



Cloud-based speech recognition software helps physicians deliver best possible care

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Jonathon Dreyer, Senior Director of Solutions Marketing,
Nuance Communications



With the growing popularity of smartphone-based personal assistants, millions of individuals have discovered the power of speech recognition software. But Nuance Communications has been helping people communicate with voice technologies since 1992. Its flagship healthcare solutions are used by more than 500,000 clinicians in 10,000 healthcare organizations globally to help them capture and communicate more than 300 million patient stories each year.



Nuance likes to say that its technology frees people from having to learn the jargon of technology so that they can communicate in everyday language. Based in Burlington, Massachusetts, the company sells its speech recognition, transcription, and other clinical documentation solutions to consumers and to businesses in a variety of industries.

However, its healthcare division represents 50 percent of revenues and is its fastest growing area, with solutions that are used by 72 percent of US healthcare providers. "Speech recognition has taken off in healthcare partly because the technology is getting so much better, with advances in machine learning and artificial intelligence, but also because of new healthcare delivery models," says Jonathon Dreyer, Senior Director of Solutions Marketing at Nuance Communications. "As a result, more and more of the care team's workflow is distributed across locations and devices."

To address this challenge, Nuance introduced the industry's first cloud-based, medical speech recognition platform in 2011. This solution took its place alongside the company's boxed-software and network versions of Dragon Medical.

As Dragon Medical One became more popular, more clients deployed or migrated to Nuance's cloud platform, and Nuance needed to migrate its back-end servers to a world-class cloud infrastructure with robust security, reliability, and scalability.

Choose a trusted, reliable cloud

Nuance evaluated Microsoft Azure and cloud solutions from other providers. It ultimately chose Azure. "Our application stack is all Microsoft, so Azure seemed the logical choice," says John Vasicek, Vice President of Cloud and Mobile R&D at Nuance Communications. "In addition, we were impressed with the current and future geographic presence of Azure, which would help us expand our business globally."

Another impressive benefit was Azure security. "Only a couple of vendors were willing to sign a business associate agreement¹, which eliminated several vendors right away," Vasicek continues. "We liked Microsoft's rich security feature set and its constant effort to improve its security posture."

After a few months of planning, Nuance migrated Dragon Medical One from a hosting provider datacenter to Azure. It uses a mix of Azure infrastructure as a service (IaaS) and platform as a service (PaaS) to run, secure, optimize, and manage the application. (See "A physician-approved cloud architecture" below for details.)

"We migrated 10,000 end users to Azure in a four-hour window," says Vasicek. "The only real work involved was copying our database to Azure SQL Database."

"There's a huge volume of information passing through our solutions, and we have tremendous confidence and peace of mind in the Azure platform's ability to scale to handle any volume."

John Vasicek, Vice President of Cloud and Mobile R&D, Nuance Communications

Customer Name: Nuance Communications
Industry: Professional services—IT services
Country or Region: United States
Customer Website: www.nuance.com
Employee Size: 14,000 employees

Customer Profile:

Customer Profile: Nuance Communications is a leading provider of voice recognition and language solutions for businesses and consumers around the world. Its technologies, applications and services make the user experience more compelling by transforming the way people interact with devices and systems. Every day, millions of users and thousands of businesses take advantage of Nuance's proven applications.

¹Under the US Health Insurance Portability and Accountability Act (HIPAA) of 1996, a business associate agreement is a contract between a HIPAA-covered entity and a HIPAA business associate that protects personal health information in accordance with HIPAA guidelines.

Deliver lightweight speech recognition at the point of care

With Dragon Medical One running in Azure, Nuance can deliver its speech recognition software with great responsiveness and performance across devices, including thin client and virtual deployments. “Hospitals are shifting their IT deployments and making use of virtualization technology,” Dreyer says. “By moving that heavy processing workload to Azure, our software that runs on the client network is very light.”

Another benefit of running Dragon Medical One in the cloud: Nuance can more easily update its software and keep it current for clients while rolling out innovations as soon as its R&D team creates them.

Physicians enjoy a consistent experience and workflow regardless of where they are. “Physicians often move between hospitals, clinics, home, different EHRs systems, and other applications, and our product is usually the one technology that’s consistent in their day,” Dreyer says. “Because of this consistency across platforms and devices, physicians have more time to spend with patients. By delivering a stable, accurate platform across devices, we help deliver intelligent input at the point of care.”

For example, 94 percent of physicians at [Nebraska Medicine](#) say that Dragon Medical One helps them do their jobs better. “We wanted not only to positively impact usability and physician satisfaction, but also to give them the tools to provide even higher levels of patient care,” says Brian Lancaster, Executive Director of Information Management at Nebraska Medicine. “The Nuance solutions represent a natural evolution of what we want our documentation to become, moving away from simply recording what happened with a patient to helping guide physicians on what should happen next in terms of delivering patient care. The best time to inform these thought processes is right at the time of documentation, and these Nuance solutions help us achieve this goal.”

As part of its Dragon Medical rollout, Nebraska Medicine also deployed Nuance PowerMic Mobile—also hosted in Azure—to allow physicians to dictate into Dragon Medical using their smartphones. This makes it easier for physicians to document on the go and into any type of desktop, thin-client, or virtualized environment.

[Virginia Spine Institute](#), another Nuance client, has realized similar gains. In the past, it used transcription services for most of its documentation, but it took three to five days to get dictations transcribed. These turnaround times were not ideal from a patient care perspective, and

they also made it difficult to receive reimbursement payments on time.

By using Dragon Medical embedded in its mobile EHR, Virginia Spine Institute has reduced transcription costs by 65 percent and dramatically improved patient documentation. “We have been blown away by the accuracy of Nuance’s speech recognition technology,” says Colin Haines, MD, of Virginia Spine Institute. “It helps my productivity since I don’t have to type into the EHR or be at a desktop to complete dictations. Plus, since I have my smartphone with me at all times, I can always dictate.”

Now, physicians can add notes and make other time-sensitive edits to the patient record much faster than waiting for transcriptions. They can dictate patient notes or edit a patient’s chart in real time. Chart information is updated immediately, which means the next provider sees this information right away—rather than the typical three to five days it takes to transcribe dictations.

Double cloud business

Since it shifted to a cloud-based SaaS model, Nuance has added thousands of users a month to its Dragon Medical One client base and is able to deliver services and acquire clients at a scale previously impossible. “Since its introduction, Dragon Medical One has been unbelievably successful,” Dreyer says. “Clients love it. We’ve doubled the



number of organizations using Dragon Medical One in the last year, and 97 percent of clinicians recommend it to a colleague because of the freedom it brings to cloud-connected clinical users.”

Azure can handle any volume of traffic that Nuance throws at it. One physician captured 7.2 million words in one year using Dragon Medical One. “There’s a huge volume of information passing through our solutions, and we have tremendous confidence and peace of mind in the Azure platform’s ability to scale to handle any volume,” Vasicek says. “Azure got us out of the hosting business. There’s no way, given the popularity of Dragon Medical One, that we could have supported this growth by racking and stacking our own hardware. With Azure, we can serve more clients.”

Dreyer adds, “Just telling clients that we’re partnering with Azure makes them immediately comfortable. Azure is a significant competitive advantage for Nuance and our healthcare clients.”

Expand anywhere, improve reliability

The global Azure footprint is opening up new opportunities for Nuance to expand. “We can spin up our application in a new Azure datacenter in just a few hours, which is a quantum leap forward for us. That flexibility gives us tremendous growth potential,” Vasicek says.

Availability is much improved in the cloud, too, because Azure provides healthcare organizations with 99.95 percent uptime. Nuance uses an active-active datacenter configuration, so even in the unlikely event that an entire Azure datacenter failed, Nuance would be able to fail over its clients to another datacenter in five minutes. “Since moving to Azure, we’ve dramatically improved our uptime commitments,” Vasicek says. “Hospitals never close, so our previous maintenance windows were always a hassle for our clients.”

Chart a future in the cloud

Nuance plans to move more solutions to Azure and to explore product development in the cloud. “It’s nice to have access to the Azure toolset,” Vasicek says. “As new product opportunities arise, we’ll check to see what Azure has to offer before we build in-house.”

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John Vasicek, Vice President of Cloud and Mobile R&D, Nuance Communications

Software

- Microsoft Azure
 - Azure Load Balancer
 - Azure Security Center
 - Azure SQL Database
 - Azure Storage
 - Azure Traffic Manager
 - Azure Virtual Machines
 - Azure Virtual Network



A physician-approved cloud architecture

Clinicians expect fast, accurate, real-time speech recognition. Chief security officers demand that applications be secure and comply with HIPAA. And because hospitals never close, Nuance speech solutions need to be available 24 hours a day, 365 days a year. Nuance uses a variety of Azure services to meet these demands.

To meet the high-availability uptime requirements, Nuance has deployed its speech solutions in an active-active configuration in two Azure datacenters. It uses [Azure Traffic Manager](#) to intelligently route traffic to the closest datacenter based on network response times, which ensures that a doctor will always have the optimal speech experience. Nuance also uses Azure Traffic Manager to seamlessly route traffic between datacenters to facilitate maintenance and updates without any downtime.

In addition, Nuance uses [Azure SQL Database](#) as the foundation for its active-active application deployment. By utilizing the geo-replication features of Azure SQL Database, database changes are propagated in real time from the master database to five read-only database instances across the datacenters. This

advanced replication architecture allows Nuance to guarantee a recovery point objective (RPO) of five minutes or less.

With these services providing the backbone for a high-availability, active-active datacenter, Nuance was able to architect a high-performing and scalable solution within each Azure datacenter using additional core services.

Once Azure Traffic Manager routes a request to a specific datacenter it is processed by the [Azure Load Balancer](#) service within the selected datacenter. Azure Load Balancer uses an intelligent “least loaded” algorithm to route the incoming request to an available speech node for processing.

The heart of the Nuance solution is the Dragon Medical Server speech node, which processes individual requests for speech recognition services using the company’s industry-leading Dragon speech engine. Each Dragon Medical speech node is deployed as an [Azure Virtual Machine](#) and can quickly be horizontally scaled to provide unlimited recognition capacity. And while Azure Virtual Machines provide the raw compute power, Nuance uses [Azure Storage](#) to provide lightning-fast file system access.

Although many industries are moving rapidly to the cloud, concerns around patient data privacy can be an impediment for healthcare organizations to follow suit. To address this concern, Nuance uses a variety of core Azure security features. From a network perspective, the Nuance solution uses [Azure Virtual Network](#) services to properly segment its solution and place patient data behind a perimeter network. Nuance also uses [Network Security Groups](#) in conjunction with Azure Virtual Network to ensure that only authorized personnel have access to the segmented network.

Layered on top of the structured and highly secure network configuration, Nuance uses [Azure Security Center](#) to manage and monitor individual virtual machines for malware and virus protection. With the Azure Security Center dashboard, Nuance personnel can easily view the security health of each individual node and take proactive and preventive measures to apply security patches and ensure that all nodes are at the latest security patch levels.

[Explore and learn more about Azure Security solutions.](#)