Argonne Leadership Computing Facility (ALCF)

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The DOE Leadership Computing Facility

- Collaborative, multi-lab, DOE/SC initiative ranked top national priority in *Facilities for the Future of Science: A Twenty-Year Outlook*.
- Mission: Provide the computational and data science resources required to solve the most important scientific & engineering problems in the world.
- Highly competitive user allocation program (INCITE, ALCC).
- Projects receive 100x more hours than at other generally available centers.
- LCF centers partner with users to enable science & engineering breakthroughs (Liaisons, Catalysts).
ALCF User Community

- ALCF is targeted to a few very large science projects
- Minimal award in 2014 expected to be at least 50M core-hours
- Diverse base of users with diverse needs
- Support and provide compute time to individuals and teams of researchers from academia, national laboratories, and industry
- Wide-range of scientific disciplines utilize our resources
- INCITE 60%, ALCC 30%, Discretionary 10%

2013 INCITE Allocations: 2.1B Mira, 736M Intrepid

ALCF Users by Affiliation in 2012
## Allocation Programs at the LCFs

<table>
<thead>
<tr>
<th></th>
<th>INCITE</th>
<th>ALCC</th>
<th>Director’s Discretionary</th>
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<tbody>
<tr>
<td><strong>Mission</strong></td>
<td>High-risk, high-payoff science that requires LCF-scale resources*</td>
<td>High-risk, high-payoff science aligned with DOE mission</td>
<td>Strategic LCF goals</td>
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<tr>
<td><strong>Call</strong></td>
<td>1x/year – (Closes June)</td>
<td>1x/year – (Closes February)</td>
<td>Rolling</td>
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<tr>
<td><strong>Duration</strong></td>
<td>1-3 years, yearly renewal</td>
<td>1 year</td>
<td>3m, 6m, 1 year</td>
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<td><strong>Typical Size</strong></td>
<td>30 - 40 projects</td>
<td>5 - 10 projects</td>
<td>100s of projects</td>
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<td></td>
<td>50M - 500M core-hours/yr.</td>
<td>10M – 300+M core-hours/yr.</td>
<td>.5M – 10M core-hours</td>
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<tr>
<td><strong>Review Process</strong></td>
<td>Scientific Peer-Review</td>
<td>Computational Readiness</td>
<td>Strategic impact and feasibility</td>
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<tr>
<td><strong>Managed By</strong></td>
<td>INCITE management committee (ALCF &amp; OLCF)</td>
<td>DOE Office of Science</td>
<td>LCF management</td>
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<td><strong>Readiness</strong></td>
<td>High</td>
<td>Medium to High</td>
<td>Low to High</td>
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<tr>
<td><strong>Availability</strong></td>
<td>Open to all scientific researchers and organizations</td>
<td><strong>Capability &gt; 131,072 cores (16.7% of Mira)</strong></td>
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10 Petaflops Blue Bene/Q - Mira

- **Mira – BG/Q system**
  - 49,152 nodes / 786,432 cores
  - 786 TB of memory
  - Peak flop rate: 10 PetaFLOPs
  - 3,145,728 hardware threads

- **Vesta (T&D) - BG/Q system**
  - 2,048 nodes / 32,768 cores
  - 32 TB of memory
  - Peak flop rate: 420 TF

- **Tukey – Nvidia system**
  - 100 nodes / 1600 x86 cores / 200 M2070 GPUs
  - 6.4 TB x86 memory / 1.2 TB GPU memory
  - Peak flop rate: 220 TF

- **Storage**
  - Scratch: 28.8 PB raw capacity, 240 GB/s bw (GPFS)
  - Home: 1.8 PB raw capacity, 45 GB/s bw (GPFS)
  - Storage upgrade planned in 2014
  - Cross-mounted on Compute and Data Analytics

- **WAN**
  - 100 Gbit/s
  - ALCF connected to at 10x10

- **Globus Online, GridFtp**
Science Domains on Mira and Intrepid in 2013

2013 ALCF Projects by Domain

Researchers from a wide range of disciplines were awarded a total of 5.8 billion core-hours on Mira and Intrepid in 2013.