

RTX 2009 & RTX 2009 SMP

Architecture

The x86-based RTX 2009, which includes support for Symmetric Multiprocessing (SMP), is a true extension of the Microsoft Windows operating system in that it does not encapsulate Windows and does not interfere with, or modify the Windows infrastructure.

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

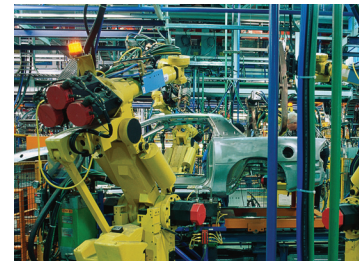
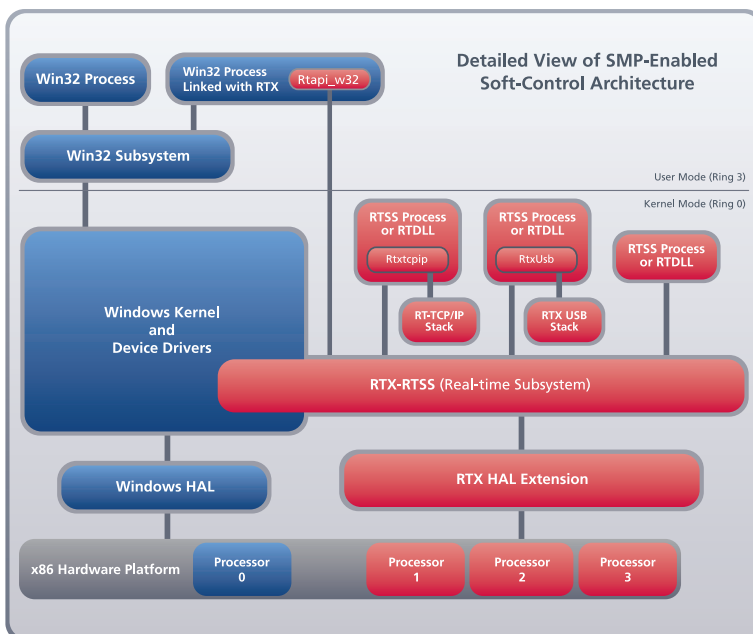
Fine-grained control over applications is assured with 127 levels of assignable thread priority and IST latency performance of less than 10 microseconds.

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 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.

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). There is also an RTX USB add-on component that supports USB 1.1 and USB 2.0 in the real-time environment.



Technical Facts RTX 2009 RTX 2009 SMP:

RTX 2009, and RTX 2009 SMP are supported on Windows 7 (dedicated configuration), Windows Vista, up through SP2; Windows XP, up through SP3; Windows Embedded Standard 2009; Windows Server 2003 SP2.

Significant value differentiators for OEMs include:

- **Cross-Core Thread Assignment**
 - Single MCP 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 task parallelism
- **Single Instantiation**
 - One Real-Time Subsystem runs across 7 cores, not 7 subsystem instantiations
- **Real-Time Transparency**
 - No virtualization: No inter-core synchronization required
 - Direct access to hardware/memory
- **Windows Human-Machine Interface onboard**
- **Windows Development Environment and Tool Chain (Visual Studio 2003, 2005, & 2008)**
 - Support for Intel compilers
- **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

RTX Real-time Subsystem Processor Utilization Options

	RTX Runtimes		
	RTX 8.1	RTX 2009	RTX 2009 SMP
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 seven dedicated processors			✓

Product

IntervalZero's RTX 2009 is an essential component in a powerful new Soft-Control Architecture that is changing the basis of competition for Embedded OEMs with high precision and control requirements in markets such as Machine Tools, Medical Systems, Digital Audio Workstations, Test & Measurement and Military/Aerospace.

A Soft-Control Architecture gives OEMs clear competitive advantages and product differentiation by delivering breakthroughs in throughput and yields; in production quality; in a more compact physical footprint; and in cost reductions of 25-50%.

By leveraging RTX 2009's native symmetric multiprocessing (SMP) support on multiprocessor architectures, and its tight integration to the Microsoft Windows' environment, OEMs get a market-leading Soft-Control Architecture that moves the hard real-time control logic, such as PLC or motion logic, from specialized hardware components to software components. The software runs on multi-core, industrial-strength commodity x86 processors and uses both Open Standards and Standard Communications Architecture, such as USB and real-time Ethernet.

The foundation for a Soft-Control Architecture in hard real-time environments is an Integrated Real-Time Development Platform comprising Microsoft Windows; multiprocessor x86 architectures; and IntervalZero's RTX 2009, which provides real-time operating system functionality extension to Windows and enables SMP.

RTX provides the hard real-time extension of Windows and utilizes as many as seven exclusive processors to deliver the SMP capabilities that OEMs require for levels of precision, control and performance that eliminate the need for DSP and FPGA. RTX 2009 is a cost-effective, versatile solution for the Windows real-time and Win32 on x86 market.

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

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