Argonne NATIONAL LABORATORY

Argonne Leadership Computing Facility

Accelerating Discovery and Innovation

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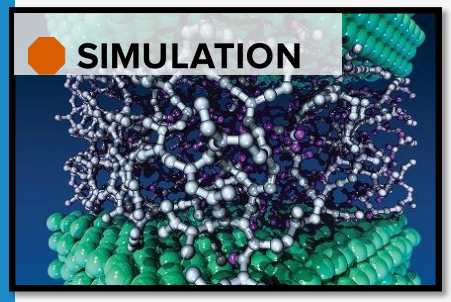
www.anl.gov

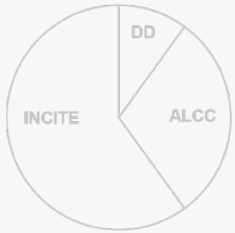
Argonne Leadership Computing Facility

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



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



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)

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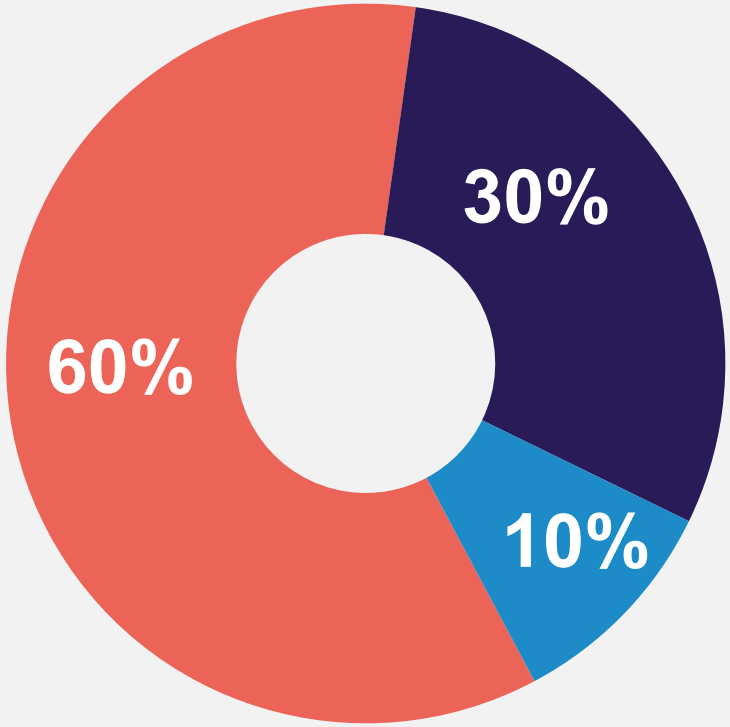
ALCF Allocation Programs



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

LCF Allocation Programs	INCITE 60%		ALCC 30%		Director's Discretionary 10%
Mission	High-risk, high-payoff science that requires LCF-scale resources*		High-risk, high-payoff science aligned with DOE mission		50% Strategic LCF goals 50% ECP
Call	1x/year – Opens in April, Closes June		1x/year – Opens in November, Closes February		Rolling
Duration	1-3 years, yearly renewal		1 year		3m,6m,1 year
Typical # Projects	**10-15 projects**		**5-15 projects**		**~100 of projects**
Total Hours	**~17.8M Theta node-hours ~2M Polaris node-hours**		**~8.5M Theta node-hours ~900K Polaris node-hours**		**~6M Theta node-hours ~290K Polaris node-hours**
Review Process	Scientific Peer-Review	Computational Readiness	Scientific Peer-Review	Computational Readiness	Strategic impact and feasibility
Managed By	INCITE management committee (ALCF & OLCF)		DOE Office of Science		LCF management
Readiness	**High**		**Medium to High**		**Low to High**
Availability	Open to all scientific researchers and organizations ***Capability > 20% of resource***				

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

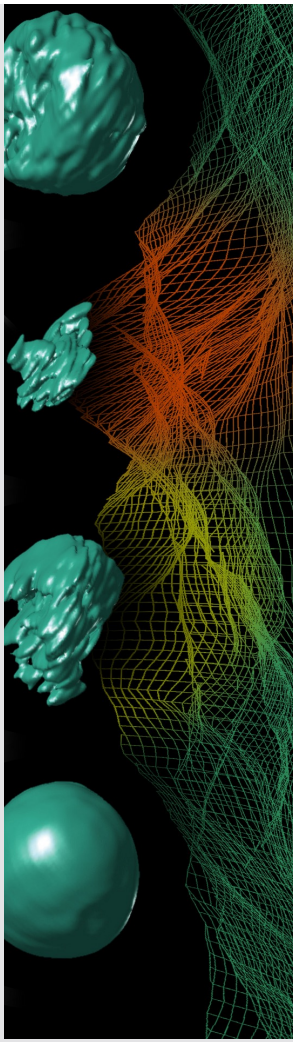
Review Process: Projects must demonstrate a need for high-performance computing resources; reviewed by ALCF

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

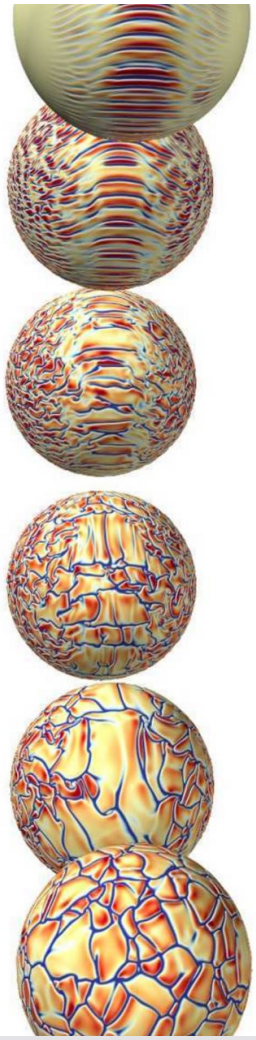
Award size: ~1.0-2.5M node-hours

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

	Summit	Frontier
System Peak Performance	200 PF	>1.5 EF
Awards size		
Machine node-hours	300-800 K	~ 1M
Summit equivalent node-hours	300-800 K	3-4 M
		
	Summit IBM/NVIDIA	**Frontier** Cray/HPE
	2023	2023-2025

Argonne LCF

	Theta	Polaris	Aurora
Node Performance compared to Theta	1x	30x	100x
System Peak Performance	11.7 PF	44 PF	≧2 EF
Awards size			
Machine node-hours	1-2.5 M	100-200 K	N/A
Theta equivalent node-hours	1-2.5 M	3-6 M	50-100 M
			
	Theta Intel-Cray XC40	**Polaris** HPE	**Aurora** Intel-HPE
	2023	2023-2025	2023-2025

U.S. DEPARTMENT OF ENERGY INCITE LEADERSHIP COMPUTING

INCITE criteria

Access on a competitive, merit-reviewed basis*

1	Merit criterion
	Research campaign with the potential for significant domain and/or community impact

2	Computational leadership criterion
	Computationally demanding runs that cannot be done anywhere else: capability, architectural needs

3	Eligibility criterion
	• Grant allocations regardless of funding source* • Non-US-based researchers are welcome to apply

*DOE High-End Computing Revitalization Act of 2004: Public Law 108-423

Twofold review process

	New proposal assessment	Renewal assessment
1 Peer review: INCITE panels	• Scientific and/or technical merit • Appropriateness of proposal method, milestones given • Team qualifications • Reasonableness of requested resources	• Change in scope • Met milestones • On track to meet future milestones • Scientific and/or technical merit
2 Computational readiness review: LCF centers	• Technical readiness • Appropriateness for requested resources	• Met technical/ computational milestones • On track to meet future milestones
Award Decisions	• INCITE Awards Committee comprised of LCF directors, INCITE program manager, LCF directors of science, sr. management	

2022 Award Statistics

	Summit	Theta	Polaris
Number of projects*	37	17	11
Average Project	508 K	1.24 M	102 K
Median Project	540 K	1.00 M	100 K
Total Awards (node-hrs in CY2022)	18.8 M	21.1 M	1.22 M

- 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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Thank You!
Learn more at: alcf.anl.gov