Parallel Software Technologies Laboratory PSTL

Research in the Parallel Software Technologies Laboratory

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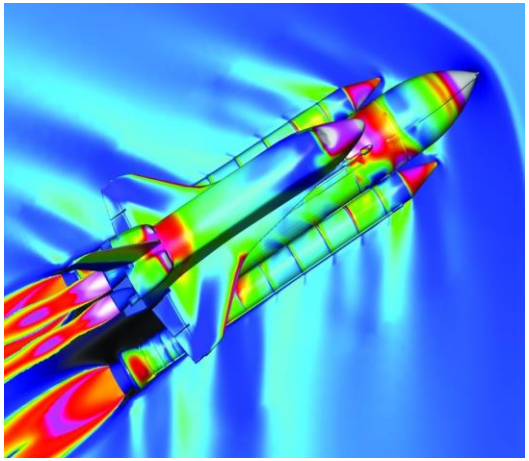
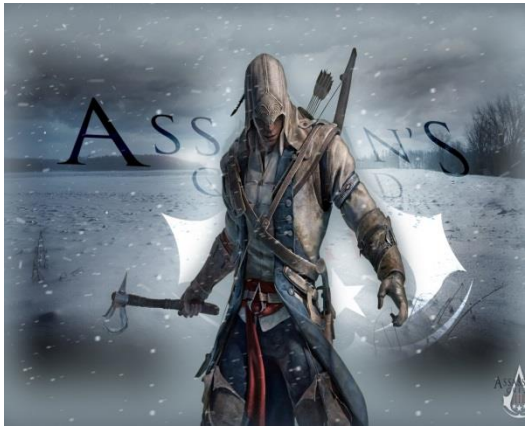
Motivation

- Why Parallel Computing?
  - Solve larger problems
  - Reduce the time to solution





How to use multiple processors

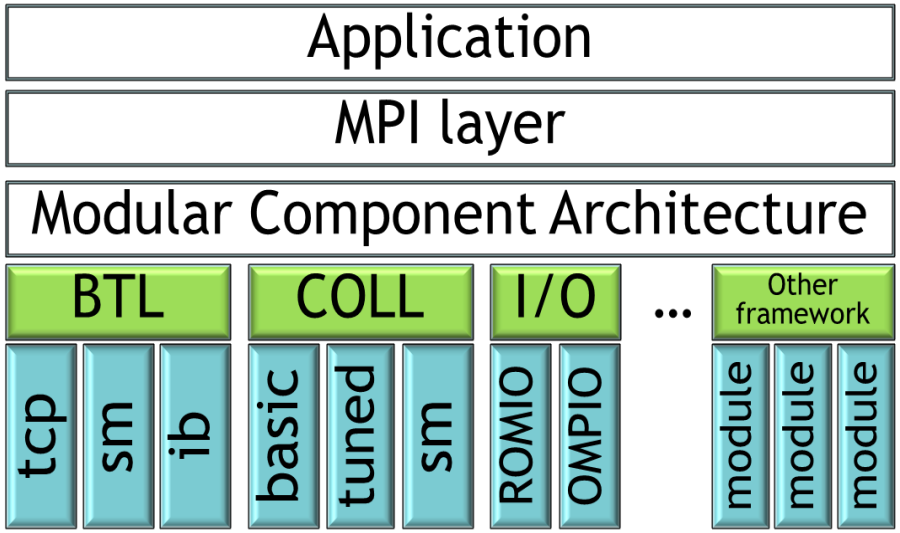
- **Functional parallelism**: each processor executes a different function
- **Data parallelism**: each processor executes the same function using a different portion of the overall problem

Portion of image on core 0

Portion of image on core 1

Open MPI

- Widely utilized public domain implementation of the Message Passing Interface (MPI)
- Jointly developed and maintained by numerous universities, research labs and companies



Abstract Data and Communication Library

- Auto-tuning of (collective) communication operations
  - Library of possible algorithms / implementations
- Runtime selection logic through
  - Brute force search
  - Orthogonal search
  - 2k factorial design search
- Historic learning
  - Incorporating knowledge of previous executions
- Support for asynchronous operations through timer-object