VisualDSP++ Development and Debugging Environment

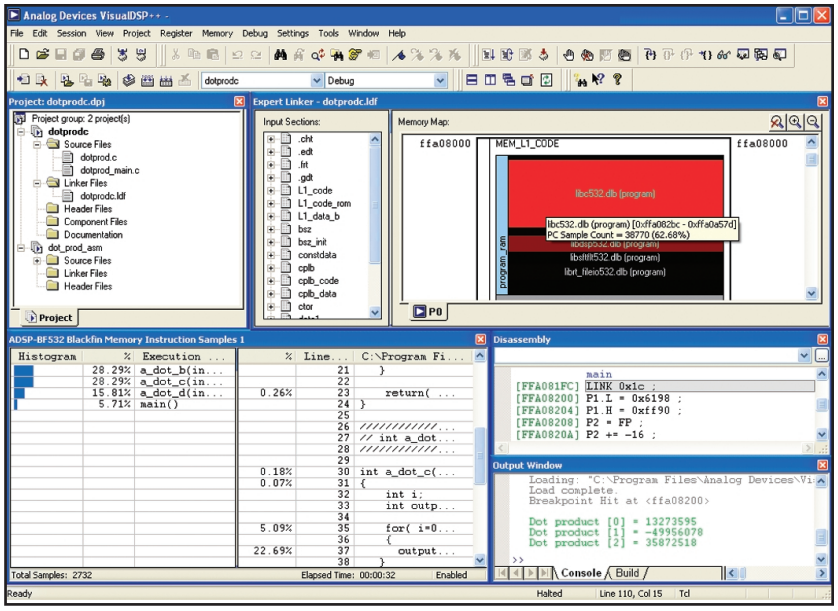
Key Features

Integrated Development and Debugging Environment

- Support for all of Analog Devices' processors and DSPs
- Multiple project support
- Profiling and tracing of instruction execution
- VisualDSP++ Kernel (VDK) with multiprocessor messaging capability
- Automation API and Automation Aware Scripting Engine
- Multiple processor (MP) support
- Background Telemetry Channel (BTC) support with data streaming capability
- Statistical profiling
- Graphical plotting capabilities
- VisualDSP++ Component Software Engineering (VCSE)
- Cache Visualization
- Pipeline Viewer
- Compiled Simulation

Efficient Application Code Generation

- Native C/C++ compiler and enhanced assembler
- Profile-Guided Optimization (PGO)
- Expert Linker with profiling capability
- Integrated Source Code Control



Overview

VisualDSP++™ is an easy-to-install and easy-to-use integrated software development and debugging environment (IDDE) that enables efficient management of projects from start to finish from within a single interface. The project development and debugging environments are integrated, allowing movement quickly and easily between editing, building, and debugging activities. Key features include the native C/C++ compiler, advanced graphical plotting tools, statistical profiling, and the VisualDSP++ Kernel (VDK), which allows the users' code to be implemented in a more structured and easier-to-scale manner. Other features include assembler, linker, libraries, splitter, cycle-accurate and functional-accurate compiled simulators, emulator support, and much, much more. VisualDSP++ offers programmers a powerful yet easy-to-use programming tool with flexibility that significantly reduces the time to market.

Platform and Processor Support

VisualDSP++ supports all of Analog Devices' processors and DSPs, including Blackfin® Processor, TigerSHARC® Processor, SHARC® DSP, ADSP-218x, ADSP-2199x and ADSP-219x DSP families on Windows® 98, Windows ME, Windows NT 4.0, Windows 2000, and Windows XP.

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Robust and Flexible Project Management

The IDDE provides robust and flexible project management for the development of applications and includes access to all the activities necessary to create and debug projects. It enables users to open and switch between multiple projects in the same session. A project group that can contain any number of projects can be saved to a file so that the same set of projects can be conveniently opened in any other work space at a later time.

Time-Saving Debugger

The VisualDSP++ debugger has a user-friendly, common interface to simulators and emulators available from Analog Devices and participating third parties. In addition, the debugger has many features that greatly reduce debugging time. Users can view C/C++ source code interspersed with the resulting assembly code, profile execution of a range of instructions in a program, set watch points on hardware, view program and data memory, and trace instruction execution and memory accesses. These time-saving features enable users to quickly correct coding errors, identify bottlenecks, and examine signal processor performance all within the debugger. Also, when used with the simulator, the debugger can generate inputs, outputs, and interrupts to simulate real-world application conditions and give users better insight in tuning the performance of their code.

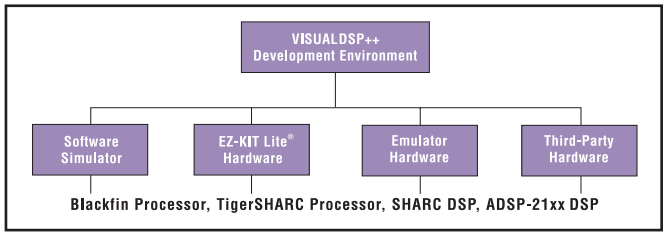
VisualDSP++ Kernel

The VisualDSP++ Kernel (VDK) provides state-of-the-art scheduling and resource allocation techniques tailored specifically to address the memory and timing constraints of programming. For example, in the case of multiprocessor messaging, a message-routing graph table can be specified by users at build time to accommodate virtually any network topology. These techniques enable engineers to use example code more efficiently, often eliminating the need to start projects from scratch and saving development and debugging time. To save users even more time, VDK also has standard libraries and frameworks with defined APIs that allow easy inclusion of boilerplate, class libraries and value-added IP code.

Automation API and Automation Aware Scripting Engine

The Automation API enables additional features and functionality to be added into the VisualDSP++ environment via a Microsoft® ActiveX plug-in. Third parties are able to seamlessly port their software to the VisualDSP++ front end. Developers are able to merge tool suites to improve design, analysis, and verification, and will only need to learn one interface to use Analog Devices' third-party tools.

The Automation Aware Scripting Engine using the ActiveX script host framework allows the use of multiple popular scripting languages, such as VBScript and JavaScript, to access the Automation API. A user is able to interact with the IDDE using either a single command or a script file.



Reduce debugging time: VisualDSP++ simplifies development via a common development environment across all Analog Devices hardware and processors.

Multiple Processor (MP) Support

VisualDSP++'s multiple processor (MP) support provides a single seamless interface for debugging multiple processors on the same hardware. Users can easily issue parallel step, run, and halt commands to all of the applicable processors. Developers can easily pick and choose individual processor registers, or memory sets of interest, by pinning those that should be updated between runs, halts, and steps. This feature also eliminates screen clutter in multiple processor debugging.

Background Telemetry Channel Support

The Background Telemetry Channel (BTC) feature is a mechanism for exchanging data between a host and a target application, with minimal intrusion on the target system's "real-time" characteristics and minimal addition on a user's development and debugging time. BTC enables real-time data collection and status messaging, eliminating the overhead involved with halting the target application, getting the desired information, and then restarting the target application. BTC is currently supported on Analog Devices' Blackfin Processor family, as well as the SHARC and ADSP-219x DSP families with VisualDSP++ release 3.0 and higher. Furthermore, starting with VisualDSP++ release 3.5, users will be able to benefit from BTC directly within the IDDE plot window if their targets support BTC. In this case, the plot window will read the target's memory contents on a user-defined time interval and upon receipt of the data convert them to the desired data type and update the plot display for users to view and analyze immediately.

Statistical Profiling

Statistical profiling allows for a more generalized form of profiling that JTAG emulator debugging targets can take advantage of. The debugger has the ability to unobtrusively and statically sample the target processors and then present the user with a graphical display of the resultant samples for review. This enables the user to easily and effortlessly identify where an application is spending most of its time.

Graphical Plotting

VisualDSP++ includes numerous graphical plotting options, including Line, Constellation, Eye Diagrams, and 3D waterfall plots that help users to better visualize, analyze, and understand their data. The plotting engine is also capable of doing some simple data processing, such as Fast Fourier Transform, 2-D Fast Fourier Transform, and Convert to Decibels on the data before it is displayed.

VisualDSP++ Component Software Engineering (VCSE)

VCSE supports an Interface Definition Language (IDL) and compiler that allow developers to create and reuse components without having to become familiar with the detail of the model and the mechanisms it involves. Components can easily be integrated into an application and are reusable. VCSE dramatically simplifies the process of incorporating and utilizing components from a variety of developers.

Cache Visualization

Cache statistics such as Total Cache Accesses, Cache Hits, and Cache Misses are associated with both the PC/Source Line and the Cache Line/Set and are collected by the simulator. Once these statistics are collected, a user will have the option to easily view and analyze them in the following formats: Histogram by PC/Source Line, Cache Line Display, where hit/miss data is associated by Cache Line/Set (way), and Summary Display of totals for hits/misses by cache.

Pipeline Viewer

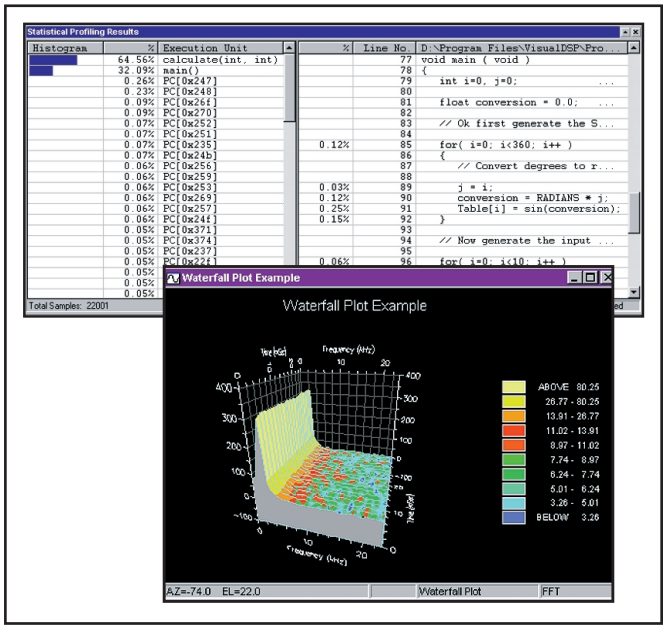
The Pipeline Viewer is an ActiveX plug-in for the IDDE that allows a user to easily view the instruction flow through the sequencer's pipeline. Stalls, aborts, and other pipeline events are graphically represented in an easy-to-read format for the developer. Visualization of the pipeline, and of the events that occur within it, allows a user to better understand where and why latencies and stalls are being introduced into an executable. Armed with this knowledge, the user can effectively and efficiently optimize an executable's instruction sequence to minimize the number of undesirable pipeline events.

Compiled Simulation

Traditionally, a standard simulator fetches, decodes, and then simulates each instruction that an application executes. For effort- and time-sensitive users, this approach is inefficient and costly, as each time an instruction is executed, it has to be decoded first. With Compiled Simulation, the simulation compiler automatically examines the whole application once and generates C code for each instruction in the application, essentially building a C program that is particularized to execute that one application. As a result, the generated application can be used to simulate that one application very efficiently (at speeds of 100 to 1,000 times faster than the ordinary simulator).

Native C/C++ Compiler and Enhanced Assembler

The native best-in-class C/C++ compiler is a time saver for developers who use it for application code generation. It generates efficient application code that is optimized for both code density and execution time, and can be easily interfaced with assembly code modules so that users can primarily program in C/C++ and still use assembly for time-critical loops. Beyond that, with C++, developers can realize an additional significant decrease in their time to market with the ability to efficiently work with complex signal processing data types and take advantage of specialized operations without having to understand the underlying architecture. VisualDSP++ simplifies development on the whole by providing a common development environment across all Analog Devices hardware and embedded processors.



Statistical profiling and graphical plotting.

While the assembly language used for Blackfin Processors, TigerSHARC Processors, SHARC DSPs, ADSP-218x (ADSP-218x does not have C++ support), and ADSP-219x DSP family is based on an algebraic syntax that is easy to learn, program, and debug, the enhanced assembler further eases the programmer's burden in writing optimal assembly code by analyzing code sequences and providing feedback to the user on latencies and stalls.

Profile Guided Optimization

Profile Guided Optimization, or PGO, is an iterative compilation approach that uses information from previous compilations to improve the optimizer's decisions on the code being compiled.

Traditionally, a compiler only compiles each function once and attempts to generate code that will perform optimally in most cases by making reasonable default assumptions in the behavior of that code.

With PGO, the compiler makes educated assumptions based on data collected during previous executions of the generated code and subsequently makes decisions about the relative importance of parts of the application, rather than simply using the default behavior. This technique can enable large gains to be realized in the run-time performance and code density of the program automatically without additional effort by the users. PGO is supported on the Blackfin Processor, TigerSHARC Processor, and SHARC DSP families.

Expert Linker

The Expert Linker creates a graphical utility that makes it easier for users to produce Linker Description File (LDF) without having to learn the LDF syntax. The graphical representation of the commands in an LDF file also allows the engineer to easily manipulate the graphical representation for changes to the LDF or generation of an LDF file. In release 3.5 of VisualDSP++, the Expert Linker also allows users to easily profile object sections in their program, identify "hot spots" graphically, and optimize their placement of code in a single step with minimal additional effort.

Integrated Source Code Control

The Source Code Control (SCC) plug-in for the IDDE enables users to easily connect to SCC applications that are installed on their machines through the Microsoft Common Source Code Control (MCSCC) interface that is widely supported by leading SCC vendors. Using the plug-in, users can also access commonly used features (such as getting the latest version, checking out, and removing a selected file from source code control) of these SCC applications, launch the SCC applications, and view a file's source control status in a project window quickly and conveniently without leaving the IDDE.

The DSP Collaborative

The VisualDSP++ environment enables independent third-party companies to add value using Analog Devices' published set of application programming interfaces (APIs). The DSP Collaborative™ is an independent network of third-party developers. The DSP Collaborative product offerings—real-time operating systems, emulators, high level language compilers, and multiprocessor hardware—can interface seamlessly with VisualDSP++, thereby simplifying development across all platforms and targets.

Take a VisualDSP++ Test Drive!

Take a free 90-day test drive of VisualDSP++. To take a test drive you can download a test drive or request a CD from the Analog Devices DSP Tools website at www.analog.com/processors/tools/testdrive or contact your local Analog Devices sales representative/distributor.

Analog Devices' Tools Product Line

CROSSCORE™, Analog Devices' development tools product line, provides easier and more robust methods for engineers to develop and optimize systems by shortening product development cycles for faster time to market. The CROSSCORE components include the VisualDSP++ software development environment, EZ-KIT Lite™ evaluation systems, and emulators for rapid on-chip debugging. For more information on development tools visit the Analog Devices website, www.analog.com/processors/tools.

Embedded Processors and DSPs

Analog Devices is a leading supplier of embedded and digital signal processing solutions, from the low power ADSP-21xx DSP families to the high performance Blackfin and TigerSHARC Processors, and from the low cost SHARC DSPs to integrated mixed-signal DSPs that are ideal for an ever-increasing spectrum of applications. Analog Devices' advances in design provide faster processing, more memory, lower power consumption, and simplified system integration. Analog Devices' products and technology provide a competitive edge, complete with expert technical support, comprehensive development tools, and the DSP Collaborative. For more information about Analog Devices' processors and DSPs, visit www.analog.com/processors.

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Ordering Information

Please call Analog Devices CROSSCORE Tools at 603-883-2430 or your local Analog Devices sales representative or distributor for pricing and ordering information for part number:

VDSP-SHARC-PC-FULL

VDSP-TS-PC-FULL

VDSP-21XX-PC-FULL

VDSP-BLKFN-PC-FULL

Floating licenses and volume discounts are also available.

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