

Lattice QCD Project

Don Holmgren

CD Project Status Meeting – Feb. 19, 2003



Introduction

- FNAL involvement in SciDAC Lattice QCD Project:
 - design, procure, and operate production clusters
 - participate in specification, design, and implementation of SciDAC software (QMP, QLA, QDP)
 - investigate and characterize new hardware (cpu's, networks)
 - investigation of FPGA-based mesh networks

Progress to Date

- 80-node Pentium-III cluster in production since January 2001
- 48-node SciDAC Xeon cluster in production since July 2002
- 128-node SciDAC Xeon cluster just brought into production (late January)
 - Top500.org score (High Performance Linpack) is about 570 GFlop/sec
 - this ranks the cluster near #96 on the list
 - sustained performance for MILC Improved Staggered is about 60 GFlop/sec
 - at least 10X better than ACPMAPS
- Software contributions:
 - FNAL SSE/SSE2 matrix algebra codes now part of MILC, will port to QLA
 - Operations and management software
- Hardware evaluations
 - dual Xeon motherboards
 - dual Athlon motherboards
 - Itanium2 (in progress)

Operations

- Current user community:

- FNAL (MILC, FermiQCD)
- MILC Collaboration (UIUC, Utah, Glasgow, Simon Fraser U, Cornell)
- approximately 6 active users (mostly expert/friendly)

According to current scientific proposals, expect little to no growth

- In place:

- mass storage (/pnfs/theory, /pnfs/lqcd)
- user monitoring tools (web, command line)
- support via mailing lists (lqcd-users@fnal.gov, qcd80-users@fnal.gov)

- Needed:

- documentation (user-level, expert-level, and administration)
- user area backups
- additional disk
- convergence with JLAB (to discuss at Workshop tomorrow)

Challenges

- Operations
 - still lots of very specialized troubleshooting is required
 - ran 128 nodes with much less than 1.5 FTE, now running 256 nodes
 - most significant hardware acquisitions still to come
- Facility (New Muon)
 - can double in size (adequate power and cooling)
 - But! Cooling depends on very old equipment
 - poor physical security

Personnel

- Very low chargeback to LGO (SciDAC salary funds)
 - lack of personnel (Holmgren + Singh + Simone)
 - exacerbated by INS and State Dept (November - January)
- In process of adding new personnel:
 - Genser to 50% soon
 - Sergeev to 75% soon
 - ESE work on network card

Upcoming Work

- Transition to operating as a facility
- Hardware evaluations for Summer expansion (Itanium2, Hammer, PPC970, Myrinet GigE)
- QLA optimizations - SSE2 + prefetching
- FNAL prototype network card

