Open Source
High Performance Computing
With Open MPI

Jeff Squyres
Cisco Systems
High Performance

- Two of the top 10
  - #2 Roadrunner (Los Alamos)
  - #10 Red Sky (Sandia)

- Collaborate to innovate
  - Vendors
  - Academic researchers
  - Lab scientists
Open MPI Is…

- Evolution of several prior MPI implementations
- Open source project and community
  - Production quality
  - Vendor-friendly
  - Research- and academic-friendly
- All of MPI-2.1
  - Working on MPI-2.2
16 Members, 9 Contributors, 2 Partners
Why Does Open MPI Exist?

- Maximize all MPI expertise
  - Research / academia
  - Vendors
  - Customers, enterprise
  - …elsewhere

- Capitalize on years of MPI research and implementation experience

- The sum is greater than the parts
“Great discoveries and improvements invariably involve the cooperation of many minds.”

Alexander Graham Bell, 1877
Cisco: Why Open MPI?

- It seems obvious to us!
  - Why re-invent the wheel?
  - Established, high quality MPI
  - Combined community resources

- Meshes with Cisco values
  - Standards-based
  - Open architectures
  - Consensus driven
  - Collaborate to innovate

Cisco votes “yes” for community MPI
Why Open Source?

- Open source HPC is good for everyone
  - Room for research / new ideas
  - Open information transfer
  - Feed them back into production / commodity products

- Shorten the cycle from research to commodity

- Researchers have ideas; industry has production capability
  - There are smart people in both!
Open MPI Sub Project: Hardware Locality

- Initially developed by INRIA
- Command line and C API
- Discover the topology of your machine
  - Processors: sockets, cores, threads
  - Memory: caches, main RAM
- *Incredibly important as we move towards manycore*
Cisco’s Open MPI Community Role

- Active development
  - Design, code

- [Very] Extensive testing
  - 100K’s regression tests/night
  - Data fed back to community

- Logistics support
  - Collaboration, facilitation
  - Face-to-face engineering meetings

- Member, MPI Forum
# Cisco’s Open MPI Goals

## Technical
- **Promote standards**
  - MPI Forum leadership
  - Ethernet-based technologies
  - Cisco Unified Computer Servers
  - Commodity Clusters
- **Integrate with tools**
  - Provide deep insight into complex problems
  - Make parallel programming [a little] easier

## Non technical
- **Promote community**
  - Conferences, tradeshows
  - Contribute on open mailing lists
- **Partner with academics and researchers**
  - Foster cutting-edge research
- **Perform “community service”**
  - Example: Fortran API maintenance
“Open source is decided by those who show up.”

Cisco is there. Come join us.
welcome to the human network.