Argonne Training Program on Extreme-Scale Computing (ATPESC)

Introduction to ATPESC

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ECP
EXASCALE COMPUTING PROJECT

Filling in for Pete Beckman

Watch Pete's Videos

An Introduction to Parallel Supercomputing I Pete Beckman, Argonne National Laboratory

ANL Training • 369 views • 8 months ago

Presented at the Argonne Training Program on Extreme-Scale Computing 2018. Slides for this presentation are available here: ...

An Introduction to Parallel Supercomputing | Pete Beckman, Argonne National Laboratory

ANL Training • 1.8K views • 2 years ago

Presented at the Argonne Training Program on Extreme-Scale Computing, Summer 2016. Slides for this presentation are ....

An Introduction to Parallel Supercomputing I Pete Beckman, Argonne

ANL Training • 448 views • 1 year ago

Presented at the Argonne Training Program on Extreme-Scale Computing 2017. Slides for this presentation are available here: ...

Pete's Advice

- Put phones away

- Ignore email for a few weeks

- Dive into the material presented / experiment

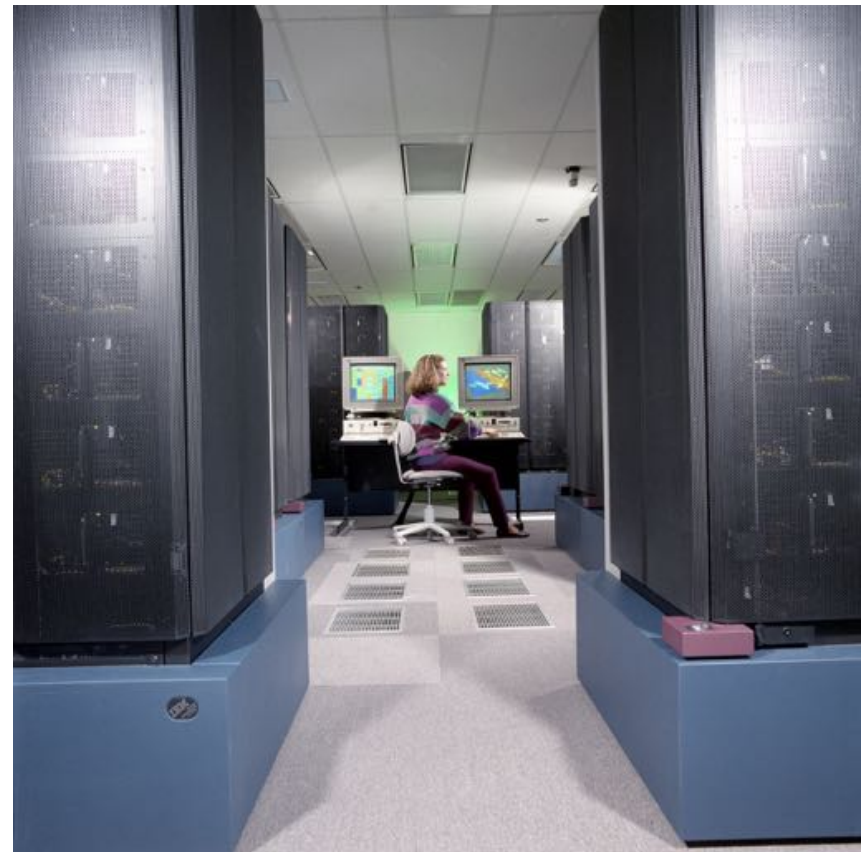- Have fun …

Agenda

Argonne First Digital Computer

AVIDAC, Argonne's first digital computer, began operation in January 1953. It was built by the Physics Division for $250,000.

Established Advanced Research Computing Facility (ARCF)

Continued Deployment of Computing Advances

Fast Forward to Today
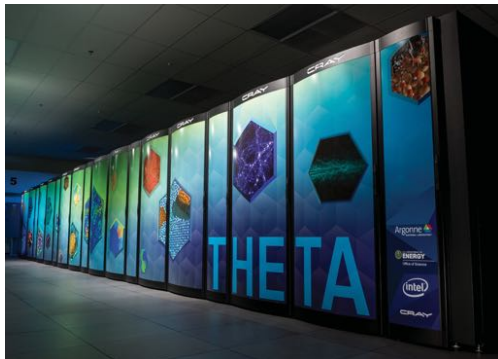
Mira IBM BG/Q
49,152 nodes
786,432 cores
768 TiB RAM
Peak flop rate: 10 PF

Cetus IBM BG/Q
4,096 nodes
65,536 cores
64 TiB RAM
Peak flop rate: 836 TF

Tape
- The ALCF has three 10,000-slot libraries using LTO 6 tape technology.
- Hardware compression for an effective capacity of 36-60 PB.

Theta Cray XC40
4,392 nodes
281,088 cores
892 TiB RAM
Peak flop rate: 11.69 PF

Cooley Cray/NVIDIA
126 nodes
1512 Intel Haswell CPU cores
126 NVIDIA Tesla K80 GPUs
48 TB RAM / 3 TB GPU

Iota Intel/Cray XC40
44 nodes
2,816 cores
8.9 TiB RAM
Peak flop rate: 117 TF

Firestone IBM Power8
2 nodes + K80 GPU
20 cores
128 GB RAM
Hybrid CPU/GPU

Storage Capability
Disk
- Mira: ~27 PB of GPFS file system capacity with performance of 240 GB/s on the largest file system (19PB).
- Theta: ~18 PB of GPFS/Lustre file system capacity; 9PB is GPFS and 9.2PB is Lustre.

Argonne NATIONAL LABORATORY

ECP EXASCALE COMPUTING PROJECT
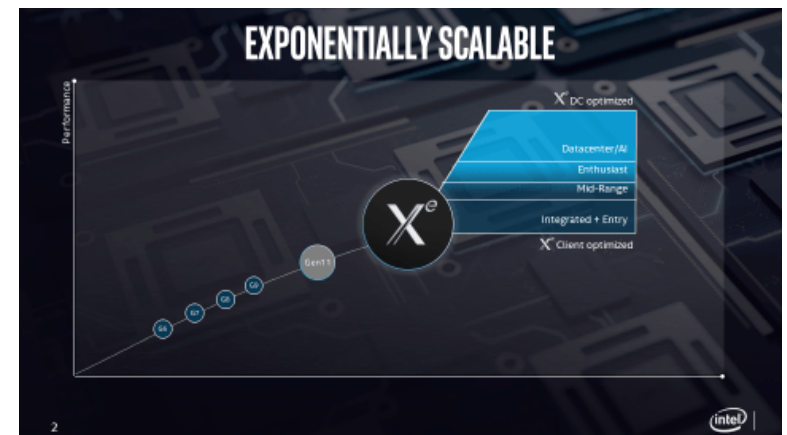
High Level View of Aurora

- Aurora is an Intel/Cray machine

- The system is to be delivered to Argonne in 2021
  - Limited availability to applications in 2021
  - Expect broader availability to applications in 2022

- Aurora will be a Exa-scale system
  - Will have a peak performance of over 1 ExaFlop/s in Double-Precision
  - Much higher than 1 ExaFlop/s in Half-Precision
  - Target for applications performance is an 50x speedup over Titan/Sequoia

Aurora Hardware Overview

Compute Node and Memory

- Processor
  - Future Intel® Xeon® Scalable Processor

- Accelerator
  - New Intel® Xe Compute Architecture

Aurora Hardware)verview

Platform, Fabric and I/O

- ## Compute Platform
  - Cray Shasta next generation supercomputing platform

- ## System Interconnect
  - Cray Slingshot interconnect

- ## I/O system
  - Intel's DAOS (Distributed Application Object Storage)
  - Traditional parallel filesystem augments DAOS (bulk storage, legacy support)

Top500.org

Performance Development
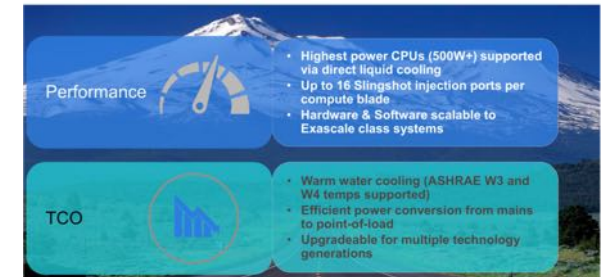
QUESTIONS?

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