



Data Sheet

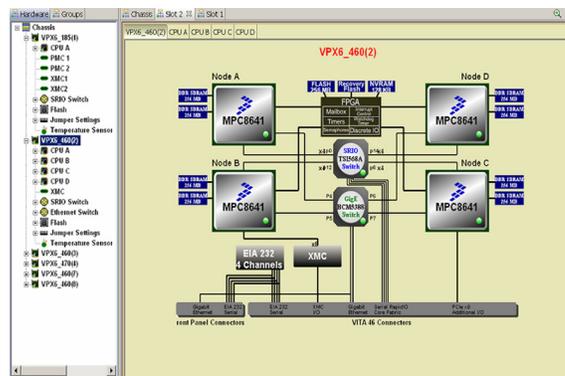
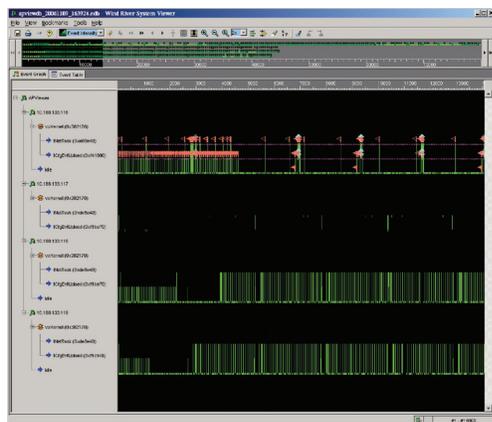
Continuum Insights

Features

- ◆ System Monitor tool visualizes complete details of large systems
- ◆ System management tool extends traditional uni-processor workflow to the entire system
- ◆ Event Analysis tool displays time-correlated events across the entire system
- ◆ Analyze Serial RapidIO[®] fabric loading and error conditions
- ◆ Customize Serial RapidIO routing
- ◆ Scales to systems from tens to hundreds of processors
- ◆ VxWorks and Linux target support

Benefits

- ◆ Increases productivity of debugging multi-board, multi-processor applications
- ◆ Multi-processor event analysis aids in diagnosis of difficult problems such as race conditions.
- ◆ Run-time monitoring quickly identifies such problems as memory leaks and deadlocks.
- ◆ Designed and developed using Eclipse[™] Development Framework ensuring compatibility with industry leading tools.
- ◆ Analyze Serial RapidIO fabric performance which is otherwise invisible to normal tools, avoid congestion bottlenecks before they occur



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ABOVE & BEYOND

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Overview

Curtiss-Wright Controls Embedded Computing's Continuum Insights™ is a suite of GUI-based software tools, designed to ease and optimize the development of application software for multi-computer embedded systems. With support for systems with up to 112 Intel or PowerPC cores in an OpenVPX chassis, developers gain access to unprecedented levels of information in regards to operational status and inter-processor interactions in an easy to use and navigate GUI format. Understanding precisely the intricacies of the complex multi-computer reduces development time and ultimately speeds time to market.

Continuum Insights, is based on the Eclipse Development and Application Framework, and provides developers of complex multi-processor-based computer systems with the information they need to accurately tune their system and speed their time to market. This advanced suite of development tools includes an Event Analysis Tool, System Monitoring Tool, System Management Tool, and Network Fabric Analysis Tool. Continuum Insights is the latest addition to Curtiss-Wright's COTS Continuum architecture initiative, which defines a common software, hardware and mechanical architecture across all current and future Curtiss-Wright product lines.

Continuum Insights goes beyond the limitations of single-processor data capture, enabling system developers to make time-aligned comparisons of the effect of events

occurring on multiple processors, significantly reducing the time required to debug their systems. These comparisons can facilitate the capture of potential race conditions and deadlocks between multiple processors, facilitating the identification and correction of events that occur in the wrong sequence.

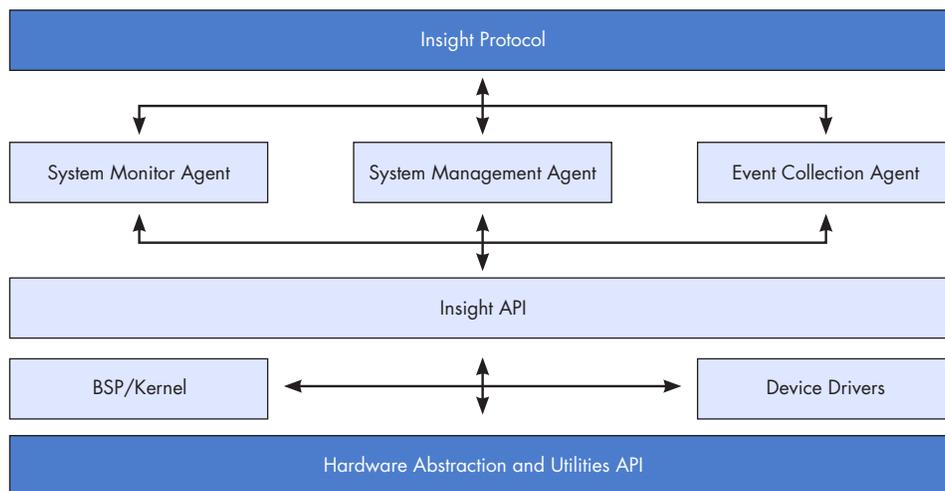
Continuum Insights eases the identification of task level and processor level memory usage across multiple processors in the system. Using a combination of the System Monitoring Tool and the Event Analysis Tool, the exact times of when memory buffers are allocated and de-allocated as well as identification of overall memory usage on a particular processor or processors can be identified quickly and graphically, all within the same tool. This allows capture of potential memory leakage corruption problems and allows developers to quickly make the proper adjustments to the application code.

Continuum Insights Capabilities

Continuum Insights offers total system development tools in the following categories:

- ◆ System monitoring
- ◆ Event analysis
- ◆ System management
- ◆ Network Fabric Analysis

Figure 1: Linux and VxWorks BSP/Kernel and Device Drivers

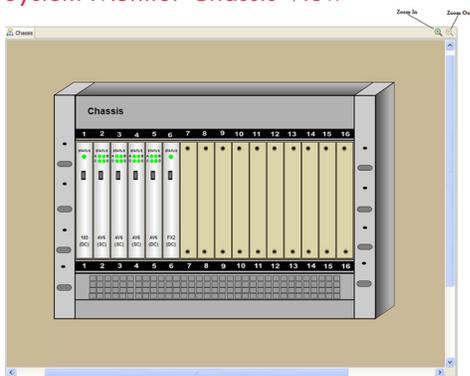




System Monitoring Tool

The System Monitoring Tool provides application programmers with greater visibility into their entire system by collecting and displaying critical, periodic, non-intrusive, real-time data. Using a GUI format, the System Monitoring Tool presents this information hierarchically, enabling intuitive navigation that lets the developer quickly find any source of potential problems within the system. System and health information are updated in real-time providing displays of processing threads, utilization, task allocations, and processor-level and system-level configuration information.

Figure 2: System Monitor Chassis View



Automatic Discovery

The System Monitoring Tool automatically discovers the multi-computer system. All information required to graphically represent the system is sent from the target to the host through the Ethernet interface. Simply provide a range of IP address, and the tool will dynamically discover nodes within the system.

Hierarchical Representation of System

The System Monitoring Tool presents the user with a graphical view of their system. The initial view of the system consists of a representation of the system at the chassis level. The chassis level view allows easy identification of the multi-computer system, allowing the user to quickly identify the board type and slot locations of the individual cards.

The board-level view identifies all the major components that make up the board being viewed. Color coded icons allows easy identification of the status of individual components. Information provided at the board-level view include:

- ◆ Slot number
- ◆ Board type
- ◆ Board revision number
- ◆ Board serial number
- ◆ Firmware revision and creation date
- ◆ On-board FPGA revision
- ◆ Number of processors

Figure 3: System Monitor Board Level View

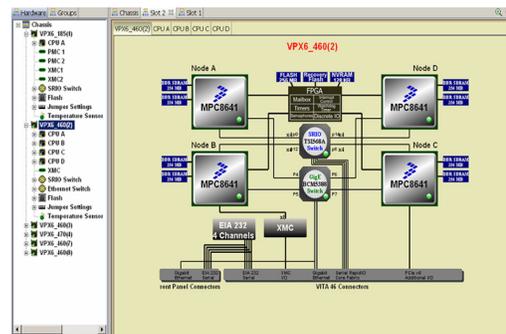
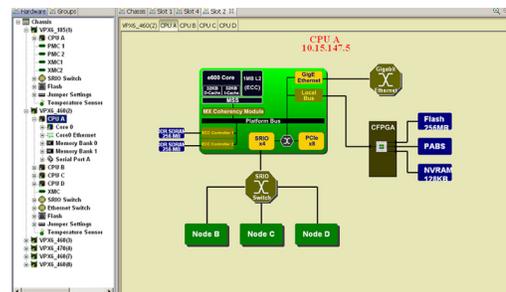


Figure 4: System Monitor Component View





Memory Utilization

Memory usage by any individual processor within a system is an important piece of information during the development of a multi-processor system. Identification and correction of memory leakage problems are often a source of time-consuming integration and debug time. The System Monitoring Tool allows this information to be displayed for all processing elements from a single point, allowing developers to quickly gather this information and make the proper adjustments if necessary.

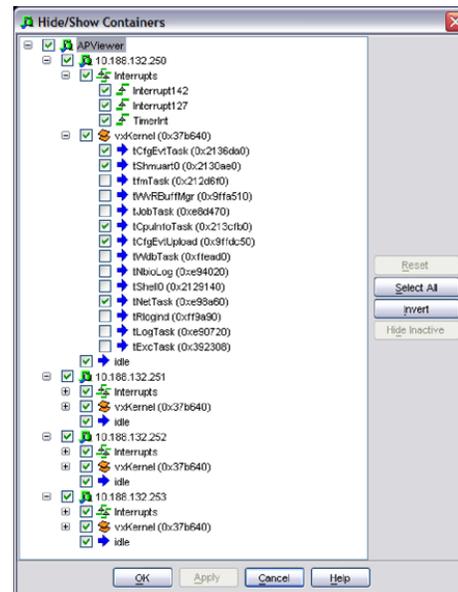
Event Analysis Tool

Event analysis allows the developers to view actions or events that occur on a given processing node. These events can consist of operating system level events such as context switches, semaphore usage, and interrupt processing time. In addition, events can be user-defined. This allows developers to insert events for capture within their application code at various instances within the execution of the application. User-defined data can also be associated with these events allowing post processing analysis, correlated in time with other events within the system.

The Continuum Insights Event Analysis Tool expands upon the System Viewer Tool, for VxWorks, and LTT, for Linux, by allowing the analysis of event data across multiple processors within the multi-computer. Designed for systems consisting of a few to hundreds of processing nodes, Continuum Insights allows developers already familiar with these Viewer Tools to quickly get up and running for accurate analysis of a multi-processing system.

Continuum Insights takes advantage of Curtiss-Wright's Multi- Board Synchronization Clock (MBSC) to accurately time align events that occur on one processor with events that might occur on any other processor or processors within the system. This powerful feature allows board-level events to be correlated in time across an entire system, providing a powerful tool for debugging system-level problems.

Figure 5: Event Filtering



Event Data Graph

Extending the capabilities of the System Viewer Tool from Wind River and LTT for Linux, Continuum Insights provides event data for all processors and cores, or a user-defined subset of processors and cores, in a single time-aligned view. All of the available view manipulation capabilities of the System Viewer Tool and LTT are maintained.

Navigating Within an Event Trace

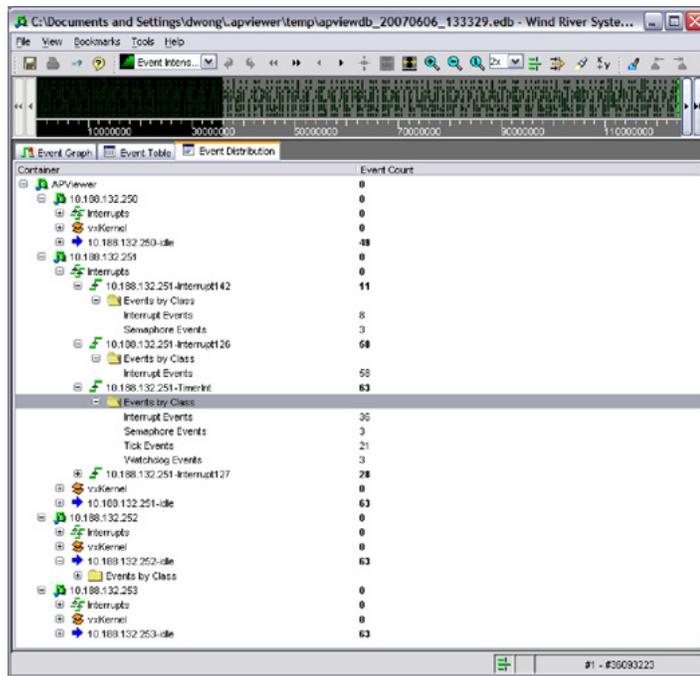
The Event Analysis Tool allows for the manipulation of the event views from a macro system level down to details of one specific event and anywhere in between. Users have the ability to specify a range of time in which to view events. Users can zoom in/out. Advanced search capabilities allow the user to quickly and easily find events of interest.

Filtering Events

Users may wish to filter information displayed in the event data collected for easier visualization of event interactions between tasks and processors, allowing developers to focus on specific tasks or groups of processors at any given time. By allowing particular events to be removed or shown, users can easily correlate events occurring in the system in a simple to understand view.



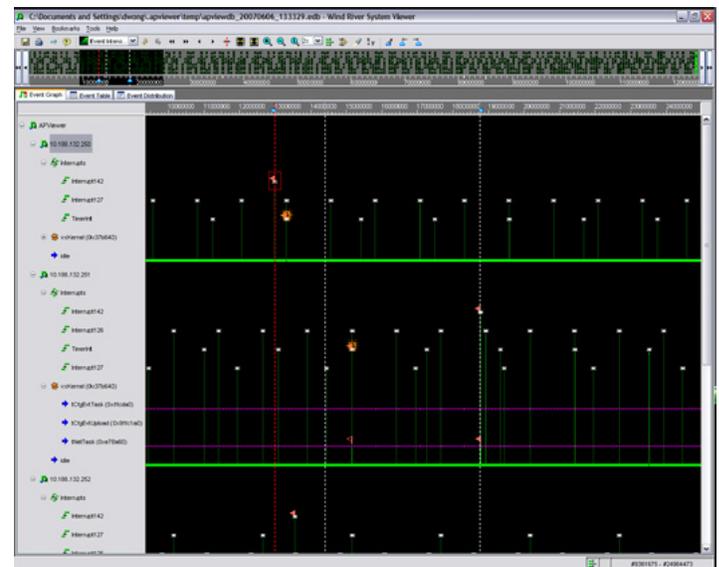
Figure 6: Event Analysis Density Display



Event Data Capture

Using the Continuum Insights GUI, a developer of a multicomputer system can fully configure the entire system, or a subset of the system for event collection. The operator can specify the level of event information collected. For example, the operator may only wish to view operating system level events, or operating system level events plus user-defined level events. User's can also manipulate the target side and host side buffer sizes for event collection. By providing the ability to control the buffer sizes, the system can cache the collected event data, reducing the communications back to the host, which reduces the intrusiveness of the event collection to the actual application code.

Figure 7: Event Analysis Event Selection



System Management Tool

The System Management Tool provides an environment for users to manage and launch executables onto the multicomputer. Ensuring the right application is loaded onto the right processor within a multi-computer can be a tedious task, especially when the multi-computer consists of tens to hundreds of processors. The System Management Tool simplifies this task by allowing the developer to create group definitions that specify a group of processors, the application to load, and how to execute the application. With a simple click of a mouse button, the developer can launch and execute applications across the multi-computer, and manage the execution and initialization of the entire system.

In addition, the System Management Tool provides developers with the capability of completely managing the flash storage sub-system on individual cards or a group of cards. Through the GUI interface of Continuum Insights, developers can store and delete files.



Group Definitions

The System Management Tool allows users to create group definitions that define a set of processors within the multicomputer. The group definition defines the executables that reside on that processor, for example, Firmware versions, BootROM, OS kernel, and any and all application executables. From within the group definitions, developers can manage the following functions:

- ◆ Event Analysis Configurations
 - Event Logging
 - Event Filtering
- ◆ Target Tools
 - Telnet console configurations
 - Task and memory statistics displays
 - Temperature statistics displays
- ◆ Manage flash within the group
 - Environment variable configuration
 - File manipulation (store, delete...)
 - Upgrade firmware

Multi-node Telnet

The multi-node telnet tool allows users to create telnet connections to multiple targets in one single step and allows them to monitor all connections using a single window. Time stamped output from different nodes are displayed in different colors for easy reading. This tool provides many additional capabilities compared to a regular telnet window. It provides the ability to record commands and to run them on multiple targets at a later time. The user can also store commands in a text file and run them on selected nodes. The "Send to all" option gives the ability to send a command to all the connected targets without typing it multiple times. It also comes with the ability to log the outputs from all targets for detailed analysis.

Download Firmware/BIOS

The System Management Tool supports the ability to download firmware/BIOS and boot ROM on any board within the system or on a set of boards defined within a group. The tool simplifies the task of upgrading the firmware/BIOS and boot ROM across multiple boards within the system. Once boards are grouped based on their type, the download of firmware BIOS and boot ROM can be started from the group level in one single step.

Duplicating Environment Variables/BIOS settings

In a system with many boards, it is often desirable for all boards to be configured with uniform firmware and BIOS settings. It is hard to compare the firmware environment variables or BIOS settings to make sure that they match. Continuum Insights makes this easy by letting the user copy the environment variables or BIOS settings on one board to a selected set of boards in the system. Any changes to these settings can be made on one board and the settings can then be duplicated on the desired set of boards.

Launching Applications

Application modules can either be dynamically created at run-time or statically instantiated within the operating system image itself. Typically during the development phase, application modules are dynamically loaded and unloaded to reduce reconfiguration time and OS loading time. During the production and deployment phase, application modules are typically instantiated within the OS image itself to reduce startup time and memory allocation uncertainties. Continuum Insights builds upon both of these development paradigms by providing facilities to simplify the execution of the application across a multitude of processors within a system.

After defining a group of processors, an application module or set of application modules can be assigned to that group allowing the developer to perform the following functions:

- ◆ Download the application module(s) to the group(s)
 - Files can be located in flash or locally on a host
 - Single-click downloads module(s) to all processors within the group
- ◆ Execute/Run Application
 - Specify application module entry point
 - Specify any necessary parameters to entry point

Flash Management

The Continuum Insights System Management Tool GUI interface supports the ability to manage flash on any board within the system or on a set of boards defined within a group. The tool simplifies the task of flash management across multiple boards within the multi-computer by allowing a single file operation to target multiple flash sub-systems.



Typical flash management functions include:

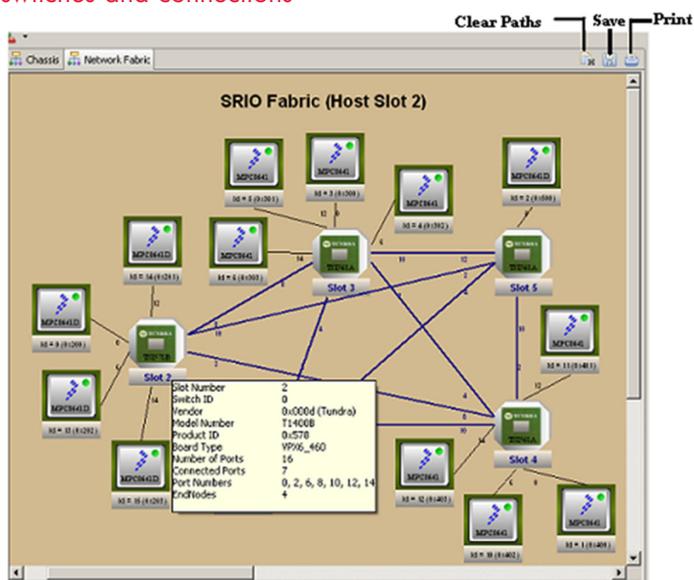
- ◆ Download a new file to the flash file system(s)
- ◆ Delete an existing file in the flash file system(s)
- ◆ Upload an existing file from the flash file system
- ◆ Create/delete/modify environment variables

Network Fabric Analysis Tool

The Network Fabric Analysis tool will probe the target system Serial RapidIO network and determine the complete connectivity of the system. The configuration of the system is then available to the user in either a graphical representation, or a logical hierarchical representation. Serial RapidIO end-points (i.e. processors) and switches are both displayed. A user may drag the component icons to new locations in the graphical view to suit a personal preference. The modified view is saved between sessions.

The tool provides a feature to display the Serial RapidIO routing in the system. The routing defines what path a packet will traverse through the switches from one endpoint to another. In a standard configuration, this will report the routing that was established by the system firmware during Serial RapidIO enumeration.

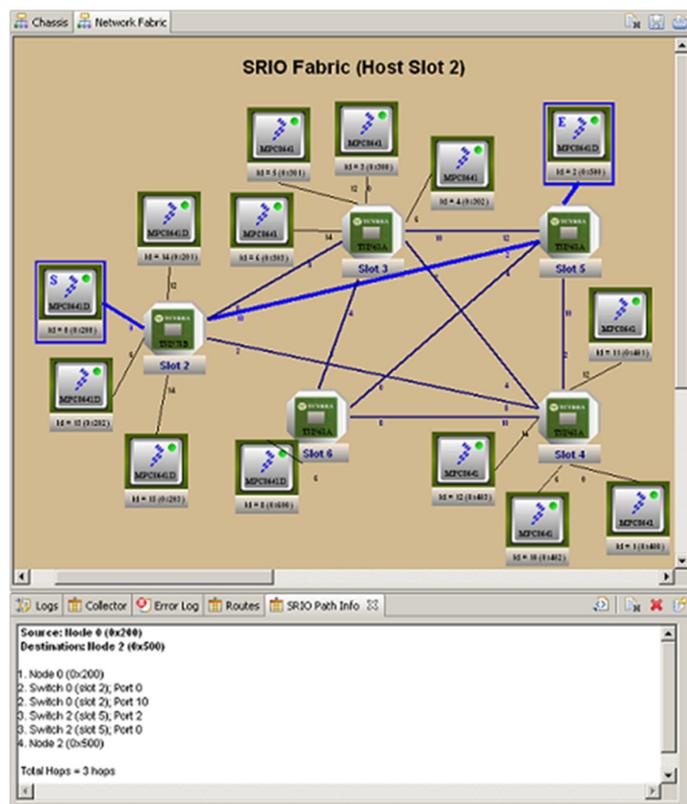
Figure 8: Graphical display of SRIO fabric endpoints, switches and connections



Custom Network Routing

A system designer may wish to exercise specific control over the Serial RapidIO routing in a system. For instance, the system communications traffic may be such that one or more links in the system are over burdened. The Network Fabric tool provides the user with the capability to discretely set any or all of the routes in the system. Having established the desired static routing, Insights can save the configuration to a file which will then be used at system startup to automatically re-establish the customized Serial RapidIO routing. Note that Continuum Insights does not need to be installed on a deployed system in order for the customized routes to be restored.

Figure 9: Graphical display showing route between two endpoints





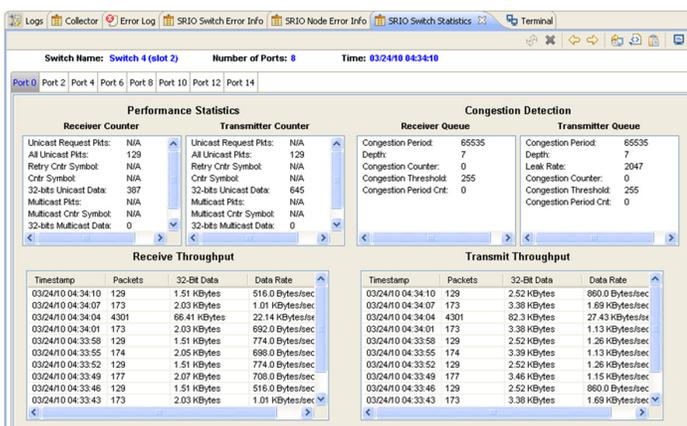
Network Performance Assessment

Is one or more of the Serial RapidIO connections in the system overloaded? Does my system meet the customer's specification for 100% capacity growth? Is my backplane causing a high rate of Serial RapidIO transmission errors? Is my communications load what I think it is?

The answers to these questions may be determined with the performance and error statistic reporting features of the Network Fabric Analysis Tool. The tool provides a mechanism to extract this critical information from the registers within the system Serial RapidIO switches and end-points. The quantity and nature of the Serial RapidIO traffic can be analyzed including information on packet priority classes, uni-cast and multicast packets and control symbols. Congestion statistics are available that measure the occurrence of switch input/output queues reaching a specified depth threshold. A variety of error statistics are accessible including rate of CRC errors and number of dropped packets. Between the performance and error statistics, a user can determine if there are any underlying problems in the Serial RapidIO system and whether those problems are of a data congestion, or signal integrity nature.

The user may examine the performance and error statistics, ad-hoc, or may setup the software to periodically poll and store the information to a file for later analysis.

Figure 10: Performance Statistics Display



Ordering Information

The development license permits software development for one project, unlimited users and unlimited processor nodes. Continuum Insights is distributed on CDROM for development under VxWorks® with Windows-based workstations or Linux on the host and target. The Continuum Insights software is delivered in object code form with example source code and User Guide Documentation. Continuum Insights software is a member of the Continuum HPEC family of products. Specific releases of Continuum Insights will receive HPEC certification when tested in conjunction with the Continuum HPEC family of products. Specific supported configurations are below.

Order part number DSW-INST-001-LNX for Continuum Insights version 5.X supporting the following boards using the Linux operating system: CHAMP-AV8 (VPX6-462), VPX6-1956, CHAMP-FX3 (VPX-472), and VPX6-6902. Software maintenance is available for access to upgrades, fixes, technical documentation updates, and more. For maintenance, order part number: MNT-INST-001-LNX.

Order part number DSW-INST-001-VXW for Continuum Insights version 5.X supporting the following boards using the VxWorks operating system: CHAMP-AV8 (VPX6-462), VPX6-1956, CHAMP-FX3 (VPX-472), and VPX6-6902. Software maintenance is available for access to upgrades, fixes, technical documentation updates, and more. For maintenance, order part number: MNT-INST-001-VXW.

Order part number DSW-DEV-INST-00-CD for Continuum Insights version 4.X supporting the following boards using the VxWorks operating system: CHAMP-AV6 (VPX6-460) multi-processor board, CHAMP-FX3 (VPX6-472), CHAMP-FX2 (VPX6-470) FPGA board, the HPE720 FPGA/FMC board and the VPX6-185 single board computer. Software maintenance is available for access to upgrades, fixes, technical documentation updates, and more. For maintenance, order part number: MNT-DEV-INST-00-CD.

Please contact a Curtiss-Wright sales representative for current hardware and operating system version support.



Warranty

This product has a one year warranty.

Contact Information

To find your appropriate sales representative:

Website: www.cwembedded.com/sales

Email: sales@cwembedded.com

Technical Support

For technical support:

Website: www.cwembedded.com/support

Email: support1@cwembedded.com

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