



# SUMMIT: Scaling New Heights

The Oak Ridge Leadership Computing Facility (OLCF), a US Department of Energy Office of Science User Facility at Oak Ridge National Laboratory, provides access to the nation's fastest supercomputer to address some of the grand challenges of our time and enable scientific breakthroughs in science domains as diverse as biology, nuclear science, and cosmology.

In 2018, the OLCF launched Summit, the latest leap in leadership-class computing systems for open science. The IBM AC922 system offers scientists 200 petaflops of performance, or 200 million billion calculations per second. Summit delivers about eight times the performance of its predecessor, the 27-petaflop Titan supercomputer, and represents a substantial step toward the nation's first exascale machine, a system capable of a billion billion calculations per second. The same year it launched, researchers broke the exascale barrier on Summit with a genomics algorithm, achieving a peak throughput of 2.36 exaops, or 2.36 billion billion reduced precision calculations per second—the fastest science application ever reported.

## Leading the Way

Summit allows researchers to add much more complexity to their codes than past systems, enabling simulations of greater resolution and higher fidelity to advance human knowledge. Some exciting Summit research projects include:

- studying exploding stars at unprecedented scales,
- simulating particle turbulence in sustainable fusion reactions,
- researching materials for high-temperature superconductors, and
- carrying out fluid dynamics simulations to accelerate combustion science.

## An AI Supercomputer

In addition to modeling and simulation, Summit offers researchers unparalleled opportunities for the integration of artificial intelligence (AI) and scientific discovery. Applying AI techniques like machine learning and deep learning to automate, accelerate, and drive understanding at supercomputer scales will help scientists achieve breakthroughs in human health, energy, and engineering and answer fundamental questions about the universe.

"The computational speed of Summit is helping us simulate the evolution of the structures in the universe we observe with very large telescopes."

**Katrin Heitmann, Summit User and Physicist**  
*Argonne National Laboratory*



**200**  
Number of petaflops  
supplied by  
Summit

**4,608**  
Number of  
Summit  
nodes

**185**  
Miles of fiber-optic  
cable installed  
in Summit

**250**  
Petabytes of data  
storage provided by  
Summit's file  
system

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