OAK RIDGE National Laboratory

Accelerating Competitiveness through Computational ExceLlence

HPC Industrial
Partnerships Program

Oak Ridge National Laboratory

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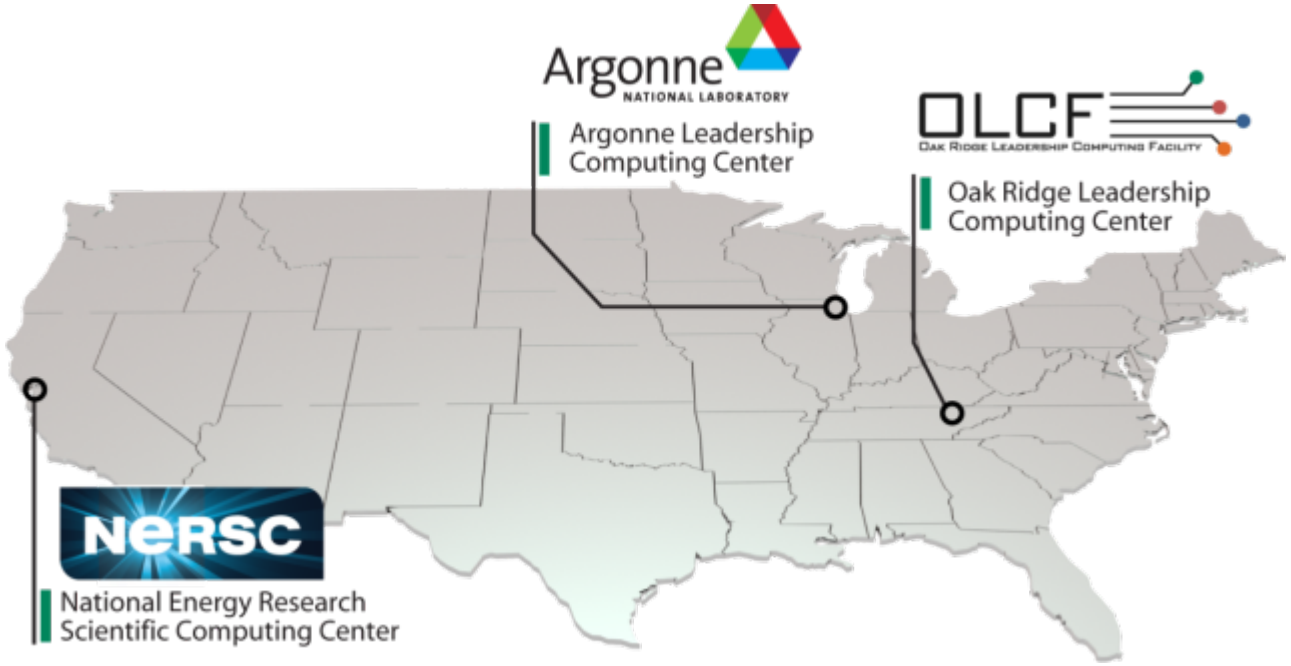
ORNL is managed by UT-Battelle, LLC for the US Department of Energy

U.S. DEPARTMENT OF ENERGY

DOE/Office of Science Computing User Facilities

DOE's Office of Science Advanced Scientific Computing Research (ASCR) *Computation User Facilities*



NERSC
Cori is 30 PF

ALCF
Theta is 11 PF

OLCF
Summit is 200 PF

- **Oak Ridge Leadership Computing Facility** (OLCF):*DOE Leadership Computing Facility*
- **Argonne Leadership Computing Facility** (ALCF): *DOE Leadership Computing Facility*
- **National Energy Research Scientific Computing Center (NERSC):** *A scalable parallel computing facility for Office of Science research needs*

OAK RIDGE National Laboratory

Summit

- Peak of 200 Petaflops (FP_{64}) for modeling & simulation
- Peak of 3.3 ExaOps (FP_{16}) for data analytics and artificial intelligence

- 4,608 nodes
- Dual-rail Mellanox EDR InfiniBand network
- 250 PB IBM file system transferring data at 2.5 TB/s

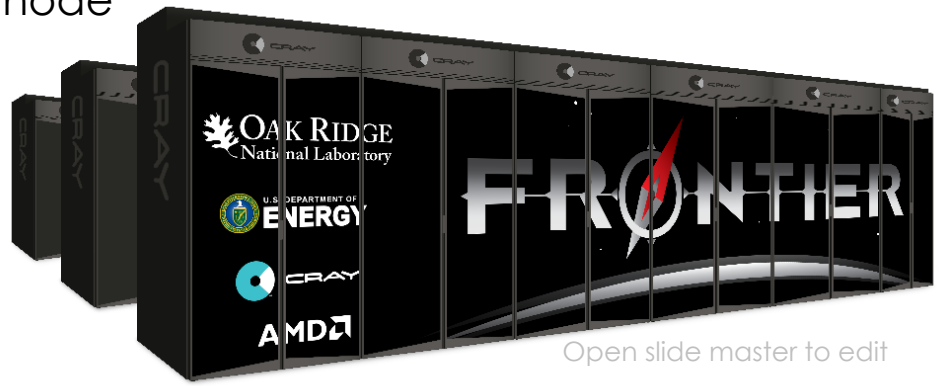
- Node architecture
  - 2 IBM POWER9 processors
  - 6 NVIDIA Tesla V100 GPUs
  - 608 GB of fast memory (96 GB HBM2 + 512 GB DDR4)
  - 1.6 TB of non-volatile memory

TOP 500 #2

Frontier (2021)

- Partnership between ORNL, Cray, and AMD
- The Frontier system will be delivered in 2021
- Peak Performance greater than 1.5 EF

- Composed of more than 100 Cray Shasta cabinets
  - Connected by Slingshot™ interconnect with adaptive routing, congestion control, and quality of service
- Node Architecture
  - An AMD EPYC™ processor and four Radeon Instinct™ GPU accelerators
  - Fully connected with high speed AMD Infinity Fabric links
  - Coherent memory across the node
  - 100 GB/s injection bandwidth
  - Near-node NVM storage



ACCEL
Accelerating Competitiveness through Computational ExceLlence

ACCEL Industrial HPC Partnership Program

How the program works

Key Points About Our Industry Program

- Working with firms actively engaged in modeling and simulation…and taking them to their next HPC level.
  - **Big firms, small firms and those in between**
  - You don't have to be at 200 Petaflops (Summit).
  - But, you can't be at "ground zero."
  - We try to "right-size" the problems - user goals to OLCF capabilities and mission.
- Procedures to protect proprietary information.
- Procedures to comply with export control regulations.

Our Approach

- High touch, customized program:
- One size does not fit all
- We are an “innovation” shop, not a “cycles” shop
- Goal is high value-add, high impact science/engineering results
- Requires more attention, but fosters deeper relationships

Gaining Access to our User Facility (OLCF)

You apply for time to run your problem on our supercomputers

- Multiple pathways to apply for access depending on:
  - Amount of time needed.
  - Ability of software to scale and take advantage of our systems.
  - **Your timing**…some pathways are annual calls for proposals, some are open all year long.
- There is not a special "set-aside" for industry
- Industry applies for time and competes in each pathway along with researchers from academia and government.

Problems to Bring to Our User Facilities: High Risk – High Return

Competitive Opportunity ***(Break out of the Pack!)***

Strategic

High Risk

Breakthrough Innovation

High Return

Routine Low Risk

Moderate Risk and Innovation

Industrial HPC Partnership Program

Helping Companies Succeed

Who's Been Working With Us?

GO BEYOND

P&G

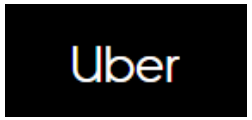
Raytheon Technologies

TOTAL
COMMITTED TO BETTER ENERGY

BOEING

GENERAL ATOMICS

DRESSER-RAND
A Siemens Business



BOSCH

OAK RIDGE National Laboratory

What Companies Are Doing With Us

- Scaling current problems for greater accuracy.
- Tackling new, competitively important problems that can not be addressed with in-house systems/software.
- Conducting large scale Design of Experiment (DOE) and Multidisciplinary Optimization (MDO) problems.
- Exploring machine learning/AI algorithms and techniques and testing them at scale on important problems

What Companies Are Doing With Us

- Testing pathways to build an internal ROI case for additional system and/or software
- Testing internally developed software at scale; testing GPUs
- Achieving breakthrough insights and understanding, and/or discovering something new.
- Gaining a "crystal ball" look into advanced HPC systems and software, and a head start in using them.

We Provide Access To…

Talent

Training

Tools

So that industry can:

Accelerate innovation
Reduce risk
Lower costs
Solve the seemingly intractable
Predict the future

Getting Started…

Start with a conversation about your computing needs!

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