graphics and Compute

CoreSuite extends LYNX MOSA.ic's modular principles to the GPU domain, enabling safety-critical graphics and compute alongside other system subjects under deterministic execution models. This is crucial for cockpit displays, sensor fusion, AI, and video pipelines.

Supported Graphics and Compute Capabilities

- **Graphics APIs:** OpenGL® SC 1.0, SC 2.0, and Vulkan SC.
- **Video:** Encode and Decode for H.264/H.265; Video I/O integration.
- **GPU Compute:** BLAS & FFT, neural network primitives, deterministic execution frameworks.

RTOS Ecosystem Support

Although CoreSuite products are by default optimized for MOSA.ic, its Operating System Abstraction Layer (OSAL) enables integrations with third-party operating environments which include:

- Linux
- VxWorks® HVP (Helix Virtual Platform)
- Deos™
- Integrity-178®

This flexibility allows integration into existing program architectures while maintaining certification resilience.

Platform Enablement and BSP Engineering Services

Accelerating Intel-Based Deployments

Lynx provides comprehensive platform enablement services to accelerate adoption of Intel architectures in aerospace and defense systems.

Safety-Aligned BSP Strategies

For programs requiring certification, Lynx supports safety-aligned BSP approaches consistent with DO-178 objectives. Lynx collaborates closely with customers, silicon vendors and hardware partners to ensure platform software:

- Aligns with certification plans and controls certification scope
- Supports deterministic system behavior and minimizes integration risk

These deployments demonstrate architectural maturity, repeatability, and reduced risk for avionics programs.

Inventory Assurance Services and Long-Term Supply

In addition to software enablement, Lynx provides Intel processor lifecycle and supply-chain risk mitigation services.

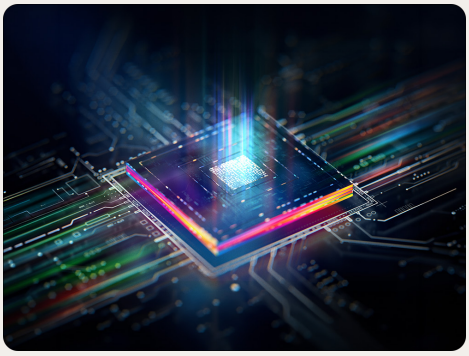
For select platforms, including Intel Tiger Lake, Lynx offers:

- DTR (Dynamic Temperature Range) screened SoCs
- Production yield optimization support
- Inventory management
- Climate-controlled warehouse storage
- Long-term availability programs

Benefits to programs:

- Reduced production variability
- Improved manufacturing yield
- Extended lifecycle continuity
- Mitigated obsolescence risk
- Secure storage of sensitive inventory

By combining certifiable software architecture with hardware lifecycle assurance, Lynx reduces both technical and supply-chain risk for mission-critical deployments.



Intel Hardware Ecosystem Support

Lynx has extensive experience with Intel platforms (Skylake 6th gen, Apollo Lake, Bay Trail Atom E3800). Current active development for MOSA.ic and CoreSuite includes Intel Tiger Lake (with certification) and Intel Raptor Lake.

Our solutions are actively deployed across a broad ecosystem of ruggedized Intel-based aerospace and defense platforms.

- Curtiss-Wright® Defense Solutions (VPX and rugged mission computers)
- Mercury Systems® (secure processing subsystems and avionics platforms)
- Congatec® (OpenVPX and embedded Intel platforms)
- Supermicro® (development, integration, and lab reference platforms)

We work closely with hardware partners to enable Intel silicon features for deterministic operation, develop and maintain platform-specific BSPs, align multicore mitigation strategies, and support certification-aligned integration, including DO-254 system level board solutions.

Ready to Revolutionalize Your Mission-Critical Systems?

Lynx enables confident adoption of Intel multicore CPU and GPU technologies for safety- and mission-critical systems. To learn how Lynx can accelerate your Intel platform deployment, contact us:

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