



**Hewlett Packard**  
Enterprise

# **HPE TECHNICAL UPDATE**

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Utz-Uwe Haus, Head of HPC/AI EMEA Research Lab  
HPC User Forum 2022-10-3

# WE ACHIEVED EXASCALE

- Frontier in numbers:
  - 37,888 AMD MI-250 GPUs
  - 9,472 AMD Trento CPUs
  - 2,424,832 HBM chips
  - 75,776 DIMMs
  - 23,680 cooling connectors
  - 2368 switches
  - 37,888 High-Speed NICs
  - 150 km of interconnect cables
  - 21-29 MW of power
- Performance
  - 1.102 Exaflops
  - 19.2 Pflops per rack
  - 4.85 PB HBM + 4.85 PB DDR
  - 7.5 PB/s injection bandwidth



## "It is really good to be number one:" DOE and ORNL debut Frontier exascale supercomputer

Officially launching the system that went up earlier this year

August 18, 2022 By: Sebastian Moss Comment



The Department of Energy held a dedication ceremony for the Frontier supercomputer this week, which launched earlier this year as the first official exascale supercomputer.

Unmentioned during the hour-long series of speeches was the fact that China secretly [launched two exascale supercomputers](#) last year, beating Frontier to the title. However, China did not submit the systems to the Top500 ranking, so Frontier is the [only 'official' exascale supercomputer](#).

"It is really good to be number one," David Turk, the DOE's deputy secretary, said. "And it's also incredible to really take a step back and

in front of the pack Frontier and it's right now, we have the next generation."

"the speed of the world's rcomputer," he added, Fugaku system, which ne Top500.

items may actually be faster st until it is fully optimized. o tell as details are limited - uters are believed to be much less power efficient and less optimized compared ID system.



## HPC WIRE

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May 30, 2022

The 59th installment of the Top500 list, issued today from ISC 2022 in Hamburg, Germany, officially marks a new era in supercomputing with the debut of the first-ever exascale system on the list. Frontier, deployed at the Department of Energy's Oak Ridge National Laboratory, achieved 1.102 exaflops in its highest-scoring High Performance Linpack run, which was completed over the course of two hours and thirty minutes Friday morning in Oak Ridge, Tenn. It was widely anticipated that Frontier would debut on this list, but the run that put them over the one exaflops line was filed in the nick of time, according to list co-author Jack Dongarra.



Wall Clock time (Eastern) May 27, 2022 (2.45 hour run time)

#1 on Top500  
#1 on Green500  
#1 on HPL-AI

# EXASCALE IS HERE, WHAT'S NEXT?

## Capability computing

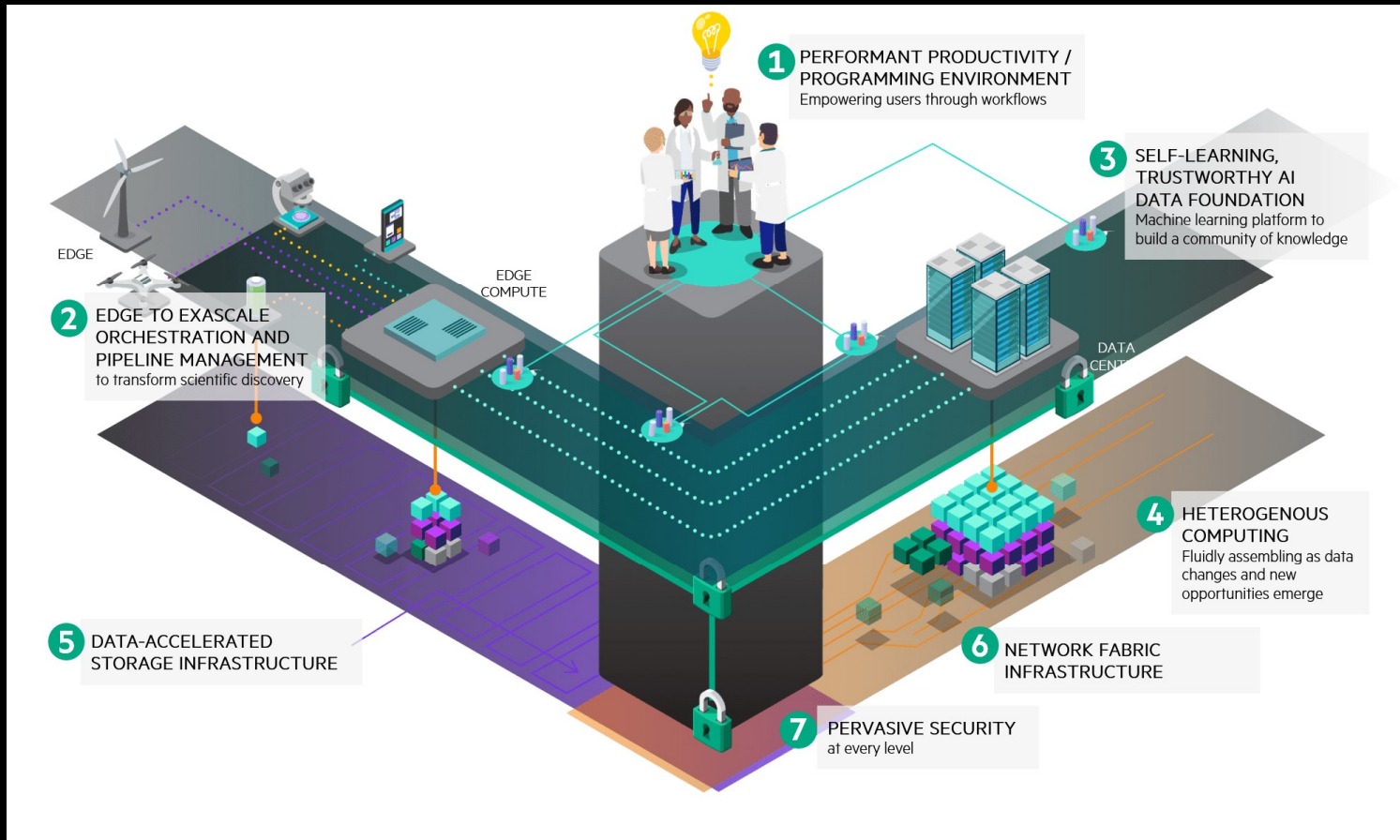
- Exascale science
  - Climate
  - Complex system twins
  - Nuclear Fusion
- Data movement bottleneck stays prominent
- Heterogeneity grows
  - In architecture, in-system, on-site, cross-site
  - In software

## Federated HPC

- Geographically distributed
- Multi-user workflows
- Workflows-as-a-Service
- FAIR data management
- More than a return of the Grid
- Connected EuroHPC resources
- Gaia-X and HPC



# FEDERATED HPC: EDGE TO SUPERCOMPUTER TO CLOUD



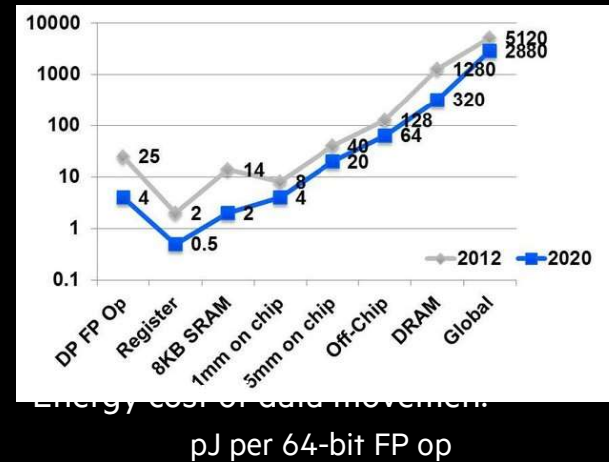
Recommended Reading [ETP4HPC Whitepaper Federated HPC, Cloud and Data Infrastructures](#)

# SUSTAINABILITY

## External

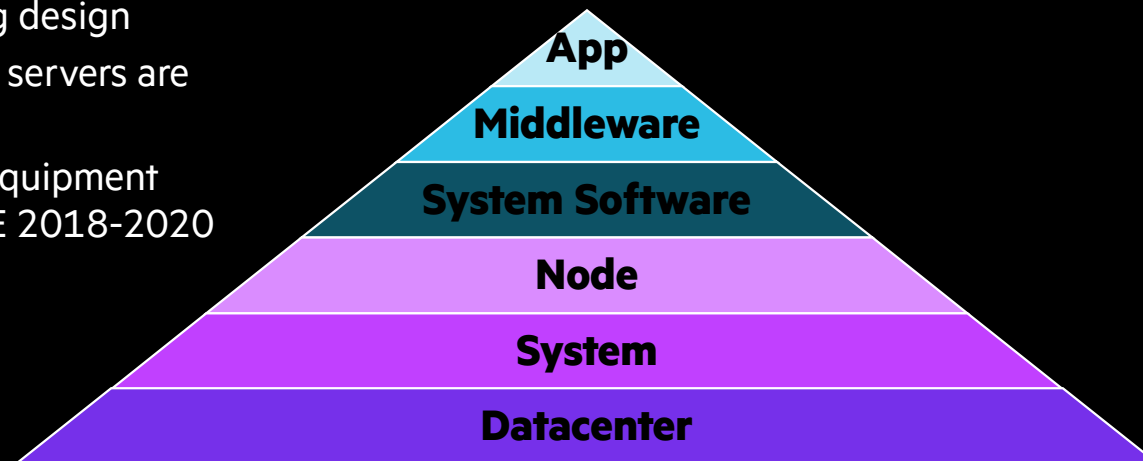
- CO<sub>2</sub> - aware resource allocation and federation
- Grid-Interactive HPC
- Connecting building system management and HPC system management
- Equipment Lifecycle
  - 80% of environmental impact influenced during design
  - 30% of large DC servers are unused
  - 73k tons of IT equipment recycled by HPE 2018-2020

## Internal



## User-facing

- Power usage feedback
  - Profilers
  - Job-level
- New Middlewares
- Tuned libraries
- Adaptive application-specific power steering



## THOUGHTS FOR DISPUTE

### Democratization of HPC

- Is python-from-laptop-to-HPC a sign of 'low-code/no-code'?

### Trustworthy compute

- What are explainable Digital Twins?

### Artificial Intelligence

- Will it decrease or increase heterogeneity of the HPC ecosystem?

**THANK YOU**

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