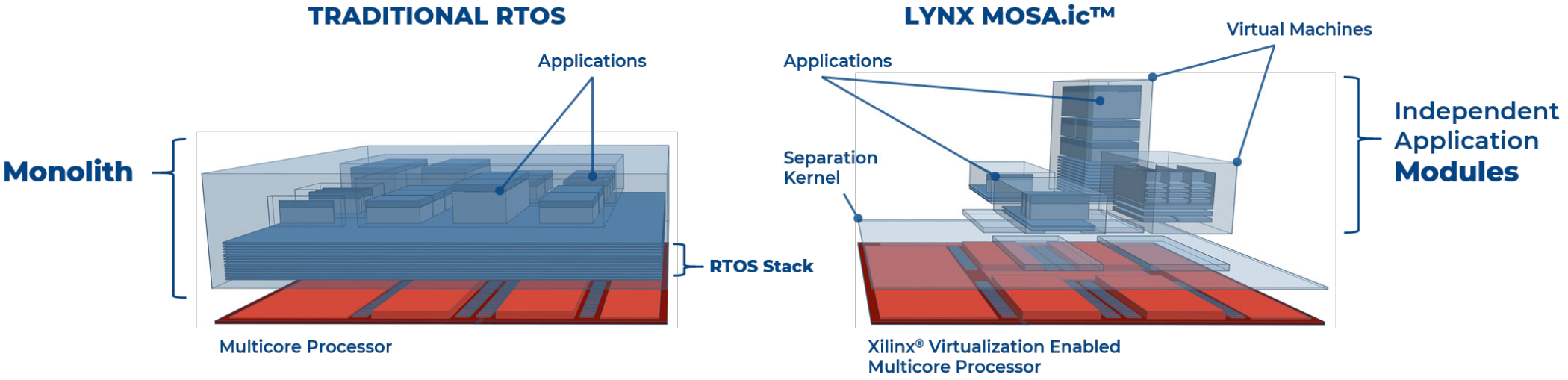
LYNX MOSA.ic™ for AVIONICS

ADVANTAGE WITH XILINX® PROCESSORS

LYNX MOSA.ic™ for Avionics supports Xilinx UltraScale+ MPSoC processors to simplify software stack complexity, unlock rapid development and integration options, and enable complex, heterogeneous and powerful solution architectures to greatly reduce the technical risk and certification costs for future safety and performance-critical programs. The technology champions open standards and modular composability to pass forward the cost savings benefits of open proprietary software component.

ACCELERATE SAFETY-CRITICAL DEVELOPMENT AND CERTIFICATION CYCLES

In a traditional platform (left side of diagram below), hardware resources are owned by the real-time operating system (RTOS), which controls CPU cores, memory, and peripherals. This software is a monolithic block of code that manages task scheduling, memory partitioning, and device I/O, all of which must be safety certified to the same level and bug-free to be secure. LYNX MOSA.ic (right) is based on the LynxSecure® separation kernel, which configures on hardware virtualization, MMU, SMMU and other key technology to manage discrete, immutable partition isolation. The result are efficient, tamper-proof, and non-bypassable virtual machines (VMs). Hardware resources are robustly partitioned into VMs populated with a mix of OSes, RTOSes, and bare-metal applications. This partitioning allows systems to be built consisting of multiple safety levels, minimizing high design assurance levels (DALs).



HARNESS THE POWER OF VIRTUALIZATION W/ XILINX AND LYNX

FAA and EASA avionics certification authorities require all avionic software to comply with RTCA DO-178C development and CAST-32A multicore certification guidelines. Supporting modern avionic software requirements is incredibly costly; testing alone for DO-178C compliance can cost RTOS vendors tens of millions of dollars for a modest set of features to meet DAL C or higher. Multicore integrity and timing analysis for airworthiness certification adds additional program costs and technical risk of comparable magnitude. Lynx is serving major new avionics programs to set new standards in compute capacity and high availability platform design for autonomous flight control. These programs have aided Lynx in achieving DO-178C DAL A quality standards for LYNX MOSA.ic products across a range of target platforms.

ACHIEVE DO-178C DAL A CERTIFICATION FASTER

LYNX MOSA.ic for Avionics takes advantage of virtualization technology to define VMs by efficiently mapping memory, peripherals, interrupts, and DMA to processor cores. This deep level of virtualization defines a truly independent compute platform and minimizes software stack complexity, while separation maximizes software security. The platform has achieved DO-178C DAL A quality standards, while its compartmentalized framework enables customers to reuse existing certifications for the DO-178C OS (via AC 20-148), with only new software modules needing to be certified. This cuts development costs and reduces time to deployment.

SIMPLIFY SW DESIGN W/ BEST-IN-CLASS VIRTUALIZATION & TOOLS

LYNX MOSA.ic architecture revolutionizes traditional monolithic software resource management and I/O multiplexing by:

- Defining allocation of processor cores before run-time services are loaded
- Assigning hardware privileges and rights for specific system functionality to any guest operating system (OS)
- Precluding software components from modifying system partitioning or interfering in the operations of other software components
- Eliminating the requirement for a master / root / helper OS

LYNX MOSA.ic software development tool suite includes:

- Model-driven architecture design tools to guide the definition of architectural spatial and timing boundaries of system behavior
- Intuitive user model for controlling low-level hardware partitioning, such as cache partitioning and attributes, memory and I/O mapping, and interrupt signaling
- Traceability from system-level specification to low-level hardware allocations, facilitating integrity hazard analysis and worst-case execution timing (WCET) analysis

KEY BENEFITS

- Unleash the flexibility of Xilinx UltraScale+ MPSoC family with a fully featured, safety-certifiable platform
- Reduce NRE costs by rapidly porting legacy code to an open standard RTOS
- Reduce system complexity by decomposing monoliths into highly modularized architectures
- Improve real-time performance predictability through low-level hardware control
- Mitigate security vulnerabilities through small footprint (<50 KB) trusted code-base
- Certify fewer source lines of code (SLOC) by partitioning functionality across multiple critical safety levels
- Zynq UltraScale, RFSoC and MPSoC dual CG, EG, and EV device families and RFSoC supported
- Lynx software complements Xilinx hardware's ISO 26262 ASIL C and IEC 61508 safety certifications

CERTIFICATION

- FAA AC 20-148 Reusable Software Component (RSC) certified RTOS
- DO-178C DAL A RTOS and network stack quality artifacts

FEATURES

- RTOS open standards API support
  - POSIX, FACE, ARINC 653
- DO-178C DAL A IPv6 network stack
- DO-178C DAL A filesystem
- Arm v8A support
- Performance monitor unit support
- Legacy application integration
- Model-based system design
- GDB debugger
- RTOS real-time profiling
- Embedded Linux™ app. development tools
- Bare-metal application development tools