Mul:processors are ubiquitous, but programming them continues to be challenging.

Our Goal: Simplify multiprocessor programming without compromising performance.

Order in programs obstructs parallelism.
- Use non-deterministic programs, or order in programs obstructs parallelism.
- Use exact parallelism algorithms, or order in programs obstructs parallelism.

Run-time parallel execution manager (C++ library)
- Performs out-of-order super scalar processor-like execution
- Dataflow scheduling
- Speculation
- Globally precise-interruptible

Precise-restart Engine
- Tracks tasks and their order in a Reorder List
- Checkpoints mod id in History Buffer
- Retries task in (total) program order

Dataflow Engine
- Unblocks parallelism past blocked tasks in the program
- Constructs dynamic data dependence graph using write and read sets
- Executes tasks out-of-order if task dependence/orde order are unknown, speculates tasks are independent
- Detects and rectifies misspeculation

Scales fault-tolerance with system size
- Better speedups (75%, ~3X) than OpenMP, Cilk
- Better speedups (20%) than Pthreads
- Better speedups than Conventional Checkpoint-and-Recovery

Evaluation
- Better speedups than Cilk, TL2 STM