

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 10^{18} , 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 at Oak Ridge National Laboratory will be home to one of America's first exascale systems: Frontier.



Frontier will calculate in 1 second what would take more than 6 years if all 7.7 billion people on Earth completed 1 calculation per second.

Unprecedented Power for New Knowledge

ORNL has decades of experience in the delivery and operation of world-leading supercomputers for scientific discovery. Summit, the most recent supercomputer built at the laboratory and launched in 2018, ranks as the world's most powerful system and continues the growing trend of hybrid architectures in high-performance computing. Frontier's operation in 2021 will leverage ORNL's extensive experience and expertise in accelerated computing and help researchers answer problems of national importance that simply can't be addressed with today's computing platforms.

- Enhance nuclear reactor efficiency and safety by modeling their entire lifespan
- Uncover the underlying genetics of disease
- Discover patterns in patient data for precision medicine
- Further integrate artificial intelligence with data analytics, modeling, and simulation

"We're working to ensure that the capability to perform exascale science is awaiting Frontier upon its arrival."

Bronson Messer,
Director, ORNL Center for Accelerated Application Readiness

2
basketball courts

Frontier will cover over 7,300 square feet

35
school buses

Equal the weight of Frontier

>1.5
exaflops

Theoretical peak performance

160

Frontier will have the performance of the top 160 fastest supercomputers in the world COMBINED

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CONTACT:

Gina Tourassi, Director,
National Center for
Computational Sciences

tourassig@ornl.gov,
865-576-4829

One Bethel Valley Road,
Oak Ridge, TN 37830



www.ornl.gov

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