A General Framework for Multicore Programming
with Sourcery VSIPPL++

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• Multicore Programming is Hard.

• Dividing array operations into blocks is (often) simple; scheduling them is difficult.
  • Data dependencies.
  • Communication latency.

• A solution: Automatic scheduling.
  • We are extending our Sourcery VSIPL++ library to do this.
- Framework is based on a dataflow description.
  - Tasks: Operations on array blocks.
    - Can reference implementations on multiple architectures.
  - Array Conduits: Move array blocks between tasks.

```c
Conduit_matrix A, B, C, T, Z;
...
Forall_index i(0, A.n_blocks(0));
  Forall_index j(0, A.n_blocks(1));
    T(i,j) = task_mult(B(i,j), C(i,j));
    Z(i,j) = task_add(A(i,j), T(i,j));
```

- Portability: Most of this is architecture-independent.
• **Proof-of-Concept Demonstration.**
  • **Portability.**
  • **Performance:**

![Graphs showing speedup vs. number of threads and SPUs](image)

- Multicore x86
- Cell / B.E. SPUs

• **Design in progress: We’d like feedback!**