

BLUE WATERS

SUSTAINED PETASCALE COMPUTING

Blue Waters Acceptance Testing: Overview

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NCSA

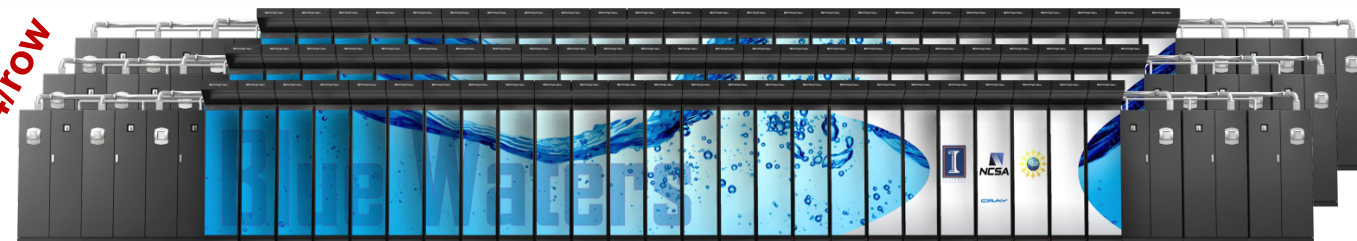


GREAT LAKES CONSORTIUM
FOR PETASCALE COMPUTATION

CRAY®

1 – Introduction - Blue Waters: Sustained-Petascale System

288 cabinets:
12 rows x 24/row



Peak: 13.3 PF
XE: 7.1 PF
XK: 6.2 PF

3D-Torus:
24 x 24 x 24

Aggregate Memory – 1.6 PB

10/40/100 Gb
Ethernet Switch

External Servers

IB Switch

>1 TB/sec

120+ Gb/sec

100 GB/sec



Deployment: 2012

Operation: 04/2013

27+ B. core-hrs

Spectra Logic: 300 usable PB

Sonexion: 26 usable PB

2 - Acceptance Testing

a) **Structure of Test Plan:** *what does acceptance look like at your center?*

- Acceptance Testing: Test Design + Execution + Verification
- Detailed test-design phase: 2011 – Test Matrix (ref: CUG-2012)

actions

stats

filters

TESTS (300+)

ID	Test	Point of Contact	Current Status	Category	Cray SOW	Section in Cray SOW
15	HPSS core/mover network performance	glasgow	Not Started	SP	No	
29	loseek	arnoldg	In normal Progress, not yet in Inca	SP, F	No	
79	Hardware management	Jfullop	Not Started	SM	Yes	9.6.2.3
92	Vector unit functionality	dhguo	In normal Progress, inside Inca	A, U	No	
95	PETSc installation	dhguo	In normal Progress, inside Inca	U	No	
96	HYPER installation	dhguo	In normal Progress, inside Inca	U	No	
108	PAPI test	rulliu	In normal Progress, not yet in Inca	U	No	
109	PerfSuite test	rulliu	In normal Progress, not yet in Inca	U	No	
110	TAM test	rulliu	In normal Progress, not yet in Inca	U	No	
111	Performance Counters	rulliu	In normal Progress, not yet in Inca	U	Yes	9.10.4
113	Performance Profiling	rulliu	In normal Progress, not yet in Inca	U	Yes	9.10.4
114	Visit	semeraro	In normal Progress, not yet in Inca	U	No	

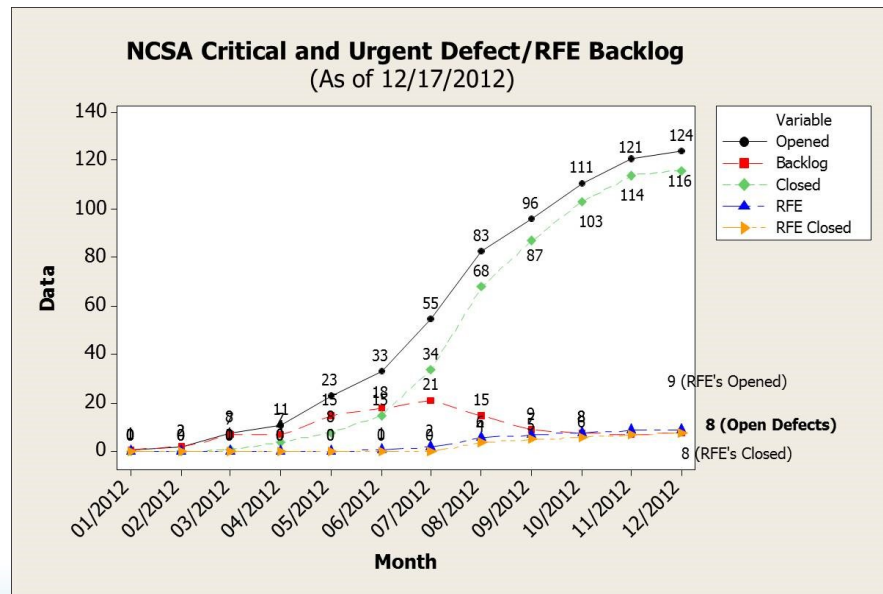
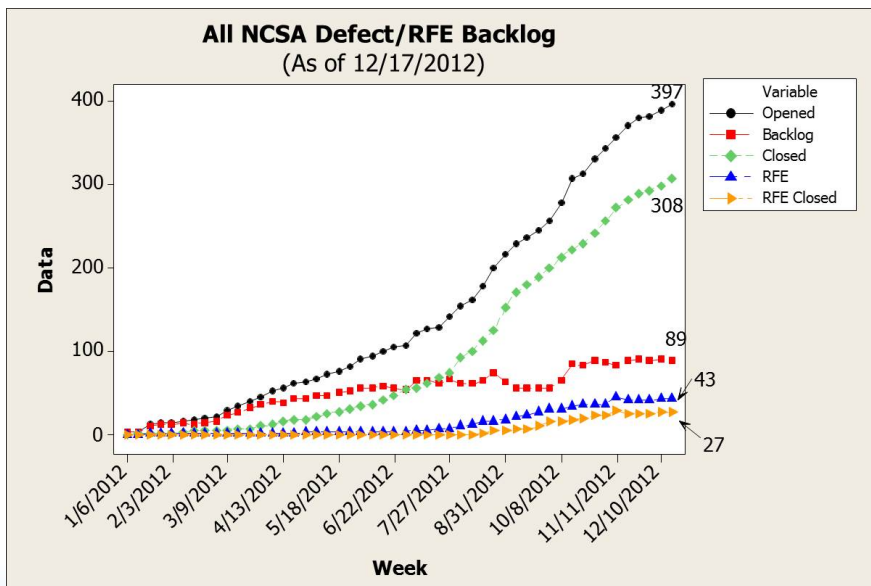
2 - Acceptance Testing

a) **Structure of Test Plan:** *How long does it take? How large is your team?*

- Timeframe of acceptance:
 - Jan-Jun/2012: Design and preparation of tests on TDS and Early-Sc.
 - Jul-Sep/2012: “Testing” of all tests – debugging, refining, etc
 - Many tests applied to Cray software on TDS
 - Oct-Nov/2012: Bulk of acceptance testing, availability evaluation
 - Dec/2012: Reporting, acceptance decisions
- Personnel involved in testing:
 - Entire Blue Waters team: ~40 people
 - Varied levels of participation and responsibility

2 - Acceptance Testing (cont.)

- Defects found during testing period, filed to CrayPort



2 - Acceptance Testing (cont.)

b) Test Selection: *How do you determine which tests to use? What about job sizes to use? Do you use benchmarks, full applications, or a mix?*

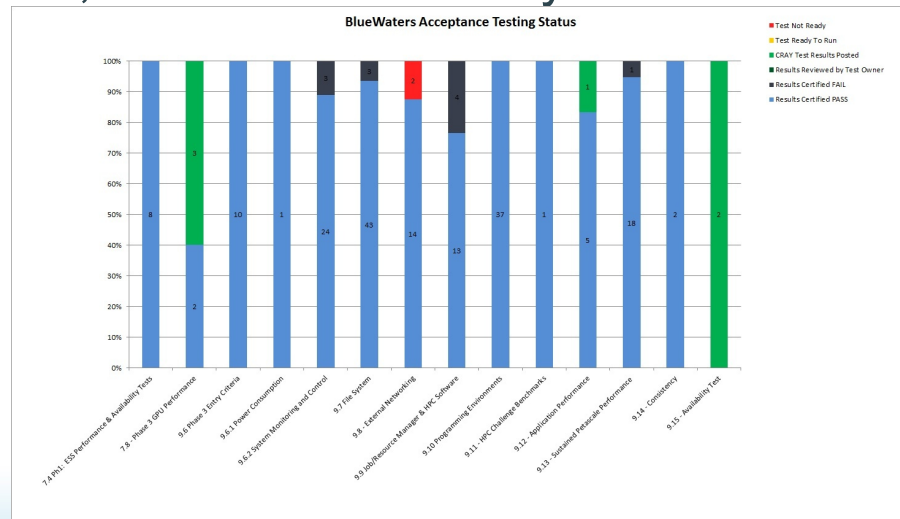
- Two classes of tests:
 - Tests directly derived from the NCSA/Cray contract (SOW): 219 tests
 - Tests specified by NCSA based on other system specs
- Job sizes:
 - Many full-system tests, to demonstrate sustained-petascale perform.
 - Some smaller tests to verify functionality
- Types of tests - Mix:
 - Full applications: Petascale apps, SPP apps – various areas of science
 - Benchmarks (HPCC, IOR, etc)

3 - Testing Tools

a) How do you execute your acceptance test? *By hand vs. home-grown tool vs. open source vs. comm*

- Special job queue created for tests, controlled manually 24/7
 - Test execution: *test owner*
 - Job scheduler: Joe Glenski!
- Tracking of progress: daily
 - Checked jointly by NCSA/Cray
 - All results stored at internal Wiki
 - Results classified into 5 levels

e.g. status on Oct.17, 2012:



3 - Testing Tools (cont.)

b) Have you considered other tools? *e.g.: Gitlab CI, Jenkins, CTest, etc.*

- NCSA is using Jenkins for regression testing on Blue Waters
- Tests run periodically or on demand
- Historical results remain available
- Help from R.Budiardja (ORNL)
- Described in paper @ CUG'2017

GUI of BW-Jenkins:

S	W	Name ↓	Last Success	Last Failure	Last Duration
		cray-hdf5-parallel-jyc	1 day 18 hr - #48	5 mo 19 days - #21	10 min
		cuda-jyc	7 hr 45 min - #442	N/A	10 min
		HDF5Benchmarks	19 min - #2095	1 day 1 hr - #2085	58 sec
		IOR-jyc	8 hr 49 min - #613	N/A	11 min
		JobLaunch-JYC	50 min - #7384	1 day 2 hr - #7367	1 min 34 sec
		LAMMPS	1 day 0 hr - #2086	1 day 1 hr - #2085	46 min
		Lustre_Check_Ost_JYC	58 min - #6892	N/A	3.9 sec
		mdtest-jyc	1 hr 58 min - #529	17 days - #496	10 min
		MILC	4 hr 45 min - #1254	14 days - #1250	31 min
		NAMD	2 hr 44 min - #2135	14 days - #2126	29 min
		NWCHEM	22 hr - #1177	13 days - #1173	4 hr 6 min
		osu_reduce	10 hr - #418	N/A	10 min
		Ostat_JYC	38 min - #8032	N/A	3.9 sec
		stream-xe-jyc	12 hr - #445	26 days - #397	10 min
		testterminaljob	N/A	N/A	N/A
		TestSSH-JYC	2 days 4 hr - #21	1 day 2 hr - #25	6 sec

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