

SBIR Topic Number:
OSD03-022

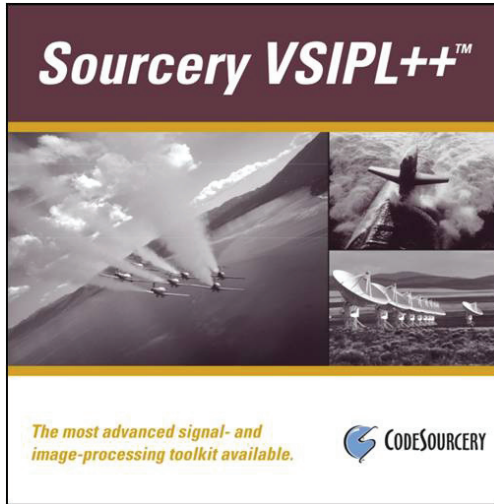
SBIR Title:
High Performance Object
Oriented Software for
Parallel Embedded Systems

Contract Number:
FA8750-05-C-0004

SBIR Company Name:
CodeSourcery, Inc.
Granite Bay, CA

Technical Project Office:
AFRL Information
Directorate, Rome, NY

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



Sourcery VSIPL++ is widely applicable to a variety of military radar, communication and sonar signal, and image processing applications

Software Toolkit for Developing High-Performance Signal and Image Processing Applications

- The Air Force faces several challenges in reusing high performance signal and image processing software. Rapid changes in hardware technology can make existing software obsolete.
- CodeSourcery demonstrated that its Sourcery VSIPL++ product can deliver the same levels of performance as lower-level programming techniques, but with dramatically less code and full portability across systems.
- Developed with SBIR funding, the Sourcery VSIPL++™ software library implements the open-standard VSIPL++ Application Programming Interface (API).
- The technology can be used in a broad range of defense and commercial fields, including medical imaging.

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DISTRIBUTION A:
Approved for public
release; distribution
unlimited.

Air Force Requirement

The Air Force faces several challenges in reusing high-performance signal- and image-processing software. This software has tended to be tied closely to a particular hardware platform, and rapid changes in hardware technology have thus made existing software obsolete.

Writing this software – which often involves programming multiple central processing units (CPUs) simultaneously – has been especially difficult and error-prone. The Air Force needs a more efficient and effective way to maintain full portability across systems for high-performance software.

SBIR Technology

CodeSourcery developed its Sourcery VSIPL++™ software product with SBIR funding provided by the Air Force. The product implements the open-standard VSIPL++ Application Programming Interface (API). This API [co-designed by CodeSourcery and other members of the Vector Signal and Image Processing Library (VSIPL) Forum] provides a high-level object-oriented programming model for signal- and image-processing applications and includes support for parallel programming.

CodeSourcery optimized its implementation of the API to provide high levels of performance on systems containing x86 and Power Architecture CPUs. Sourcery VSIPL++ can deliver the same levels of performance as lower-level programming techniques, but with dramatically less code and full portability across systems.

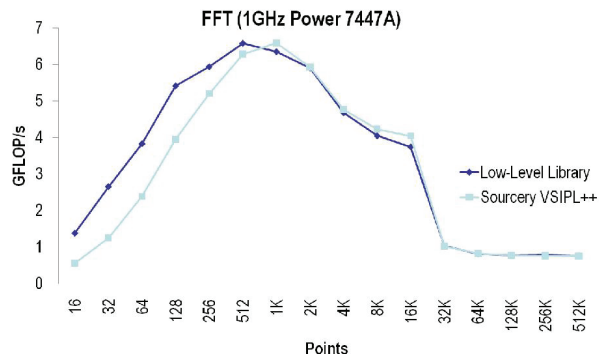
Potential Air Force Application

Sourcery VSIPL++ will provide the Air Force and its contractors with a way to write faster, more reliable code that can run on hardware platforms available today and in the future. As a result, this technology will make it cheaper, faster, and easier for the Air Force to develop software in the future.

The VSIPL++ API is widely applicable to a variety of military radar, communication and sonar signal, and image processing applications. In addition to the libraries, CodeSourcery developed and optimized VSIPL++ routines for NCet and Gotcha Synthetic Aperture Radar (SAR) processing.

CodeSourcery highlights the advantages of using its new technology product as follows:

- Productivity: With Sourcery VSIPL++'s compact syntax and intuitive API, algorithms can be expressed with much less code than would be necessary in C syntax. In addition, automatic communication and memory management save time and eliminate defects.
- Performance: The product utilizes sophisticated C++ techniques and takes advantage of optimized libraries so that an application runs as fast as if it were hand-coded.



Sourcery VSIPL++ vs. a Low-Level Library on Fast Fourier Transform (FFT) Performance

- Portability: Applications can be deployed and reused on workstations, embedded systems, or supercomputers.

Company Impact

"The Air Force support for our development of Sourcery VSIPL++ has had a major impact on the growth of CodeSourcery," said Mark Mitchell, CodeSourcery's Chief Sourcerer. "Sourcery VSIPL++ has drawn tremendous interest from major defense contractors and from other fields, including medical imaging. We're presently engaged in porting Sourcery VSIPL++ to the Cell/B.E. Processor with funding from IBM, and there are now major commercial users of Sourcery VSIPL++. We'll be releasing a new version of Sourcery VSIPL++ – with even greater performance – in the fall of 2008, and we've been awarded a new Phase I SBIR project to continue our development."

CodeSourcery builds software tools that enable its customers to get the most out of hardware platforms ranging from embedded devices to supercomputers. Founded in 1997, CodeSourcery is a privately-held company headquartered in Granite Bay, California.



SBIR/STTR

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