

# Hands-On with the Summit Supercomputer

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Oak Ridge Leadership Computing Facility (OLCF)

SC19 Hands-On with Summit  
Denver, CO  
November 22, 2019

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.



# Agenda



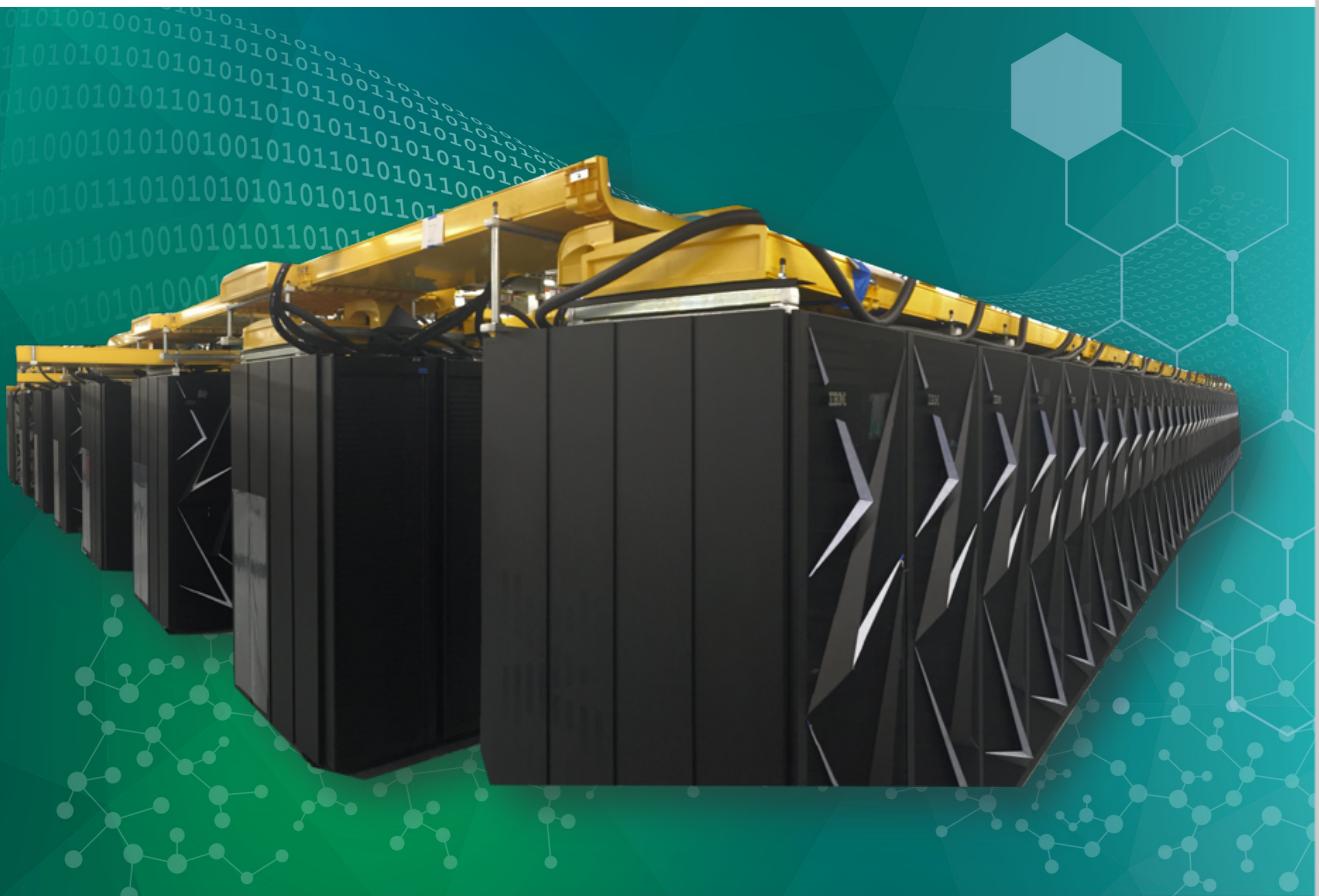
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What	When
Welcome	8:15 - 8:20
Intro to the Oak Ridge Leadership Computing Facility	8:20 - 8:30
Intro to the Summit supercomputer	8:30 - 8:40
Using the World's Most Powerful Computers	8:40 - 9:20
Break	9:20 - 9:45
Hands-on Challenges	9:45 - 11:45
Opportunities at ORNL & Staying in Touch	11:40 - 11:50
Closing Remarks	11:50 - 11:55

# Supercomputing at the OLCF

Jack Morrison  
HPC Engineer

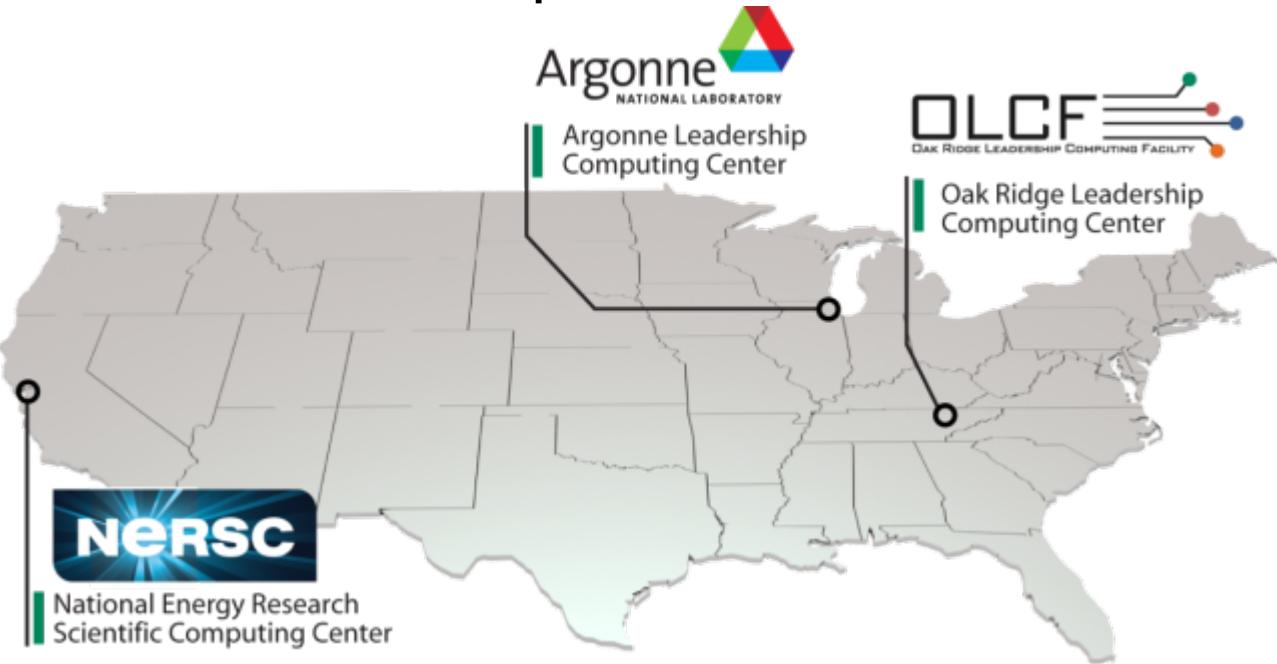
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# DOE's Office of Science Computation User Facilities



NERSC  
Cori ~30 PF



ALCF  
Theta ~12 PF



OLCF  
Summit 200 PF

- DOE is leader in open High-Performance Computing
- Provide the world's most powerful computational tools for open science
- Access is free to researchers who publish
- Boost US competitiveness
- Attract the best and brightest researchers

# Origin of Leadership Computing Facility

118 STAT. 2400

PUBLIC LAW 108-423—NOV. 30, 2004

## 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.

Public Law 108-423  
108th Congress

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.

### An Act

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 of the Department of Energy.

#### 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;

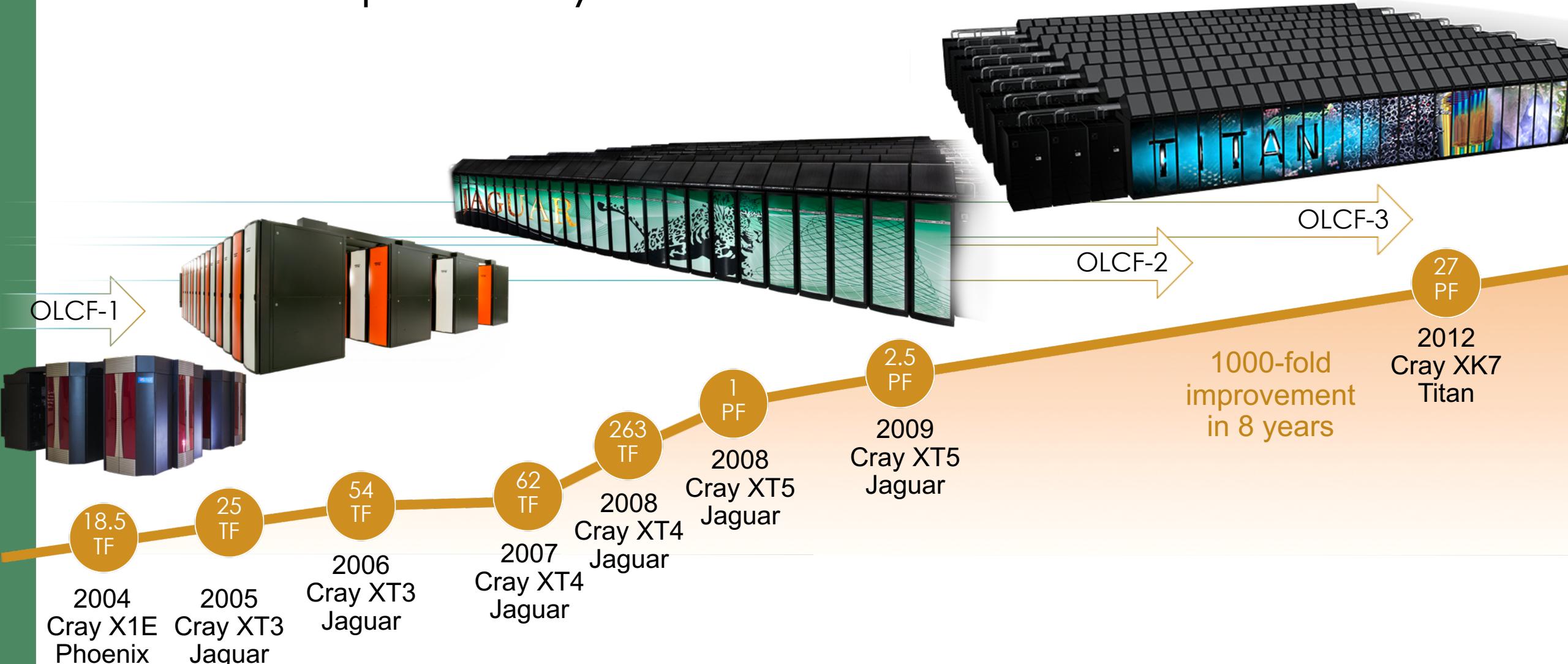
(2) conduct research in multiple architectures, which may include vector, reconfigurable logic, streaming, processor-in-

# What is a Leadership Computing Facility (LCF)?

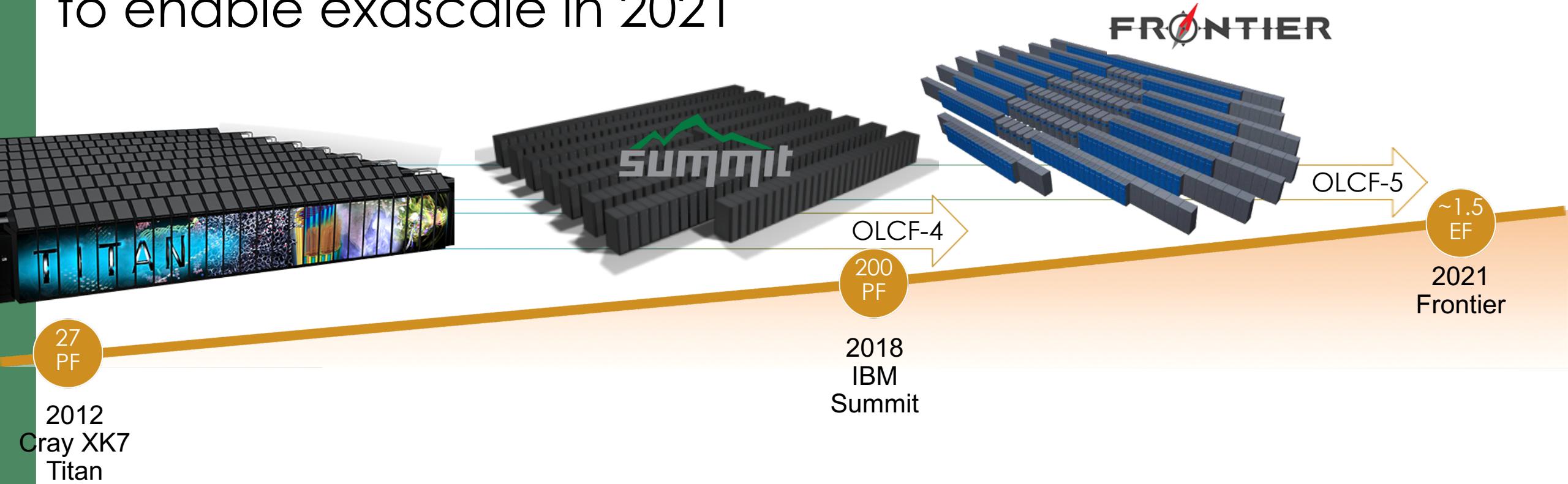
- Collaborative DOE Office of Science user-facility program at ORNL and ANL
- Mission: Provide the computational and data resources required to solve the most challenging problems.
- 2-centers/2-architectures to address diverse and growing computational needs of the scientific community
- Highly competitive 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).



# ORNL has systematically delivered a series of leadership-class systems



We are building on this record of success  
to enable exascale in 2021



- 311 projects at the OLCF today
- Biology, Chemistry, Computer Science, Engineering, Earth Sciences, Fusion, Industry, Materials, Nuclear Energy, Physics,...