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

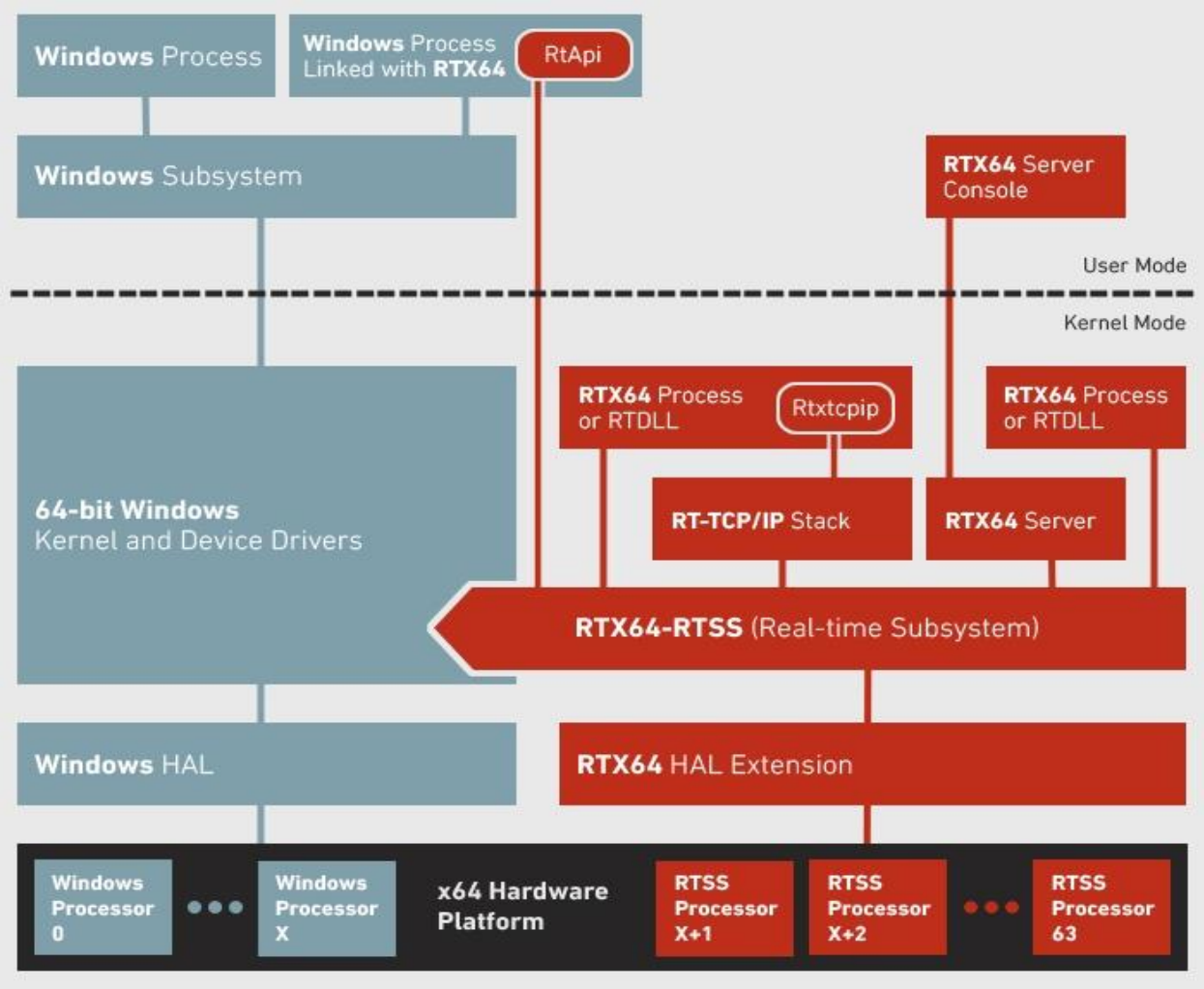
About RTX64

- 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.)

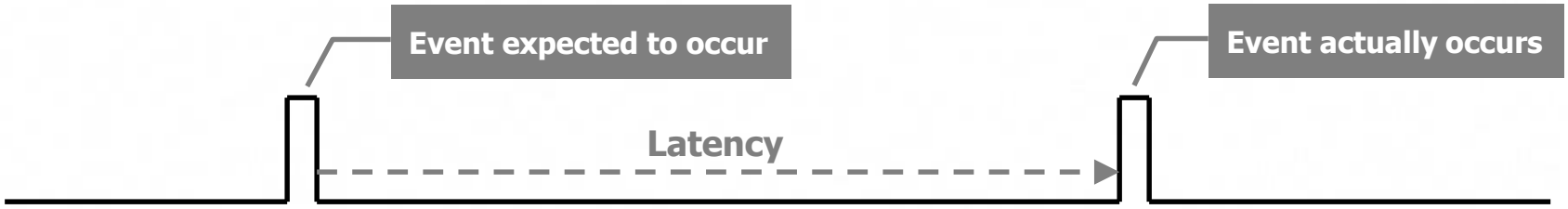
- Supports C/C++ programming
- Optional native Ethernet support
- Supports EtherCAT and PROFINET communication protocols via third-parties
- Timer resolution down to 1µs versus 1ms for Windows

About RTX64 – architecture

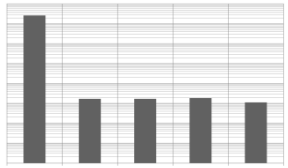


About latency and jitter

- 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 (µs)	
	< 99 µs	100 – 199 µs	200 – 299 µs	300 – 399 µs	> 400 µs	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 (µs)	
	< 99 µs	100 – 199 µs	200 – 299 µs	300 – 399 µs	> 400 µs	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

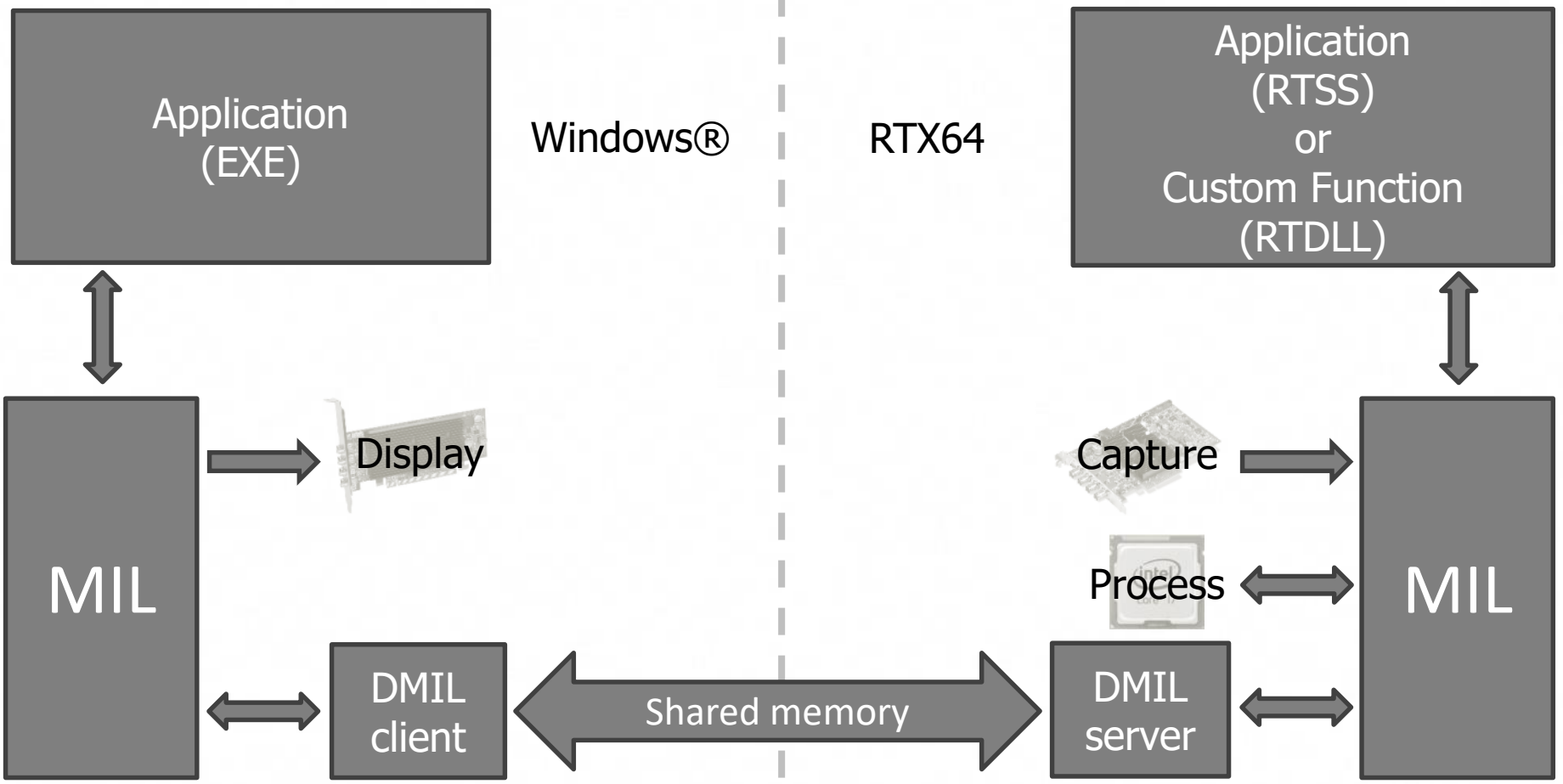
MIL on RTX64

- 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)