

The USQCD Infrastructure Project

Current Status and Future Prospects

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Overview

- Status and Future of the SciDAC Project
- Status of the QCDOC
- Status of the LQCD Computing Project

SciDAC Software

- Basic QCD API is ready for production use on the QCDOC, Clusters, and Commercial Supercomputers
 - Level 3 Inverters for Asqtad and DWF quarks on the QCDOC and P4 Clusters
 - QDP and QDP++
 - QMP and QLA
 - QIO
- Some remaining tasks
 - Common Runtime Environment
 - Convenient data movement among the labs
 - Convenient data movement between the labs, universities and national supercomputer centers
 - Software for meta-facility and participation in ILDG

SciDAC Prototype Clusters

Lab	Nodes	CPU	Bus Speed (MHz)	Single/Dual CPUs	Interconnect	Performance (Gflop/s)	Date in Production
JLab	128	2.0 GHz Xeon	400	Single	Myrinet	100	7/2002
FNAL	48	2.0 GHz Xeon	400	Single	Myrinet	40	7/2002
FNAL	128	2.4 GHz Xeon	400	Dual	Myrinet	130	1/2003
JLab	256	2.67 GHz Xeon	533	Single	GigE	350	3/2004
FNAL	128	2.8 GHz P4E	800	Single	Myrinet	140	6/2004
FNAL	32	2.0 GHz Xeon	400	Dual	Infiniband	30	7/2004
JLab	384	2.8 GHz Xeon	800	Single	GigE	500	1/2005
FNAL	260	3.2 GHz P4-640	800	Single	Infiniband	330	6/2005

The FNAL performances are for Asqtad quarks and the JLab ones for DWF. The FNAL 260 node infiniband cluster will double in size before the end of this year, bringing the total cluster through put to approximately 1.8 Tflop/s.

SciDAC 2005 Meeting

- San Francisco, June 26-30
- Highlight advances through the SciDAC Program
- Help set the agenda for an extension of SciDAC
- LQCD Plenary Speakers: Norman Christ, Paul Mackenzie, John Negele
- LQCD Posters: Claude Bernard, Richard Brower, Peter Petreczky, David Richards, Junko Shigemitsu and Matt Wingate
- Talks and posters in many other areas
- Panel discussions on the future of SciDAC

SciDAC Renewal Proposal

- Within the coming year there is likely to be a call for new SciDAC proposals covering the period FY 2006 to FY 2011
- A Lattice QCD proposal would probably cover three areas:
 - Software Development
 - Hardware Research & Development
 - Algorithms
- LQCD Whitepaper setting out some ideas is on the collaboration webpage:
`www.physics.ucsb.edu/~sugar/collaboration`
- Input would be greatly appreciated

QCDOC

- The 12,288 node QCDOC for the U.S. community has been built at BNL
- Initial users (LHPC, MILC, RBC) are on the machine testing code
- Production work is about to begin
- The QCDOC will most likely run at 400 MHz
- The DWF inverter runs at 42% efficiency in double precision with a 4^4 local volume, which corresponds to a throughput of 4.1 Tflop/s for the full machine.
- The Asqtad inverter runs at 45% efficiency in single precision with a $5^3 \times 6$ local volume, which corresponds to a throughput of 4.4 Tflop/s for the full machine.

Lattice QCD Computing Project

- Build and operate production computing facilities dedicated to Lattice QCD
- Prospective budget:

	FY 2006	FY 2007	FY 2008	FY 2009
Hardware	1,916	1,766	1,730	852
Operations	584	734	770	848
Total	2,500	2,500	2,500	1,700

Budget figures are in thousands of dollars.

Hardware Plans

- Each year acquire the hardware that will best advance the science.
- In 2006 the choice is clusters, which will be built at FNAL and JLab.
- Possible alternatives to clusters in 2007 and beyond include a commercial supercomputer, such as a successor to the BlueGene/L, or in 2009 a successor to the QCDOC.

Hardware Milestones

	FY 2006	FY 2007	FY 2008	FY 2009
Acquired TFs	2.25	2.74	4.50	3.65
Delivered TFs	6.65	9.50	12.00	15.00

- The delivered Tflop/s include those produced by the QCDOC and the prototype SciDAC clusters.
- The Project Milestones can be met by building clusters each year.
- If an alternative to clusters is selected, then the hardware milestones will be exceeded.

Project Management

- Project Manager: Don Holmgren (FNAL)
- Associate Project Manager: Bakul Banerjee (FNAL)
- Site Managers
 - Amitoj Singh (FNAL)
 - Tom Schlagel (BNL)
 - Chip Watson (JLab)
- Management documents setting out the scientific objectives, technical scope, work breakdown structure, milestones, budget
 - OMB Exhibit 300
 - Project Execution Plan
 - Review Documents

Project Review – May 24-25, 2005

- Review Committee: M. Golterman, W. Haxton, D. Hitchcock (Chair), W. Kramer, K. Schilling, M. Seager, T. Wettig, F. Wilczek
- Judging by the exit interview, the report will be very positive regarding:
 - The scientific significance of the research
 - The SciDAC Software effort
 - The SciDAC hardware prototyping effort
 - The project management
- Questions were raised regarding the optimal number and location of clusters
- The importance of the continuation of the SciDAC grant to this project was emphasized.