

OPPORTUNITIES FOR TIER-2 COMPUTING AT ARGONNE



Jean F. Hall, 1953

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COMPUTING AT ARGONNE

Two world-class computing facilities



- Part of DOE Leadership Computing Facility (together with Oak Ridge)
- Key player in exascale project
- User facility



- Mid-range supercomputing resources
- Aimed to enable high-performance computing (HPC) across Argonne
- Paid through laboratory overhead



U.S. DEPARTMENT OF
ENERGY

Argonne National Laboratory is a
U.S. Department of Energy laboratory
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ALCF COMPUTING RESOURCES

5 clusters: Theta, Mira, Cetus, Vesta and Cooley

MIRA (2012)



- IBM BlueGene/Q architecture
- 49,152 IBM PPC A2 Nodes
- 786,432 cores total
- 10 PetaFlops

THETA (2017)



- Cray/Intel (prototype for Aurora)
- 4,392 Intel Xeon Phi 7230 Nodes
- 281,088 cores total
- 11.69 PetaFlops



AURORA: WORLD'S FIRST EXASCALE COMPUTER

- ALCF 2021 (under construction)
- Order-of-magnitude leap from current generation
- Support for 3 “pillars”: simulation, data and learning

LCRC COMPUTING RESOURCES

2 clusters: Bebop and Blues



- Traditional cluster (like farm)
- Sandy Bridge & Haswell nodes
- ~7000 cores total
- 110 TeraFlops



- Cray CS400 architecture
- Intel Broadwell & Knight's Landing
- 46,720 cores total
- 1,000 TeraFlops (1 PetaFlops)



Argonne, 1965

LCRC WORKFLOW

Job scheduling and dispatching

- SLURM on Beboop
 - ▶ same as new JLab batch system!

- PBS on Blues

Infrastructure

- Fast data transfer through GLOBUS
- Large scale data storage possible
- Possible to buy additional “private” cluster nodes for Beboop
 - ▶ Maintenance included in Argonne overhead!

OPPORTUNITY

A dedicated tier-2 system for CLAS12 (SIDIS, ALERT, ...) as a service?



- Proposal for a dedicated tier-2 system
 - ▶ Store significant part of raw data at Argonne (minimizing data transfer bottlenecks)
 - ▶ Use Bebop (PetaFlops cluster!) to run reconstruction jobs
 - ▶ Can also use system for large-scale simulation jobs
 - ▶ Tie everything together with GLOBUS (similar to OSG)
- **Leverage the considerable computing resources our group already pays for!**



WHITE PAPER



MOVING FORWARD?

- Start with existing resource allocation, can hit the ground running.
- White paper for official large-scale LCRC project
 - Enables us to obtain additional resources
- ... **only with your endorsement!**

**WE CAN OFFER CONSIDERABLE COMPUTING
RESOURCES FOR RECONSTRUCTION/SIMULATION
AT ARGONNE ...**

... WITH YOUR ENDORSEMENT.



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