Argonne Leadership Computing Facility

Accelerating Discovery and Innovation

Katherine M Riley
Director of Science, Argonne Leadership Computing Facility

www.anl.gov
Argonne Leadership Computing Facility

The Argonne Leadership Computing Facility provides world-class computing resources to the scientific community.

- Users pursue scientific challenges
- In-house experts to help maximize results
- Resources fully dedicated to open science

Architecture supports three types of computing

- Large-scale Simulation (PDEs, traditional HPC)
- Data Intensive Applications (scalable science pipelines)
- Deep Learning and Emerging Science AI (training and inferencing)

ALCF offers different pipelines based on your computational readiness. Apply to the allocation program that fits your needs.
ALCF Allocation Programs

**INCITE: Innovative and Novel Computational Impact on Theory and Experiment**
- Yearly call with computational readiness and peer reviews
- Open to all domains and user communities

**ALCC: ASCR Leadership Computing Challenge**
- Yearly call with peer reviews
- Focused on DOE priority
- Exascale Computing Project (ECP)

**DD: Director’s Discretionary Program**
- Rapid allocations for project prep and immediate needs
- Early Science Program (ESP)
- ALCF Data Science Program (ADSP)
- Proprietary Projects
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<th>ALCC</th>
<th>Director’s Discretionary</th>
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<td>High-risk, high-payoff science that requires LCF-scale resources*</td>
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<td><strong>Call</strong></td>
<td>1x/year – Opens in April, Closes June</td>
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<td><strong>Typical # Projects</strong></td>
<td>10-15 projects</td>
<td>5-15 projects</td>
<td>~100 of projects</td>
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<tr>
<td><strong>Total Hours</strong></td>
<td>~17.8M Theta node-hours ~2M Polaris node-hours</td>
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<td><strong>Readiness</strong></td>
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<td><strong>Availability</strong></td>
<td>Open to all scientific researchers and organizations</td>
<td>Capability &gt; 20% of resource</td>
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DD
Director’s Discretionary

**Purpose:** A “first step” for projects working toward a major allocation

**Eligibility:** Available to all researchers in academia, industry, and other research institutions

**Review Process:** Projects must demonstrate a need for high-performance computing resources; reviewed by ALCF

**Award Size:** Low 10 thousand of node-hours

**Award Duration:** 3-6 months, renewable

**Total percent of ALCF resources allocated:** 10%

**Award Cycle**
Ongoing (available year-round)
ALCC
ASCR Leadership Computing Challenge

The DOE’s ALCC program allocates resources to projects directly related to the DOE’s energy mission, as well as national emergencies, and for broadening the community of researchers capable of using leadership computing resources.

Eligibility: Available to researchers in academia, industry, and other research institutions

Review process: DOE peer reviews all proposals for scientific/technical merit; appropriateness of approach; and adequacy of personnel and proposed resources

Award size: ~1M node-hours

Award duration: 1 year

Total percent of ALCF resources allocated: 20-30%

Award Cycle
July 1 to June 30

Nov Call
Plan for
LOI
INCITE
Innovative & Novel Computational Impact on Theory and Experiment

The DOE’s INCITE program provides allocations to computationally intensive, large-scale research projects that aim to address “grand challenges” in science and engineering.

Eligibility: Available to researchers in academia, industry, and other research institutions

Review process: INCITE program conducts a two-part review of all proposals including a peer review by an international panel of experts, and a computational-readiness review

Award size: ~1.0-2.5M node-hours

Award duration: 1-3 years, renewable

Total percent of ALCF resources allocated: 60%

Award Cycle
January 1 to December 31

2024
Call Opens April 2023
Estimations of Project Award Sizes and node-hours

**Oak Ridge LCF**
- System Peak Performance: 200 PF
- Awards size: 300-800 K
- Machine node-hours: 300-800 K
- Summit IBM/NVIDIA: 2023
- Frontier Cray/HPE: 2023-2025
- ~ 1M
- >1.5 EF

**Argonne LCF**
- System Peak Performance: 11.7 PF
- Awards size: 1-2.5 M
- Machine node-hours: 1-2.5 M
- Theta equivalent node-hours: 100-200 K
- Theta Intel-Cray XC40: 2023
- Polaris HPE: 2023-2025
- ~ 1M
- 30x
- ≥2 EF

**Summit**
- Machine node-hours: 300-800 K
- Summit IBM/NVIDIA: 2023

**Frontier**
- Machine node-hours: 3-4 M
- Frontier Cray/HPE: 2023-2025

**Awards size**
- Machine node-hours: 3-6 M
- N/A
- 50-100 M

**Node Performance compared to Theta**
- 1x
- 30x
- 100x

**Machine node-hours**
- 3-4 M
- 3-6 M
- 50-100 M
### INCITE criteria
Access on a competitive, merit-reviewed basis*

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<th>Merit criterion</th>
</tr>
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<td>1</td>
<td>Research campaign with the potential for significant domain and/or community impact</td>
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<td>2</td>
<td>Computationally demanding runs that cannot be done anywhere else: capability, architectural needs</td>
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<th>Eligibility criterion</th>
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<td>3</td>
<td>• Grant allocations regardless of funding source*</td>
</tr>
<tr>
<td></td>
<td>• Non-US-based researchers are welcome to apply</td>
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*DOE High-End Computing Revitalization Act of 2004: Public Law 108-423
## Twofold review process

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<th>New proposal assessment</th>
<th>Renewal assessment</th>
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<td>• Scientific and/or technical merit</td>
<td>• Change in scope</td>
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<tr>
<td>• Appropriateness of proposal method, milestones given</td>
<td>• Met milestones</td>
</tr>
<tr>
<td>• Team qualifications</td>
<td>• On track to meet future milestones</td>
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<tr>
<td>• Reasonableness of requested resources</td>
<td>• Scientific and/or technical merit</td>
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<tr>
<td>• Technical readiness</td>
<td>• Met technical/computational milestones</td>
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<tr>
<td>• Appropriateness for requested resources</td>
<td>• On track to meet future milestones</td>
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**Peer review:** INCITE panels
- Technical readiness
- Appropriateness for requested resources

**Computational readiness review:** LCF centers
- INCITE Awards Committee comprised of LCF directors, INCITE program manager, LCF directors of science, sr. management
## 2022 Award Statistics

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<th>Summit</th>
<th>Theta</th>
<th>Polaris</th>
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<td>Number of projects*</td>
<td>37</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Average Project</td>
<td>508 K</td>
<td>1.24 M</td>
<td>102 K</td>
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<tr>
<td>Median Project</td>
<td>540 K</td>
<td>1.00 M</td>
<td>100 K</td>
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<tr>
<td>Total Awards (node-hrs in CY2022)</td>
<td>18.8 M</td>
<td>21.1 M</td>
<td>1.22 M</td>
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- Total of 53 INCITE projects (6 projects received time on both Theta and Summit)
  - 4 have time on both Theta and Summit
  - 11 have time on both Theta and Polaris
  - 1 project has time only on Polaris

* All reported in node-hours native to each resource.
Recent Trends in INCITE
Data, Learning and Nontraditional Uses of the Architecture

• In addition to traditional computationally intensive simulation campaigns, INCITE encourages Data and/or Learning projects with unique data requirements (e.g. large scale data analytics) or workflow needs that can only be enabled by the LCFs.
  – A “Learning” panel evaluated proposals that had significant machine / deep learning component to their campaign
  – When appropriate, these proposals were also assessed by their scientific discipline peers as well

• Early Career Track (w/in first 10 years of PhD)
• Interest in using AI or Quantum Testbeds
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*Capability > 20% of resource*
Thank You!

Learn more at: alcf.anl.gov