Open Source
High Performance Computing
With Open MPI

Unify. Simplify. Amplify.
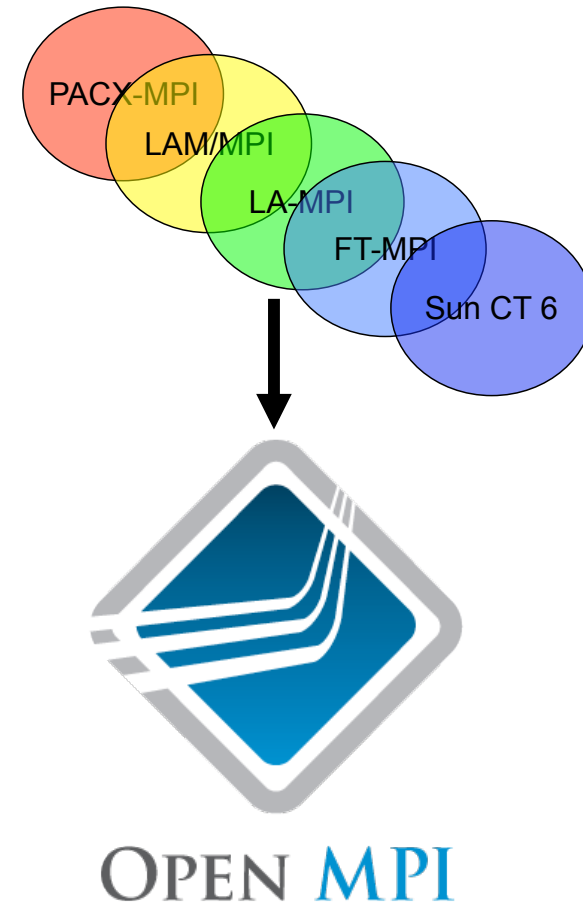
Jeff Squyres

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

PACX-MPI

LAM/MPI

LA-MPI

FT-MPI

Sun CT 6

OPEN MPI

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
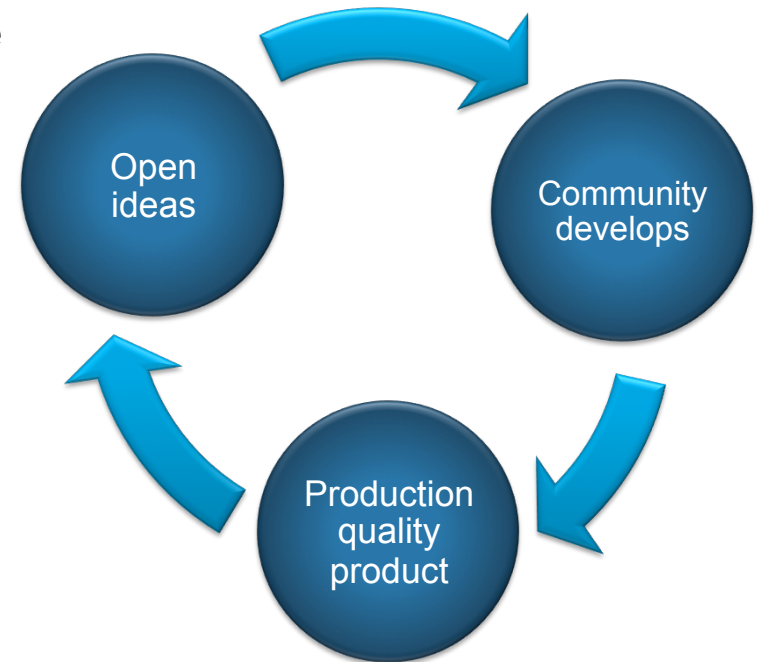
Cisco: Why Open MPI?

- 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
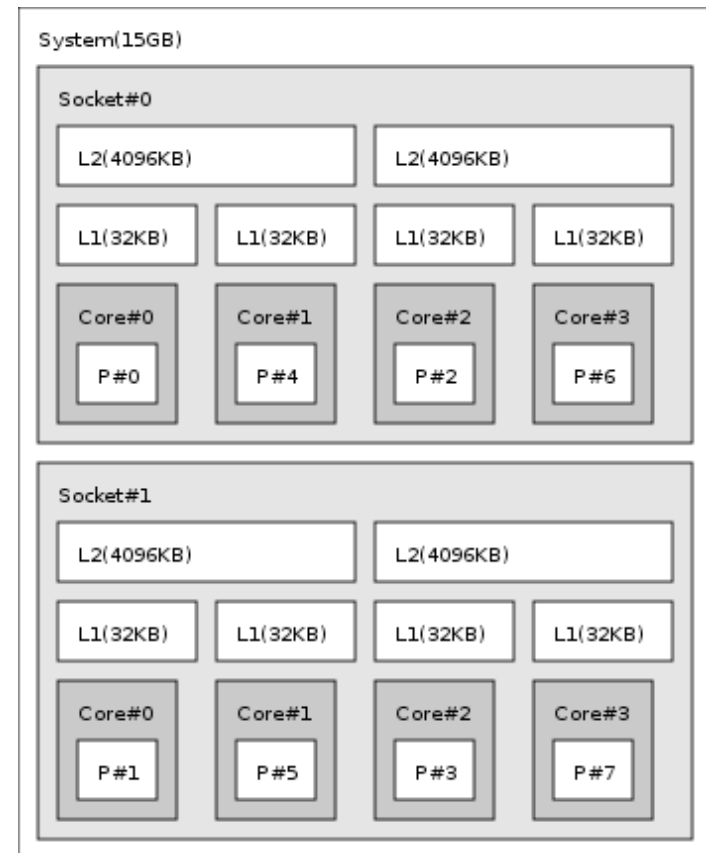 - Collaborate to innovate

Cisco votes "yes"
for community MPI

 Cisco Public

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 ideas

Community develops

Production quality product

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**

Open MPI Test Reporter

http://www.open-mpi.org/mtt/index.php?limit=&wrap=&trial=&yaxi...

#	▲Org▼	▲Platform name▼	▲Hardware▼	▲OS▼	▲MPI name▼	▲MPI version▼	Test run ▲Pass▼	▲Fail▼	▲Skip▼	▲Timed▼	▲Perf▼
1	absoft	Fortran_10.2_32_Suse9.3	ia32	Linux	ompi-nightly-v1.2	1.2.9a0r19779	24	0	0	0	0
2	cisco	svbu-mpi	x86_64	Linux	ompi-nightly-trunk	1.4a1r19857	3432	0	0	0	0
3	cisco	svbu-mpi	x86_64	Linux	ompi-nightly-trunk	1.4a1r19872	83656	196	198	3212	2672
4	cisco	svbu-mpi	x86_64	Linux	ompi-nightly-v1.3	1.3b2r19861	224785	181	978	2284	7787
5	iu	IU_BigRed	ppc64	Linux	ompi-nightly-trunk	1.4a1r19874	2562	14	18	4	0
6	iu	IU_BigRed	ppc64	Linux	ompi-nightly-v1.2	1.2.9a0r19779	2549	19	18	0	0
7	iu	IU_BigRed	ppc64	Linux	ompi-nightly-v1.3	1.3b2r19861	2564	14	18	2	0
8	iu	IU_Odin	x86_64	Linux	ompi-nightly-trunk	1.4a1r19874	8737	21	12	10	0
9	iu	IU_Odin	x86_64	Linux	ompi-nightly-v1.2	1.2.9a0r19779	1315	7	6	2	0
10	iu	IU_Odin	x86_64	Linux	ompi-nightly-v1.3	1.3b2r19861	6423	21	12	0	0
11	iu	IU_Sif	x86_64	Linux	ompi-nightly-trunk	1.4a1r19874	4577	19	12	5	0
12	iu	IU_Sif	x86_64	Linux	ompi-nightly-v1.3	1.3b2r19861	4714	25	12	25	0
13	mellanox	mlnx-mpi	x86_64	Linux	ompi-nightly-trunk	1.3b2r19861	3310	2	0	12	0
14	sun	burl-ct-v20z-10	x86_64	Linux	ompi-nightly-v1.2	1.2.9a0r19779	3200	8	248	0	56
15	sun	burl-ct-v20z-12	x86_64	Linux	clustertools-8.1	1.3r19845-ct8.1-b04b-r17	4	0	78	750	0
16	sun	burl-ct-v20z-2	i86pc	SunOS	ompi-nightly-v1.2	1.2.9a0r19779	2576	1980	228	2	4
Totals							354428	2507	1838	6308	10523

Cisco's Open MPI Goals

Technical	Non technical

Technical

- Promote standards
  - MPI Forum leadership
  - Ethernet-based technologies
  - Cisco Unified Computer Servers
  - Commodity Clusters

- Integrate with tools
  - Provide deep insight in to 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.

CISCO