



# Frontier: America's Exascale Computing Future

Exascale is the next level of computing performance. By solving calculations more than five times faster than today's top supercomputers—exceeding a quintillion, or a billion billion, calculations per second—exascale systems will enable scientists to develop critically needed technologies for energy, medicine, materials, and more. The Oak Ridge Leadership Computing Facility (OLCF) at Oak Ridge National Laboratory (ORNL) is home to America's first exascale system, the 2 exaflops HPE Cray EX Frontier supercomputer.



If each person on earth completed one calculation per second, it would take more than 4 years to do what Frontier can do in 1 second.

## Unprecedented Power for New Knowledge

ORNL has decades of experience in the delivery and operation of world-leading supercomputers for scientific discovery. Since 2006, the OLCF has deployed four supercomputers that debuted as fastest in the world, including Summit in 2018. In May 2022, Frontier came online as the first exascale machine ever developed and the most powerful supercomputer in the world. Its power will help researchers answer problems of national importance that cannot be addressed on existing supercomputing platforms, such as:

- enhancing nuclear reactor efficiency and safety by modeling their entire life span;
- uncovering the underlying genetics of disease;
- discovering patterns in patient data for precision medicine; and
- further integrating artificial intelligence with data analytics, modeling, and simulation.

“Frontier’s novel architecture is ideally suited for delivering unprecedented machine learning and data science insights and automations that could vastly improve our understanding of critical processes.”

—Associate Laboratory Director, CCSD **Gina Tourassi**



- 2 basketball courts**  
Frontier covers over 7,300 square feet
- 2 pickup trucks**  
Equal the weight of one Frontier cabinet
- 2 exaflops**  
Theoretical peak performance
- 700 PB**  
Frontier's storage system holds 33 times the amount of data in the Library of Congress

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