CCI – An HPC Perspective

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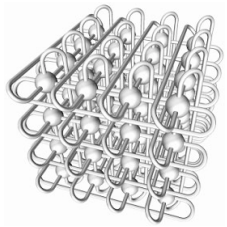
What is CCI?

- An API for inter-process communication over modern interconnect technologies
- Designed to provide a common API for application and system software developers for data movement
- A balance between simplicity of semantic and support for modern interconnect capabilities
- Designed from the ground-up for scalability, robustness, and performance
- Community developed and vendor neutral

Current State of the Art



- HPC service-oriented communication
  - A wide variety of “service-oriented” use-cases exist
    - Run-time environments, file systems, debugging, WAN data movement
  - MPI is ill-suited for these use-cases
    - Primarily designed for a static pool of processes
    - Reliant upon a number of HPC services (see above)
  - Service-oriented applications are forced to either:
    - Create their own custom network abstraction layer and support it across a wide variety of interconnects, or
    - Use the Sockets API
- The Sockets API was not designed for modern networks
  - Design limitations: assumes buffering, no zero-copy, per-peer resources/completion
  - Cannot properly leverage high-speed interconnects

Rationale for a New Approach

- Network-specific communication APIs
  - Design driven by hardware capabilities
  - Benefits: high performance, native hardware capabilities
  - Drawbacks: vendor lock-in, single-source risk, and limited portability
- Message Passing Interface
  - Design driven by the needs of HPC communication
  - Benefits: high performance, portability, scalability
  - Drawbacks: lack of resilience, (essentially) static model
- Need a common, high performance communication API
  - Targeted to provide *portability*, *scalability*, and *performance*
  - Design driven by the needs of a broad range of use-cases while exposing common capabilities of modern interconnects

The CCI Approach

- Common Communication Interface
  - Best practices from 15 years of R&D
  - Community-driven, vendor-neutral ecosystem
- Benefits for developers
  - Designed for performance, scalability, resilience, and portability
  - Minimize business and technological risks associated with custom vendor solutions
- Benefits for vendors
  - Leverage technological innovations
  - Increases total addressable market
  - Levels the playing field

Partners

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