RTX 2011

Architecture

The x86-based RTX 2011 hard real-time software, which includes support for Symmetric Multiprocessing (SMP), is a true extension of the Microsoft Windows operating system.

RTX 2011 is a Windows plug-in that does not encapsulate Windows and does not interfere with, or modify the Windows infrastructure.

The RTX 2011 real-time subsystem (RTSS) is designed around a real-time, deterministic scheduler that utilizes both priority-driven and pre-emptive algorithms. The RTX 2011 scheduler ensures critical thread context switches; and yields to threads of higher priority occur in the sub-microsecond range.

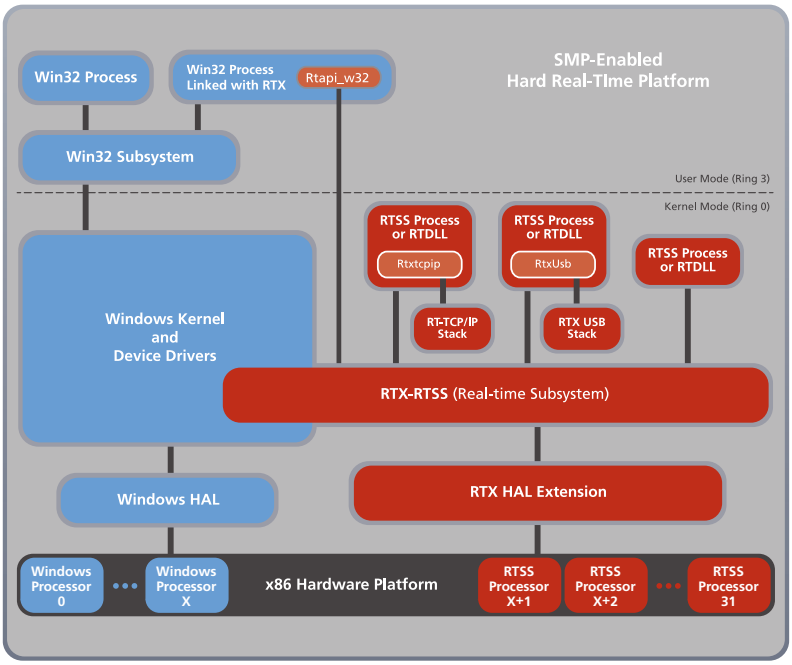
RTX 2011 provides support for systems with up to 32 processors, more than quadrupling the number of cores that were supported in the previous RTX version. Additionally, RTX 2011 has six Runtime editions, giving customers increased options for choosing the level of core support required for their embedded systems.

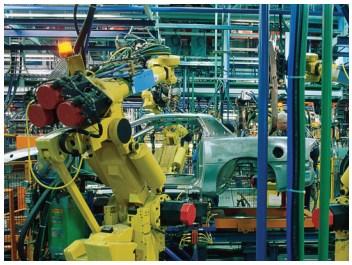
RTX 2011 assures fine-grained control over applications, with 127 levels of assignable thread priority and IST latency performance of less than 10 microseconds.

RTX supports MSI and MSI-X capable devices, providing an alternative to line-based interrupts. This message-based interrupt support is available on all supported operating systems. RTX requires only that the device supports MSI/MSI-X, not the operating system.

By supporting both message-based and line-based interrupts on PCI and PCI Express buses, RTX is easy to configure on the Windows Embedded, XP, Vista and Windows 7 operating systems.

To facilitate communication and data sharing between RTSS and Win32 processes, RTX provides common inter-process communication (IPC) objects, such as events, mutexes and semaphores, along with shared memory for data sharing.





Technical Facts RTX 2011

RTX 2011 is supported on Windows 7 up through SP1; Windows Vista, up through SP2; Windows XP, up through SP3; Windows Embedded Standard 7 up through SP1; Windows Embedded Standard 2009; Windows Server 2003 SP2.

Significant value differentiators for OEMs include:

- Real-time Subsystem Extension Plug-In To Windows
- Instant Recompile Capability
  - DSP and FPGA are time consuming
  - Real-time transparency
- Increased engineering productivity
  - Flexible, Reusable C/C++
  - Compiles far easier than FPGA loads
- Extensible – End User Development Kit
  - Portable, Open, C/C++ environment
- Cross-Core Thread Assignment
  - Single scheduler can assign a thread across cores
  - Very lightweight IPC compared to AMP/ Virtualization architectures.
- Thread Affinity Assignment
  - Thread isolation delivers task parallelism
- Core-Specific Thread Priorities
  - Allows programmers to manage load balancing
- Parallelism
  - Data and thread parallelism
- Single Instantiation
  - One Real-Time Subsystem runs across 31 cores
- Real-Time Transparency

Using shared memory and IPC objects, Windows and RTSS processes can share large amounts of data with no performance degradation. The RTSS provides high performance TCP/UDP/IP networking for RTX applications.

The RT-TCP/IP Stack supports Internet Protocol version 4 (IPv4) and next-generation Internet Protocol version 6 (IPv6).

RTX 2011 Runtime Editions

	Solo	Entry	Basic	Pro	Premuim	Ultimate
1 Core	✔	✔	✔	✔	✔	✔
2 Cores		✔	✔	✔	✔	✔
3 Cores			✔	✔	✔	✔
7 Cores				✔	✔	✔
15 Cores					✔	✔
31 Cores						✔
Plus Build Tools						✔

Product

IntervalZero's RTX 2011 software replaces FPGAs and DSPs for hard real-time requirements, radically reducing the development costs, and significantly improving the quality of embedded systems.

RTX 2011 is an essential component of innovative Soft-Control Architectures that leading OEMs are rapidly adopting to achieve system-development cost reductions of 25-50%, as well as breakthroughs in throughput and yields, in production quality, and in a more compact physical footprint.

By leveraging RTX 2011's tight integration with the Microsoft Windows environment and its native symmetric multiprocessing (SMP) support on x86 multiprocessors, OEMs get Soft-Control Architectures that move the hard real-time control logic, such as PLC or motion logic, from specialized hardware components – FPGAs and DSPs – to software components.

OEMs that will benefit most from Soft-Control Architectures have complex Human-Machine Interfaces, require the precise coordination of multiple tasks, and the deterministic, hard real-time performance capabilities that RTX delivers.

Additionally these OEMs will be able to take advantage of new standards and technology innovations that are driving economic and operational benefits. These include: Open Standards; x86 muticore technologies, including support for Intel's Advance Vector Extension (AVX), a 256-bit instruction set extension to Streaming SIMD Extensions (SSE) designed for applications that are floating point intensive; real-time communications, COTS initiatives, and touch-centered usability.

Increased Product Competitiveness and Differentiation

- Better yields and throughput on machines of similar footprint
- Same yields and throughput on machines with smaller footprint
- Dramatically improved quality for machines with same footprint

Reduced Costs of 25-50% in the Compute Platform

- Elimination of the additional PC to perform the HMI
- Elimination of proprietary controller and communications cards
- Improved asset utilization: Take advantage of underused multi-core capacity.

Improved Operational Efficiencies and Cost Reduction

- Reduced manufacturing costs and fewer BOM/physical parts
- Elimination of some inventory costs
- Reduced maintenance costs
  - Field upgrades are via a software download rather than board replacement

RTX Real-time Subsystem Processor Utilization Options RTX Runtimes

- The RTX real-time subsystem shares one processor with Windows
- The RTX real-time subsystem has one dedicated processor
- The RTX real-time subsystem has from one to 31 dedicated processors

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