WHITE PAPER

AXIS Software Development Tools

abaco SYSTEMS

AXIS Software Development Tools

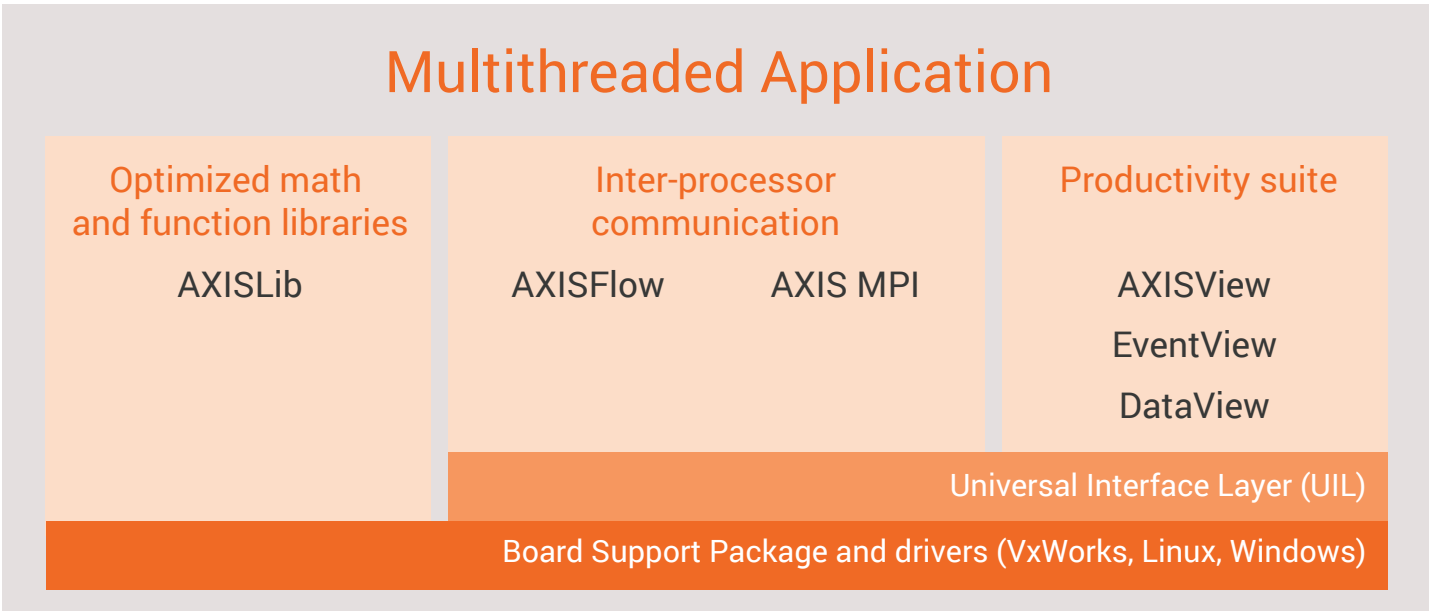
Introduction

AXIS is a full suite of integrated software development tools. It is designed to accelerate the time-to-deployment of complex, multi-threaded applications based on embedded multi-core and multiprocessor platforms.

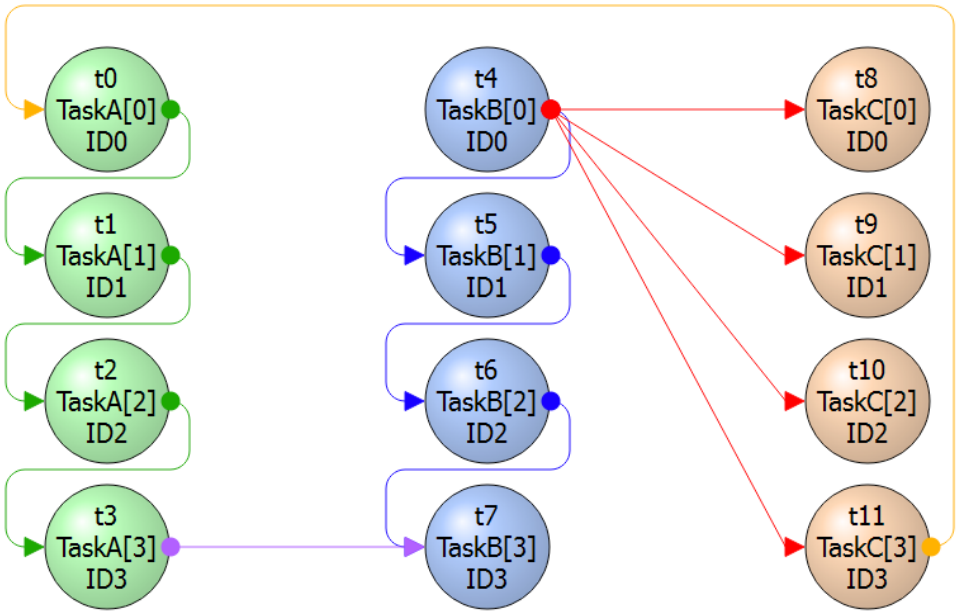
AXIS gives developers the tools you need to be more productive, and largely frees you from the complexities of the underlying hardware architecture – allowing you to focus attention on the area where you are the domain expert—the application.

AXIS

- Accelerates time-to-deployment
- Reduces cost of development
- Minimizes lifetime cost of ownership
- Lessens risk
- Maximizes return on investment
- Enables rapid achievement of optimum performance
- Improves system efficiency (CPU usage, power consumption)



AXIS Software Development Tools



ApplicationView allows developers to visualize thread mappings and dataflow.

Five reasons to choose AXIS

Performance
With high throughput, low latency, reconfigurable communications, AXIS is able to take advantage of high performance fabrics to support the most demanding, data-intensive applications. Optimized libraries deliver the maximum performance for the specific application.

Open Standards
For users to whom it is important, a key strength of AXIS is its support for, and implementation of, industry standards, making applications developed using AXIS straightforward to port to alternative hardware/operating system environments, thus reducing lifetime cost of ownership. AXIS-specific versions of some tools are available that are optimized for the environment, delivering superior ease of use and performance.

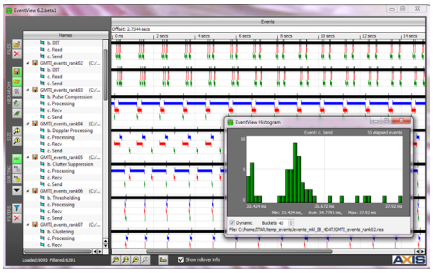
Portability
AXIS is processor- and operating system-independent, as well as supporting industry standards. This allows for the creation of applications which can more easily be moved from current hardware to future platforms. For applications with long life cycles, this portability provides invaluable flexibility and peace of mind as well as protecting the original investment in development.

Scalability
AXIS is specifically designed to simplify the task of moving an application from development to production to deployment. Of equal importance, AXIS offers you the ability to reconfigure or scale the system, depending on the application needs, by adding or subtracting processing elements as required. An algorithm developed for a single CPU can easily be transferred to a higher performance, multiprocessor platform. This scalability brings with it the knowledge that changing hardware and changing application needs will not result in extra development and rework time – again, maximizing the value of the original investment.

Simplicity
The AXIS development environment is inherently intuitive and quick to learn, ensuring ease of use while hiding the complexities of the underlying hardware architecture. System visualization increases productivity and performance, and helps provide consistency between tasks, processors, boards and systems.

AXIS Software Development Tools

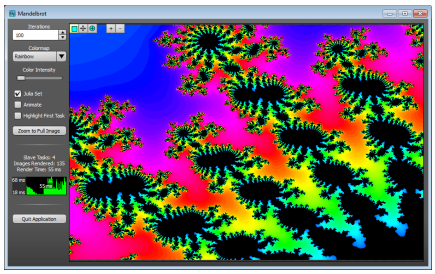
Productivity tools



EventView

AXIS EventView is a performance analysis – or 'event analyzer' – tool that provides a 'C' API library that is used to instrument code by logging events, and a GUI viewer to analyze the subsequent event traces and determine application behavior. It provides the application developer with a much more detailed and intuitive visual analysis of the application's performance than other profiling tools on the market.

EventView enables rapid identification of bottlenecks and non-deterministic behavior. Quick to learn and simple to use, it is highly portable and runs on all current platforms. Its API works across Linux®, Windows® and VxWorks® platforms, while the EventView GUI runs on Windows and Linux. Underlying hardware architectures that are supported include Intel®, ARM® and PowerPC™/Power Architecture™; mixed architecture systems are also supported.



DataView

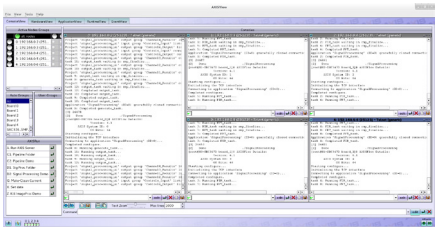
AXIS DataView is a tool for rapidly building graphical interfaces for embedded applications. No expertise in GUI development is required as you don't need to write any GUI code. The GUI is built using simple XML constructs and the GUI is built automatically. A very simple API hooks the application to the GUI controls and displays.

DataView enables GUI controls and live data display to be easily added to an embedded application. Easily mastered and straightforward in use, it is highly portable. It works with applications on Linux, Windows and VxWorks platforms; the GUIs can be hosted by Windows and Linux machines. Underlying hardware architectures that are supported include Intel, ARM and PowerPC/Power Architecture.

AXIS Software Development Tools

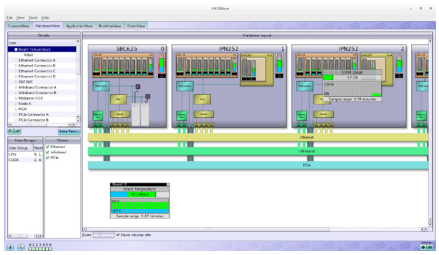
AXISView

AXISView is a suite of graphical software tools that aids you by making the process of developing a portable and scalable multithreaded application as uncomplicated as possible. AXISView comprises the following components.



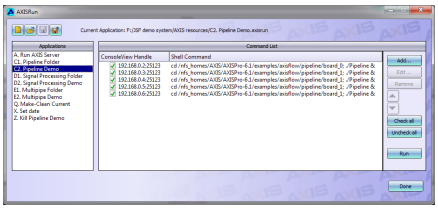
ConsoleView

ConsoleView allows you to manage multiple console windows from a single AXIS window. Commands can be directed to individual nodes or groups of nodes via a simple user interface.



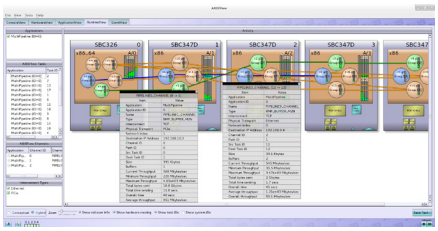
HardwareView

HardwareView provides a unique capability that enables you to visualize the hardware within the system, examine its configuration and monitor sensors.



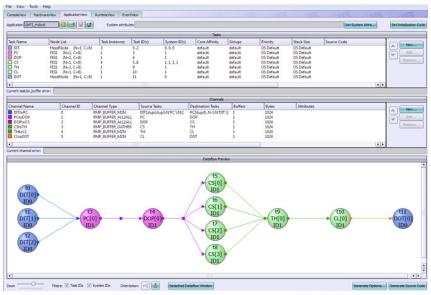
AXISRun

AXISRun streamlines and simplifies the process of issuing commands and running scripts across multiple nodes, making the development cycle as convenient and easy as possible.



RuntimeView

RuntimeView enables the application to be monitored at run-time. The load on system resources (such as CPU usage and communication channel bandwidth) is displayed, allowing you to visually identify performance bottlenecks.



ApplicationView

ApplicationView allows you to build an application in terms of tasks, and AXISFlow communications channels between those tasks, and to view a graphical representation of this. The communication configuration source code and application template are automatically generated. It allows the application to be easily rescaled for different hardware configurations, and to be redistributed among the processors for load balancing of the application.

AXIS Software Development Tools

Performance-optimized inter-processor communications

AXIS delivers the ability to significantly optimize communications between processors, enabling processing resources to be used more efficiently. It provides extreme flexibility of transports, including InfiniBand®, RoCE, TCP, UDP, Posix shared memory, KNEM shared memory and GPU IPC. It uniquely supports heterogeneous architectures including multiple processor architectures (Power PC/Power Architecture, Intel, ARM) and operating systems (Windows, Linux, VxWorks).

AXIS MPI

Providing higher performance and greater simplicity in use than commonly used open source alternatives, AXIS MPI high performance message passing middleware adheres to the industry standard open architecture API, meaning that it benefits from broad compatibility and interoperability.

AXIS MPI has been demonstrated to have a significantly beneficial effect on power consumption/heat dissipation in certain applications, and to deliver substantially superior throughput compared with alternative message passing interfaces. Its support for direct data transfers between GPU memory over RDMA fabrics via GPUDirect™ technology provides a significant performance advantage.

AXIS MPI can be optimized for minimal latency or minimal CPU usage (best SWaP performance), providing flexibility for a wide range of embedded applications.

AXISFlow

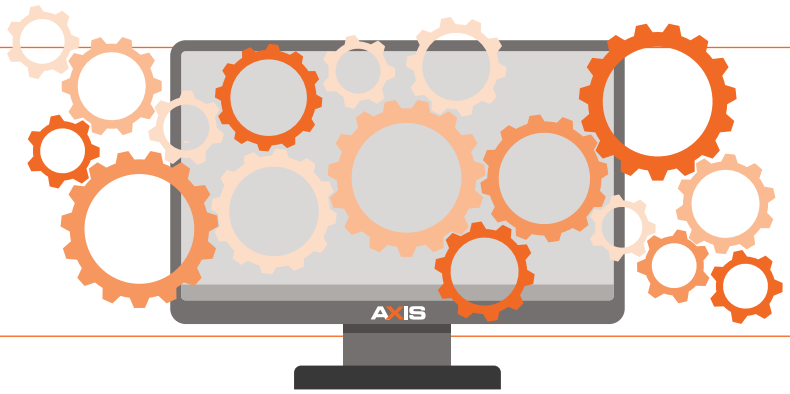
Like AXIS MPI, AXISFlow is an inter-processor communications API library, but it is specifically optimized for embedded, SWaP-constrained environment to deliver higher performance and superior ease of use. It offers high throughput, low latency, reconfigurable interconnects that facilitate data transport between tasks, processors, boards, and systems. Processing elements can be integrated for seamless scalability to meet the requirements of the most demanding applications.

AXISFlow is processor-, operating system- and fabric-independent, ensuring future flexibility. It can operate in standalone mode or as an integrated element within the AXIS Advanced Multiprocessor Integrated Software environment.

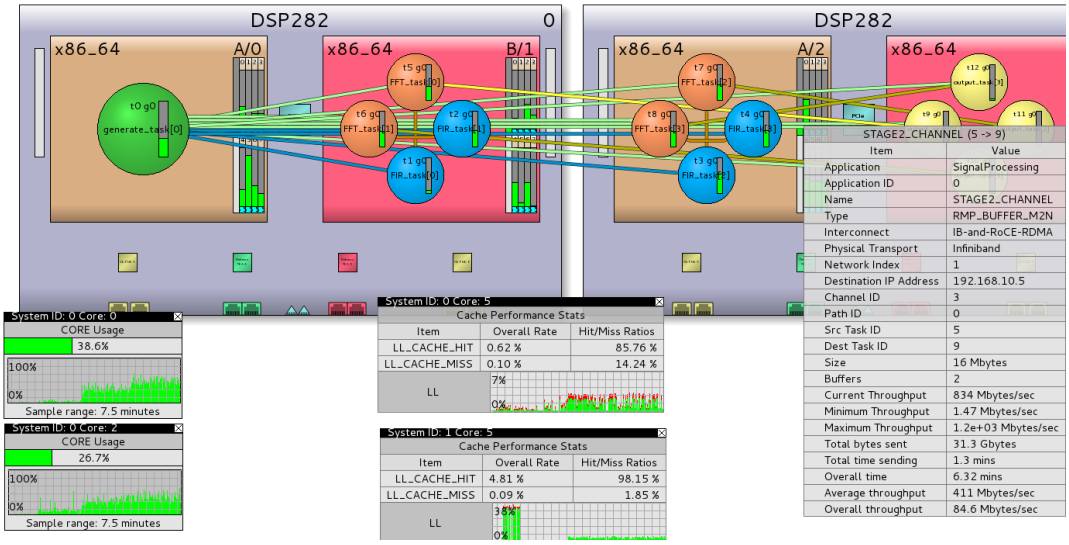
Its architecture provides significant flexibility, providing you with the ability to reconfigure or scale applications to meet future application demand.

Declare independence from your hardware and operating system

In addition to simplifying application development, AXIS creates a layer of abstraction between the application and the hardware and operating system. This independence offers the added benefits of portability and scalability.



AXIS Software Development Tools



RuntimeView allows visualization of real-time applications.

Optimized high performance libraries

AXISLib products provide high performance signal processing and vector math libraries. You have the choice of two APIs. RSPL is a signal processing API optimized for the embedded environment and is performance-focused. VSIPL provides an API that is compliant with the industry standard VSIPL Core 1.0 profile, providing a layer of abstraction to ensure portability. Both APIs are provided for either Intel architecture systems or for those based on the PowerPC/Power Architecture platform.

Abaco can supply performance benchmarks for a suite of common DSP and vector math functions on the latest Intel and PowerPC/Power Architecture platforms.

AXISLib-AVX

AXISLib-AVX provides a suite of more than 600 performance-optimized digital signal processing (DSP), linear algebra and vector math function libraries for latest generation Intel Core™ i7 and Xeon® D processors with AVX2 that deliver world class performance for size, weight and power (SWaP) constrained platforms. AXISLib-AVX extends support beyond the AVX1 256-bit floating point unit introduced on previous generation SKUs, to the latest generation AVX2-enabled platforms that add fused multiply add (FMA) and 256-bit wide integer instructions.

AXISLib libraries include support for single- or multi-threaded operation that allow you to derive the most benefit from Intel's latest multi-core platforms.

AXISLib-AVX runs on Red Hat® Enterprise Linux (RHEL) as well as Wind River Systems VxWorks 6.9 and Windows 7 (all 64-bit). RHEL-compatible and real-time Linux distributions may also be used.

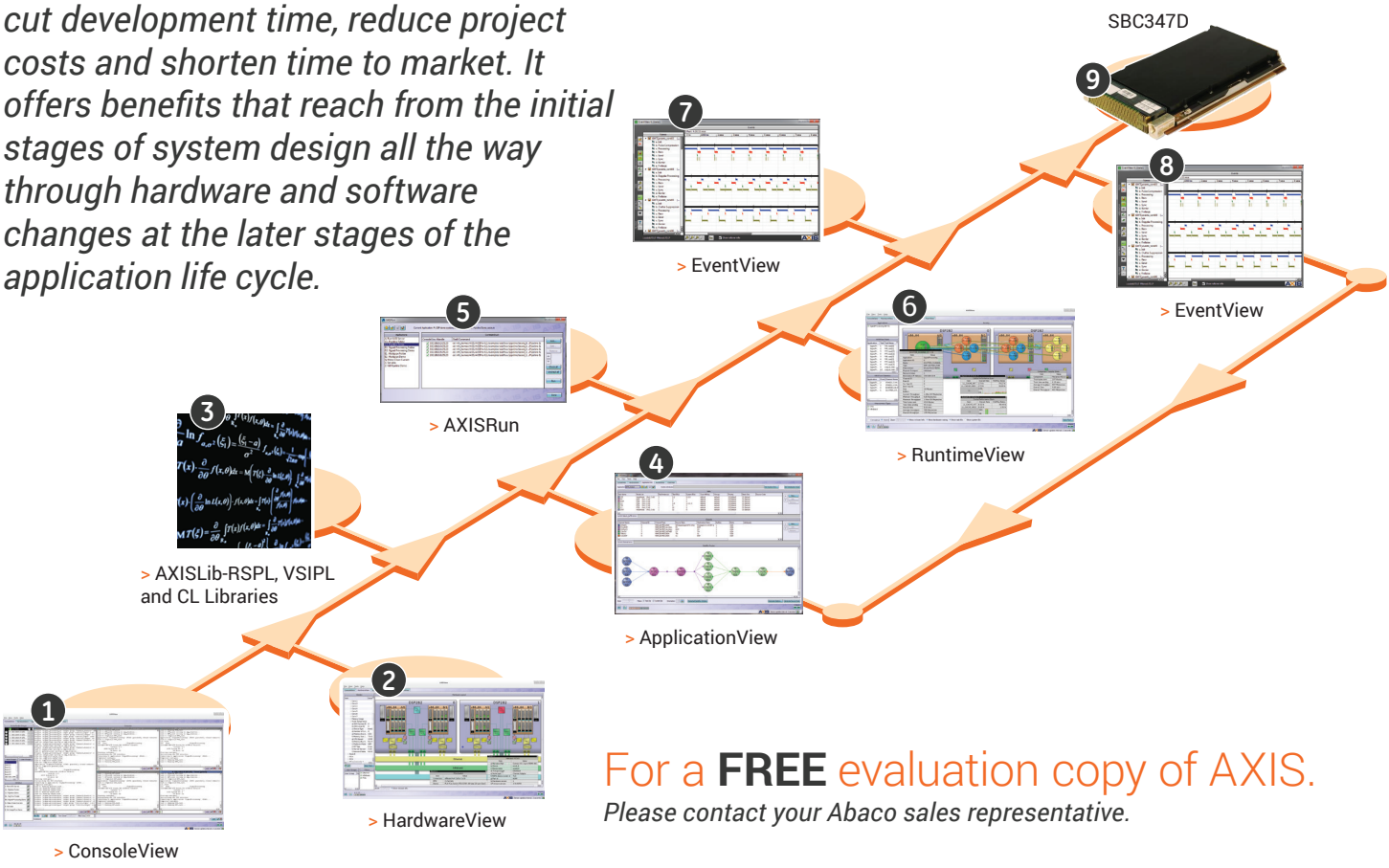
AXISLib-PPC

AXISLib-PPC provides over 600 signal processing, linear algebra and vector math functions for the latest Freescale Power PC platforms with AltiVec™ such as the MPC8640D and T2081. The RSPL and VSIPL API libraries are highly optimized to take advantage of the 128-bit wide AltiVec SIMD unit, allowing four floating point operations to occur in parallel. AXISLib-PPC's utilization of this has been demonstrated to enable a close to theoretical x4 performance increase over regular 'C' coded algorithms,

AXISLib-PPC gets the best performance out of the deployed system while reducing project work load, cost of ownership and shortening time to solution. It runs on VxWorks 6.3 to 6.9 as well as Yocto Linux (both 32-bit).

AXIS Software Development Tools

AXIS is a modular architecture that puts control in the engineer's hands. It can cut development time, reduce project costs and shorten time to market. It offers benefits that reach from the initial stages of system design all the way through hardware and software changes at the later stages of the application life cycle.



For a **FREE** evaluation copy of AXIS.

Please contact your Abaco sales representative.

1. **Initialize the system**
   Quickly configure all nodes in the system
2. **Check system configuration**
   Automate system configuration validation
3. **Maximize algorithm performance**
   Identify opportunities for improvement
4. **Map application to system**
   Place tasks for best performance
5. **Run the application**
   Download and run on multiple nodes with two clicks
6. **Determine bottlenecks**
   Locate and resolve bottlenecks in data flow and task performance
7. **Measure real-time performance**
   Profile runtime data across entire system
8. **Rescale the application**
   Move the application to larger or smaller systems
9. **Migrate to a new system**
   Reduce future life cycle support issues

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