Innovating with data for the safety of children

Drawing on the computational resources of the Ohio Supercomputer Center, researchers create a novel COVID-19 analytics and monitoring system for Ohio schools.

Customer profile

THE OHIO STATE UNIVERSITY

Scientific Research | United States

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Dr. Ayaz Hyder
Assistant Professor, College of Public Health
The Ohio State University

Needs

School administrators, teachers and parents were looking for national, state and local data to help keep children as safe as possible during the COVID panedemic. They turned to Ohio State University, leveraging the Ohio Supercomputer Center.

Results

- Facilitating critical insights into the spread of COVID-19 in local schools
- Helping schools offer safe educational experiences for students and teachers
- Enabling local decisions to be made with local data
- Improving the ability to predict localized outbreaks

Solutions at a glance

- Dell EMC PowerEdge servers with Intel® Xeon® Scalable processors
- CoolIT® Systems Direct Liquid Cooling
- EDR InfiniBand networking

Back to school — with data analytics

In 2020, as the COVID-19 pandemic was sweeping globe, many local school districts were struggling with the decision on how schools should open for the 2020-2021 academic year. Was it safe to bring students back to the classroom? Should learning take place remotely? Should schools offer a hybrid educational experience, with time split between classroom and remote learning? For educational leaders wrestling with these questions, local data to guide decisions for their local school district were hard to come by.

It was concerns like these that prompted the rise of an ambitious project based at The Ohio State University to provide educational administrators with the timely local information they need to help ensure a safe learning experience for students, staff and teachers. This ongoing initiative, known as CATS puts data analytics and visualization tools to work to allow school superintendents and local public health departments in Central Ohio to make critical health and safety decisions with the confidence that comes with timely and local data. CATS served the school-based monitoring needs of 21 local school districts in Central Ohio, serving approximately 1.4 million residents and 238,000 school-aged children during the COVID-19 pandemic.

Using local data for local decisions

The CATS project was spearheaded by Dr. Ayaz Hyder, an assistant professor in the College of Public Health at The Ohio State University and a core faculty member at the Translational Data Analytics Institute. The initial impetus came when he learned there was no clear strategy to help local school districts make decisions about when to switch between different learning modalities.

Dr. Hyder reached out to a local school district, where three of his children are enrolled, and proposed a pilot project using the COVID-19 monitoring methods he had developed for agencies throughout the state. The district agreed, and the local public health departments were brought on board to provide expertise in contact tracing, outbreak investigation and data interpretation. In the weeks and months that followed, additional schools and stakeholders joined the effort, as did a contingent of University student workers who assisted in programming, managing and visualizing the CATS data.

“The school districts were getting pressure from parents to use local data, because county-level trends don’t always represent what’s happening in the individual community,” Dr. Hyder says. “We were able to take that pressure off of the superintendents and school administrators by providing local data, in partnership with the local health departments and their epidemiologists and nursing staff. We could then make a strong case to parents and staff that local data was being used for local decision-making.”

How it works

The CATS application considers multiple data flows to help school leaders and public health officials make informed decisions on the most appropriate learning modalities — virtual, in-person or hybrid — to help prevent and control the spread of disease. These include the monitoring and epidemiological review of school nurse visits among students and absences among students and staff due to COVID-19-like illness. The team also considers temporal and spatial patterns in county-level and school district attendance area-level data for COVID-19 case rates.

The information from these diverse data flows is entered into the COVID-19 Analytics and Targeted Surveillance System. Using password-protected CATS dashboards, school district staff and the local public health department monitor the system, watching for signs of outbreaks.

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The general public is also able to access CATS dashboards that contain aggregated information specific to each school district. By closely tracking possible indicators of COVID-19 infection, the CATS system allows for real-time analyses of factors that can help predict localized outbreaks.

"Prior to CATS, COVID-19 case rates per were not publicly available at the sub-county level," Dr. Hyder explains. "They were available only at the county level, which has 16 different school districts [in Franklin Country, Ohio]. The districts didn't want to make decisions based on what the county as a whole was experiencing. They wanted to make decisions based on the dynamics of the pandemic within their own school district."

CATS meets this need for highly localized information, and it delivers the results in a user-friendly visual format — the dashboards.

"With the dashboards, all the stakeholders could see the data right in front of them," Dr. Hyder says. "They could see their rates going up or down, and their absences going up or down. This kind of information helps parents and teachers trust the decisions that superintendents are making in consultation with local health departments and the CATS team. They know that decisions are based on science, and the view of experts who are looking at this information on a regular basis."

In addition, CATS includes web-based applications, automated alerts, and weekly reports for the general public and decision makers, including school administrators, school boards and local health departments. The result is essentially an early-warning system for case clusters — and a safer educational experience for students and their teachers.

Drawing on the expertise of the Ohio Supercomputer Center

The CATS project was a computationally-intensive undertaking that brought its own set of technical challenges. To overcome these challenges, the CATS team turned to the Ohio Supercomputer Center, or OSC, in Columbus, Ohio. OSC is dedicated to making High Performance Computing (HPC) resources and expertise readily available to university and industrial researchers in Ohio and points beyond.

For a closer look at the CATS project, see the Dell Technologies video "Schools work with OSC for safety."

OSC's physical HPC resources and staff expertise were vitally important in the success of the CATs project, according to Dr. Hyder.

"From early on, the Ohio Supercomputer Center really helped us get going," Dr. Hyder says. "They helped us develop our dashboards and our code."

"They helped with troubleshooting when we were having issues. And they provided technical support day and night, 24/7, weekends included. They were there for us every step of the way."

The CATS project also benefited from the computational power of the HPC systems at OSC, which is made accessible to users via a groundbreaking portal called Open OnDemand. This portal, developed at OSC, gives users access to HPC systems via a web browser. That made it easy for the CATS team, including its software developers, to run their HPC workloads.

The systems that are accessible via the Open OnDemand portal include OSC's two main clusters, Owens and Pitzer. Collectively, these clusters built by Dell Technologies deliver the power of more than 50,000 Intel® Xeon® compute cores, along with hundreds of GPUs.

"With the resources of the Ohio Supercomputer Center, we were able to set up 16 different dashboards that were going to be accessible by hundreds and thousands of people at the same time," Dr. Hyder says. "We were really fortunate to have that kind of support from the Ohio Supercomputer Center."

Making students safer — and saving lives

By the spring of 2021, twenty-one school districts were participating in CATS, with their leaders making better-informed decisions based on the local data appearing in the dashboards in front of them.

"The school administrators would tell me that they looked at the dashboards every morning," Dr. Hyder says. "It became part of their daily work routine to look at how their district is doing compared to the county as a whole, and whether their rates and absences were going up or down. With this data, they were able to explain the rationale for their decisions to keep their schools open, to close certain buildings or to make plans that were aligned with the different metrics in the dashboards."

All of that adds up to keeping students safer in a time of a deadly pandemic. And that's what really matters in all of this. Protecting children is a goal shared by all of the stakeholders in CATS — from school superintendents and country health officials to parents and teachers.

"These kind of partnerships are driven by a desire from society, from the different community partners, to really make an impact in the lives of people, particularly the lives of students, who have their whole lives ahead of them," Dr. Hyder says. "Throughout this project, we felt that if we were able to keep even one student safe, if we were able to keep even one staff member safe from a severe COVID infection, it will have all been worth it."