

MPI Implementation Health Assessment Through Multi-Institutional Distributed Testing

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OPEN MPI



MTT





OPEN MPI

Open MPI

Combine the expertise from across the HPC community to create the highest-quality, open-source MPI implementation capable of efficiently supporting desktop to petaflop systems.

How well are we meeting our goals?

How can we assess the health of the project?



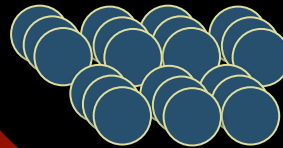


OPEN MPI

Lots & Lots of Testing

Configure (~100)

Unit Tests
(1000s)



Runtime (~500)

System Arch., Compiler,
interconnect, Resource Mgr.





OPEN MPI

Coverage: The Old Method

Compiler

gcc 4 HRS, UTK UH
 intel 4.0 HRS
 8.1 HRS CH
 8.0
 portland 5.2 IU
 6.0 IU
 pathscale 1.2 HRS IU

Launchers

x rsh/ssh
 x TM
 x Slurm
 Xgrid
 Pbs
 x Yed
 Bproc
 MPI-2 dynamics ensure sm doesn't cross

Other

= DDT
 ok sm coll
 ? NO hierarch coll
 ? tuned coll
 ? POE
 ? BLACS Test suite?

Testing

64 nodes
 Intel max 64 nodes
 IBM

Platforms

Intel 64
 Intel 32
 AMD 64

Interconnects

Sm
 TCP
 mVapi
 Open IB
 gm
 MAX

Intel 64
 Intel 32
 AMD 64

sm
 TCP
 mVapi
 Open IB
 gm
 MAX

LANE ALRS
 LANL IU
 HRS IL
 UTK IU

ex PowerPC 64 IU
 LANL

Linux PPC 64
 Linux PPC 32
 Linux AMD 64
 Intel 32
 Intel 64

Intel 64 open IB, sm
 AMD 64, PowerPC 64
 Linux PPC 64, 32
 Linux AMD 64, Intel 32, 64
 Intel 32, 64
 TCP, sm, mapi, gm

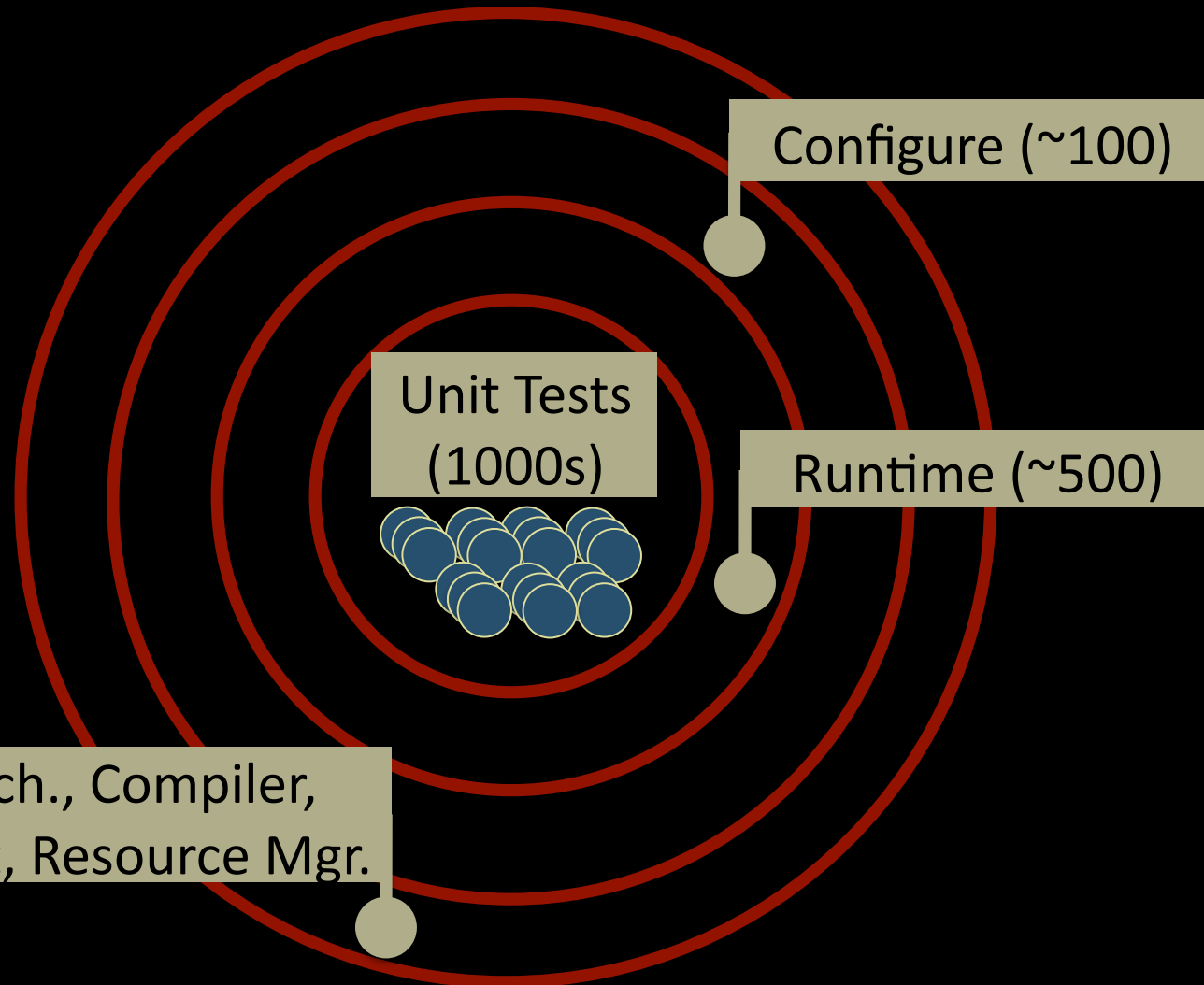
Sparc 32 = *
 Sparc 64

successful completion
 check sidern
 run hello, ring



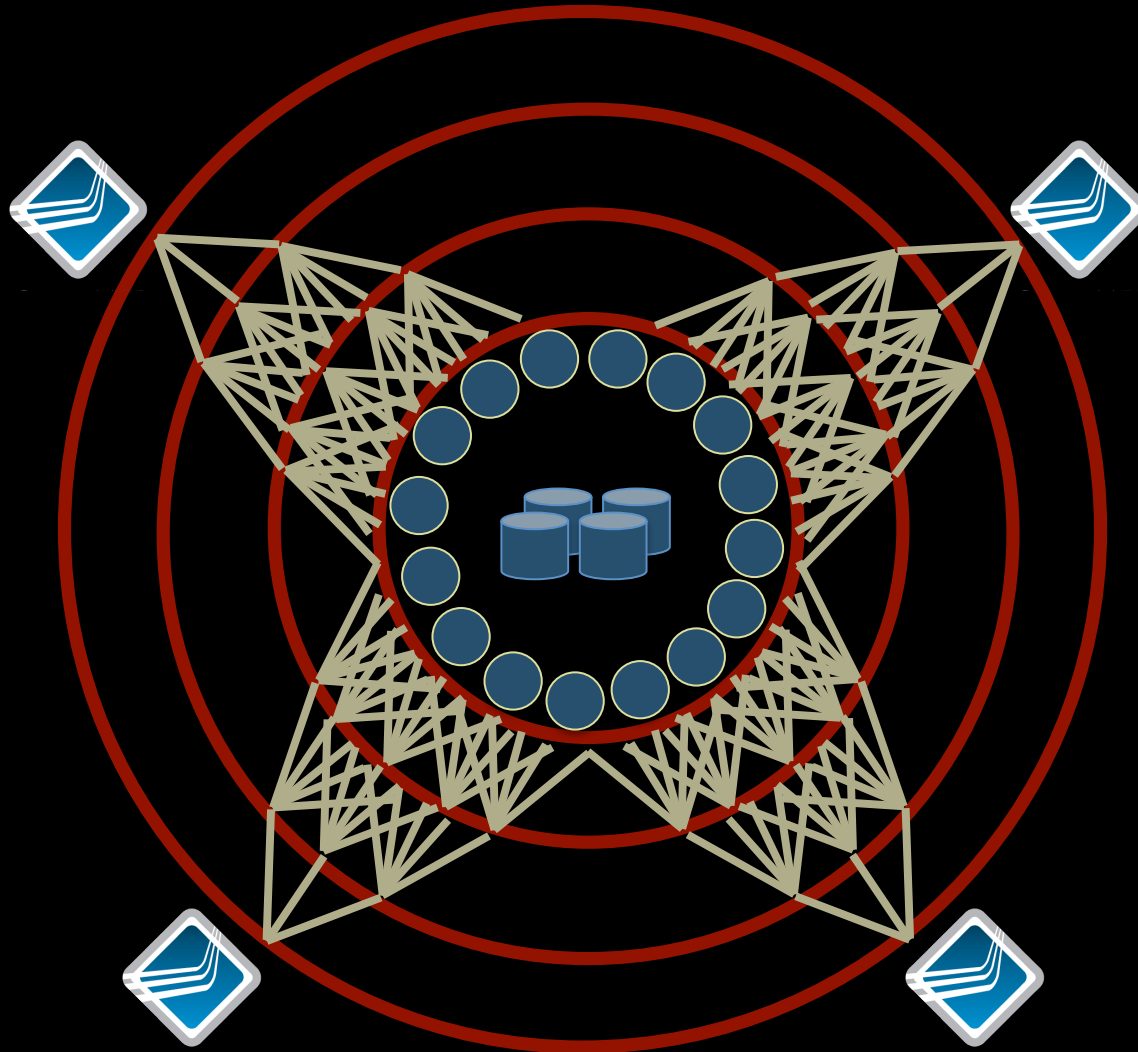


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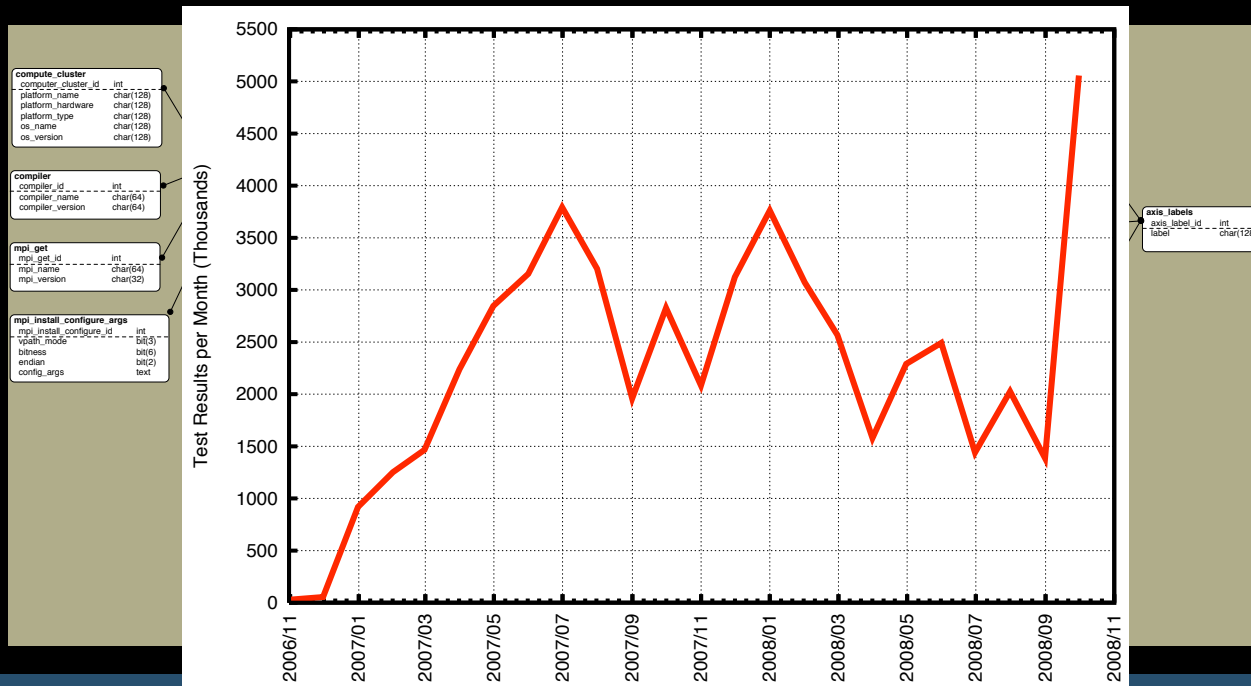




MTT



Data Storage



How do you make sense of .5 Million test results every day?





MTT

Analysis: The Old Way

	TCP	sm	pm	mx	mvapi	openib
Linux/Intel 32						
Linux/IA64						
Linux/AMD/EM64						
OSX PPC						
ATX PPC						
Linux PPC 64						
Solaris Sparc						





MTT

MTT Reporter

Test run				
▲Pass▼	▲Fail▼	▲Skip▼	▲Times▼	▲Perf▼
48	0	0	0	0
24	0	0	0	0
78	0	0	0	0
354	4	35	5	33
611	61	35	257	0
1204	129	51	10	0
4120	0	0	0	104
2426	6	260	0	52
1873	18	147	8	36
118275	1547	1178	689	362

MTT Reporter

All phases
 MPI install
 Test build
 Test run

Date range:
 Hardware:

Org:
 OS:

Local username:
 MPI name:

Platform name:
 MPI version:

Current time (GMT): 2008-05-14 13:10:09
 Date range (GMT): 2008-05-13 13:10:09 - 2008-05-14 13:10:09
 Phase(s): MPI install, Test build, and Test run
 Number of rows: 10

Absolute date range: [Create permalink](#)
 Relative date range: [Create permalink](#)

#	▲Org▼	▲Hardware▼	▲OS▼	MPI install		Test build		Test run				
				▲Pass▼	▲Fail▼	▲Pass▼	▲Fail▼	▲Pass▼	▲Fail▼	▲Skip▼	▲Times▼	▲Perf▼
1	absoft	ia32	Linux	2	0	2	0	48	0	0	0	0
2	absoft	ppc	Darwin	2	0	2	0	24	0	0	0	0
3	absoft	undef	undef	0	0	3	0	78	0	0	0	0
4	cisco	x86_64	Linux	8	5	56	0	84246	725	648	292	118
5	ibm	ia32	Linux	4	0	20	0	742	2	36	4	52
6	lu	ppc64	Linux	8	0	23	0	5014	617	36	375	0
7	lu	x86_64	Linux	15	12	71	0	19704	179	51	10	0
8	mellanox	x86_64	Linux	5	0	30	0	4120	0	0	0	104
9	sun	i86pc	SunOS	2	0	12	0	2426	6	260	0	52
10	sun	sun4u	SunOS	1	1	6	0	1873	18	147	8	36
Totals				47	18	225	0	118275	1547	1178	689	362

Total script execution time: 8 second(s)

Total SQL execution time: 2 second(s)

Overall MTT contribution graph (updated nightly): [mit-contrib.pdf](#)





MTT

MTT Reporter

Test run				
Aztec	Aztec	Aztec	Aztec	Aztec
48	0	0	0	0
21	0	0	0	0
78	0	0	0	0
3540	150	650	242	111
352	4	35	5	23
611	607	30	227	0
10704	129	21	10	0
6120	0	0	0	102
2630	0	200	0	23
1812	18	151	0	30
316270	5647	1170	689	362

#	1
Date range	2008-05-14 05:12:05
Org	iu
Platform name	IU_odin
Hardware	x86_64
OS	Linux
Compiler	gnu
Vpath mode	unknown
Compiler version	3.4.6
Configure arguments	FCFLAGS=-m4 FFLAGS=-m4 CFLAGS=-m4 CXXFLAGS=-m4 --with-openib=/usr/local/ofed --with-openib-libdir=/usr/local/ofed/lib64 --with-wrupper-oflags=-m4 --with-wrupper-oxiflags=-m4 --with-wrupper-fflags=-m4 --with-wrupper-fcflags=-m4 --without-memory-manager --disable-debug --enable-binaries --with-devel-headers --disable-mpi-io --disable-mpi-f90 --disable-ipv6 --with-ftsox --with-blox=/svn/blox-0.6.5 --enable-mpi-threads --enable-ft-thread
Description	
Exit value	2
Signal	-1
Duration	00:06:33
Client serial	45755
Result message	Failed to build: make -j 8 all
Stdout	--- "make all result_stdout/result_stderr --- mv -f \$dephbase.Tpo \$dephbase.Flo dephbase\$ echo coll_sm_reduce.lo sed 's [^/]* .deps/& s \\ lo\$ ''\`\ /bin/sh ./.libs/ltlibtool --tagsCC --mode=compile gcc -DBOVT_CONFIG_H-I- -I./../../../../opal/include -I./../../../../orte/include -I./../../../../ompi/include -I./../../../../opal/mca/paffinity/linux/plpa/src/libplpa -I./../../../../. -O3 -DINDEBEG -m64 -finline-functions -fno-strict-aliasing -pthread -fvisibility:hidden -MT coll_sm_reduce.lo -MD -MF -F\$dephbase.Tpo -c -o coll_sm_reduce.lo coll_sm_reduce.c 66\ mv -f \$dephbase.Tpo \$dephbase.Flo libtool: compile: gcc -DBOVT_CONFIG_H-I- -I./../../../../opal/include -I./../../../../orte/include -I./../../../../ompi/include -I./../../../../opal/mca/paffinity/linux/plpa/src/libplpa -I./../../../../ -O3 -DINDEBEG -m64 -finline-functions -fno-strict-aliasing -pthread -fvisibility:hidden -MT coll_sm_barrier.lo -MD -MF -F\$dephbase.Tpo -c coll_sm_barrier.c -EPIC -DFPIC -o ./libs/coll_sm_barrier.o libtool: compile: gcc -DBOVT_CONFIG_H-I- -I./../../../../opal/include -I./../../../../orte/include -I./../../../../ompi/include -I./../../../../opal/mca/paffinity/linux/plpa/src/libplpa -I./../../../../ -O3 -DINDEBEG -m64 -finline-functions -fno-strict-aliasing -pthread -fvisibility:hidden -MT coll_sm_reduce.lo -MD -MF -F\$dephbase.Tpo -c coll_sm_reduce.c -EPIC -DFPIC -o ./libs/coll_sm_reduce.o libtool: compile: gcc -DBOVT_CONFIG_H-I- -I./../../../../opal/include -I./../../../../orte/include

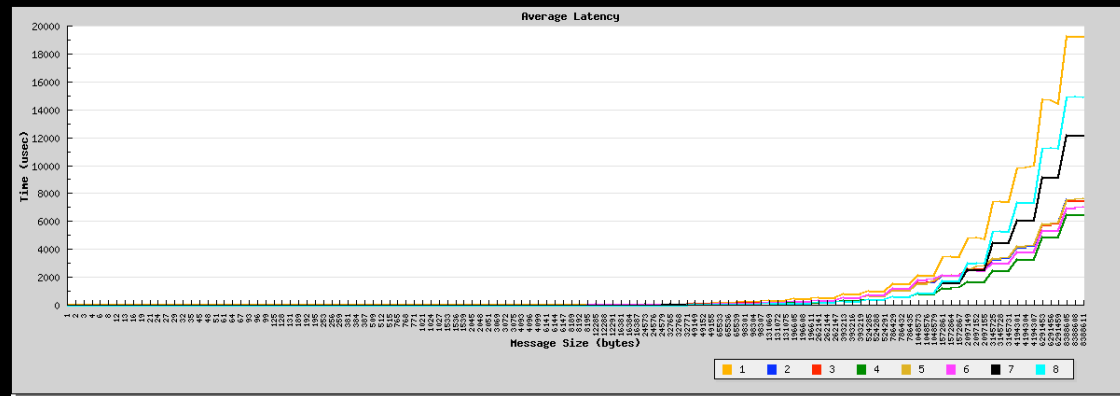
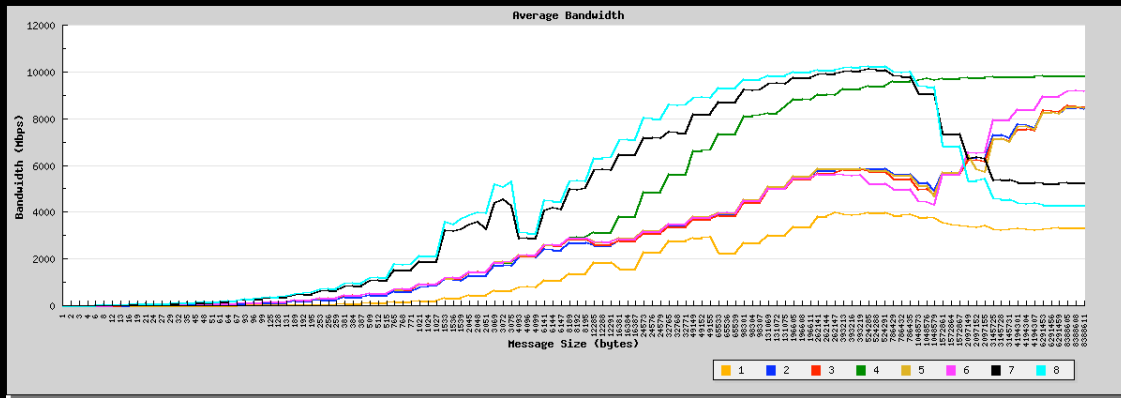




MTT

MTT Reporter

Test run				
AvgP	AvgM	AvgS	AvgL	AvgT
48	0	0	0	0
1	48	0	0	0
1	24	0	0	0
1	78	0	0	0
1	6240	328	658	242
1	332	4	35	5
1	611	681	30	237
1	10304	139	21	10
1	8120	0	0	0
1	2830	0	200	0
1	1813	18	143	0
1	318278	5847	1178	689





MTT

MTT Visualization

Test Run				
Attn#	Attn#	Attn#	Attn#	Attn#
48	0	0	0	0
21	0	0	0	0
78	0	0	0	0
85481	120	650	242	111
332	4	35	5	33
6111	601	30	227	0
10204	129	21	10	0
6120	0	0	0	100
2630	0	200	0	23
1813	18	151	0	30
318279	5487	1170	689	342

Difficult to assess project health in the Reporter

Focus Groups:

Organization x Platform Bitness x Compiler Name

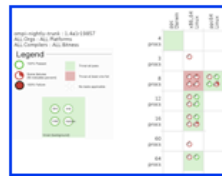
MTT Visualization (Static)

ompi-nightly-trunk / 1.4a1r19857

Arch x Compiler:



Arch x NP:



Arch x Compiler Version:



Last Updated on: Fri Oct 31 16:07:36 EDT 2008





MTT

MTT Visualization

Test Run				
Attn#	Attn#	Attn#	Attn#	Attn#
48	0	0	0	0
24	0	0	0	0
78	0	0	0	0
8546	120	650	242	111
352	4	35	5	25
611	601	30	227	0
10204	129	21	10	0
6120	0	0	0	100
2630	0	200	0	25
1812	18	151	0	30
21029	5407	1170	609	302

ompi-nightly-trunk : 1.4a1r19857
 ALL Orgs : ALL Platforms
 ALL Compilers : ALL Bitness

Legend

- 100% Passed
- Some failures (fill indicates percent)
- 100% Failure
- Trivial all pass
- Trivial at least one fail
- No tests applicable

	ppc Darwin	ppc64 Linux	x86_64 Linux
32 absoft	Trivial all pass		
32 gnu		Some failures	Some failures
64 gnu		Some failures	Some failures
64 intel			Some failures
64 pathscale			Some failures
64 pgi			Some failures

trivial (background)

ibm imb

intel mpicxx





MTT

	ppc Darwin	ppc64 Linux	x86_64 Linux
absoft GCC: 4.0.1 Pro Fortran 9.5	Green		
gnu 3.3.3		Green, Red	
gnu 3.4.6			Red, Red
gnu 4.1.2			Green, Green
gnu 4.2.4			Red, Green
intel 10.0 20070426			Red, Red
intel 10.1 20071116			Red, Red
intel 9.0 20051201			Red, Green
intel 9.1 20070109			Red, Green
pathscale 3.0			Red, Green
pathscale 3.1			Red, Red
pathscale 3.2			Red, Green
pgi 6.2-5 (64-bit x86-64)			Red, Green
pgi 7.0-7 (64-bit x86-64)			Red, Green
pgi 7.1-4 (64-bit x86-64)			Red, Red

MTT Visualization

	ppc Darwin	x86_64 Linux	ppc64 Linux
4 procs	Green		
3 procs		Red	
8 procs		Red, Red, Red, Red	Green, Green, Red
12 procs		Red, Green, Red, Green	
16 procs		Red, Red, Green, Green	
60 procs		Red	
64 procs		Red, Green	



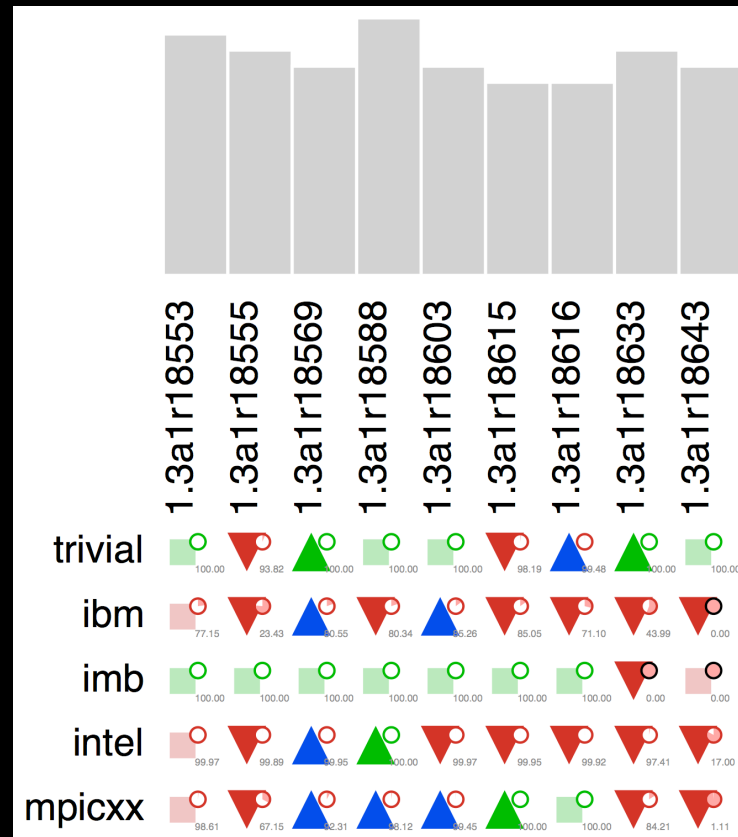


MTT

MTT Visualization

Test Run					
Run	Pass	Fail	Warn	Info	Debug
1	48	0	0	0	0
2	24	0	0	0	0
3	78	0	0	0	0
4	8546	128	658	242	111
5	352	4	35	5	23
6	611	681	30	227	0
7	1026	129	21	20	0
8	8120	0	0	0	102
9	2430	0	200	0	23
10	1812	18	151	0	30
11	318279	5847	1178	689	362

- Worse
60.00
- No Change, Some Fail
10.00
- Better
20.00
- Better, All Pass
0.00
- All Pass
0.00



Future Directions



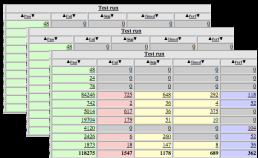
Local Testing

- Extended reporting (topology, hidden info)
- Parallel testing



Data Storage

- Improve Performance Reporting
- Information Tagging



Reporting

- Interactive Visualization Environment
- Time based visualization



Questions & Comments



OPEN MPI



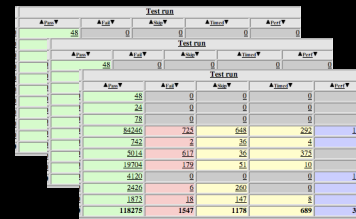
MTT



Local Testing



Data Storage

A stack of three tables showing test run analysis. Each table has columns for 'Test run', 'Status', 'Time', and 'Count'. The data is color-coded: green for success, red for failure, and yellow for warning.

Test run	Status	Time	Count
Test run 1	Success	0.1	1
Test run 2	Success	0.2	2
Test run 3	Success	0.3	3
Test run 4	Success	0.4	4
Test run 5	Success	0.5	5
Test run 6	Success	0.6	6
Test run 7	Success	0.7	7
Test run 8	Success	0.8	8
Test run 9	Success	0.9	9
Test run 10	Success	1.0	10
Test run 11	Success	1.1	11
Test run 12	Success	1.2	12
Test run 13	Success	1.3	13
Test run 14	Success	1.4	14
Test run 15	Success	1.5	15
Test run 16	Success	1.6	16
Test run 17	Success	1.7	17
Test run 18	Success	1.8	18
Test run 19	Success	1.9	19
Test run 20	Success	2.0	20
Test run 21	Success	2.1	21
Test run 22	Success	2.2	22
Test run 23	Success	2.3	23
Test run 24	Success	2.4	24
Test run 25	Success	2.5	25
Test run 26	Success	2.6	26
Test run 27	Success	2.7	27
Test run 28	Success	2.8	28
Test run 29	Success	2.9	29
Test run 30	Success	3.0	30
Test run 31	Success	3.1	31
Test run 32	Success	3.2	32
Test run 33	Success	3.3	33
Test run 34	Success	3.4	34
Test run 35	Success	3.5	35
Test run 36	Success	3.6	36
Test run 37	Success	3.7	37
Test run 38	Success	3.8	38
Test run 39	Success	3.9	39
Test run 40	Success	4.0	40
Test run 41	Success	4.1	41
Test run 42	Success	4.2	42
Test run 43	Success	4.3	43
Test run 44	Success	4.4	44
Test run 45	Success	4.5	45
Test run 46	Success	4.6	46
Test run 47	Success	4.7	47
Test run 48	Success	4.8	48
Test run 49	Success	4.9	49
Test run 50	Success	5.0	50
Test run 51	Success	5.1	51
Test run 52	Success	5.2	52
Test run 53	Success	5.3	53
Test run 54	Success	5.4	54
Test run 55	Success	5.5	55
Test run 56	Success	5.6	56
Test run 57	Success	5.7	57
Test run 58	Success	5.8	58
Test run 59	Success	5.9	59
Test run 60	Success	6.0	60
Test run 61	Success	6.1	61
Test run 62	Success	6.2	62
Test run 63	Success	6.3	63
Test run 64	Success	6.4	64
Test run 65	Success	6.5	65
Test run 66	Success	6.6	66
Test run 67	Success	6.7	67
Test run 68	Success	6.8	68
Test run 69	Success	6.9	69
Test run 70	Success	7.0	70
Test run 71	Success	7.1	71
Test run 72	Success	7.2	72
Test run 73	Success	7.3	73
Test run 74	Success	7.4	74
Test run 75	Success	7.5	75
Test run 76	Success	7.6	76
Test run 77	Success	7.7	77
Test run 78	Success	7.8	78
Test run 79	Success	7.9	79
Test run 80	Success	8.0	80
Test run 81	Success	8.1	81
Test run 82	Success	8.2	82
Test run 83	Success	8.3	83
Test run 84	Success	8.4	84
Test run 85	Success	8.5	85
Test run 86	Success	8.6	86
Test run 87	Success	8.7	87
Test run 88	Success	8.8	88
Test run 89	Success	8.9	89
Test run 90	Success	9.0	90
Test run 91	Success	9.1	91
Test run 92	Success	9.2	92
Test run 93	Success	9.3	93
Test run 94	Success	9.4	94
Test run 95	Success	9.5	95
Test run 96	Success	9.6	96
Test run 97	Success	9.7	97
Test run 98	Success	9.8	98
Test run 99	Success	9.9	99
Test run 100	Success	10.0	100

Analysis



