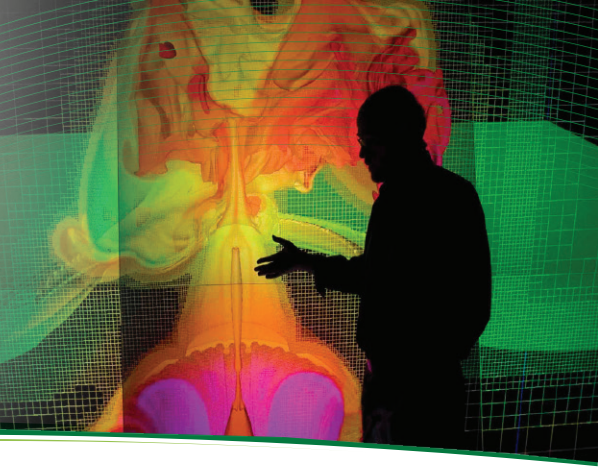
Modeling and simulation on supercomputers improves our understanding of everything from nuclear detonations to protein synthesis to the birth of galaxies.



Exascale Computing Project

High-performance computing (HPC) systems have become critical tools for research in diverse scientific fields and leadership in areas such as national security, manufacturing, and healthcare.

Today's supercomputers solve problems at the petascale—a quadrillion calculations per second—but even better performance is required for timely results from increasingly complex analyses of growing volumes of data.

The term "exascale" refers to a quintillion (1,000,000,000,000,000,000) calculations per second—50 times more computational and data analysis power than possible with today's petascale systems.

Addressing a National Imperative

While the United States has been the global leader in HPC for many years, the stark realization of exascale's potential impact on national security, scientific discovery, and industrial competitiveness has spurred aggressive HPC research among several nations, creating a global competition for technology leadership in the exascale era.

Supporting National Security

HPC plays a vital role in the National Nuclear Security Administration's annual nuclear weapons assessment and Stockpile Stewardship Program. In the coming decade, HPC and exascale-based modeling and simulation tools will be essential for understanding evolving nuclear threats and developing national policies to mitigate these threats.

Advancing Science and the Economy

HPC systems accelerate research that leads to new designs, safer products, and faster times to market. The US Department of Energy (DOE) Exascale Computing Project (ECP) aims to ensure US leadership in modeling, simulation, and data analysis capabilities that will benefit sectors ranging from manufacturing to finance to healthcare. Developing exascale systems and applying their power to national priorities will strengthen US competitiveness.

800
US researchers engaged with ECP

66
Software development projects

26
Application development projects

5
Co-design centers

U.S. DEPARTMENT OF ENERGY | Office of Science

ECP EXASCALE COMPUTING PROJECT

NNSA National Nuclear Security Administration

Seven-Year Project

Established by DOE, ECP is responsible for developing the strategy, aligning the resources, and conducting the research and development necessary to deliver exascale computing by 2021. The project is organized into four focus areas.

- **Application Development:** Developing and applying state-of-the-art scientific, engineering, and data analytics simulation technologies to solve nationally important problems of unprecedented complexity
- **Software Technology:** Building the software environment and tools that will enable applications to run with high performance on exascale hardware
- **Hardware Technology:** Developing diverse computer designs that address ECP's technical challenges in performance, efficiency, and resilience
- **Exascale Systems:** Partnering with US companies to design and develop exascale systems for DOE

Collaborating to Compete

ECP is managed by a team representing six of the largest DOE national laboratories: Argonne, Lawrence Berkeley, Lawrence Livermore, Los Alamos, Oak Ridge, and Sandia, with the project office located at Oak Ridge National Laboratory. Working together, they have established an extensive national network to lead the nation's exascale research agenda. The network includes 5 co-design centers to support development and deployment and more than 800 researchers working on 26 mission critical applications and 66 strategic software development projects. ECP also works with an external industry advisory council composed of senior executives from some of the country's most prominent public and private companies to ensure the technology will meet the nation's industrial design and manufacturing needs.

Argonne NATIONAL LABORATORY

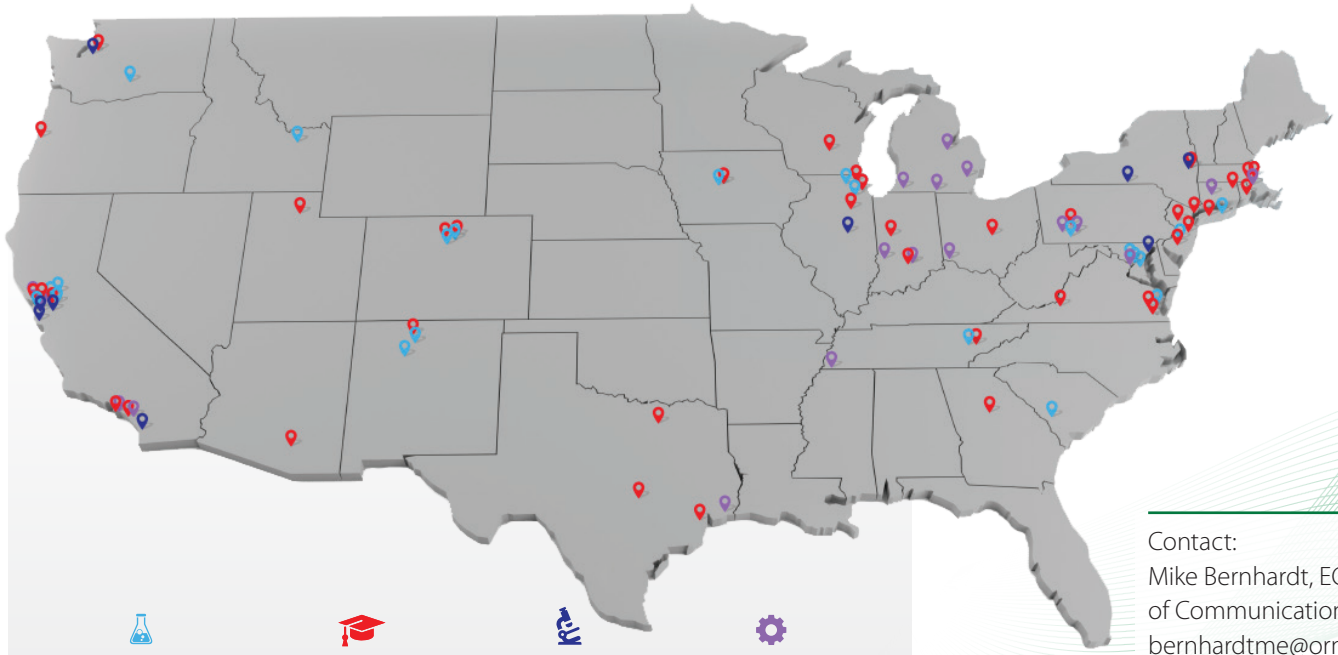
Lawrence Livermore National Laboratory

Los Alamos NATIONAL LABORATORY

BERKELEY LAB

OAK RIDGE National Laboratory

Sandia National Laboratories



DOE Laboratories and Agency Partners	University Research Partners	Private Sector Partners	Industry Council Members
22	39	9	18

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