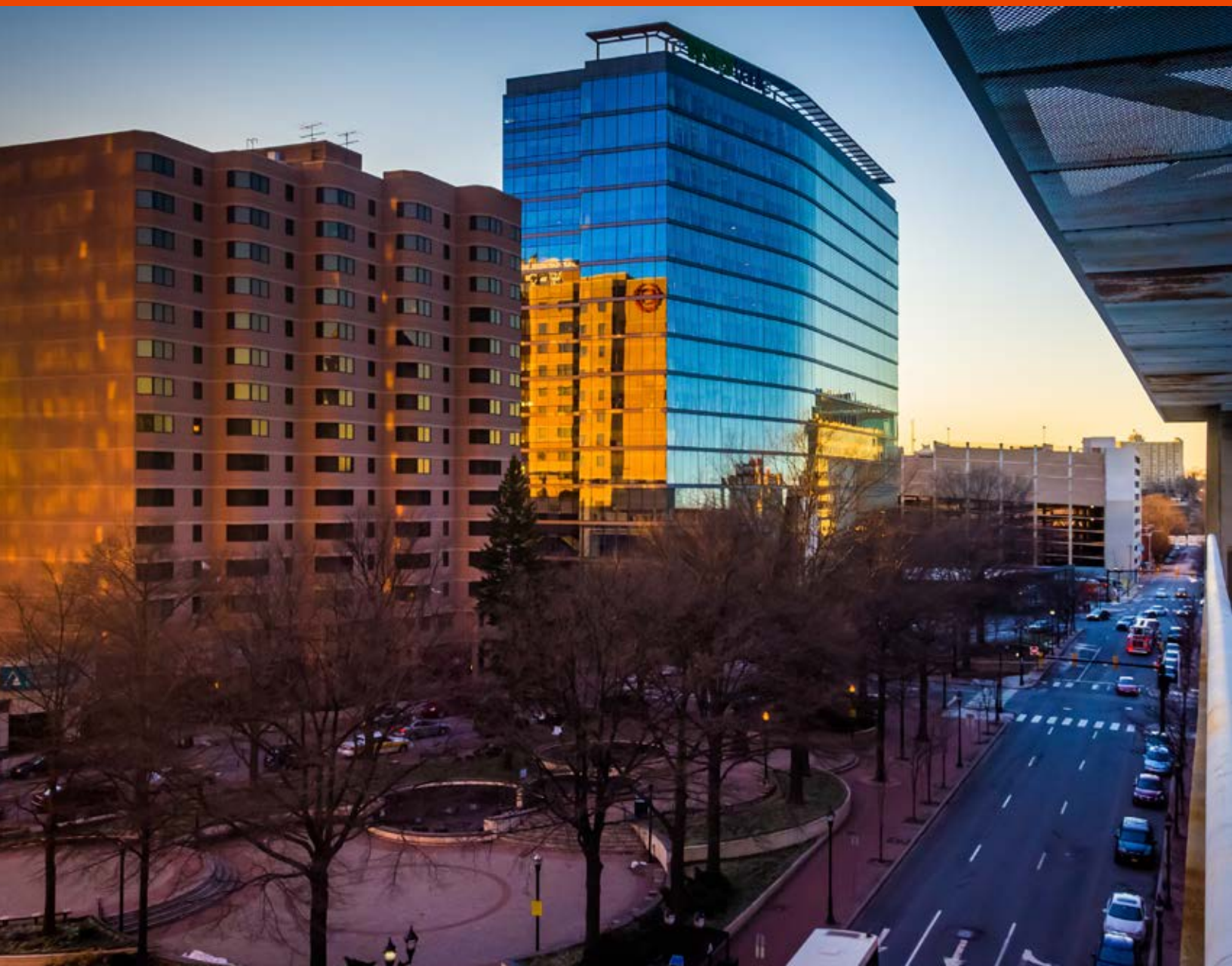
Delaware leverages the cloud to help citizens during COVID-19 pandemic

The state uses two cloud-based solutions to help citizens stay healthy and informed.



Like other states, Delaware wants to reduce COVID-19 cases and communicate information to residents with timely resources. To meet those goals, the state turned to the cloud to stand up and integrate two health tracking and reporting systems: a statewide contact tracing system and the My Healthy Community portal.

Early in the pandemic, the state's positive COVID-19 numbers were low, but Delaware's Division of Public Health (DPH) anticipated cases would grow significantly. The state needed a way to track cases and sought to implement a contact tracing solution to quickly gather the right data. But, state leaders were unfamiliar with the resources required to set up and scale a statewide contact tracing system.

DPH leaders, working with representatives from Delaware's Department of Technology and Information (DTI), hired consulting firm Health Management Associates (HMA) to evaluate potential solutions. One of the solutions they examined was Maryland's new covidLINK system.

"The consultant recommended we set up the same system Maryland uses," says Greg Lance, chief technology officer at DTI, which partners with all agencies to provide IT services for the state.

The state hired NORC, a company that manages contact tracers, and Amazon Web Services (AWS) Partner Enovational, the company that stood up Maryland's contact tracing system. Enovational was charged with helping the state bring together the same technologies used in Maryland, which included Salesforce for the application, Twilio for SMS messaging, MuleSoft for integrations and application programming interfaces (APIs), and Amazon Connect for call center operations. Delaware leaders wanted the new solution to use Amazon Connect because of its fast implementation time, features, scalability and integration with Salesforce.

Live in 24 hours

While the complete statewide contact tracing system would take time to put together, Delaware IT leaders focused first on implementing Amazon Connect to take some of the pressure off DPH's existing call center. Working with AWS, Delaware's contact tracing call center communications solution was set up within 24 hours.

Gerald Whisman, acting chief operations officer at DTI, says, "AWS worked with us quickly to understand our limitations and capabilities. The support from the AWS technical team was amazing. They worked with DTI and the agency's IT team, Information Management Resources (IRM), to implement and configure components in the state's AWS Cloud instance, as well as understand the best web browser to use for Amazon Connect."

Once Amazon Connect was live, DPH trained 100 National Guard members and local college students to use the service to manage the large number of incoming phone calls.

One of the most important requirements of Delaware's contact tracing initiative is providing a single point of contact for impacted constituents. Using Amazon Connect, every state resource making an outreach call had a unique phone number.

"That's a benefit over having individuals call people, leave individual numbers and then only that person gets a call back," says Lane. "Amazon Connect allows for better inbound calling and helps us better utilize our call center and contact tracers."

With Amazon Connect up and running, personnel from DTI and DHSS' IRM group, working alongside Enovational, then designed and built the remaining elements of the statewide contact tracing application incorporating the CRM, microservices and messaging components. Delaware's complete contact tracing solution went live just six weeks after launch.

"We were very happy with the six-week turnaround," says Bill Clancy, director of infrastructure at DHSS. "It happened fast, and it happened successfully."

"Everything is interconnected," continues Clancy. "Information is pulled from various places; reports are generated; and it's all sent to the Delaware Health Information Network (DHIN). There is a lot of information flowing back and forth that we didn't have previously. That's definitely going to help us through this crisis and beyond."

Delaware's solution also includes an exposure notification application that can notify people who may have been exposed to a person who has contracted COVID-19, including individuals the person might not know directly. Amazon Connect helps the state handle inbound calls from citizens as they are notified by the application.

"The exposure notification application drives more people to get tested, and those are the individuals we need to get tested because they've had some level of exposure," says Lane.

Connecting the dots

Delaware's statewide system was not the state's first foray into contact tracing. DPH, which like all public health organizations is tasked with promoting and protecting the health of people and the communities where they live, learn, work and play, set up a cloud-based contact tracing system for epidemiologists known as the My Healthy Community (MHC) portal in 2019. MHC was created to analyze multiple, disparate data sources and produce public health reports at the neighborhood level. The platform provides a ready framework for storing anonymized data sets, generating analyses and visualizations, and managing public access — a tool to profile and measure the social determinants (including social, economic and environmental conditions) that affect health.

"Using the MHC portal, state residents can enter their address and find localized demographic, health, and environmental data," says Dr. Tabatha Offutt-Powell, state epidemiologist and chief of the epidemiology, health data and informatics section of DPH. "This includes public and private drinking water results, air quality, asthma incidence, information about substance use disorder, maternal and child health indicators, and more."

DPH worked with AWS Partner Green River and leveraged Amazon Elastic Compute Cloud (Amazon EC2), Amazon Relational Database Service (Amazon RDS), Amazon Simple Storage Solution (Amazon S3), and Amazon CloudWatch to build and deploy the website. Before the site launched, officials conducted an external review to ensure confidentiality and compliance with Health Insurance Portability and Accountability Act (HIPAA) privacy rules.

When MHC launched in May 2019, Delaware became one of the first states in the nation to provide its citizens and health workers a dashboard of up-to-date neighborhood-level health data.

When COVID-19 emerged, DPH recognized the critical role the MHC platform could play in disseminating vital information about the virus to the citizens of Delaware, as well as for internal communication purposes for DPH staff and the office of the governor. But to enable the release of COVID-19 data to both public users and DHSS-authorized private users, the portal needed to be upgraded. DPH asked Green River to rapidly redesign the MHC portal and upgrade it to allow healthcare workers, policymakers and the public to access up-to-date information provided by multiple Delaware health agencies. A team from AWS reviewed Green River's architectures and provided guidance on how to optimize.

The MHC site was rapidly redesigned, with a new landing page focused on the pandemic.

"This allowed us to report case counts, total number of persons tested, hospitalizations and many other trends each day," says Offutt-Powell. "This software informs users about the status of COVID-19 in their communities and supports policymakers in developing and implementing the necessary community-level mitigation strategies. We can take advantage of MHC's COVID-19 specialized software to access up-to-date information concerning the prevalence of the disease within our communities."

Today, MHC reads from the statewide contact tracing application, pulls anonymized data nightly, aggregates it to the appropriate geographic levels and presents metrics on the status of the tracking system to the public.

DELAWARE'S MY HEALTHY COMMUNITY PORTAL: A CLOSER LOOK

The MHC portal is believed to be the first state platform in the nation to present pandemic results at the census block group level, a small geography comprising 600 to 3,000 people. MHC runs on a fleet of Amazon EC2 instances backed by Application Load Balancer. The application and background processing use Amazon RDS instances with caching provided by Amazon ElastiCache. They use Amazon S3 throughout the app to offload serving images, videos and data downloads to improve the user experience. Green River also uses CloudWatch and CloudWatch Alarms to stay abreast of performance issues, and deployed an AWS WAF to provide an additional layer of protection for the website.

Residents can also visualize the spread of the virus using video animations across counties, cities, districts and ZIP codes.

The MHC portal currently serves a quarter of a million users each month. Had the MHC portal not been built on cloud, the state would not have had the flexibility it needed to share up-to-date COVID-19 data with end users.

The state can also share mitigation strategies more efficiently through the portal including communicating where to locate test sites, encouraging people to wear masks and maintain appropriate social distances, and disseminating up-to-date information on closures.

Mitigation strategies are critical to slow the spread of COVID-19 and protect high-risk individuals and frontline workers. Unfortunately, few community leaders, like business owners and school administrators, have access to these data points, leaving them to sift through sometimes contradictory mitigation recommendations to make decisions in their specific context. Public health experts who do have these data points face challenges in disseminating information in relevant, timely and meaningful ways. More than ever, public data can help communities by delivering context-informed mitigation recommendations and analyses.

The future of cloud in Delaware

The use of cloud for both solutions bolstered support for additional cloud-based systems in the state. Delaware is currently setting up storage as a service (SaaS) statewide.

“The plan is to broker AWS services for all the state agencies we provide services for,” says Whisman. “That effort was leapfrogged a bit based off the benefits we’ve seen in implementing services like Amazon Connect and the MHC portal. We are seeing the value in being able to quickly stand up cloud-based systems versus trying to build them on premises. Using the cloud, you can move a lot faster.”

Offutt-Powell agrees. “In addition to allowing us to rapidly configure and deploy the server resources needed to power this very processor-intensive project, the most important aspect of the project facilitated by cloud computing is the automated loading of data into the platform,” she says. “The automated consumption, integration and distribution of information is necessary to support the public health response to COVID-19 and will be increasingly essential in future public health surveillance systems.”

DPH is developing computer-to-computer data transmission and automated integration and analytic processes to report COVID-19 data on a daily, automated basis to all relevant state and federal health systems.

The importance of data

The state of Delaware relied on proven technology and AWS Partners, as well as the example set by a neighboring state, to make contact tracing data viable. Now, Delaware can quickly scale out an important public service to citizens (COVID-19 communications and guidance); state employees have access to a simple-to-use, scalable solution; and constituents receive simple, personalized health communications from their state via calls, chat or voice. At the same time, the MHC portal provides timely COVID-related metrics to keep residents informed and help them visualize the spread of the virus.

Ultimately, Delaware leaders hope access to all this data will help slow the spread of COVID-19 in the state and reduce risks.

“The purpose is to provide usable, meaningful, timely and high-quality data,” says Offutt-Powell. “Providing residents with the ability to visualize the spread of COVID-19 across time and area helps them take the right precautionary measures.”

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