Report from the Executive Committee

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- USQCD All Hands' Meeting
- Fermilab
- May 1-2, 2015

Activities and issues this year

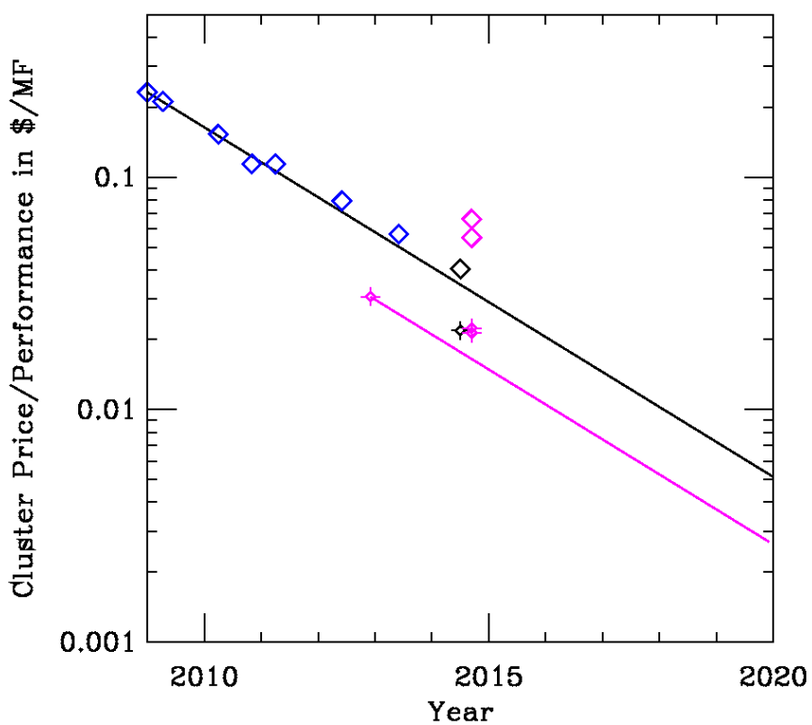
- The evolution of hardware resources in the next 5 years.
- Software and algorithms
- USQCD organization
- USQCD approaches to applying for national resources

Evolution of hardware resources in next 5 years

- The computing resources available to us will grow more slowly in the 2015-2020 than they did 2005-2014.
  - Moore's law is slowing down.
  - DoE financial support is not growing. (It's shrinking, if anything.)

Moore’s law is slowing down

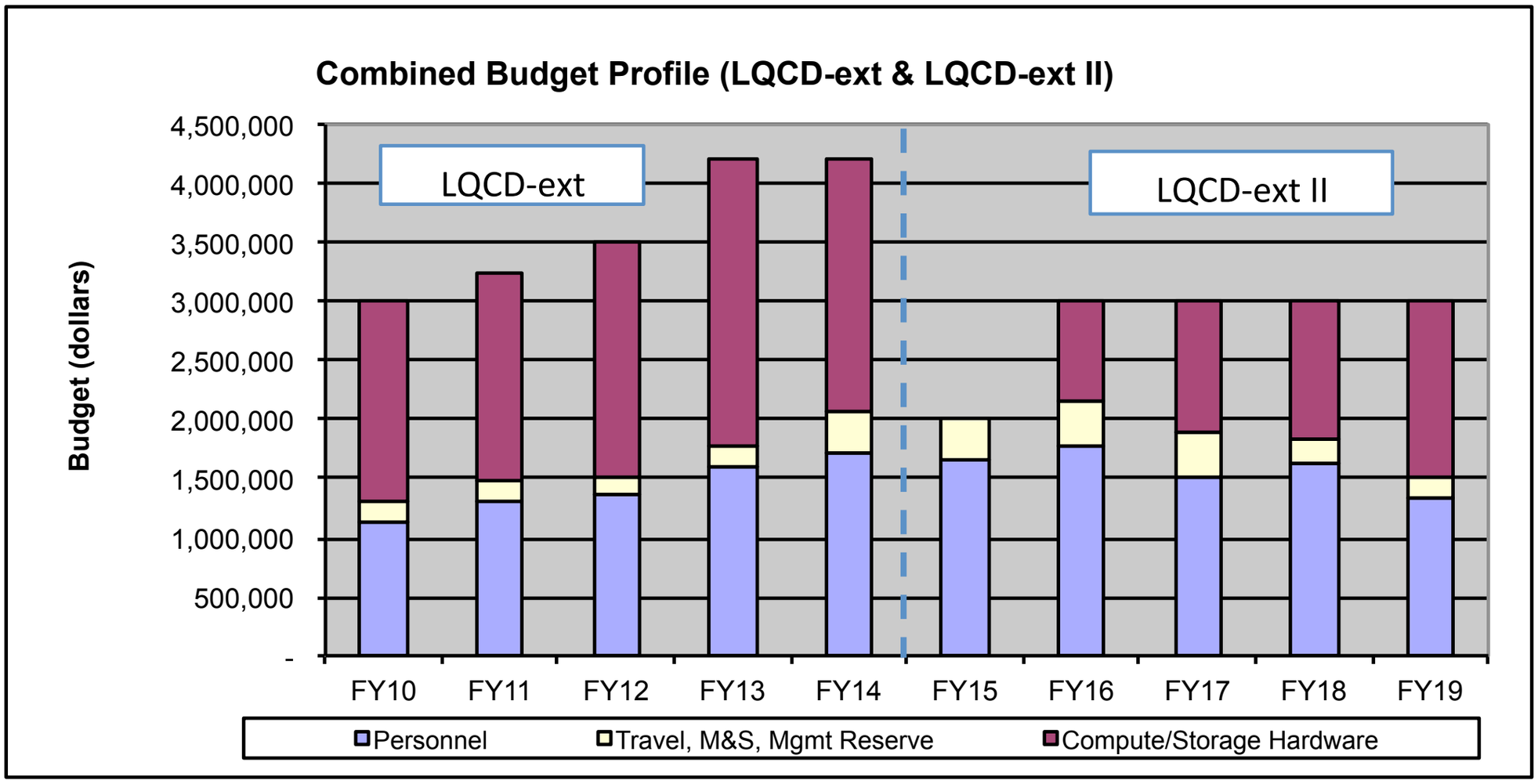
- Price/performance halving times measured on Fermilab clusters:
  - 1995-2005: As little as 1.2 years.
  - 2005 official projection: 1.5 years (conservative).
  - 2010: moved to 1.6 years based on 05-09 data.
  - 2014: LQCD-ext II, for CD1 used 2.0 years; for CD2/3, realized Pi0 wouldn’t hit that curve.



- Diamonds: conventional clusters
- Stars: accelerated clusters
- Blue: LQCD-ext, ARRA clusters
- Black: CD-1 estimates for FY14
- Magenta Diamonds: Pi0 with and without expanded memory and 5-year warranty
- Magenta Stars: ARRA 12K cluster, and Pi0-g with and without 5-year warranty

LQCD resources

LQCD-ext II was approved and has begun funding.
Current expectations for LQCD-ext II are about the same as we were told to expect last year.



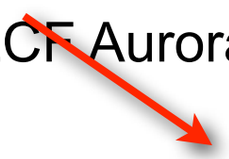
OHEP and ONP support is strong for LGT

- Managers in HEP and NP strongly support lattice gauge theory and hope for higher levels of funding.
- In HEP, improved support will depend on proving our value to the *future* HEP experimental program.
- In NP, long-range planning documents are now being prepared.
  - Some reports are optimistic about them endorsing higher levels of funding for computational nuclear physics.

Leadership computing facility upgrades are slowing down.

DOE/ASCR funding for LCFs seems to be staying strong, but...

- 2013:
  - OLCF Titan: Cray/NVIDIA
  - ALCF Mira, IBM Blue Gene/Q
- 2017
  - OLCF Summit: IBM/NVIDIA
  - ALCF Aurora: Intel/Cray



2019

SciDAC-3 software and algorithms

- HEP SciDAC-3 three-year grant ends in 2015;
  NP SciDAC-3 five-year grant ends in 2017.
  - HEP SciDAC is being recompeted now.
  - There is less money in the HEP SciDAC-3 pot now, and there are more projects applying.
- This software and algorithmic work is critical in an era when
  - Industry is moving to more and more complicated nodes,
  - Increase of hardware resources is slowing way down.

NERSC, ALCF, and OLCF application readiness and early science programs

- Leading HPC chip designers Intel and NVIDIA are moving to more and more complicated chips to push performance.
  - More cores, more complicated memory hierarchies, etc.
- Early science programs ⇒ Early access to hardware, industry, and computer lab experts.
  - ⇒ Optimized codes for inverters, configuration generation ready as soon as new machines are available.
- Adds to already close relationship we have with Intel and NVIDIA, with lattice gauge theory experts inside both companies.

Charter of USQCD

- http://www.usqcd.org/documents/charter.pdf
- A statement of current practices and organization of USQCD
  - These have evolved and will continue to evolve in response to suggestions of review panels, and as a results of discussions with USQCD members at All Hands meetings.

Charter of USQCD

December, 2014

USQCD

USQCD is a consortium of all the collaborations and nearly all the individuals in the US using lattice field theory techniques to solve fundamental problems in high energy and nuclear physics. USQCD organizes the hardware and software infrastructure needed by the United States lattice gauge theory community for the study of Quantum Chromodynamics (QCD), the theory of the strong interactions of subatomic physics, and other theories that have been proposed to explain physics beyond the standard model. The USQCD Executive Committee was formed to provide leadership in developing this computational infrastructure. USQCD receives primary funding from the DOE's LQCD computing hardware Project and SciDAC software program, as well as computing time from the DOE INCITE Program and from the NSF. In accordance with USQCD's original mandate, these resources are available to all members of the US lattice community. Membership in USQCD is open to all US lattice gauge theorists, and almost all US lattice gauge theorists are members. USQCD organizes this infrastructure nationally and sets the broad physics goals of the US lattice program. These goals are chosen to address outstanding research opportunities presented by the national and international programs in high energy and nuclear physics and to represent the goals and capabilities of the physics collaborations and

Committee Members

- Current Executive Committee is Paul Mackenzie (chair), Rich Brower, Norman Christ, Frithjof Karsch, Julius Kuti, Kostas Orginos, David Richards, Martin Savage, and Bob Sugar.
  - This year, John Negele -> Kostas Orginos.
  - The Executive Committee has been rotating at the rate of about one turnover/year for the last few years. We expect to more or less continue that rate.
- Current Scientific Program Committee is Anna Hasenfratz (chair), Tom Blum, Will Detmold, Steve Gottlieb, Kostas Orginos, Peter Petreczky, Ruth Van de Water
  - Robert Edwards, Doug Toussaint, Taku Izubuchi -> Kostas Orginos, Steve Gottlieb, Tom Blum.
  - Rotates at a rate of about two /year.

Storage

- We are spending a growing fraction of our hardware budget on storage.
  - Disk was a few % of our budget, then 5%, in FY14 8% and growing.
  - 2015: growth slowed. Good.
  - Eigenvector methods, for example, are very demanding.
- The projects have historically done a very poor job of estimating their needs.
- We should be aware that we have already sacrificed nearly 10% of our new incremental capacity in flops for storage, and should be asking whether this is what we want to be doing.
  - Are we storing propagators that could just as easily be regenerated?
  - Are we forgetting to delete data that's needed only for a short time?
  - Are we storing more multiple ensembles than necessary? (Gauge fixed...)
  - Should we be pushing the supercomputing centers to have better storage?

Organizational odds and ends

- Users survey.
  - DoE mandates that the project team take a user survey every year.
    - Only way for DoE to judge if users are happy with project management.
  - Logging in to a USQCD computer during the year constitutes an agreement to complete the survey.
    - Can be done rapidly.
- Travel funds
  - The SciDAC grants contain a small amount of funds for travel. This is mainly for sending software workers on software business, occasionally have a little extra available for worthy projects, such as sending young people without travel funds on physics trips to report on the USQCD physics program.

How should USQCD apply for time on its various resources?

2015 USQCD resources					
		M units	**Units**	**Total M core-hours**	**Grand total**
LQCD/clusters	DOE/HEP&NP			451	
LQCD/GPUs	“	9.5	GPU hrs	?	
LQCD/BNL BGQ	“			71	
LCF INCITE	DOE/ASCR			280	
Blue Waters	NSF	30	node hrs	480	
NERSC	DOE/ASCR				
				186	
LCF ALCC	DOE/ASCR				
				473	
XSEDE	NSF		SUs		
				32	
					1973

Discussion tomorrow.