

Matrox Imaging Library (MIL) on RTX64 real-time operating system (RTOS)



Motivation – Why MIL on RTOS?

- » Some highly time-critical vision applications need extreme real-time performance for image capture, processing and **GPIO**
- » Such applications were addressed in the past with dedicated vision hardware
- » Approach no longer economically viable or justifiable with multi-core CPUs

Motivation – Why MIL on RTX64?



» IntervalZero RTX64 is evolution of first real-time extension to Windows®



- » Leverages Windows user experience and functionality
- » Tight integration into Visual Studio® IDE
- » Native 64-bit support

Motivation – Why MIL on RTX64?



» MIL is the only vision library for RTX64



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Vision Systems Partners

Increasingly, vision-directed motion is an important aspect in cutting-edge industrial systems as it can both lower costs and increase throughput. IntervalZero partners with and works closely with high-level vision companies.



Founded in 1976, **Matrox** is a privately held company based in Montreal, Canada. Imaging, Graphics and Video divisions provide leading component-level solutions for imaging and machine vision, graphics, and video. Each division leverages the others' expertise and industry relations to provide timely and innovative products. Matrox Imaging is an established and trusted supplier to top OEMs and integrators involved in the manufacturing, medical diagnostic and security industries. The components consist of cameras, interface boards and processing platforms, all designed to provide optimum price-performance within a common software environment. Visit www.matroximaging.com.

Partners

Reseller Partners

General Motion Control Partners

Application Partners

EtherCAT Partners

Hardware Partners (Fieldbus)

RTX64/RTX Consulting Partners

Technology Partners

Vision Systems Partners

**IntervalZero RTOS Platform
Information for:**

About RTX64

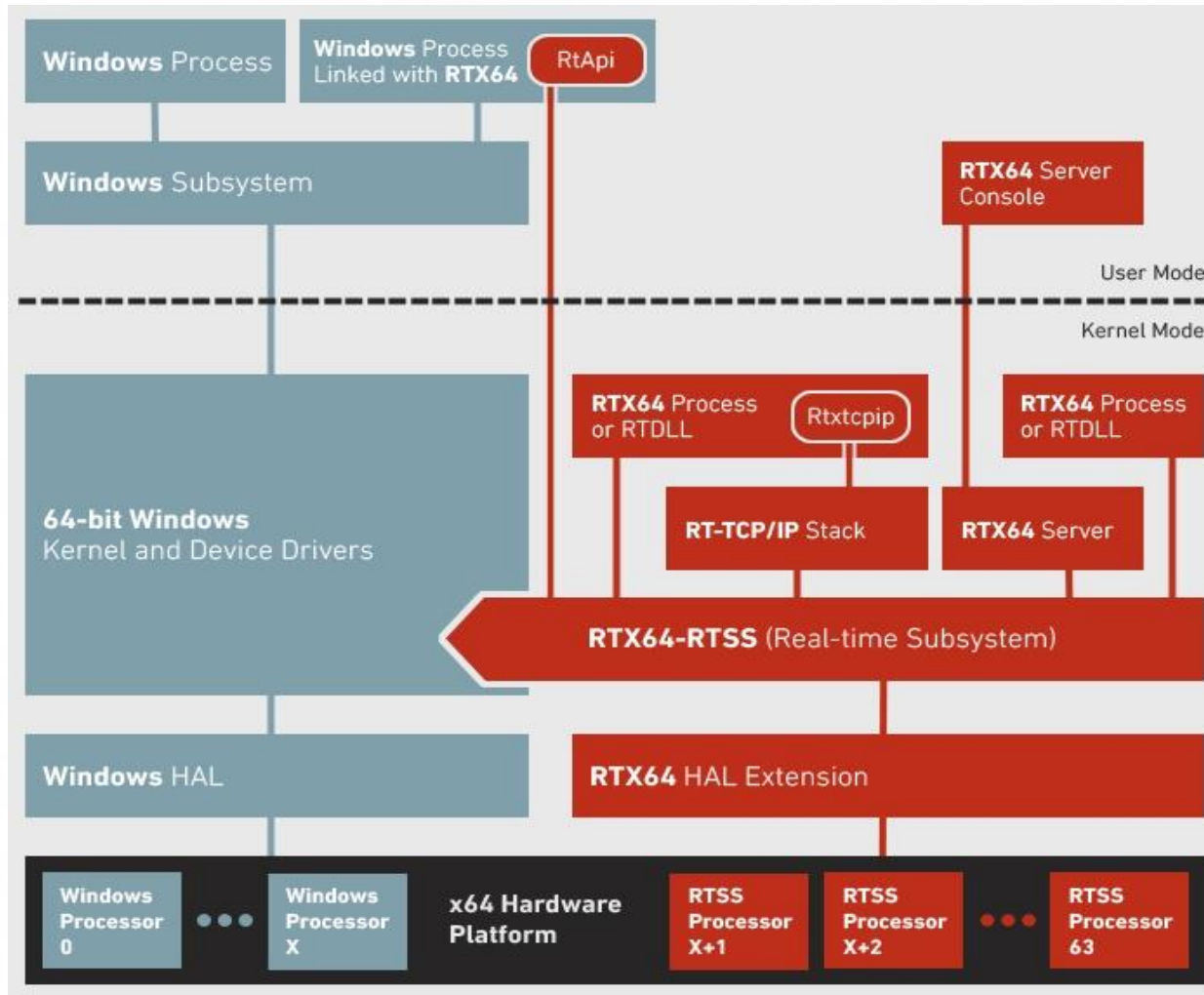


- » RTOS that runs alongside 64-bit Windows® but on separate CPU core(s)
- » Relies on Windows for desktop, console I/O and file I/O
- » RTX64-Windows communication possible through events and shared memory
- » Supports use of Windows API (partially)

About RTX64 (cont.)

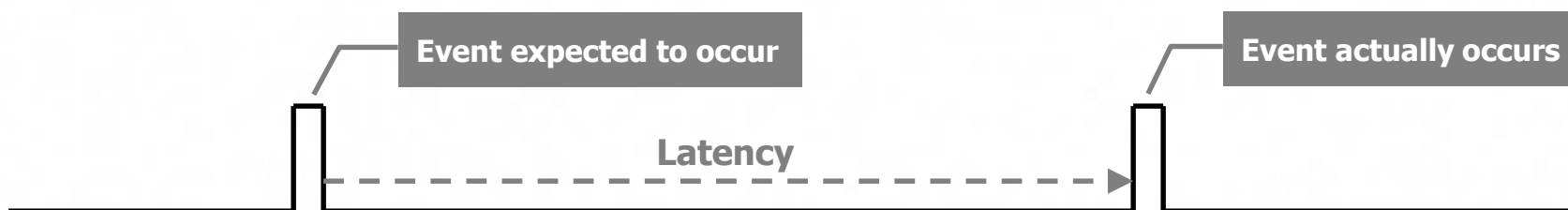
- » Supports C/C++ programming
- » Optional native Ethernet support
- » Supports EtherCAT and PROFINET communication protocols via third-parties
- » Timer resolution down to $1\mu\text{s}$ versus 1ms for Windows

About RTX64 – architecture

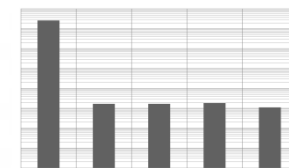


About latency and jitter

- » Define latency as the time difference between when an event is expected to occur and when it actually occurs



- » Jitter is the variation or distribution of latency measurements



About RTX64 – performance



Case 1: Without supplemental CPU load

	Latency distribution (count)					Latency (μ s)	
	< 99 μ s	100 – 199 μ s	200 – 299 μ s	300 – 399 μ s	> 400 μ s	Avg.	Max.
Windows 7 (4 cores)	1752	0	2	0	0	3.1	295
RTX64 (1 core)	2071	0	0	0	0	0.7	27

Case 2: With supplemental CPU load

	Latency distribution (count)					Latency (μ s)	
	< 99 μ s	100 – 199 μ s	200 – 299 μ s	300 – 399 μ s	> 400 μ s	Avg.	Max.
Windows 7 (4 cores)	26006k	1726	1716	1882	1117	1.2	649
RTX64 (1 core)	29407k	1	0	0	0	0.6	106

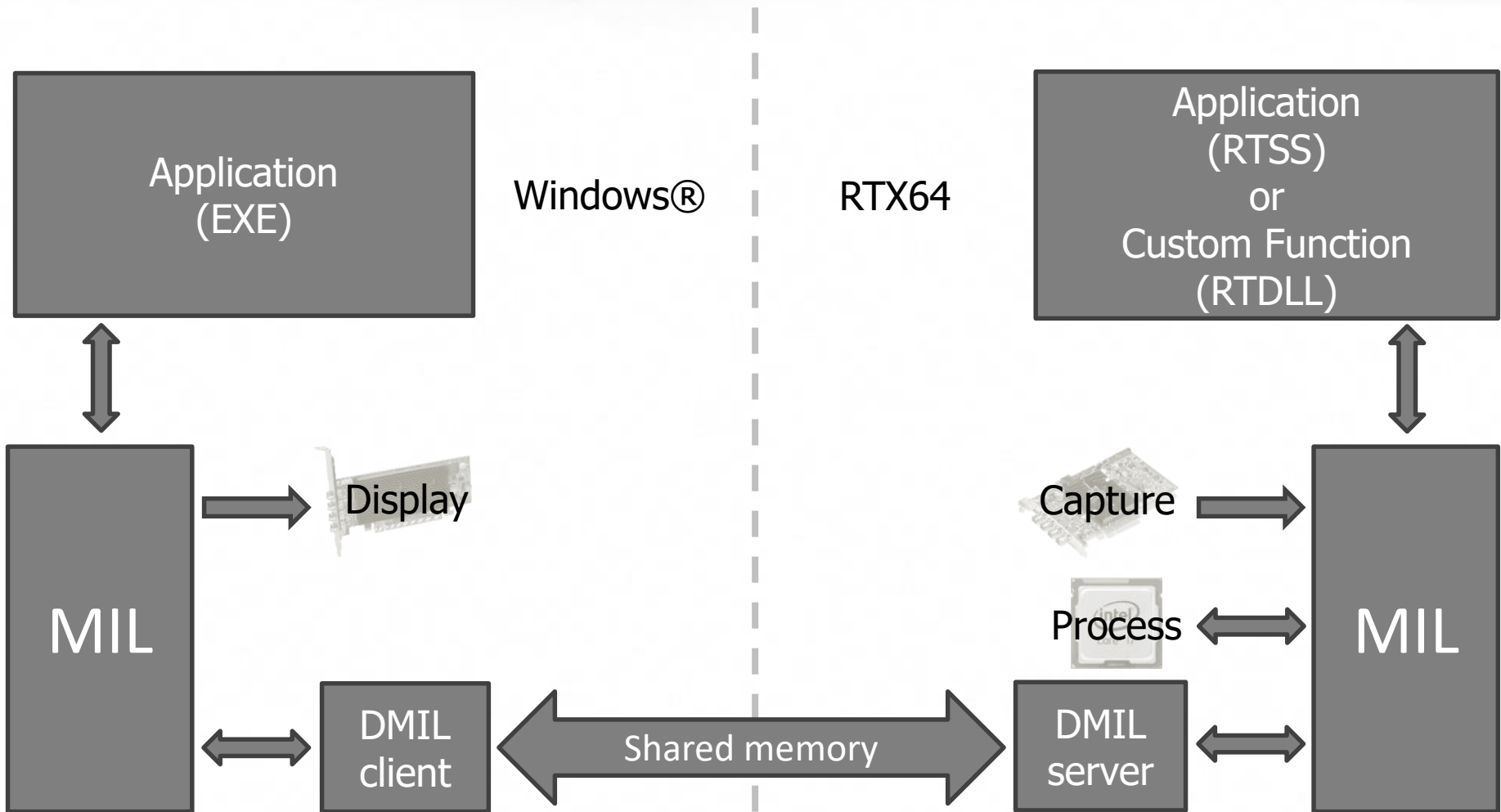
MIL on RTX64

- » Video capture and processing run natively on RTX64
- » Supports GigE Vision® camera interface standard
- » Incorporates custom memory allocator for greater speed

MIL on RTX64 (cont.)

- » Similar processing benchmarks as on Windows®
 - » **WARNING!** Windows process that saturates common memory interface adversely affects RTX64 performance
- » Distributed MIL (DMIL) shared-memory protocol for RTX64-Windows communication

MIL on RTX64 (cont.)



MIL on RTX64 (cont.)

- » Requires RTX64 3.4 with Update 1
- » Shares license with MIL for Windows
- » DMIL for RTX64-Windows communication does not required additional DMIL license
- » Available as an update at no extra cost (other than necessary MIL license)