Parallel Vector & Signal Processing

CodeSourcery, LLC
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Overview

VSIPL++ is a C++ library for:
• Vector processing
• Signal processing

Applications:
• Missile systems
• Radar arrays
Objectives

• Performance
  – Proven techniques from POOMA
• Parallelism
  – SPMD
• Portability
  – Standard ISO C++, MPI
• Rapid Development
  – High-level abstractions
Development Plan

• **Specification Development**
  – Substantially complete

• **Reference Implementation**
  – Serial implementation at proof-of-concept stage
  – Parallel implementation in FY 2003

• **Optimized Vendor Implementations**
  – Not yet underway
Background: VSIPL

- C library for vector and signal-processing applications
- Multiple vendor implementations

VSIPL++ Additions:
- Parallelism
- Simpler syntax
- Extensibility
**BLAS zherk Routine**

*zherk* performs a rank-k update of Hermitian matrix $C$:

$$C \leftarrow \alpha \ast A \ast \text{conjug}(A)^t + \beta \ast C$$

```cpp
Matrix<complex<double> > A(10,15);
Matrix<complex<double> > C(10,10);
C = alpha * prodh(A,A) + beta * C;
// Matrices and data automatically destroyed.
```
Development Benefits

• Automatic parallelism
  – No explicit MPI calls
• Code uses mathematical notation
• Automatic memory allocation
• Fewer opportunities for error.
• Reduced development costs
• Reduced development time
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