

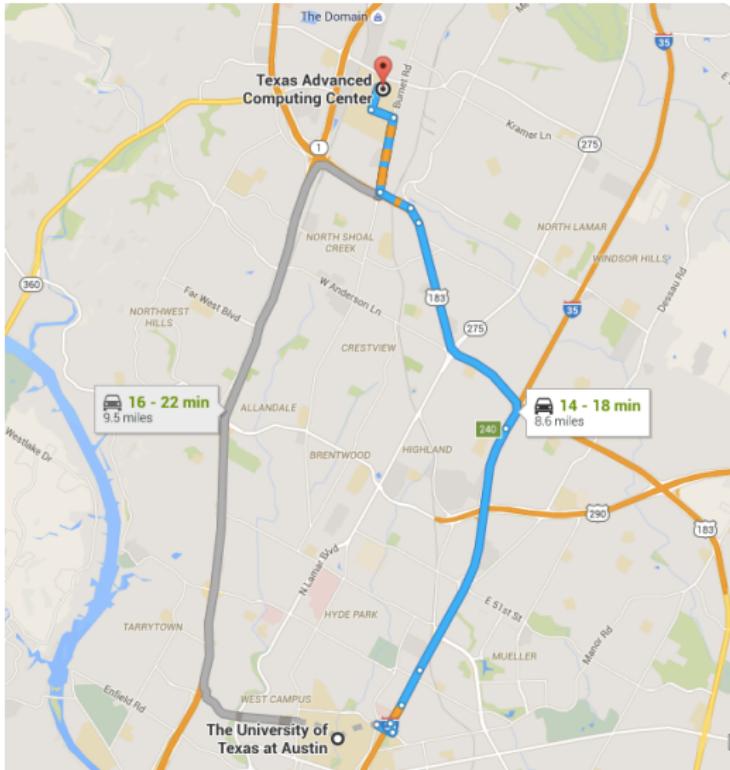
Overview of TACC

Fall 2024

last formatted: January 14, 2025

Your instructors work at the
Texas Advanced Computing Center

So where is TACC?



How do you get to TACC?



Pickle Campus

Formerly Balcones Research Center,
location of some of the best wildflowers in Austin.



James Jarrell ‘Jake’ Pickle

- 1913–2005, congressman
1963–1995
- US Navy during WW II
- important role in Civil Rights Act and Social Security reform



TACC

- Started in 2001 with 10-ish people, now 180
- UT has had computing centers before; in 2001 TACC became independent unit: falls under VP for research.
- First major supercomputer in 2008: Ranger (top500 ranking: #7); next Stampede1: #6, Stampede2 (highest ranking #12);
- Currently: Frontera, (highest ranking #5), and largest academic computer in the world;
Stampede3 unranked, Vista unranked.

TACC now

- 180-ish people, divided into Systems, High Performance Computing, Computational Biology, Big Data, Machine learning, Visualization, Outreach (and more) groups.
- A dozen machines-big-enough-to-have-a-name
- 1000 projects, 200 public data collections
- 30 web portals with 35k users
- new 10MWatt data center
- second new building in 10 years,
new building in Round Rock coming

Our new building



Supercomputers come and go

TACC has operated some of the leading supercomputers in the country / the world since 2008,

Want to guess how much a computer costs?

How long it stays operational?

Frontera

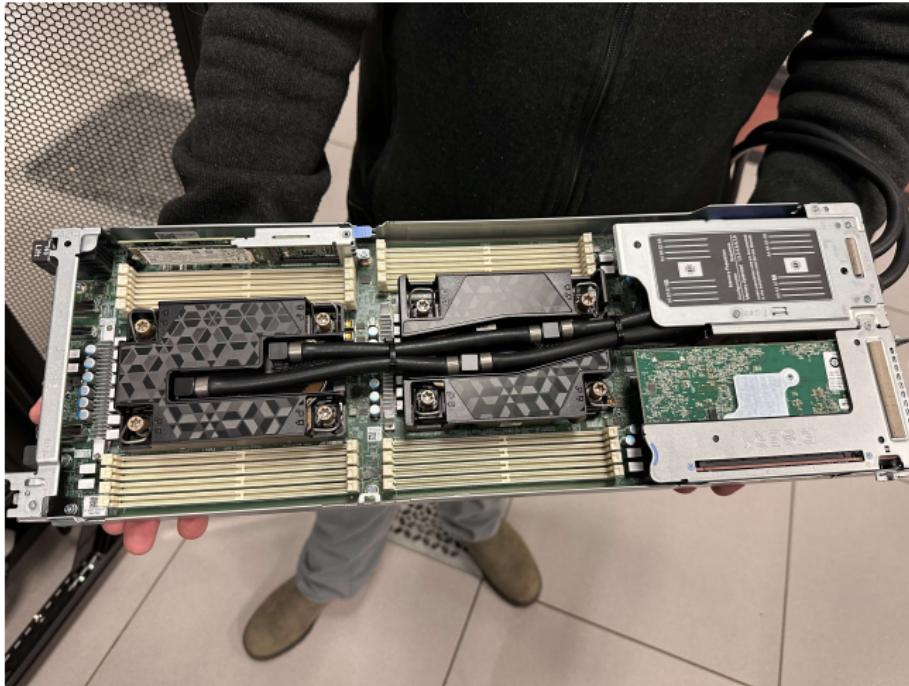
- Our currently most powerful machine, operational as of Right Now.
- Rough cost: \$60M for hardware, and similar for personnel.
- 91 racks with 8008 nodes; each node two 28-core Intel Cascade Lake processors.
- 60Pbyte of storage, of which 3Pbyte flash.
- Two GPU subclusters

Frontera compute racks; front view



rightmost rack is open: note the water cooling cables

Water-cooled node



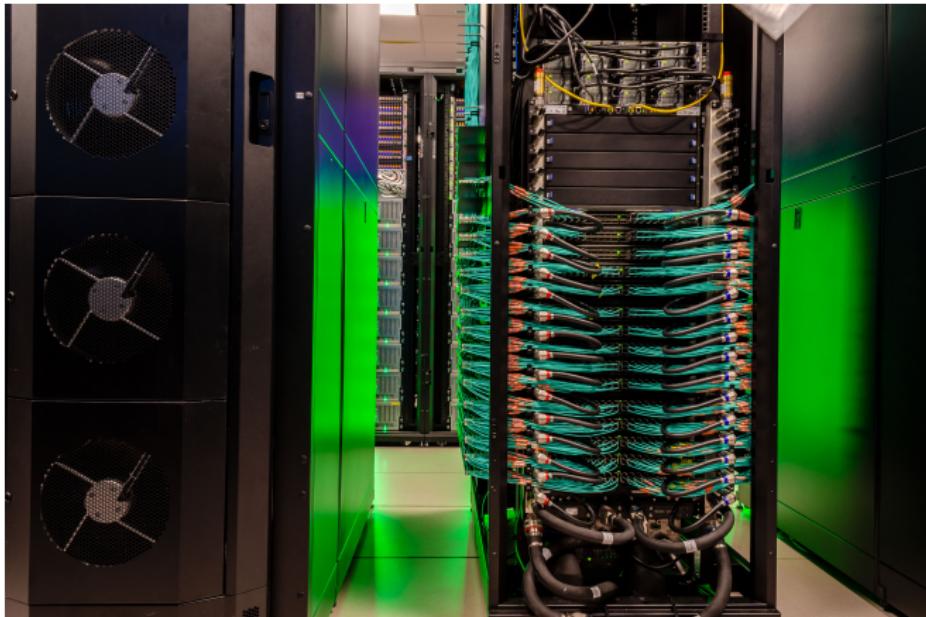
(actually a Sapphire Rapids node)

Frontera compute racks; rear view



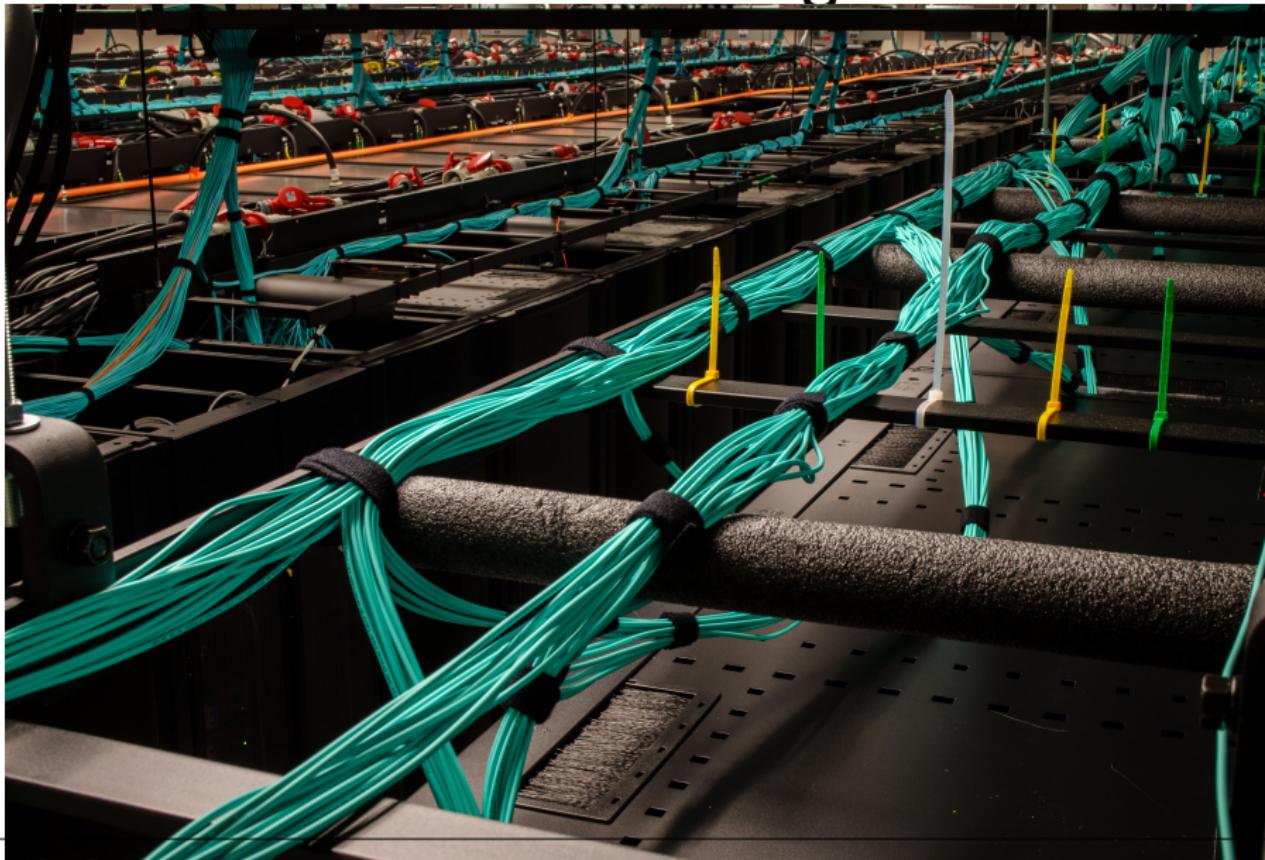
racks are approx 9ft tall; note blue network cables

Frontera network switch

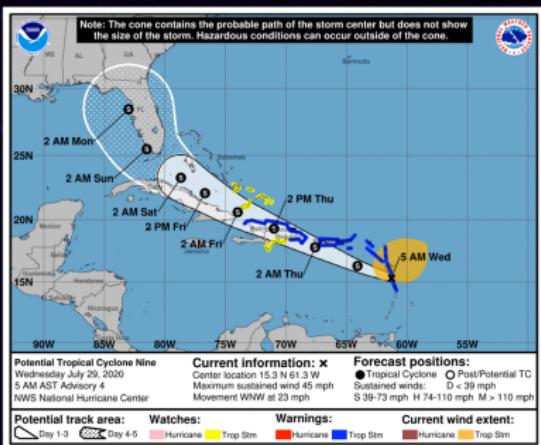
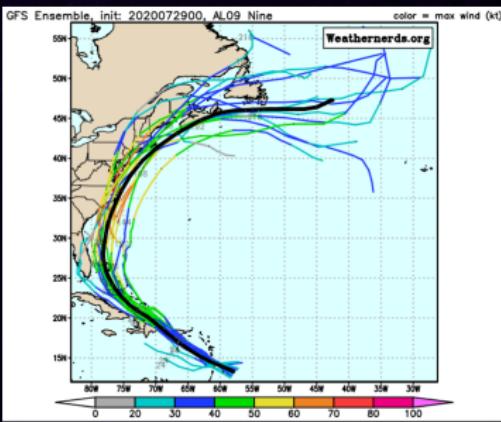


multiple network switches

Overhead cabling

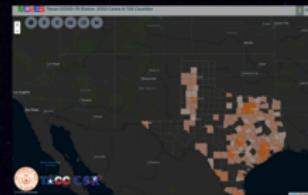


WHAT IS FRONTERA IS DOING THIS WEEK IS THIS. . .

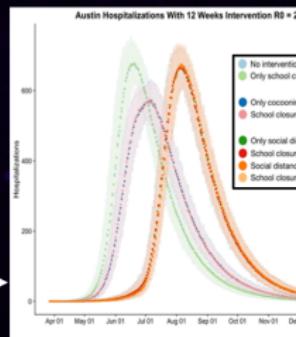
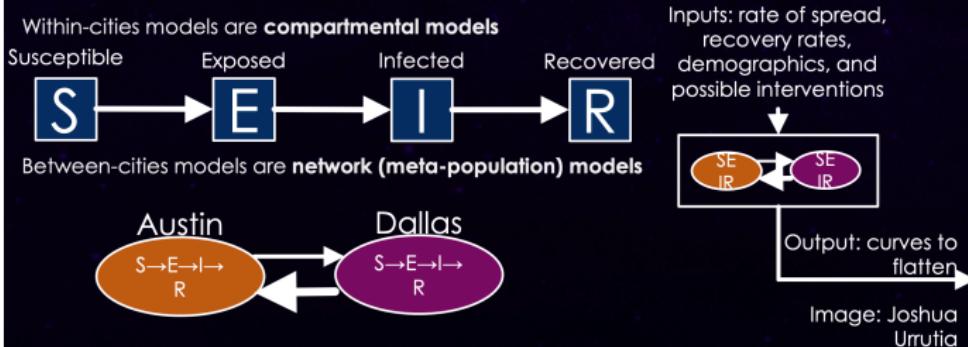


COVID - EPIDEMIOLOGY

- ▶ Dr. Lauren Meyers, UT-Austin -- Epidemiology guiding Austin and Texas shelter-in-place orders
- ▶ County-by-county outbreak predictions covered on front page of New York Times, April 5th.

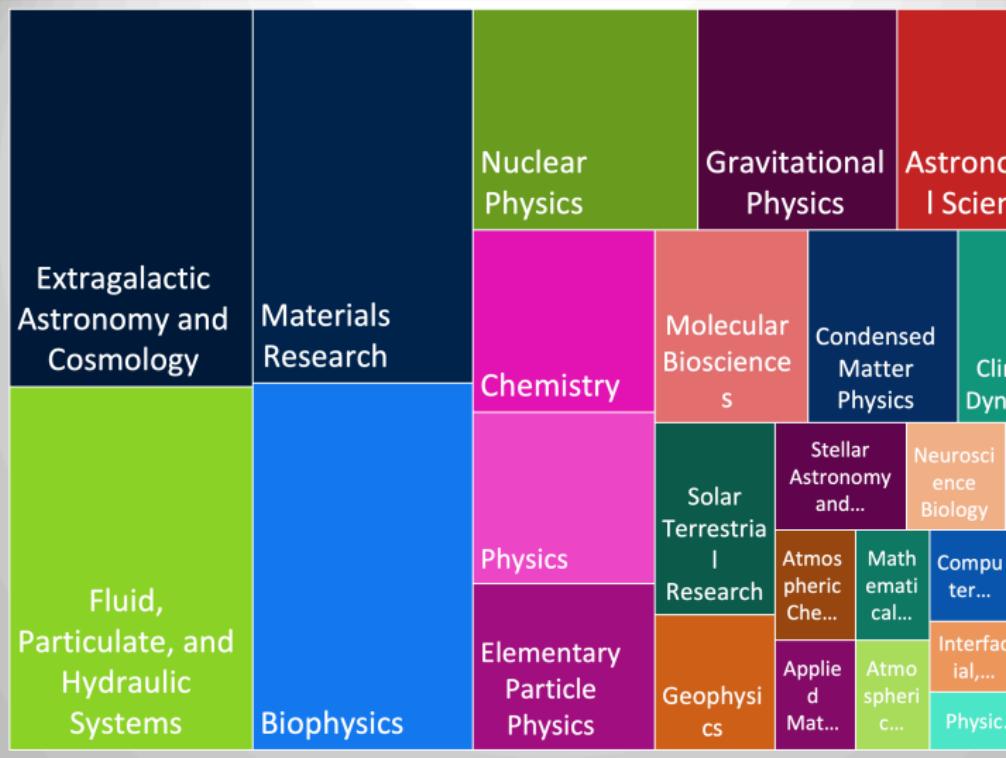


Emergency Responder
courtesy Gordon W



FIELDS OF SCIENCE

- ▶ From last allocation request



Vista

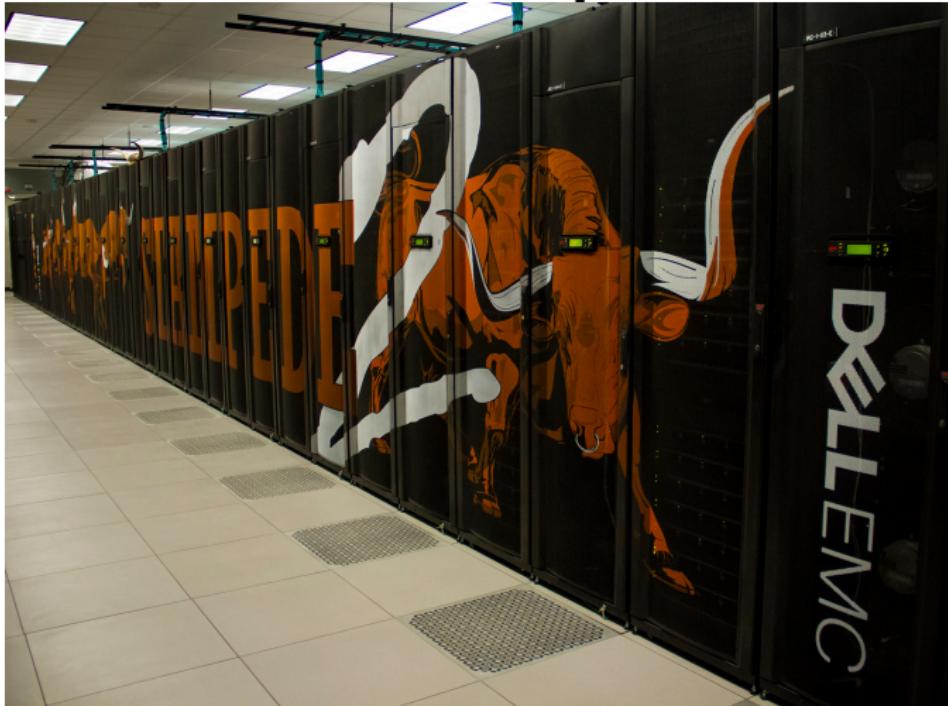
Our first NVidia machine

\$10M from NSF, \$10M from UT for AI research

256 Grace CPU nodes, 600 Grace Hopper GPU nodes.



Stampede2



Decommissioned, but the racks are still there.

Stampede3



Stampede 3 is now running, reusing cabinets from Stampede2

Cabling coming down

Cables go from each, over the racks,
coming down to the switches



Lonestar 6

Our first AMD in a long time
liquid-immersion cooled



('space coffin': before we wrapped it)

Lonestar 6

With beautiful artwork:



Lonestar 6

560 compute nodes

partly immersed, partly air-cooled

16 GPU nodes with $2 \times$ A100 each.

Frontera-rtx

Single precision GPUs.



Note: the machine hangs in a bath of HEB-\$1/bottle-mineral oil
(ok, slightly better than that)

Oil



Hikari

Solar powered



No longer with us, but: ...

Solar panels

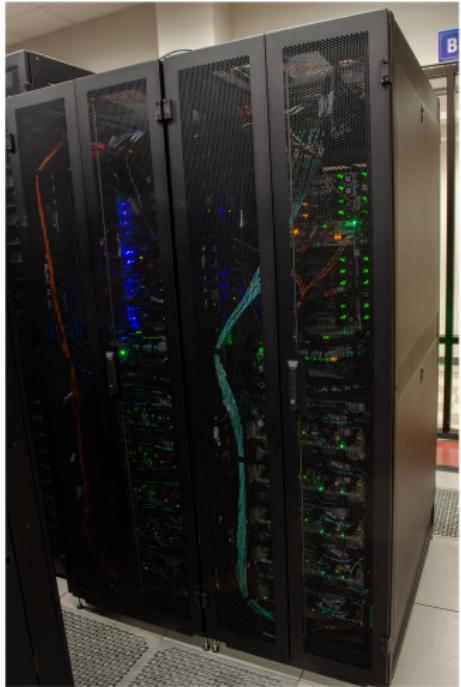


Big data

- Stockyard: 7Pbyte spinning disc (shared between all clusters)
- Ranch: 100Pbyte of tape
- Corral3: 40Pbyte
- Rustler: hadoop cluster (up for refresh)

Stockyard

Mass storage



Corral

Large spinning disc



Clouds

- Rodeo: mostly internal use
- Chameleon: cloud research
- Jetstream: for educational use

Visualization lab (POB)

Our graphics people can help you understand your results (and sell your research) through high quality visualization.



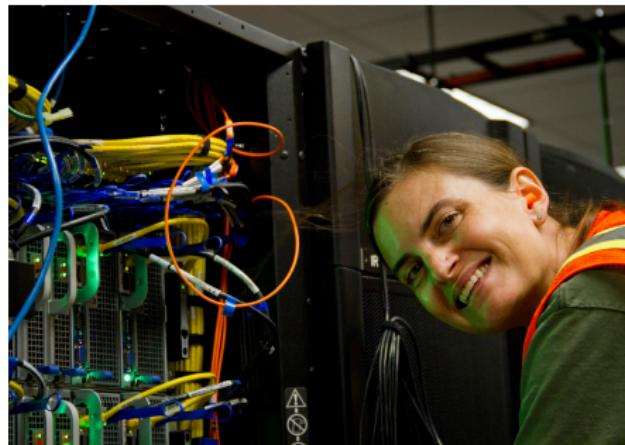
Small display in the TACC building



We're very hands-on



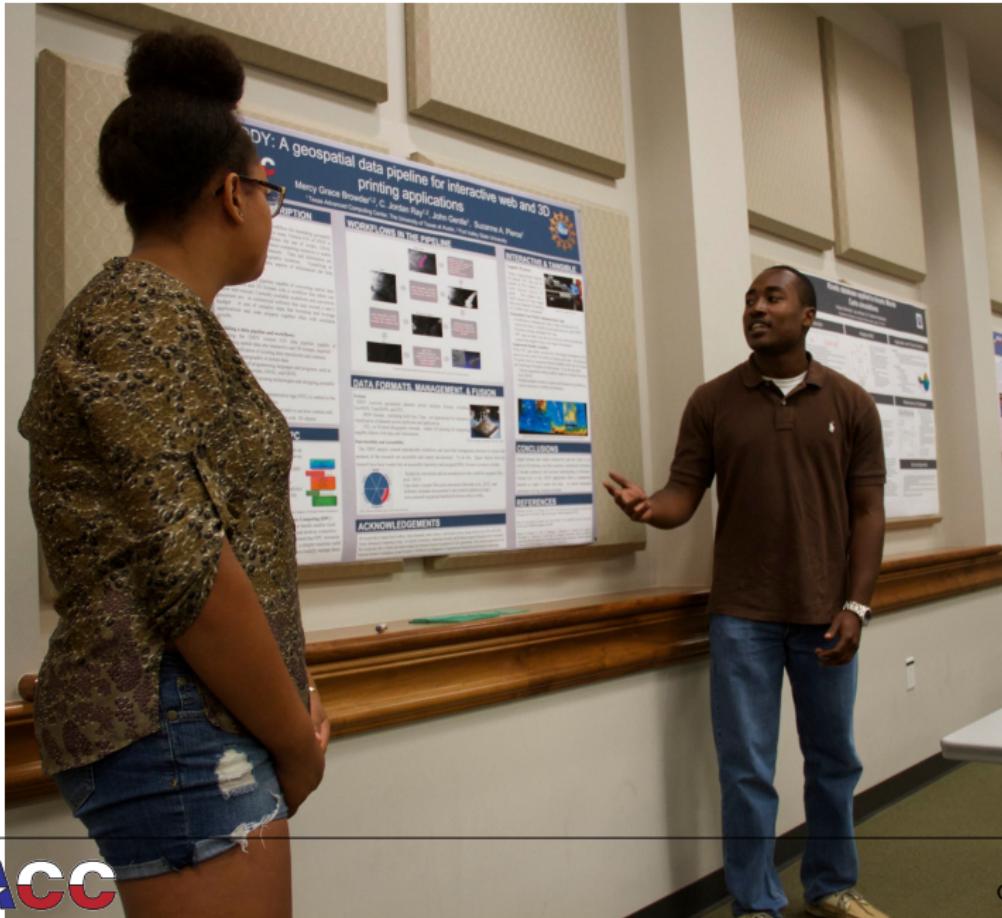
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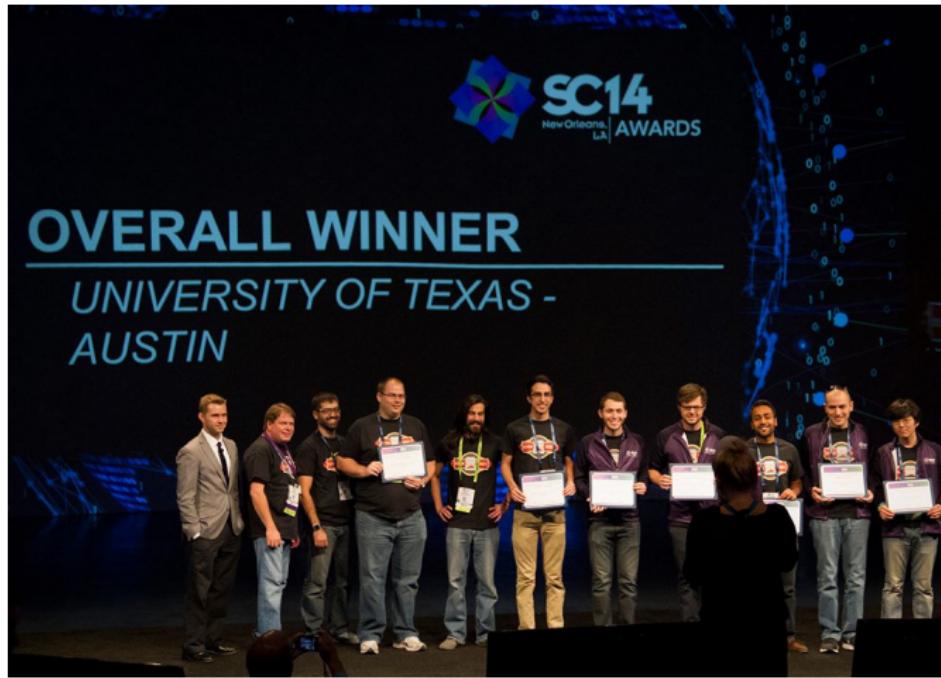
We're very hands-on



Student activities: REU



Student cluster competition



Outreach: Code at TACC



We share



We keep growing

Horizon in, we hope, FY26:



Bridging Frontera and Horizon: Vista



Credits

Most pictures: Jorge Salazar, TACC media group