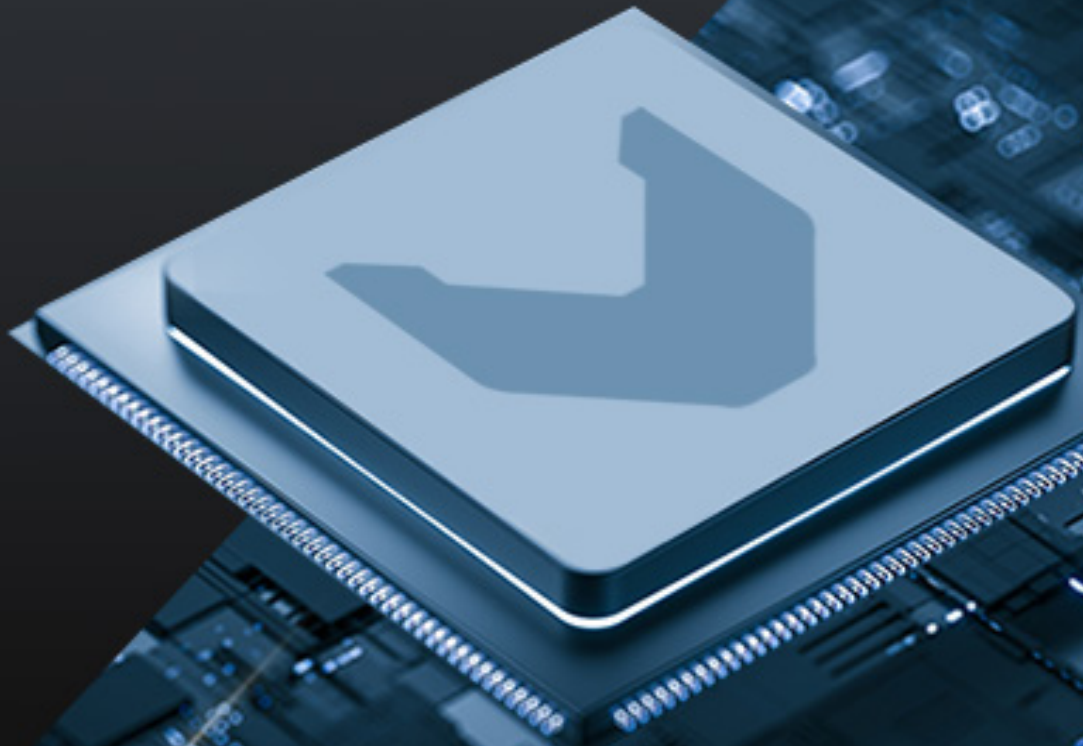




Unmatched Visibility and Faster Debugging for Mission-Critical Systems with LYNX MOSA.ic.Spyker-TZ™

Reduce debugging time by 40% and certification efforts by 30%, while eliminating key bottlenecks in real-time systems.¹ Early detection helps prevent cost overruns, as late-stage debugging can increase costs by up to 100x.²



Faster Debugging, Smarter Optimization, Greater Confidence

In safety-critical and real-time applications like those in Aviation & Defense (A&D), timing-related bugs aren't just technical setbacks—they are cost multipliers. As a developer, you know that 20–30% of debugging efforts are spent resolving timing-related issues, and when these problems are discovered late—especially during integration testing—development costs can increase by 100x.³ We know you need solutions that eliminate these bottlenecks early, before they escalate into certification delays, project overruns, and increased risk to mission success.

The key to preventing these issues is early detection and resolution. With LYNX MOSA.ic.Spyker-TZ™, you gain deep, real-time visibility into system behavior, empowering your team to:

Accelerate Debugging - Reduce debugging time by up to 40%, resolving issues faster and keeping projects on schedule.

Streamline Certification - Decrease certification efforts by up to 30%, eliminating late-stage compliance bottlenecks.

Enhance System Optimization - Gain real-time insights into CPU load, event logs, and timing dependencies to fine-tune system performance. full suite of certification evidence required to meet the following standards:

- DO-178C, up to Design Assurance Level A
- JSF SEAL Level 1 (for the F-35 Joint Strike Fighter aircraft)
- ISO 26262, up to ASIL D



Advanced Trace Analysis for Peak System Efficiency

SpyKer-TZ™ helps developers debug faster, optimize more intelligently, and eliminate the most challenging bottlenecks in complex real-time systems. Through live diagnostics and dynamic trace analysis, teams gain unmatched visibility into software performance—uncovering hidden timing issues before they derail a project.

With over 30 advanced visualizations, SpyKer-TZ enables real-time monitoring of CPU load, event logs, memory allocation, and system scheduling, helping teams track down elusive bugs, optimize performance, and ensure system reliability. Whether working on LynxOS-178™ or LynxSecure™, SpyKer-TZ provides the actionable intelligence needed to Seize the Edge™ in real-time debugging and performance optimization.

Introducing Lynx Spyker-TZ™: Powered by Tracealyzer from Percepio

Built to give developers full-system visibility over time, LYNX MOSA.ic.Spyker-TZ™ is the first dynamically instrumented system trace analyzer designed for complex, multi-threaded, multi-OS, and bare-metal environments. Unlike traditional debuggers, SpyKer-TZ instruments the kernel at runtime—without requiring a system reboot—allowing your teams to track down elusive bugs, identify CPU load spikes, and optimize system performance with precision.

With advanced visualizations like trace views, CPU load graphs, and event logs, SpyKer-TZ streamlines debugging while delivering actionable insights into real-time system behavior. Whether you are developing for high-assurance A&D systems or optimizing embedded software, Spyker-TZ empowers you to eliminate bottlenecks, improve system reliability, and keep mission-critical projects on track.

The Challenges: Overcoming Debugging Bottlenecks in Real-Time Systems

Debugging real-time and safety-critical systems presents unique challenges that can derail schedules, increase costs, and impact mission success. Traditional debugging methods often fail to provide the level of visibility you need to track down elusive timing-related issues—leading to costly delays and increased certification complexity.

Key Challenges in Real-Time System Debugging

Timing-Related Bugs are Costly and Difficult to Detect

- 20–30% of debugging efforts are spent on identifying and resolving timing-related issues.¹
- Late detection can increase debugging costs by up to 100x, creating major setbacks in the development lifecycle.²

Lack of Real-Time Visibility Slows Debugging

- Traditional debugging tools rely on the static analysis or intrusive instrumentation, which disrupts execution and fails to capture real-time behaviour.
- SpyKer-TZ eliminates these barriers by providing live diagnostics without requiring system rebooting or reconfiguration.

Multi-Core and Multi-OS Environments Add Complexity

- Debugging multi-threaded systems running on LynxOS-178™, LynxSecure™, and mixed bare-metal environments requires deep insights into scheduling, resource contention, and system interactions.
- SpyKer-TZ provides full visibility across complex architectures, helping teams streamline debugging and performance optimization.

Missed Real-Time Deadlines Lead to Certification Delays

- Late identification of scheduling anomalies and CPU overloads creates roadblocks in DO-178C and MIL-STD-1553 certification efforts.
- Delays in debugging can extend project timelines and escalate compliance costs—SpyKer-TZ helps teams catch these issues early.

A Smarter Approach to Debugging

At Lynx, we understand that missed deadlines and unpredictable debugging cycles are unacceptable in mission-critical applications. That's why we designed LYNX MOSA.ic.Spyker-TZ™ to provide developers with the real-time insights needed to debug faster, optimize performance, and keep projects on track.

With SpyKer-TZ, you gain the tools to Seize the Edge™—eliminating debugging guesswork and ensuring that your systems perform reliably under the most demanding conditions.

Why Organizations Choose LYNX MOSA.ic.Spyker-TZ™

LYNX MOSA.ic.Spyker-TZ™ is designed to give you the deepest level of visibility into real-time system behavior—without disrupting performance. Whether debugging multi-threaded software, tracking elusive timing issues, or optimizing for certification, Spyker-TZ™ provides the tools you need to Seize the Edge™ in performance, efficiency, and reliability.

Key Features and Capabilities: Smarter Debugging and Deeper Insights

Deeper Instrumentation and Low-Impact Trace Analysis

- **Dynamically Instrumented Trace Analysis** - Capture real-time events with minimal system overhead for accurate and non-intrusive debugging.
- **Auto-Instrumentation for LynxOS-178™ and LynxSecure™** - Eliminate the need for manual code modifications, allowing for faster trace setup.
- **Flexible Data Capture** - Support for both streaming and snapshot modes, ensuring adaptable trace collection based on debugging needs.

Powerful Visualizations for Accelerated Debugging

- **30+ Insightful Views** - Gain a comprehensive look at system behavior, including CPU load graphs, event logs, and communication flow analysis.
- **Detailed Event Visualization** - Intuitive GUI with zoom, jump, pop-up event details, and filtering for precise data exploration.
- **Multi-Threaded Software Behavior Analysis** - Identify thread interactions and pinpoint synchronization issues faster.

Seamless Integration and Remote Debugging

- **Local and Remote Operation** - Debug on-site or remotely via TCP/IP, making it ideal for real-world, mission-critical testing scenarios.
- **Target System Restoration** - Automatically restore the system to its original state after trace collection to minimize impact and preserve reliability.
- **Compatibility Across Operating Systems** - Designed for LynxOS-178™, LynxSecure™, and Linux variants for broad platform support.

Actionable Insights Without Performance Trade-Offs

- **Low Overhead Trace Patch** - Ensures timing integrity while capturing data, eliminating the risk of invasive trace effects.
- **Advanced Analysis Tools** - Includes CPU Load Graphs, User Event Signal Plots, and Communication Flow Graphs to accelerate troubleshooting.
- **Efficient Event Capture** - Fast, non-intrusive data collection with a focus on minimizing development costs and improving debugging efficiency.



The Value of LYNX MOSA.ic.Spyker-TZ™: Faster Debugging, Smarter Optimization

LYNX MOSA.ic.Spyker-TZ™ delivers the real-time insights and automated analysis needed to reduce debugging time, improve performance, and streamline certification efforts. With advanced trace analysis, visualization tools, and live diagnostics, Spyker-TZ empowers your team to eliminate bottlenecks and Seize the Edge™ in mission-critical development.

Measurable Impact for Developers and Engineers

Benefit to You	Impact on Your Workflow	Key Capability
Instantly visualize real-time program behavior without slowing down development.	Reduce debugging time by up to 40%, keeping projects on schedule. ¹	Dynamic Trace Analysis
Gain immediate insights into application performance and timing issues.	Shorten time-to-market by 3–6 months, accelerating deployment. ²	Live Diagnostics
Simplify setup—no need for specially instrumented kernels.	Cut setup and debugging costs by up to 50%, saving engineering hours. ³	Auto-Instrumentation
Analyze system behavior and bottlenecks with intuitive graphical views.	Speed up root cause analysis by up to 5x, eliminating guesswork. ⁴	30+ Visualization Tools
Flexibility to trace long sessions or capture snapshots for in-depth analysis.	Enhance system reliability with 60% fewer defects, improving mission readiness. ⁴	Streaming & Snapshot Modes
Detect and resolve elusive bugs and timing issues before they escalate.	Reduce certification efforts by up to 30%, minimizing compliance roadblocks. ¹	Real-Time Insights
Identify CPU load, task scheduling inefficiencies, and performance hotspots.	Optimize software performance, leading up to 25% cost savings. ⁴	System Bottleneck Analysis

Where LYNX MOSA.ic.Spyker-TZ™ Delivers Value: Use Cases and Benefits

LYNX MOSA.ic.Spyker-TZ™ is designed for developers, engineers, and certification teams working in mission-critical environments. Whether you're debugging complex software, optimizing real-time performance, or ensuring compliance with industry standards, SpyKer-TZ™ provides the insights needed to accelerate development and enhance system reliability.

Key Benefits Across Embedded and Safety-Critical Applications

- **Reduce Development Costs** - Automate data collection and analysis, reducing manual debugging time and associated costs.
- **Faster Troubleshooting and Debugging** - Identify performance bottlenecks and software anomalies early, allowing for faster fixes and improved system responsiveness.
- **Improve Software Performance** - Pinpoint CPU load spikes, inefficient task scheduling, and optimization opportunities to maximize system efficiency.
- **Enhance Product Quality** - Ensure robustness and reliability through detailed software diagnostics and event-driven insights.
- **Support for Certification and Compliance** - Facilitate in-depth system analysis to meet DO-178C, MIL-STD-1553, and other industry certification requirements.

Technical Specifications: Built for Multi-OS, Multi-Platform Debugging

- **Supported Operating Systems** - LynxOS-178™, LynxSecure™, and multiple Linux variants.
- **Comprehensive System Analysis** - SpyKer-TZ offers 30+ advanced views for deep system monitoring, providing real-time insights into performance, task execution, and bottlenecks.

With LYNX MOSA.ic.Spyker-TZ™, your team gains the real-time data and automation needed to Seize the Edge™—delivering software that is faster, more efficient, and built for mission success.

Gain System-Wide Insights with Trace Main View

Understanding how software behaves in real time is essential for debugging, optimizing, and ensuring reliability in mission-critical systems. The Trace Main View in LYNX MOSA.ic.Spyker-TZ™ provides a high-level, intuitive visualization of your system's execution flow, offering real-time insights into application performance at every stage of development.

How Trace Main View Helps You

- **Uncover Performance Issues Early** - Spot bottlenecks and inefficiencies before they escalate, even in third-party or "black box" code.
- **Debug Complex Systems with Precision** - Analyze execution flows without needing direct access to source code, making it easier to troubleshoot multi-threaded software stacks.
- **Accelerate Development and Reduce Costs** - Quickly identify anomalies, minimizing debugging time and lowering overall development expenses.

Whether you're troubleshooting critical failures or optimizing performance, Trace Main View gives you the visibility needed to make data-driven decisions faster, ensuring your software meets real-time deadlines with confidence.

Many Views to Focus on Your Data

LYNX MOSA.ic.Spyker-TZ™ provides over 30 specialized views, allowing you to analyze every aspect of system behavior in real time. From CPU load and memory usage to task execution and custom user events, each view is designed to help you pinpoint inefficiencies, optimize performance, and ensure system reliability.

Comprehensive Debugging and Performance Analysis

- **Multi-Dimensional System Insights:** Access real-time visualizations of CPU activity, memory consumption, event logs, and execution timing.
- **Customizable Data Exploration:** Focus on the metrics that matter most with user-defined filters, zooming, and event tracking tools.
- **Optimized for High-Assurance Development:** Ensure compliance with industry standards by analyzing scheduling accuracy, timing dependencies, and real-time execution.

With SpyKer-TZ's advanced trace analysis and visualization tools, you gain the clarity and precision needed to develop, optimize, and deploy high-assurance software with confidence.

CPU Load Graph View: Optimize Performance and Prevent Bottlenecks

Understanding CPU utilization is critical to ensuring efficient task scheduling and real-time system performance. The CPU Load Graph View in LYNX MOSA.ic.Spyker-TZ™ provides a clear, real-time visualization of CPU usage, enabling you to identify high-load periods, prevent scheduling conflicts, and optimize resource allocation.

How CPU Load Graph View Helps You:

- **Identify and Resolve Performance Bottlenecks:** Detect CPU spikes and overload conditions before they cause system instability.

- **Optimize Resource Allocation:** Assess whether your system has the capacity to handle additional workloads while meeting real-time deadlines.
- **Ensure System Reliability Under Varying Loads:** Monitor CPU trends over time to fine-tune system performance and prevent degradation in mission-critical environments.

With SpyKer-TZ™, you gain real-time CPU insights that help you enhance efficiency, prevent failures, and ensure smooth operation under all conditions.

Event Log: Capture and Analyze Key System Behaviors

Understanding how and when critical events occur within your system is essential for debugging and optimization. The Event Log in LYNX MOSA.ic.Spyker-TZ™ enables you to log, visualize, and analyze custom application events, providing deeper insights into sensor data, task execution, and state machine operations.

How the Event Log Helps You

- **Gain a Comprehensive View of System Behavior -** Synchronize user-defined events with other performance metrics to analyze real-time execution.
- **Measure Critical Timing Intervals -** Define and track precise event intervals to ensure compliance with strict operational deadlines.
- **Improve Debugging Efficiency -** Log custom application data to pinpoint anomalies and validate system behavior across execution states.

By using SpyKer-TZ's Event Log, you can eliminate uncertainty in system execution, synchronize event timing with performance data, and ensure precision in high-assurance applications.

Memory Heap Load: Detect Memory Leaks and Optimize Resource Utilization

Efficient memory management is critical in real-time and safety-critical applications. The Memory Heap Utilization View in LYNX MOSA.ic.Spyker-TZ™ provides clear visibility into memory allocation and deallocation, helping you identify leaks, inefficiencies, and unexpected spikes in usage before they impact system performance.

How Memory Heap Load Helps You:

- **Detect Memory Leaks Before They Cause Failures** - Track unmatched malloc and free events using the Object History View, making it easier to identify and resolve memory issues.
- **Gain Deeper Insights Into System Performance** - Correlate memory usage with specific system tasks by synchronizing heap utilization with other trace views.
- **Ensure Stability and Optimal Resource Utilization** - Optimize dynamic memory management to reduce fragmentation and improve system reliability.

By visualizing and analyzing memory usage in real time, SpyKer-TZ™ ensures efficient resource allocation, helping you deliver more reliable, high-performance software.

Custom Trace View: Capture and Analyze Custom Application Events

Real-time systems often require more than just OS-level data—they need insights into application-specific behaviors. The Custom Trace View in LYNX MOSA.ic.Spyker-TZ™ allows you to log and visualize user-defined events, providing a deeper level of system analysis tailored to your application needs.

How Custom Trace View Helps You:

- **Track Application-Specific Events in Real Time** - Create user-defined event channels to monitor sensor data, control system states, and critical system behaviors.
- **Measure and Analyze Timing Intervals** - Capture precise timing between actions, such as button press-to-release events or system response times, to fine-tune performance.
- **Enhance Debugging and Performance Optimization** - Analyze custom events alongside OS-level data for a comprehensive view of system execution.

With SpyKer-TZ's Custom Trace View, you gain full control over how you capture and analyze application events, ensuring that your system meets stringent timing and reliability requirements.



Customer Testimonial: Solving Complex Debugging Challenges in Days

A leading U.S.-based aerospace company spent months chasing a multi-threaded timing issue in a third-party application library and device driver with no success. Despite extensive efforts, the root cause remained elusive—until they deployed LYNX MOSA. ic.Spyker-TZ™.

Within just a few days, SpyKer-TZ provided the unprecedented system visibility they needed to pinpoint the problem, resolve the issue, and keep the project on track.

“We spent months chasing a complex multi-threaded timing issue in a third-party application, with no progress. Once we deployed SpyKer-TZ, we pinpointed the root cause in just a few days. The tool gave us unprecedented visibility into system behavior, enabling us to resolve the issue quickly and keep the project on schedule. SpyKer-TZ didn’t just save us time—it helped avoid costly delays and ensured we met our critical deadlines. It’s now an essential part of our toolkit for diagnosing intricate timing challenges.”

— Lead Systems Engineer, U.S.-Based Aerospace Program

Conclusion: Transform Debugging with LYNX MOSA. ic.Spyker-TZ™

In complex, real-time embedded systems, timing-related issues can be costly and unpredictable, often emerging late in development and jeopardizing schedules, budgets, and certification efforts.

- Reduce debugging time by up to 40%, pinpointing elusive software issues faster.
- Streamline certification efforts by up to 30%, eliminating late-stage surprises.
- Optimize system performance, improving reliability while accelerating time-to-market.

With advanced trace analysis, remote debugging capabilities, and non-intrusive data collection, SpyKer-TZ™ enables teams to develop faster, diagnose smarter, and optimize with confidence.



Seize the Edge™ in Debugging and System Optimization

Ready to accelerate debugging, streamline certification, and optimize system performance? Seize the Edge™ with SpyKer-TZ and take control of your system's performance.

Discover how LYNX MOSA.ic.SpyKer-TZ™ can help you eliminate bottlenecks, lower costs, and ensure real-time reliability. Visit us at www.lynx.com or contact our team to schedule a demo today

Sources

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2. Source: Frost & Sullivan, Real-Time Systems Debugging and Optimization Study, 2024.
3. Source: MarketsandMarkets, Software Debugging and Performance Optimization Report, 2024.
4. Source: Lynx internal Report.



Ready to revolutionize your mission-critical systems?

Contact Lynx today to learn more about how LYNX MOSA.ic can empower your success and help you Seize the Edge in every mission-critical endeavor.

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