Stretch IDE

The Stretch® Integrated Development Environment (IDE) unifies the development of compute-intensive application software and configuration of the Instruction Set Extension Fabric (ISEF) in the Stretch S5000 and S6000 families of software configurable processors. The Stretch IDE provides an intuitive development flow and a simple methodology for application development. Within the Stretch IDE, system developers use standard C/C++ methods to create complete applications including the specialized Extension Instructions of software configurable processors.

Stretch IDE provides a single environment for performing the following tasks:

- Functional development: Compile, run, and debug application code and Extension Instructions directly on the host (X86) processor
- Performance tuning: Compile and run application code with Extension Instructions using a cycle-accurate instruction set simulator
- System verification: Download and run application code on the customer target system or Stretch development board
- In-circuit debugging: Download and debug application code on the target system via a JTAG interface

Stretch IDE provides a graphical interface to the following tools:

Stretch C Compiler — An integrated C/C++ and Stretch C compiler for compiling both application code and Extension Instructions.

Instruction Set Simulator — A fast and cycle-accurate simulator used for debugging, performance measurement, and profiling.

Profiler — An instruction-level and event-level profiler for providing detailed information about program execution.

Debugger — A powerful source-based debugging environment for application code as well as Extension Instructions.

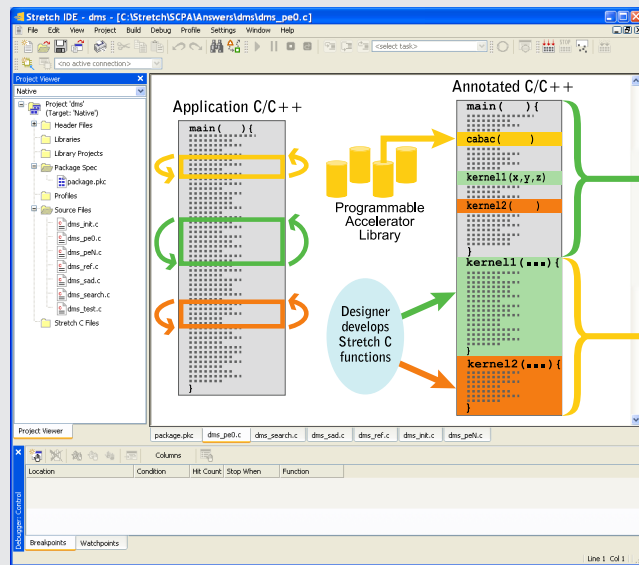**Text Editor —** A dynamic environment for editing C/C++ and Stretch C source code.

Project Manager — A resource for managing projects, builds, boards, and licenses.

Processor Array Manager — An easy way to describe the processor array topology and to direct the compiler to build applications for multiprocessor systems based on the S6000 family.
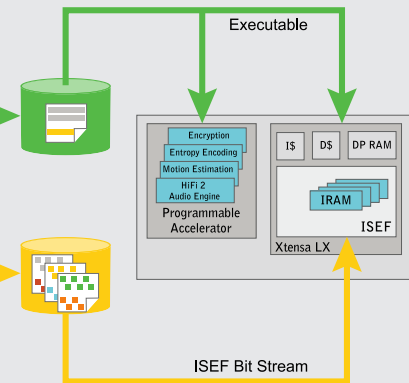
STRETCH IDE ADVANTAGES

> Intuitive development flow and simple methodology for developing and optimizing applications on Stretch's S5000 and S6000 families of software configurable processors

> Single, unified development environment (Stretch C Compiler, Stretch Instruction Set Simulator, Profiler, Debugger, and Processor Array) with the familiar look, feel, and flow of industry-leading IDEs

> Automatically converts Stretch C into Extension Instructions and ISEF configuration data

> Fast compile time for efficient development

> Runs on PC systems with Windows XP or RedHat Enterprise Linux

Software View　　　　　　　　Hardware View

Executable

Annotated C/C++

ISEF Bit Stream

Software Development Environment

Stretch C Compiler (SCC)

SCC is the first and only compiler that optimizes both the application code and the instruction set of the processor on which the application runs.

SCC generates highly optimized logic for Extension Instructions. This logic is then pipelined, placed, and routed on the Instruction Set Extension Fabric (ISEF). SCC's powerful optimizations and hardware generation capability create the smallest and fastest logic for the Extension Instructions. As a result, users can fit a large number of operators in the ISEF, enabling significant application acceleration. Generating an Extension Instruction is as easy as writing and compiling a C function. There is no need to learn hardware description languages like Verilog or VHDL or cumbersome logic design tools.

Instruction Set Simulator (ISS)

Stretch's ISS enables fast and cycle-accurate simulation of an application on the host workstation. The ISS:

- Is cycle accurate
- Models cache and memory latency effects
- Models Extension Instructions
- Provides full access to processor registers
- Outputs information such as cache misses and pipeline stalls
- Outputs profiling data used by the profiler
- Connects to the Stretch debugger
- Generates trace information for analysis in the IDE

Profiler

Stretch provides the tools required to profile an application either on the evaluation board or on the ISS. Two types of profiling are supported, call graph and instruction-level.

Debugger

Stretch's state-of-the-art debugger can be used to debug applications running in emulation on the host, on the ISS, or on a Stretch processor. Based on the GNU GDB tool, this debugger provides all the productivity features needed to debug today's complex applications in all phases, including program loading, execution, debug control, and monitoring. The Stretch debugger gives customers the ability to not only debug the application code, but also Extension Instructions.

Run-Time Software Libraries

StretchBIOS (SBIOS) provides the run-time libraries for C and C++, handlers for exceptions and interrupts, and drivers for S5000 and S6000 peripherals.

Processor Array BIOS (PABIOS) provides a run-time environment and communication toolkit for building applications for S6000 multiprocessor systems (processor arrays). The run-time environment provides a cooperative multitasking kernel, with task creation and management services, along with distributed memory allocation, mutex and semaphore support, event logging, and profiling. The communication toolkit allows tasks to communicate seamlessly across multiple processors and to exchange both bulk data and small messages.

The Programmable Accelerator application library provides convenient access to optimized functions for motion estimation, entropy encoding, audio codecs, and encryption.