

Real-time Hypervisor: Windows[®] + RT-Linux

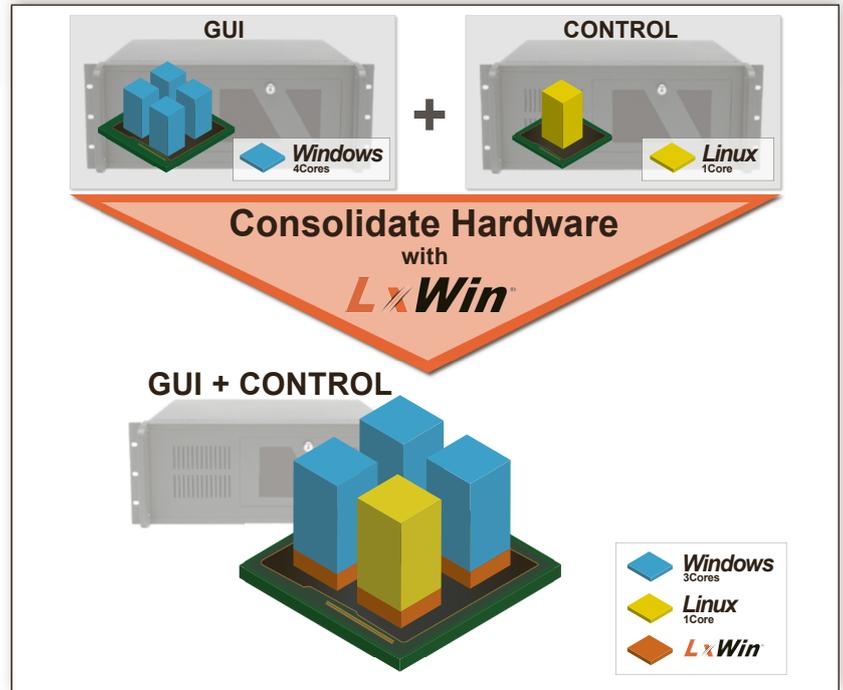
Overview

Today, Linux has become the most popular and de-facto standard Real-time operating system. Due to its deterministic hard Real-time behavior, sophisticated development tools and broad hardware driver and software support, it is used by leading manufacturers of industrial controllers. Typical applications are PLC, Motion Control and Numeric Control systems with high Real-time requirements.

Using the LxWin Hypervisor it is possible to run Windows[®] and an extremely fast Real-time Linux in parallel.

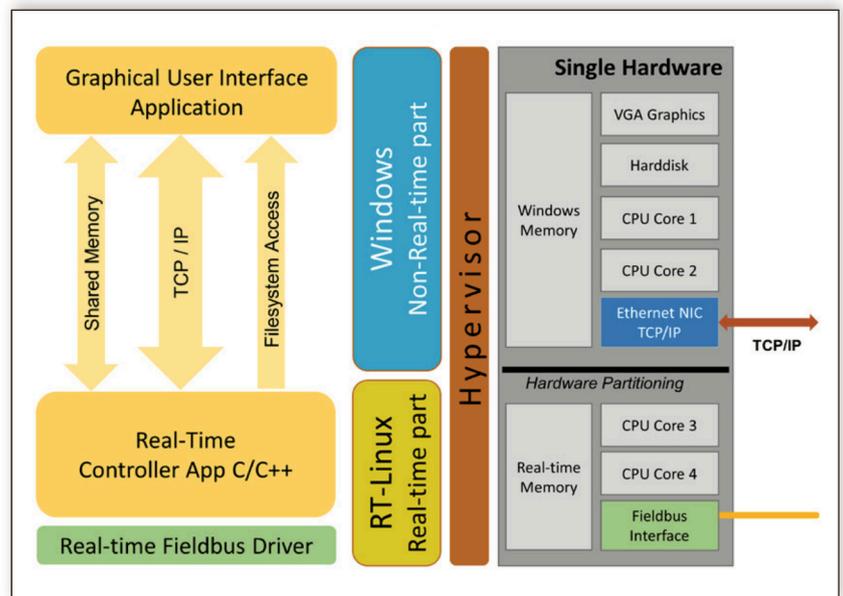
Plenty of Linux drivers, e.g. for fieldbus controllers or GigE camera systems, communication stacks (EtherCAT[®], Profinet, OPC, OPC UA, TSN, ...) or complex software solutions like CNC controller or software PLCs can be used without any change under LxWin.

Microsoft[®] Visual Studio[®] and/or Eclipse are used for software development.



Software Architecture

- Hypervisor based hardware and software partitioning
 - Clear and safe separation
- Hardware partitioning
 - Arbitrarily assign one or multiple CPU cores to the Real-time part
 - Real-time controlled hardware fully separated from Windows[®]
 - Real-time memory safely separated from Windows[®]
- 32 Bit and 64 Bit Real-time applications
- Sophisticated communication means
 - Virtual TCP/IP network
 - Shared memory, events, pipes, message queues
- Intel Virtualization (VT) support
 - Additional robustness

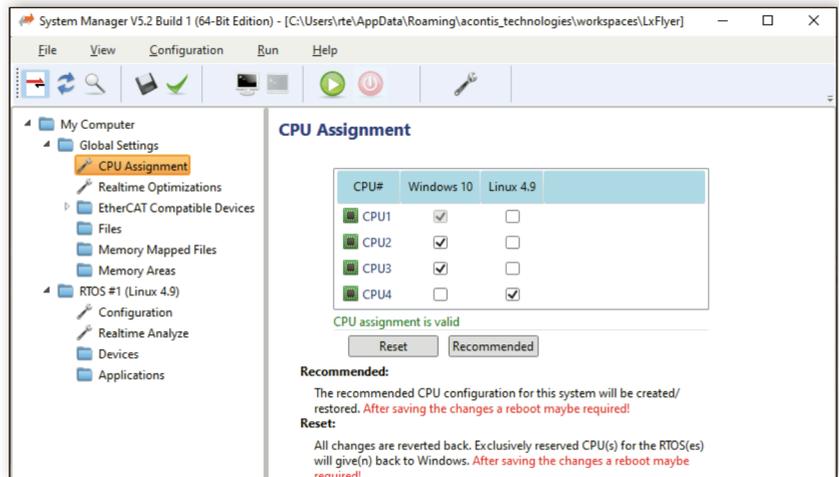


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LxWin®

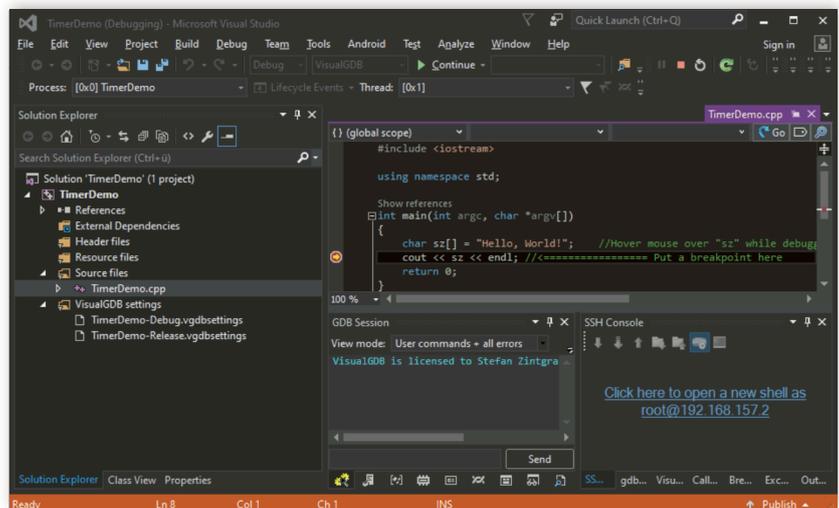
System Manager Tool

- Easy to use Windows® GUI for system configuration
- Assign CPU cores to the Real-time part
- Assign EtherCAT® compatible hardware to the Real-time part, optionally assign additional hardware
- Start and stop the Real-time part
- Real-time analysis and optimization



Application Development

- Microsoft® Visual Studio® support
- For Windows® applications
- For Real-time applications
- Project Wizards to automatically create new Real-time applications
- Real-time Application Debugging: As convenient as debugging a regular Windows® application



Features

- Real-time Linux - 32 Bit and 64 Bit
- Linux Yocto Support
- Run Linux on one or multiple CPU cores
- Fast interrupt handling and short thread latencies
- Linux continues without Real-time penalty after Windows® Blue-Screen occurred
- Windows® 32 Bit and 64 Bit
- Third Party Linux applications and drivers run without modification
- Virtual Network connection between Windows® and Linux (for application level TCP/IP communication and local debugging)
- Shared Memory, Events, Interlocked data access for high speed application level communication
- Higher Level Windows®/Linux communication: Pipes, Message Queues and Real-time sockets

Advantages and Benefits

Hardware Consolidation

- Hypervisor based solution: enhanced robustness and future safe solution
- Save a second controller system or intelligent plug-in card
- More compact controllers can be built

Software Consolidation

- Fast learning curve as fully compatible to Linux and the POSIX standard
- Programming the Real-time application, communication protocols and GUI using powerful development tools (Visual Studio®, Eclipse)
- Reuse existing Linux software

Scalability

- Integration of existing Linux applications into a Windows® environment without additional hardware costs
- Use the same Linux application on an embedded system, e.g. on ARM architecture

No need to become a Linux expert

- Pre-configured kernel for Real-time applications
- Just concentrate on the application
- Use MS Visual Studio® for development



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