

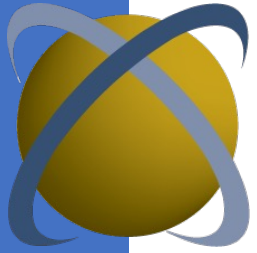
A New Frontier in Supercomputing

OK Supercomputing Symposium 2023

Addison Snell



Intersect360
R E S E A R C H

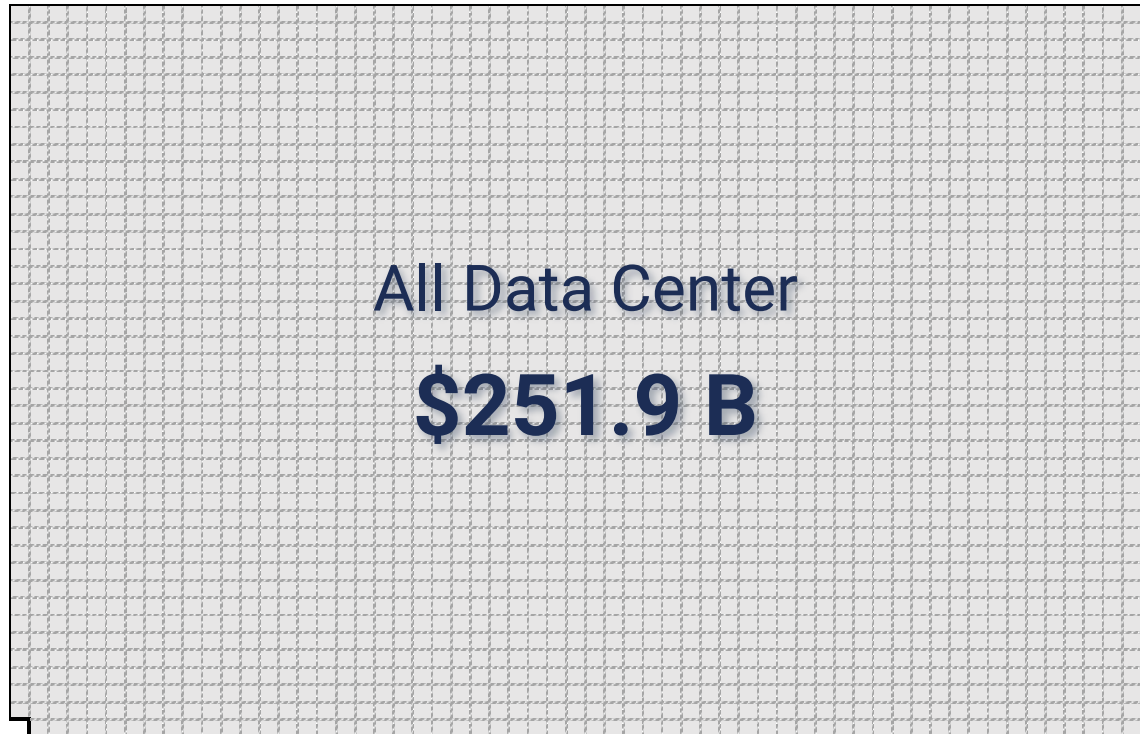


“Frontier” is new World’s Most Powerful Supercomputer





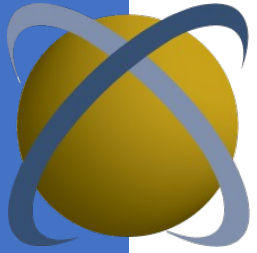
Data Center 2022: Grand Unification



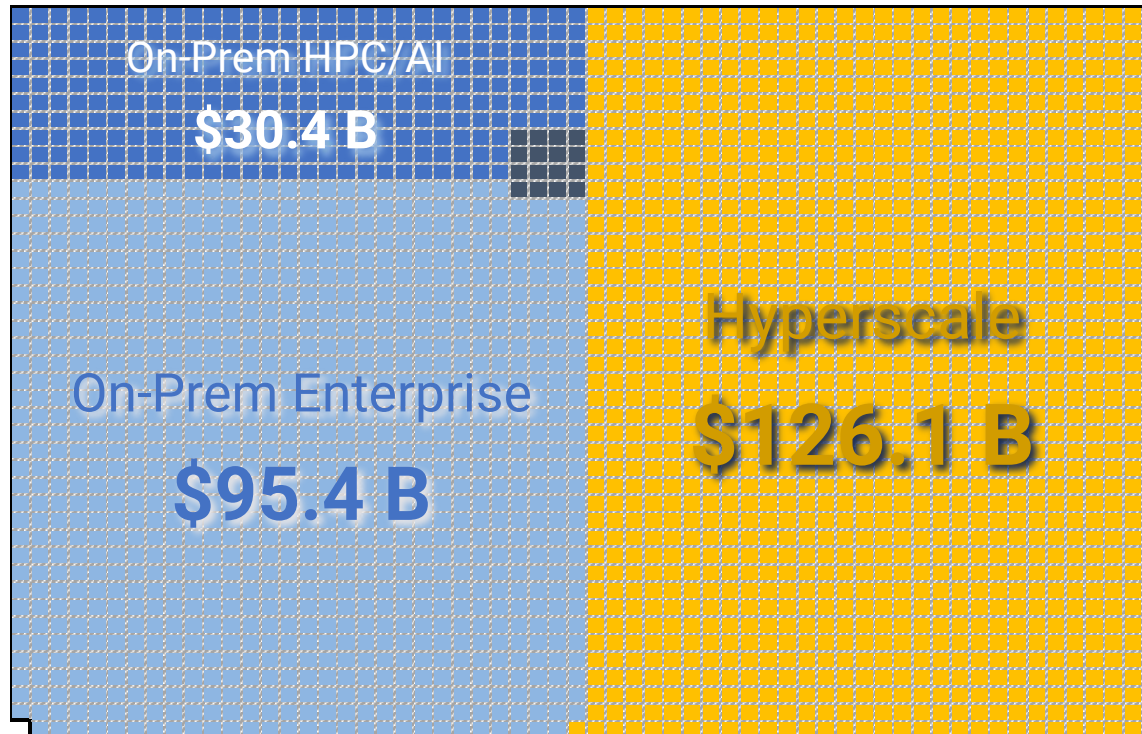
 = \$100 million

Total data center spending,
\$251.9 billion in 2022;
7.2% growth year-over-year

Includes both on-prem and
hyperscale data centers



Data Center 2022: Grand Unification

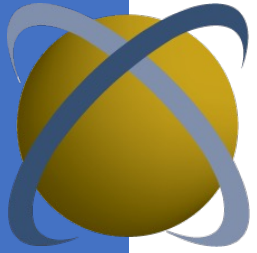


 = \$100 million

Hyperscale is now half (50.1%) of all data center spending

On-Prem HPC-AI includes both:

- Traditional HPC budgets (\$28.8B), usually mixed HPC-AI environments
- Pure AI, non-HPC (\$1.6B)



Perspectives on Hyperscale

A large-scale national supercomputer costs hundreds of millions of dollars

At least 10 hyperscale companies spend over \$1 billion each year.

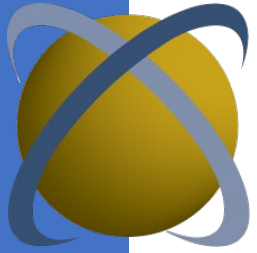
Four spent over \$10 billion last year.
Two spent over \$20 billion.

Hyperscale companies spent \$18 billion on AI last year alone

The top two hyperscale companies' data centers, worldwide, cover

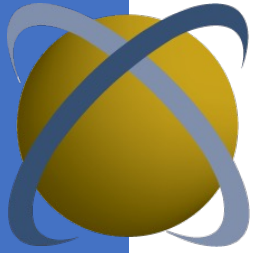
more than
25 square miles,

more computing than would physically fit in Manhattan.

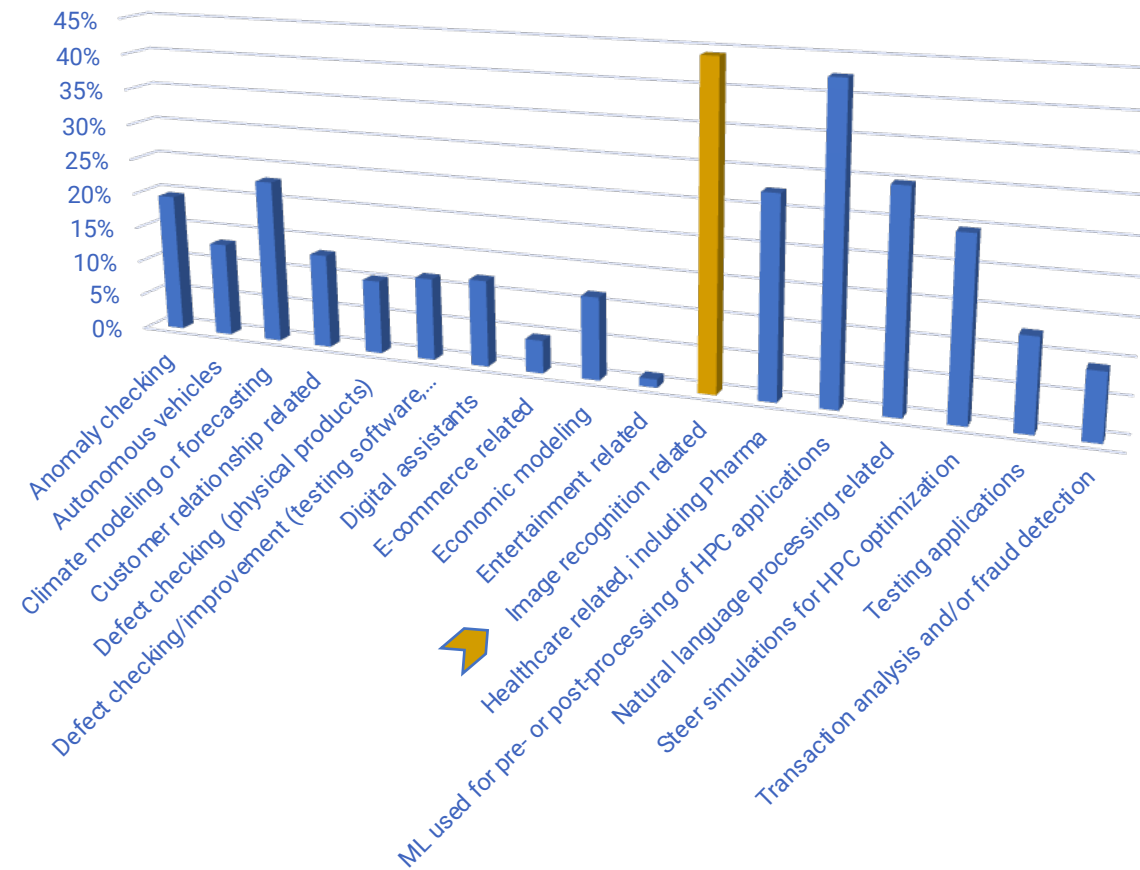


“The New HPC”





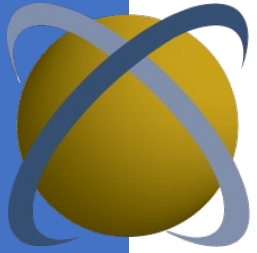
AI Uses in HPC Environments



Surveyed organizations covered a wide range of application domains.

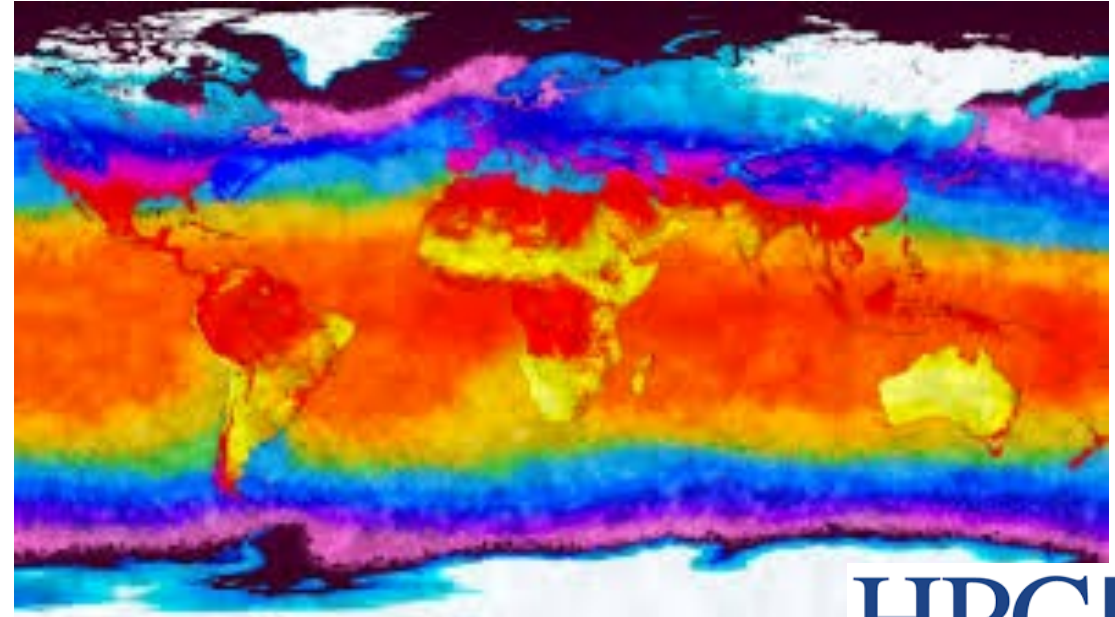
ML is broadly used for image recognition, including in blended HPC-AI environments

Major promise in computational steering



What Are “Grand Challenge Problems”?

- Climate change
- Epidemics / pandemics
- Population rise: food, water, energy
- Natural disasters, pollution
- Understanding the universe
- New developments: robotics, AI, ...



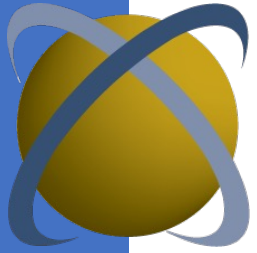
HPC wire

Science is Cool. And Science Doesn't Stop Moving Forward.



Everyday Science (Still Cool)





Power/Cooling Constraints

We have made
compromises in system configurations
based on power consumption

Our data center(s) are constrained
by power availability

~50% of HPC/AI users
(49% - 52%, depending on statement)
agree with these statements about power and cooling

Our data center(s) are constrained
by cooling capacity

Power consumption is a
more limiting factor to our HPC/AI strategy
than it was two years ago



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