



TEXAS ADVANCED COMPUTING CENTER

Research and Development | United States

## Data science helps keep people safe during the COVID-19 pandemic

University of Texas at Austin researchers run epidemiological models using high performance computing powered by Dell Technologies.



The UT COVID-19 Modeling Consortium provides governments and businesses with the information needed to keep people healthy. The collaboration that the Consortium fostered has helped reduce the pandemic death rate significantly.

### Transformations



Powers supercomputing with standardized high performance computing (HPC) solutions.



Develops data insights to understand and mitigate global pandemics.



Establishes computational modeling best practices for public interest.

### Outcomes



Provides insights that help governments and businesses keep people safe.



Enhances trust in science by demonstrating value of data-driven research.



Contributes to minimizing the COVID-19 death rate.



Offers a model for healthcare collaboration.

Early in 2020, when it became clear that COVID-19 was about to become a global emergency, data scientists and epidemiologists at the University of Texas at Austin (UT) sprang into action immediately. Within one month, UT scientists collaborating with the university's Texas Advanced Computing Center (TACC) created the UT COVID-19 Modeling Consortium. Since then, they have used TACC computing resources to develop epidemiological models to understand the severity of the virus and forecast its expansion and evolution. Decision-makers in government, healthcare and business rely on this guidance to mitigate the threat and save lives.

## Data science illuminates pandemic unknowns

In 2009, UT scientists partnered with TACC to develop computational tools for preparedness during the H1N1 pandemic. Dr. Lauren Ancel Meyers, professor at the University of Texas at Austin and director of the UT COVID-19 Modeling Consortium, says, "I am grateful to have TACC right down the road, providing essentially unlimited state-of-the-art computing resources for my research. This has allowed us to do life-saving work during the pandemic."

While earlier experiences helped the scientists get COVID-19 research underway quickly, reliable data sets were hard to obtain. "Our most jaw-dropping study during the pandemic happened at the very beginning, when we scraped data off the websites of 18 different Chinese public health departments," explains Dr. Meyers. "We used Chinese case report data to infer how quickly the virus was spreading, and we discovered that people were disseminating the virus before they had symptoms. At the time, nobody quite believed that." In the next step, TACC resources came into play. "Once we had usable data, it took TACC supercomputing technology to analyze it," she adds. "Since then, the UT COVID-19 Modeling Consortium is running a dozen or more epidemiological models at any given time."

## Fast answers to urgent questions

Data modeling on TACC supercomputer Frontera enabled UT researchers to assess how effectively the measures taken by cities and local governments could keep people safe from COVID-19. They sought to answer questions like when it might be safe to open schools or how many people were likely to be admitted to hospitals or intensive care units over a certain period. When governments



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imposed lockdowns early in the pandemic, researchers needed to know how often people were still going out and potentially transmitting the virus. So they used anonymized smartphone traces from millions of individuals to assess their movements.

The Consortium rapidly gained renown as it met a critical need for substantiated guidance. That led researchers to share their findings with the Centers for Disease Control and Prevention (CDC) and help the White House Coronavirus Task Force project how many U.S. residents were likely to die from the virus in 2020.

## Enhancing trust in science

Researchers at the Consortium realized that it was important to deliver data insights to anyone who wanted access and not just to policymakers and organizational leaders. They created five online dashboards to help the public visualize the spread of COVID-19 across Texas and the U.S. and highlight disparities in vaccine access, hospitalizations and mortality rates in cities across the country.

Broad sharing of pandemic-related insights not only allowed decision-makers and organizations to take the right measures, but it also boosted confidence in science at a time of rampant misinformation. Dr. Meyers says, “Regaining and building trust in science is one of the most important things we at the Consortium can do for the future of COVID-19 and global health and safety.”

## A model for saving lives and managing a pandemic

The city of Austin, where the UT COVID-19 Modeling Consortium and TACC are located, benefited greatly from the research, including the millions of simulations on the TACC supercomputer. The Consortium’s data science made it possible to create a five-level alert system — with triggers based on supercomputing models — to determine whether the city should augment or relax protection measures. Researchers facilitated a close, unique collaboration. In addition to scientists, Austin’s COVID-19 task force included elected officials, public health officials and the executives of all major healthcare systems in the metropolitan area.

This approach was extremely effective. “When you look at the pandemic statistics in Austin compared to those for the rest of Texas cities, you can see that data-driven, computational decision-making really saves lives,” Dr. Meyers comments. “Our death rate is less than half the statewide average and much lower than that of the other major metropolitan areas.”

## Expanding TACC supercomputer capabilities

Frontera runs on high performance computing (HPC) solutions from Dell Technologies. Built on standardized, readily available hardware, HPC can be both powerful and flexible. Dr. Kelly Gaither, director of health analytics at Texas Advanced Computing Center and associate professor at the University of Texas at Austin, says, “HPC has changed dramatically over the last 20 years. Today, it can deliver computing capabilities that are more flexibly designed for emerging applications. Using off-the-shelf solutions helps bring costs down as you scale up, and you can still address data-intensive and extremely critical problems.”

While the Consortium has already achieved huge accomplishments to save lives and enable the best possible protection measures during the pandemic, it still has more work to do to help the world weather this difficult hurdle. Dr. Meyers concludes, “Globally, computational modeling will support efforts to navigate COVID-19 as it evolves. Our mission is to pioneer a new era of pandemic science and ensure that we are better equipped the next time we face an emerging viral threat.”



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