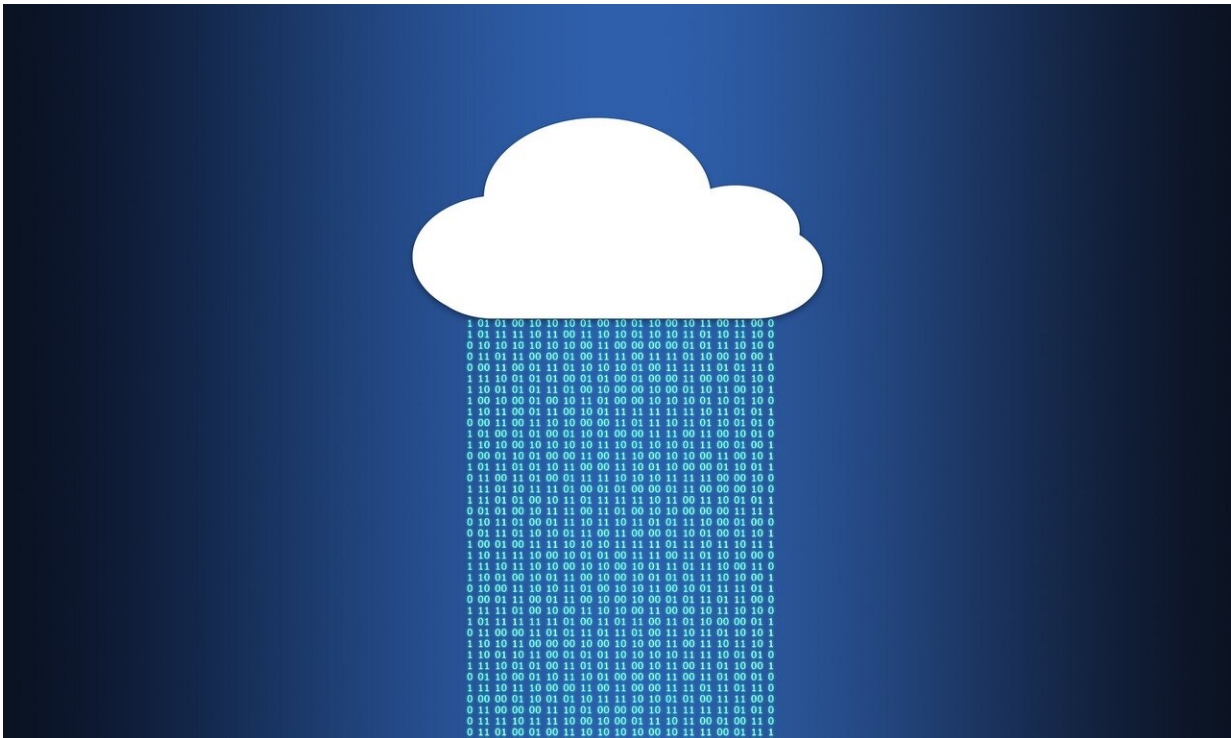


# Researcher builds solution to work-from-home cloud-computing 'storms'

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Credit: CC0 Public Domain

The outbreak of COVID-19 pushed rapid deployment of the work-from-home movement. Azure Cloud Computing saw a 775% increase in cloud usage in social-distanced areas, while Amazon Web Services experienced 33% growth in the first quarter of this year alone.

As more companies migrate their operations to a virtual world, cloud environments will experience additional service disruptions. Now, a computer science researcher at UTSA has helped develop Orchestra, an algorithm that keeps up with the demand of cloud computing to reduce spikes in such resource "storms."

"Since a lot of our jobs are now moved online and rely on the cloud to operate, the data center systems definitely have more spikes in resource demands," says Wei Wang, an assistant professor in UTSA's Department of Computer Science, who worked on the project with researchers at the University of Georgia, University of Virginia and TJ IBM Watson Research Center.

Orchestra mitigates what is known as resource surges, in which demands for CPU and memory to run foreground services, such as email or video meetings, could interfere with a company's critical background applications, such as virus detection programs or backups.

"The algorithm directs when and how long the foreground or background services should run so that these services can coordinate their efforts and resource demands to execute smoothly under a resource storm, much like the conductor in an [orchestra](#) directs the instruments to form a symphony," added Wang.

The benefit of Orchestra is that it operates with little need for IT resources and can respond dynamically to workloads in virtual machines. So if you help run a company such as Netflix or a telecommuter logs into your company's email or shared drives, there is the increased risk that business interruption will occur.

The reason is an added number of employees connect from home, overwhelming the cloud and resulting in uneven services to end users. Netflix experienced an outage for an hour in March in America and

Europe. Although the issue was restored, other services that run only on the cloud, such as health care systems, could be severely impacted.

The Orchestra mitigation system takes an online approach using lightweight monitoring, which requires minimal amount of time and effort from IT personnel to install, deploy, manage and keep an eye on the technology. The algorithm also creates performance-based models for various cloud applications on the fly, so it responds in real time and constantly adjusts the cloud resources between foreground and background applications.

Researchers evaluated the performance of Orchestra on the Amazon Elastic Compute Cloud with a range of cloud usage requirements. The algorithms successfully guaranteed that foreground applications performed at all times. Moreover, Orchestra maintained the background applications, such as big data management systems, by minimizing company costs that the organization could incur for not properly allocating cloud services.

"This solution is agnostic. It can be used on other on-demand cloud computing platforms other than Amazon. So if you are a company that relies on virtual networks to do work, regardless of what cloud [service](#) you use, Orchestra can be applied," said Wang.

Many organizations have only so much capacity to operate on their own network infrastructures. It's this reason that these cloud platforms offer the alternative to migrate many operations to a virtual environment.

The cloud computing industry already serves close to 6,000 companies on Amazon's elastic computing platform, including popular services such as Airbnb and Uber. Many health care organizations rely on cloud computing to maintain electronic health records, communicate with patients and even reduce operating costs.

"Orchestra offers an immediate solution," said Wang. "More services are cloud-based and we need to keep businesses running. However, we shouldn't have to compromise allocating the cloud to conduct data backups at the expense of not running malware detection programs."

Provided by University of Texas at San Antonio

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