

# Hands-On with the Summit Supercomputer

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ORNL is managed by UT-Battelle LLC for the US Department of Energy

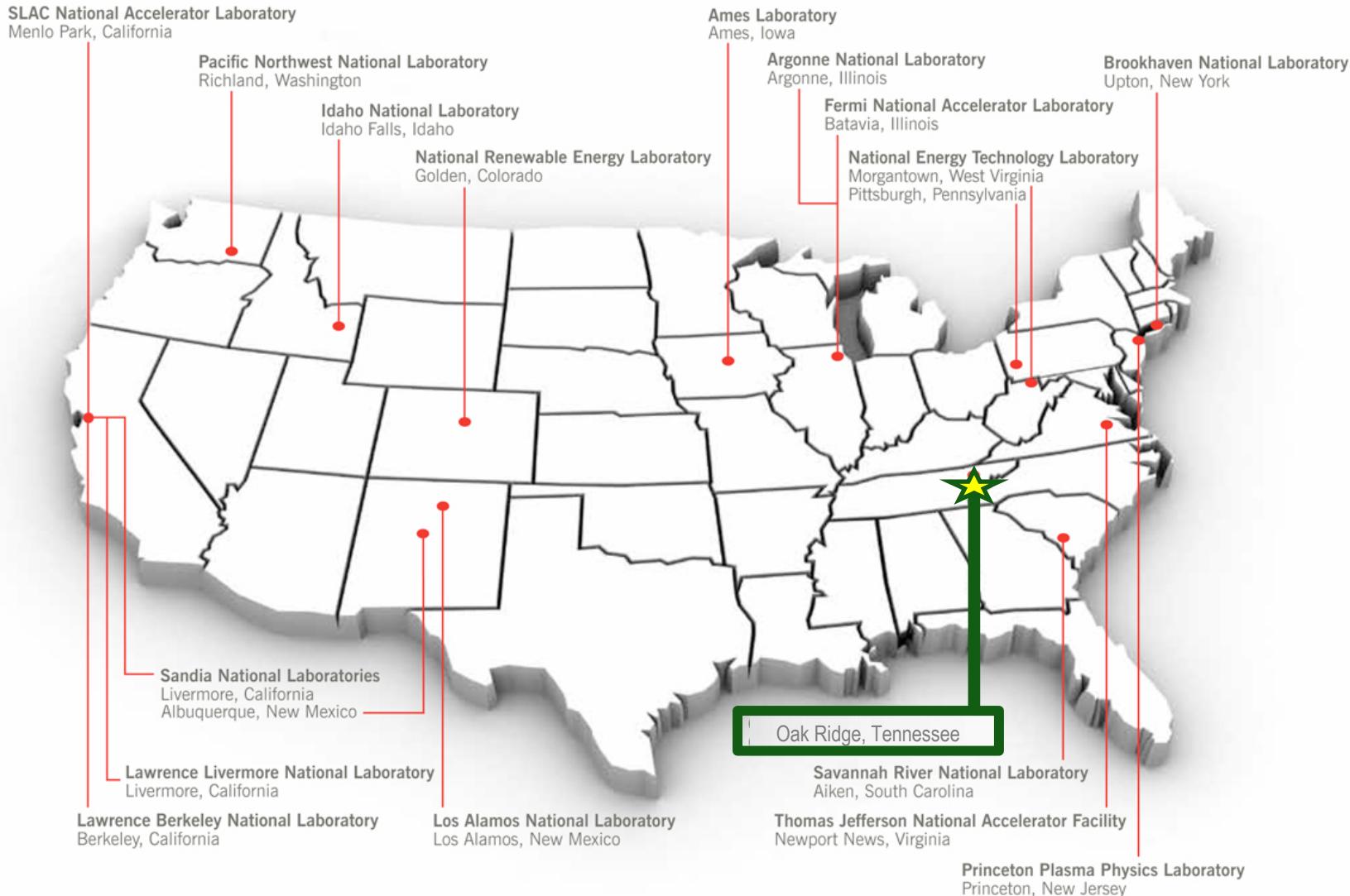
This research used resources of the Oak Ridge Leadership Computing Facility at the Oak Ridge National Laboratory, which is supported by the Office of Science of the U.S. Department of Energy under Contract No. DE-AC05-00OR22725. Some of the work presented here is from the TOTAL and Oak Ridge National Laboratory collaboration which is done under the CRADA agreement NFE-14-05227. Some of the experiments were supported by an allocation of advanced computing resources provided by the National Science Foundation. The computations were performed on Nautilus at the National Institute for Computational Sciences.



# Agenda

<b>What</b>	<b>When (ET)</b>
Welcome	11:00 – 11:05
Intro to the Oak Ridge Leadership Computing Facility	11:05 – 11:15
Intro to the Summit supercomputer	11:15 – 11:30
Using the Summit Supercomputer	11:30 – 12:00
Hands-on Challenges	12:00 – 2:55
Closing	2:55 – 3:00

# A Little About ORNL...



Oak Ridge National Laboratory is the largest US Department of Energy (DOE) open science laboratory

# What is a Leadership Computing Facility (LCF)?

- Collaborative DOE Office of Science user-facility program at ORNL and ANL
- Mission: Provide the computational and data resources required to solve the most challenging problems.
- 2-centers/2-architectures to address diverse and growing computational needs of the scientific community
- Highly competitive user allocation programs (INCITE, ALCC).
- Projects receive 10x to 100x more resource than at other generally available centers.
- LCF centers partner with users to enable science & engineering breakthroughs (Liaisons, Catalysts).



# Origin of Leadership Computing Facility

Department of Energy High-End Computing Revitalization Act of 2004 (Public Law 108-423):

The Secretary of Energy, acting through the Office of Science, shall

- Establish and operate Leadership Systems Facilities.
- Provide access [to Leadership Systems Facilities] on a competitive, merit-reviewed basis to researchers in U.S. industry, institutions of higher education, national laboratories and other Federal agencies.

118 STAT. 2400

PUBLIC LAW 108-423—NOV. 30, 2004

Public Law 108-423  
108th Congress

An Act

Nov. 30, 2004  
[H.R. 4516]

Department of Energy High-End Computing Revitalization Act of 2004, 15 USC 5501 note, 15 USC 5541.

15 USC 5542.

To require the Secretary of Energy to carry out a program of research and development to advance high-end computing.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Department of Energy High-End Computing Revitalization Act of 2004".

SEC. 2. DEFINITIONS.

In this Act:

(1) CENTER.—The term "Center" means a High-End Software Development Center established under section 3(d).

(2) HIGH-END COMPUTING SYSTEM.—The term "high-end computing system" means a computing system with performance that substantially exceeds that of systems that are commonly available for advanced scientific and engineering applications.

(3) LEADERSHIP SYSTEM.—The term "Leadership System" means a high-end computing system that is among the most advanced in the world in terms of performance in solving scientific and engineering problems.

(4) INSTITUTION OF HIGHER EDUCATION.—The term "institution of higher education" has the meaning given the term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

(5) SECRETARY.—The term "Secretary" means the Secretary of Energy, acting through the Director of the Office of Science

SEC. 3. DEPARTMENT OF ENERGY HIGH-END COMPUTING RESEARCH AND DEVELOPMENT PROGRAM.

(a) IN GENERAL.—The Secretary shall—  
(1) carry out a program of research and development (including development of software and hardware) to advance high-end computing systems; and  
(2) develop and deploy high-end computing systems for advanced scientific and engineering applications.

(b) PROGRAM.—The program shall—  
(1) support both individual investigators and multidisciplinary teams of investigators;  
(2) conduct research in multiple architectures, which may include vector, reconfigurable logic, streaming, processor-in-

# DOE Leadership Computing Facility

- Leadership Computing Facility is a collaborative, multi-lab, DOE/SC initiative ranked top domestic priority; 2 centers/2 architectures to address diverse and growing computational needs of the scientific community
- Mission: Provide an ecosystem, including partnering opportunities, that enables unsurpassed capability computing opportunities and the associated science and engineering breakthroughs
- Administer and support two highly competitive user allocation programs (INCITE, ALCC)
  - Innovative and Novel Computational Impact on Theory and Experiment (INCITE)
  - ASCR Leadership Computing Challenge (ALCC)
  - Computational allocations typically 100 times greater than routinely available for university, laboratory, and industrial scientific and engineering environments



# The OLCF has Successfully Delivered Six Systems Since 2004

- All projects delivered on scope, schedule, and budget
- Frontier will be system number seven and will provide an increased capability of over 80,000x
- Large part of success has been strong user partnerships to scale & refactor codes/methods
- Partnering has been essential to delivering science in a rapidly changing computational environment

