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THE GLOBAL LEADER IN
CLOUD CLIENT COMPUTING

Addressing Changes in the Healthcare IT Legislative and Regulatory Environment

How Virtualization and Cloud Client Computing Eases Compliance and Expands Options for Caregivers

A white paper by Wyse Technology Inc.

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Introduction

Profound changes in healthcare reform and accelerating advances in medical technology are placing information technology (IT) in a pivotal role as the business model for healthcare undergoes rapid transformation, and healthcare providers seek to keep pace. With health care costs and quality assurance taking central roles in health reform, attention is being focused on leveraging healthcare IT to improve the efficiency of provider business operations, medical care delivery and, ultimately, patient outcomes. To meet Health Insurance Portability and Accountability Act (HIPAA) privacy standards, IT must help ensure that this data is secure.

In addition, IT must deploy new technologies to help ensure that doctors, nurses, and other clinical staff have access to the data and applications they need on demand, from any location. And finally, IT must effectively address the cost equation by delivering solutions that increase operational efficiencies and ultimately drive down costs.

Although demands for IT will continue to rise, cost must come down: CIOs must be looking for innovative ways to manage the costs within information systems organizations. One of the key technologies that can make healthcare provider IT departments more efficient and help them to meet these challenges is virtualization. This whitepaper focuses on major advances in cloud client computing solutions supported by Virtual Desktop Infrastructure (VDI), and how these technologies can address the challenges facing healthcare providers by providing a more flexible, integrated, and virtualized IT environment.

Healthcare is a very complex and highly regulated industry, and the evolution triggered by regulatory requirements will occur over a decade or more. However, 2011 is shaping up to be a record year for spending in healthcare IT, as the industry rushes to meet new government regulations and looming deadlines. According to Gartner Group, more than $88.6 billion was spent by providers in 2010 implementing electronic health records (EHRs), health information exchanges (HIEs) and healthcare IT initiatives . In 2011, healthcare IT vendors and consultants are expected to see an increase in revenue between 10 and 20 percent, a confirmation of the critical role that IT plays in the transformation of the healthcare model.

[1] Kenneth Brant, "Forecast: Enterprise IT Spending by Vertical Industry Market, Worldwide, 2008-2014, 1Q10 Update," Gartner, Apr. 30, 2010

Drivers for Change in Healthcare IT
Legislative and Regulatory

The role of IT within healthcare was enlarged in April 2004, when President Bush set a broad goal to expand the reach of healthcare IT over ten years, establishing the Office of the National Coordinator for Health Information Technology in the U.S. Department of Health and Human Services. In February 2009, President Obama signed the Health Information Technology for Economic and Clinical Health (HITECH) Act, a component of the American Recovery and Reinvestment Act of 2009, which has become the guiding framework for expansion of healthcare IT in the US.

The legislation includes multiple components aimed at encouraging and supporting providers in the adoption of healthcare IT, namely authorizing $19.2 billion for enhanced Medicaid and Medicare payments to providers who adopt "meaningful use" of healthcare IT into their practices between 2011 and 2015, while helping to establish what "meaningful use" should be. The Congressional Budget Office projects the incentives will result in the adoption of comprehensive Electronic Health Records (EHRs) by 90% of physicians and 70% of hospitals by 2019.[2]

The Patient Protection and Affordable Care Act (ACA) signed by President Obama in 2010 also included requirements that the federal and state governments establish new electronic systems for enrolling individuals who will purchase insurance in insurance-based exchanges starting in 2014. The legislation emphasizes transparency of the online process, guidance to making informed decisions, accommodations for a range of users, privacy and security, and inclusion of private and public insurance options.

Electronic Record Keeping

While there are many opportunities to expand the use of technology in the health care system, there has been concerted attention on the development of electronic records to allow consumers, health providers, and health systems to communicate electronically. Personal Health Records (PHRs) allow individuals to collect, view, manage, or share their health information electronically. These include online resources like Google Health that allow health consumers to manage their own records as well as those that are linked with other health information systems. Electronic Medical Records (EMRs) are an adapted version of the patient record in an electronic format primarily intended for health care providers and stored within a given institution or organization such as hospital or health delivery system. Unlike PHRs, which are owned and used by the patient, EMRs store health information (drug allergies, diagnoses, treatments, medical history) at the hospital or delivery organization level.

Electronic Health Records (EHRs) have a similar structure to EMRs, but can be shared cross-institutionally to link data from various providers. EHRs are generally more patient-focused than EMRs in that they allow interactive patient access when lined to a PHR.

[2] R. Steinbrook, "Health Care and the American Recovery and Reinvestment Act," New England Journal of Medicine, March 2009

Guidelines call for gradual implementation of EHRs, to evaluate standards and use of the technology. The term "meaningful use" refers to the standards that EHRs must meet, including electronic recording of basic demographic data, use of electronic prescriptions and tracking of medication, lab test coordination, patient reminders, and electronic communication between providers.

According to a research study published in the October 2010 issue of Health Affairs, titled "A Progress Report on Electronic Health Records in U.S. Hospitals", it is estimated that only 20% of doctors and 10% of hospitals currently use EHRs, so there still a long haul ahead. Despite the difficulties of implementation, proponents of health IT cite the potential of drawing significant long-term savings to the health care system with widespread adoption of electronic systems. One estimate projects that universal transition to EHRs can lead to a potential efficiency savings averaging more than $77 billion per year.[3] These include reduction of costs associated with medication errors, communication and documentation of clinical care test results, staffing and paper storage.

Electronic Records and ICD-10 Conversion

In addition to the attention spent in 2011 trying to achieve the government's meaningful use criteria and adopt EHRs and EMRs, healthcare providers will also be focused on meeting another important government mandate: the transition for medical diagnoses and inpatient procedure coding from ICD-9 to ICD-10. Some healthcare IT observers equate the move from ICD-9 to ICD-10 as the healthcare industry's very own Y2K technology upgrade project. While there are currently about 13,600 ICD-9 codes, the number of codes will increase more than five-fold, to approximately 69,000 with ICD-10. The new coding system, which will be required in 2013 for all medical billing related to anyone covered under HIPAA rules, brings more detail to diagnoses and procedures in the codes used on claims…but also places greater burdens on healthcare IT organizations to provide support.

Mobility and Anywhere Access to Information

Aside from the many mandates healthcare providers will be addressing, another critical area in health IT is the need to be able to access patient information at anytime, anywhere, and the continued evolution of mobile health tools. This is one of the most significant non-regulatory demands facing healthcare CTOs. With patient records now being moved into electronic formats, the computer screen has replaced the bedside chart.

Care-givers in clinical environments are constantly on the go, moving from patient-to-patient, and back to nursing stations and floor supervisory desks. The need for caregivers to interact with patients and deliver information immediately must be supported regardless of location, and this places an additional burden on IT systems to provide reasonable access along with the necessary security safeguards. In addition, many regional medical centers must also provide the same quality of medical technology and support for smaller remote clinics and need effective solutions to address that challenge.

[3] Hillestad, R., J. Bigelow, A. Bower, et al., "Can Electronic Medical Record Systems Transform Health Care? Potential Health Benefits, Savings, and Costs", Health Affairs Oct 2005

Electronic Imaging and Collaborative Communication

Electronic Picture Archiving and Communication Systems (PACS) have been developed as a means of providing economical access, storage, and rapid retrieval of images acquired with multiple modalities, and simultaneous access at multiple sites, and this requires an integrated reading and reporting experience. Healthcare organizations are handling an increasing number of exams and diagnostic images every year, and imaging now involves clinical areas beyond radiology; cardiology, oncology, gastroenterology and even the laboratory are creating medical images that can be incorporated into PACS.

At the same time, the shortage of radiologists and pressure to manage costs requires healthcare IT organizations to accomplish more with fewer resources, demanding more efficient use of people and technology. Deploying PACS capabilities beyond a single radiology facility provides the opportunity of extending the reach of diagnostic imaging to a greatly expanded base. Using advanced data communications technologies to share images in multiple locations enables a collaborative environment which can contribute to more informed diagnoses and improved patient outcomes.

Security and Patient Privacy

Back in 1996, the Health Insurance Portability and Accountability Act (HIPAA) established regulations for the use and disclosure of information about health status, provision of health care, and payment for health care that can be linked to an individual. Years later, privacy still remains a top concern across a range of healthcare IT advances. Concerns about insufficient data security and the possibility of inappropriate access to medical records have been debated for years now, and continue to be a source of considerable IT attention and investment, as the changing landscape of data vulnerabilities and potential security breaches remains a moving target.

An Innovative Solution to Diverse Healthcare IT Challenges – Virtual Desktop Infrastructure

Changes in the healthcare industry and advances in information technologies have directed the focus of IT to a new model for collecting, storing, disseminating, and displaying patient records, clinical data, and medical imaging. The data center model utilizes Virtual Desktop Infrastructure to reduce IT overhead, enhance security, facilitate electronic record-keeping, support regulatory compliance, and ensure greater reliability and simplified access to critical life-impacting applications within the hospital environment. Desktop virtualization is a data center computing model that leverages the best attributes of a network computing environment: System administrators centrally manage virtual desktops in the datacenter, and end-users are provided with a traditional PC desktop experience on a thin-client.

Rather than utilizing traditional dispersed and fragmented platforms such as PCs, the data center model provides a secure, unified, centralized repository leveraging powerful virtualization software. The virtualized server is integrated with a Virtual Desktop Infrastructure from Wyse, which uses a thin-client approach to provide end-users with improved access to all of their critical applications. For example, doctors and nurses can securely log-in to the system at any virtual desktop and immediately access their home page, patient records, or clinical application.

A Virtual Desktop Infrastructure using thin clients has many advantages over traditional PCs, foremost among them being cost. A PC desktop averages around $900, while a thin-client averages $350 per desktop. Thin clients not only have lower initial capital cost, but also have lower maintenance costs and higher levels of reliability as they have no moving parts such as a disk drive and do not run a local operating system. Thus, there is no need to install and patch software on these devices, rendering them unsusceptible to security vulnerabilities.

For IT, virtualization of the server environment can deliver multiple benefits. Critical applications can be managed securely from a centralized environment, where redundant systems can be deployed for secure backup and additional reliability. Virtualized server environments can run multi-user systems software such as Citrix XenApp, Microsoft Remote Desktop Services or Terminal Services, or VMware View to deliver popular applications such as MS Office and Oracle to virtual desktops. Updates, new applications and specialized services can be provisioned rapidly by network administrators. Applications run simultaneously, and can be accessed on demand from any secure thin client regardless of the application OS. Access to applications is centrally controlled and can be based on user roles and responsibilities or other security hierarchy.

VDI Benefits for Healthcare Providers

Several medical centers in the U.S., faced with the many challenges described in this paper, have taken a leading role in adopting virtualized server environments and migrating from desktops dominated by PCs to a Virtual desktop Infrastructure utilizing Wyse cloud client computing. For these healthcare organizations, the benefits of using simplified desktops and workstations are clear:

Improved security – Thin clients do not store data or sessions, and all data resides on highly secure servers. That makes it much simpler for IT to comply with data security and back-up policies. End points and individual access can be completely locked down by the IT administrator through centralized control of the virtual machines hosted by the servers.

Greater reliability – Thin clients do not have moving parts such as disk drives and fans, and require no native OS to be loaded on the machine, since they are completely dependent upon the centralized servers. With no PC OS to corrupt, thin clients, and more secure ‘zero clients’,

reduce or eliminate virus or vulnerability issues. Unlike a PC, it is impossible for users to "customize" the thin client with outside software which could potentially disrupt the workstation and the network.

Reduced capital and operational costs – On average, it costs more than twice as much to provision a PC vs. a thin client. PCs typically incur significant annual maintenance costs associated with software maintenance and upgrades, hard drive failure, and troubleshooting, while cloud clients are essentially maintenance-free, and can be easily swapped out when necessary. The average lifespan of a thin client is six to eight years, vs. the three to four year lifespan of a PC, thus extending the buying cycle and reducing costs over time. In addition, thin clients provide a greener solution from an energy perspective, consuming a tenth of the wattage (under 7 watts versus 100 or more) required to operate a PC.

Anytime, anywhere access – The lower per-unit costs of thin clients vs. PCs means that more thin clients can be deployed throughout the clinical environment, and the streamlined profile of thin client devices enables them to be easily mounted with flat-screen monitors in hospital corridors, nursing stations, patient rooms, and anywhere else where healthcare data is needed by caregivers. Thin client wireless solutions provide the option to support roaming workstations that require only a small footprint. Software like Wyse PocketCloud enables secure access to this information from tablets and smartphones using Apple and Google OS.

Simplified desktop environment and ease of use – Since information and computing resources are resident on centralized servers, thin clients are not cluttered with multiple applications which can impact desktop performance and compromise quick access to critical data. Nor do nursing stations need to have multiple desktops and displays to support multiple applications running on separate operating systems. A single thin client can efficiently run any application and OS supported by the virtual server environment.

Improving Patient Outcomes with Wyse PocketCloud – Medical Professionals Share Their Success Stories

The rapid adoption of connected mobile devices such as smartphones, tablets, and notebooks has provided medical professionals with new ways to quickly and securely access electronic medical records and the latest patient information anytime, anywhere using the Wyse PocketCloud mobile cloud computing application. Doctors and clinical staff are no longer tethered to bulky desktops and workstations, and are able to spend more time focused on providing patient care in the clinic and on the hospital floor. The result is more personalized medical care and improved patient outcomes.

VDI Deployment in Healthcare Environments

Leon Medical Centers - *a carefully controlled information communications environment, where sensitive digital patent and medical data are accessed from a centralized server, thus improving security as well as workflow*

Leon Medical Centers serves the Miami-Dade, Florida, area with a full range of medical services, and is a Medicare-contracted Health Management Organization (HMO). Enrollments have been growing at a record pace, so the healthcare provider recently opened two new medical centers, for a total of seven.

Leon Medical Centers was running its electronic medical records (EMR) and patient management applications on Citrix XenApp 11, with users working on PCs. However, the PCs were beset with continual maintenance issues, with hard drive failures and problems with viruses. Reliability became such a problem that each area needed a spare PC standing by, so that if one malfunctioned, doctors and nurses could continue to care for patients. Leon Medical Centers sought a new system that delivered greater security to help it comply with HIPAA specifications. In response to these problems, Leon Medical Centers selected Wyse thin clients to migrate to a Virtual Desktop Infrastructure and replace many of its aging PCs.

With just one week to set up 300 Wyse thin clients at two new medical centers, with minimal training the IT team was able to set up each Wyse device in about 30 minutes. In contrast, setting up a PC would have taken 90 minutes, thus saving the IT staff over 300 hours in set-up time alone…. the equivalent to 12.5 man-days. The Wyse thin clients provide staff at the new medical centers access to Leon Medical's new domain, built on Windows Server 2008 and running on virtualized servers. At the front desk, administrative staff use Wyse R90Ls to access Leon Medical Center's NextGen EMR and EPM applications to schedule appointments, check in patients, and answer questions. Medical assistants, doctors, and nurses use these applications to view a patient's history, tests, and x-rays, and to gather new information. With a Wyse R90L device in every exam room, they can check the Internet and the company's own resources on the spot to provide patients details and print-outs on their condition. Other users in the medical centers include area managers, transportation coordinators, primary care physicians, specialists, and dentists, as well as urgent care stations and pharmacies.

Switching to the new domain and infrastructure has made a huge difference in information security, as Leon Medical Centers often had to pull PCs out of action because of spyware or

Using PocketCloud to Reduce Time Accessing Patient Records

Dr. Paul Grant Sr. is a specialist in pain management and anesthesiology at Texas Health Care P.L.L.C., in Fort Worth. Texas Health Care is a multi-specialty physician group practice, owned and governed by physicians and consists of 150 doctors as well as more than 50 nurse practitioners, physician assistants, and nurse midwives. Dr. Grant needed a solution that provided portable and secure access to the clinic's NextGen Electronic Health Record (EHR) application. Before adopting Wyse PocketCloud, he had to carry a bulky laptop and go through the lengthy process of logging into NextGen whenever he entered an examining room. Now, he uses PocketCloud Pro to access NextGen from his iPad using WiFi while at the office, and 3G/4G networks when on the go. According to Dr. Grant, the Wyse PocketCloud Pro plus iPad solution "works flawlessly." He no longer needs fixed desktops or heavy laptops to access health records, and is able to spend more time focused on patient needs and providing quality care.

viruses. The Wyse virtual infrastructure enables the IT team to lock down end-points since user data is not stored on the virtual desktops, and Wyse thin clients are never affected by spyware or viruses. Every connection is handled through servers, which feature extensive security features and centralized administrative control.

Gwinnet Medical Center - *Improving patient care and simplifying IT operations while undergoing explosive growth.*

Gwinnett Medical Center (GMC), ranked "One of America's safest hospitals" by Forbes, consists of 4,200 associates and 800 affiliated physicians, and treats more than 400,000 patients per year with 500 licensed beds. Just in the past three years, it has added 150 beds. While adding beds and building out as fast as they could, GMC discovered they could not roll out PCs fast enough. And as they grew, maintaining their existing 3,500 PCs was becoming increasingly difficult. Adding to the challenge, many of the new machines were needed in areas where they couldn't be constantly overseen, like hallways, private rooms, and admission areas. GMC couldn't afford to have unauthorized personnel accessing the devices, because the potential for a breach of HIPAA rules was too great. All these challenges pointed to a cloud client solution, with inexpensive access devices that would be easy to install and maintain — and with all data securely maintained in the datacenter.

Using PocketCloud to More Efficiently Conduct Rounds

Dr. Michael Klein is Chairman of the Department of Pediatrics at Middlesex Hospital in Middletown, Connecticut. Dr. Klein uses Wyse PocketCloud on his iPad 2 to access Cerner's Electronic Medical Record (EMR) application, PowerChart, while seeing newborn babies during rounds. He has found that the flexibility and speed of his iPad 2 with PocketCloud installed makes the process of rounds much faster and more efficient compared to the same process with a laptop. Dr. Klein finds Wyse PocketCloud to be "very reliable" when connecting to and using the Cerner PowerChart application. Each time he uses PocketCloud, it "logs on without fail" to the network, allowing him to easily update each newborn's electronic medical record — all without having to carry around a laptop or search for a desktop to view and update patient information. Another important benefit for Dr. Klein is that he can also easily access his Mac and Windows computers when needed, giving him the flexibility to be connected to those resources from almost anywhere.

The GMC IT team considered blade PCs and thin clients from HP and Neoware as well as from Wyse. Ultimately they chose Wyse thin and zero clients. In addition to the power, flexibility, and economy advantages of Wyse cloud clients, GMC chose Wyse because of Wyse Device Manager (WDM), which is software that provides easy management of just a few to many thousands of thin clients from a centrally located server.

Today, GMC offers staff access to patient care applications and medical records through approximately 3,500 PCs and 1,000 Wyse thin clients: a mix of Wyse V10Ls with the Wyse ThinOS, Wyse V90s with Windows XPe, and WyseP20 zero clients for VMware. The Wyse devices are supported by VMware View 4, running on IBM blade servers. Wyse thin clients are concentrated in hallway alcoves and patient rooms of the new facilities, where they provide healthcare workers with access to GMC's care management applications. In patient rooms, nurses use attached barcode scanners to scan medication labels, the patient's wristband, and the nurse's badge, creating a precise record of who administered

what, when, and to whom. Nurses also use the devices to update the patient's chart with vital signs. Doctors use the thin clients in the hallway or in the patient's room to pull up data, order any additional tests, and add comments to the charts. In the hospital's admission areas, staff use thin clients for patient registration. These machines are vulnerable to theft, so the security of thin clients — which don't store any data — is important in this setting. GMC has recently begun implementing Wyse devices in the operating rooms, too, for perioperative charting during surgery: assistants enter all details of what takes place during the procedures.

GMC is benefitting from its Wyse thin and zero clients in a number of ways. Most important, of course, is that the devices support a high standard of patient care. The many person-hours saved via easy "hands off" manageability of the Wyse devices, the vast reduction in replace/repair activity, the much improved security and patient information protection, the efficient, low-cost hardware, and energy cost savings are also tremendous benefits for the hospital, enabling it to provide the very best patient care and maximize the value it gets from its IT budget.

Using PocketCloud to Easily Access Remote EMR Applications and Files

Dr. Bradford Unroe is a podiatric medicine practitioner and partner at Tipton & Unroe Foot and Ankle Care in Louisville, Kentucky. Dr. Unroe uses Wyse PocketCloud on his Android tablet to securely and efficiently access his practice server, which holds all of his patients' information. PocketCloud, along with his Android device, provides him access to these critical files and applications while on the go, over both WiFi and 3G/4G networks. Dr. Unroe was "pleasantly surprised with the ease of installation, use, efficiency, and great user interface" of Wyse PocketCloud. He was seeking a robust way to access his eClinicalWorks Electronic Medical Record (EMR) application from both his smartphone and Android device, which of course, PocketCloud easily solved for him. Dr. Unroe has met his objective of accessing patient data remotely with PocketCloud, making it easier for him to render more efficient care for his patients while away from the office and after hours.

Raritan Bay Medical Center - *a truly collaborative atmosphere, where professionals who are involved in data interpretations and patient care achieve an improved user experience*

PACS typically entails a supporting data center infrastructure to scale across larger, more diverse and distributed environments, and is a good example of how a virtualized healthcare data center and architecture can support a healthcare provider's growing requirements. Raritan Bay Medical Center (RBMC), meets the healthcare needs of central New Jersey residents. The nonprofit healthcare provider operates two full-service hospital locations with 501 beds, 2,200 physicians, nurses and support staff, and treated more than 90,000 patients in 2008. A 2009 U.S. News & World Report ranked it among the best hospitals in the U.S.

Like other medical institutions, RBMC must control costs while maintaining the highest levels of patient care, safety, and privacy as required by HIPAA. RBMC relies on technology to help it meet these high standards and to support a collaborative environment. Various departments use multiple specialized applications, such as several from Siemens Healthcare including, Med Administration Check™ used heavily by nursing staff, and a patient management and clinical records system, called INVISION®, that is used throughout the facilities; and multiple third party applications including a Picture Archiving Communication System (PACS) and scheduling

systems. Staff accesses the applications via RBMC's secure intranet using fixed workstation and mobile units.

The hospital faced challenges with critical imaging applications on Windows PCs. Images such as x-rays at PACS workstations were blurry because those devices could not deliver high resolution, and physicians had to line up four-deep to view images on a single nurse workstation that provided correct resolution. PC desktops were also prone to corrupting user profiles that impacted medical staff productivity. Wyse thin client devices enable doctors to view PACS images in high resolution from any available thin client workstation, improving time-to-care, and increasing opportunities for collaborative diagnoses.

Nurses benefit from tidier workstations where wall-mounted monitors increase available workspace, and the tangle of cords associated with desktops is eliminated. Nurses also rely heavily on the mobile workstations that enable bedside patient assessments and medication tracking. The low energy consumption of these thin client devices extends battery life by 300 percent over the previous mobile PCs, allowing nurses to use a workstation for eight hours, rather than two hours, before re-charging is necessary.

Wyse thin client devices enable greater convenience and boost productivity, and staff can now access applications remotely over SSL/VPN connections if they are not able to be physically present at the medical center. Doctors, nurses, and support staff value being able to do their work remotely from their offices and homes, and some are also retrieving applications from mobile devices such as iPhones, iPads, and Android-based phones and tablets using the Wyse PocketCloud app.

Summary

These examples illustrate the value of deploying thin clients and a Virtualized Desktop Infrastructure in demanding healthcare provider environments. Not only does the cloud client computing platform from Wyse Technology deliver better VDI with clear and compelling operational benefits to healthcare organizations, it also enables more efficient adoption of the complex regulatory mandates that healthcare IT organizations are being required to implement. Wyse Technology continues to deliver ground-breaking software and hardware solutions in virtual computing environments which reduce IT overhead, enhance security, facilitate electronic record-keeping, support regulatory compliance, and ensure greater reliability and simplified access to critical life-impacting applications for healthcare organizations.

Wyse Technology is the global leader in Virtual Desktop Infrastructure and Cloud Client Computing. The Wyse portfolio includes industry-leading thin, zero and cloud PC client solutions with advanced management, desktop virtualization and cloud software supporting desktops, laptops and next generation mobile devices. Cloud client computing replaces the outdated computing model of the unsecure, unreliable, energy-intensive and expensive PC, all while delivering lower TCO and a superior user experience. Wyse has shipped more than 20 million units and has over 200 million people interacting with their products each day, enabling the leading private, public, hybrid and government cloud implementations worldwide. Wyse partners with industry-leading IT vendors, including Citrix®, IBM®, Microsoft®, and VMware® as well as globally-recognized distribution and service partners. Wyse is headquartered in San Jose, California, U.S.A., with offices worldwide.

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