

CASE STUDIES

CASE I

DARAZ MIGRATES TO AWS CLOUD IN FOUR MONTHS

Designer Brands at Your Doorstep

As the sixth-most-populated country in the world, Pakistan presents a large customer base for retail operations. Launched in 2012, Daraz offers a diverse assortment of products to online shoppers in Pakistan and four additional South Asian markets: Bangladesh, Myanmar, Nepal, and Sri Lanka. The e-commerce provider is focused on providing a superior customer experience, including a user-friendly interface and comprehensive customer care. With 2 million products, 30,000 sellers, and 5 million customers, Daraz has become a household name in the region.

RECURRING DOWNTIME PROMPTS CLOUD MIGRATION

In November 2016, during the busiest sales campaign of the year—Black Friday—the unthinkable occurred: Daraz's backend systems crashed. The Daraz mobile app was extremely slow, even unresponsive, and customers could not view product images. Since launching, Daraz had maintained a hybrid IT network, running its applications virtually through a third-party data center. The company had leveraged two third-party providers, a Frankfurt company for customized network hosting and a Portuguese provider for development and infrastructure support. When the Frankfurt company's routers went down in 2016, Daraz began evaluating cloud-based alternatives. The company considered several providers but found Amazon Web Services (AWS) the most mature in terms of the breadth of services offered, and it also liked the fact that AWS can be configured for multiple availability zones. Two additional network glitches interrupted the Daraz website in early 2017, prompting its management to urgently migrate its primary workloads to AWS before the next annual Black Friday campaign.

Stability, Simplicity, and Flexibility

Rai Umair, chief technology officer at Daraz, listed three goals for moving to the AWS Cloud. First and foremost was stability. "Especially during campaign periods, our site cannot be down for even a minute," he says. Stability was also essential during the migration process; Daraz could migrate its customer-facing workloads for all its five markets onto AWS in just four months, with little or no downtime. The company measures performance based on customer orders, with no significant decrease reported during the four-month migration period.

Simplicity was the next goal. Daraz wanted more control over its network. Umair started with a team of four, which has since doubled in size. Most employees had little, if any, experience with AWS, but they were able to experiment and learn on the job, taking advantage of the AWS Business Support plan as needed. "We've been able to simplify in terms of management, so our team of eight is capable of solving any network issue that comes up, 24/7," Umair explains.

Flexibility was the final goal. During campaigns such as Black Friday, Daraz experiences rapid spikes in traffic, from 200,000 requests per second—the average on any given day—to more than a million during campaign periods. Umair expects site traffic to continue rising exponentially. Daraz also needs to quickly scale down its infrastructure after big campaigns to save costs, which it can now do with just one click, by turning off inactive AWS instances.

Ensuring Availability While Reducing Complexity

Daraz uses Amazon Elastic Compute Cloud (Amazon EC2) instances of various sizes for all workloads: the Daraz online mall, its order management system, and business intelligence (BI). It also employs Elastic Load Balancing to distribute incoming traffic across Amazon EC2 instances and multiple availability zones. Distributing workloads across separate availability zones also ensures redundancy and stability.

When servers in one zone go down, Daraz's web traffic is rerouted to a secondary zone, with no interruption to site functionality. In addition, the company relies on Amazon CloudWatch to monitor servers and perform minute-by-minute reporting.

Umair and his team have simplified day-to-day operations with Amazon Relational Database Service (Amazon RDS), using it to run the open-source database MariaDB. "Before this, we were running our databases directly on our own managed boxes, taking a lot of time to set up redundancy and take backups. We saved a lot of time and have reduced complexity by moving to Amazon RDS," says Umair. "We have many replicas, and by using Amazon RDS, it's easy to set them up. The complexity is hidden behind the servers." Automated backups from Amazon RDS are then stored in Amazon Simple Storage Service (Amazon S3).

Automation Improves Customer Calls

As a customer-centric company, Daraz always seeks to improve its customer experience. Before using AWS, nearly half of all customer calls received were simple inquiries about order status, which Daraz wanted to expedite using automation. Faster calls would enable each customer service agent to handle more calls each day, which would boost productivity. Experience had also shown that the less time a customer has to wait to hear their order status, the happier they are with the call. The company now uses Amazon Polly to deliver automated real-time information when customers check on their order status. Edouard Gheerbrant, head of the customer experience, says, "We were able to shorten the duration of such calls by more than 40 percent." The majority of these calls are now handled in 15 seconds, Gheerbrant explains, "which has had a positive impact on customer service without increasing the number of agents."

After each call, Daraz customers are asked to complete a survey evaluating how satisfied they are with the experience. "Today, we're standing on the verge of 4.8 out of a total score of 5, and before we introduced Amazon Polly we were at about 3.5," Gheerbrant says. Looking ahead, he is considering using Amazon Lex to develop a chatbot that would automate up to 80 percent of all calls, beyond just providing order status. He is also now able to train his agents on more complex issues that would be the subject of the remaining 20 percent of calls.

Solutions Partner Helps Pinpoint Problems

Since moving to AWS, Umair and his team can design more monitoring and BI applications. He can manage all IT issues with just eight engineers because they no longer have to worry about setting up data centers or brokering power and bandwidth agreements. The team has used AWS Support to work through any issues and will continue to do so in the future.

"AWS Support has been fantastic," Umair says. "The responses are so detailed. When we faced difficulties because we had no formal AWS training, they responded with exactly what must be done and what the real issue was. There were many instances where we were addressing the symptoms of a problem without understanding why it was happening. Once we had an issue with managing container images and spent a week trying to identify the cause, but AWS was able to help pinpoint the root cause and resolve it quickly."

CASE 2

HOW THE CLOUD IS IMPROVING HEALTHCARE IN REMOTE POPULATIONS

From improved diagnosing to enhanced treatment methodologies for a multitude of illnesses and diseases, the healthcare industry has benefited tremendously over the past decade thanks to advancements in technology. One of the most notable improvements has come about as the result of cloud technology - an increased ability to provide healthcare to remote populations.

In India, approximately 70% of the population lives in villages, many of which have limited access to healthcare providers, if any. Thankfully though, health technology specialists are tapping into the \$125bn healthcare market and creating cloud-based equipment, such as all-flash storage arrays, and solutions that

provide a point of care diagnostic abilities along with telemedicine antidotes. These digital health breakthroughs are empowering more than 8,000 healthcare technicians to serve as proctors for physicians in rural areas.

When data is shared through cloud-based health programs, it enables health workers, including physicians, nurses, and health technician specialists, to link their data through shared networks located at central medical facilities. The data can be integrated into today's most accurate diagnostic systems, allowing extremely effective medical objectives and treatment methods to be developed and implemented.

A cloud-based healthcare program proves to be of benefit because it operates within a large pool of unique, easily accessible useable resources that are virtualized. The resources can be dynamically reconfigured so that they can adjust to a variable scale, or load, which then provides users of the program to perform optimum utilization of the resources stored in the cloud pool.

As with any type of healthcare solution, some challenges must be appropriately addressed. Cloud-based computing, especially within the healthcare field, requires lots of maintenance and training. Physicians and healthcare technicians must not only know how to utilize cloud-based software programs and equipment, but owners of healthcare clinics and medical centers must also address all legal issues that coincide with using cloud-based technology.

One program which is cloud-based and increasing healthcare to remote populations is *ReMeDi*. This program provides a unique form of video and audio capabilities between physicians and patients located in rural areas. The video and audio features allow real-time consultations to take place, which can be critical and even lifesaving in some situations.

Take, for example, a patient who arrives at a village center. A health technician takes vitals and performs basic diagnostic testing, followed then by adding the data and information to an electronic health record. The information is then shared via the appropriate cloud-based healthcare program and viewed by an offsite physician; this physician can quickly create a treatment plan, as well as prescribe any medications that may be needed to fight off a deadly infection.

Systematic innovation has always been a major factor in the development of advanced healthcare. Innovation drives cost-effectiveness as well as efficiency and high-quality resolutions to today's healthcare concerns. Cloud-based technology is proving to be a breakthrough in modern healthcare tactics, allowing research outcomes to be greatly improved, thus changing the face of IT. Data handling problems, coupled with complex and even sometimes unavailable or expensive computational methods have always resulted in research complications, especially within the biomedical research field. Cloud-based programs, though, are showing a lot of potential in being able to overcome these hurdles.

CASE 3

ADIDAS GROUP LAUNCHES ON DROPBOX ENTERPRISE FOR "SEAMLESS COLLABORATION"

Cloud storage firm Dropbox has announced a new customer win in the form of sports brand The Adidas Group. The announcement, which appeared on the firm's official blog, explains how Adidas is utilizing Dropbox Enterprise, which was launched in November last year, to have 'fast, reliable access to...data' and 'seamless collaboration' for its employees.

"At the Adidas Group, we want to provide our employees with the best tools they need to get their work done," said Soren Schmidt, collaboration, and mobile director in a statement. "When selecting a technical solution that is meant to change the way people collaborate, usability and simplicity were among our most important criteria."

"The strong adoption of Dropbox Enterprise among employees shows us that we made the right choice." Dropbox Enterprise was launched as an attempt to bridge between the traditionally friendly user experience and the grunt needed to manage 'tens of thousands of users, as the company put it at the time. Among the new functions presented to enterprises included a suspended user state option, which gives greater control if an employee leaves the organization, and custom branding.

Elsewhere, Dropbox announced last week the beta availability of Dropbox Paper, a collaborative tool that has been linked by practically the entire tech media as a competitor to Google Docs. Users can create to-do lists, take meeting notes, and brainstorm ideas including text, videos, and images.

The release, which is available on Android worldwide and will be ready soon for EU users on iOS, comes at a particularly interesting time after Salesforce announced its intent to buy Quip, a similar company in the space, for \$582 million last week. Writing for sister publication Enterprise AppsTech, Alex Gorbansky, CEO of Docurated – another collaboration firm – discussed the deal's importance in the context of the sphere's maturation.

"The entire customer lifecycle, from sales, to account management, to support, is highly content-intensive," Gorbansky wrote. "Owning the content stack will make Salesforce stickier and, more importantly, provide them with invaluable data and insight around which content is most effective at driving deals."

According to figures released by Dropbox a year ago, the company had exceeded 400 million users, with eight million business customers on board. Figures from Statista argued the cloud storage firm had exceeded 500 million overall users by March this year.

CASE 4

BOEING AND RYANAIR LOOKING TO TAKE ADVANTAGE OF THE CLOUD AND BIG DATA PLATFORMS

The airline industry has traditionally been ripe for technological innovation – and a couple of examples have hit CloudTech's inbox concerning how different providers are currently utilizing big data and cloud. Boeing has announced an agreement with Microsoft to build a cloud-based platform for its range of analytics tools, aiming to transition many of the airline's commercial aviation applications into the Microsoft Azure cloud.

Among the applications ready to move into the cloud include real-time information on purchasing and leasing airplanes and engines, as well as route planning, managing inventory, and maintaining fleets. The airline claims that through the use of its apps by customers, crew scheduling costs have gone down by as much as 7%.

"Boeing's expertise and extensive aviation data resource, coupled with Microsoft's cloud technology, will accelerate innovation in areas such as predictive maintenance and flight optimization, allowing airlines to drive down costs and improve operational efficiency," said Kevin Crowley, Boeing vice president of digital aviation. "Together, two companies that changed their industries are teaming up to accelerate the digital transformation of aviation through the use of analytics-based applications, cloud technologies, and large-scale integration."

Elsewhere, Ryanair is using visual analytics to improve route management, reservations, and in-flight services. The low-cost flight provider is working with data analytics provider Qlik to build an overview of its business, and according to Shane Finnegan, senior BI developer at Ryanair, the use of two Qlik products – Qlik Sense, for easy to digest data visualizations, and QlikView, for more in-depth analytics – has helped in identifying and addressing issues much closer to real-time.

"Ultimately, we want to find the best ways to make our customers happy on-board, while being able to offer them the lowest fares on the market – and Qlik gives us the foundation to make educated decisions which will make that notion a reality," said Finnegan.

Ryanair is looking to expand its initial collaboration with Qlik to potentially feature improving in-flight retail, as well as better targeted flight offerings, optimizing the supply chain by understanding the anticipated group of passengers on a given flight.

Cloud and big data are not the only areas in which airlines – and airports – are trying to take advantage. Delta has started to implement improvements around the Internet of Things (IoT), predominantly around the manufacturing and maintenance of planes, while Miami International Airport has launched the MIA Airport Official mobile app, which gives contextual information to passengers based on their location around hundreds of beacons installed at the airport.

CASE 5

HOW CARLSBERG IS DEPLOYING OFFICE 365 TO MOVE ITS OPERATIONS TO THE CLOUD

Danish beer brand Carlsberg is rolling out Microsoft Office 365 for greater enterprise collaboration, according to details of a customer case study from Redmond.

Carlsberg is rolling out this technology initiative under the banner of 'GloCal', which "aims for global efficiency while staying true to its local roots," and chose Microsoft Office 365 as the optimal solution.

Employees use a full range of Microsoft products: Exchange Online for email; Lync as a messaging tool; SharePoint for collaboration; and Yammer for social networking.

"One way we are helping our employees work better together is by deploying Office 365," said Etienne Dock, vice president of IT architecture and sourcing at Carlsberg.

"No matter what device or distance, the cloud is breaking down traditional barriers so we're better able to focus on brewing the best beer in the world."

From six markets in 2000, Carlsberg is now the fourth-largest brewer of beer in the world with over 500 different brands to manage. The firm has also launched the Carlsberg Supply Chain (CSC) which utilizes cloud technologies, such as Office 365, to streamline the business.

As a result, any opportunity to cut corners and improve the bottom line is a welcome one for Dock.

"Breweries are capital intensive, so we don't want to build too many," Dock said. "CSC gets huge business value from using Office 365 as a global collaboration tool to interact with our global markets and exchange the information we need to fine-tune the balance between these variables to optimize our operations and save money."

This isn't the only tech initiative Carlsberg has rolled out in recent weeks. The firm rolled out beer mats containing an NFC tag and a QR code at pubs across Denmark earlier this month, as well as installing Bluetooth beacons to drive traffic on its CrowdIt venue discovery app.

A report released last week by Skyhigh Networks found that many enterprises weren't using the full umbrella of Microsoft cloud apps. While Office 365 and SharePoint were popular, Yammer, Lync, and OneDrive did not get as much traction.

CASE 6

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CASE 7

THE WEATHER COMPANY

The weather impacts everything around us and drives decisions that range from government policy on climate change to whether it is a good day for the family to go to the beach. The Weather Company focuses on connecting people, businesses, and governments with the world's best weather forecasts. It is the parent company for The Weather Channel and other radio and television broadcast channels, as well as digital properties such as weather.com. The company creates apps for broadband and mobile platforms, including iOS and Android mobile devices. Hundreds of thousands of customers in the aviation, broadcasting, energy, insurance, and other industries, as well as governments worldwide, use its weather forecasting tools and systems.

The Weather Company also uses data to provide analytic services that help companies understand the relationship between the weather and consumer behavior. Retailers can use the information to target ads and consumer messaging using weather-driven decisions. Based in Atlanta, Georgia, The Weather Company is owned by a consortium made up of NBC Universal and the private equity firms The Blackstone Group and Bain Capital.

The Challenge

Over the years, the company made several acquisitions and grew organically to transform from a cable television company to a global provider of weather data services. As a result, the company's infrastructure became a collection of 13 data centers running legacy systems that included forecasting models built and run on Fortran. That environment was not cost-effective or scalable for a company that provides weather forecasts for 2.4 billion locations worldwide.

The Weather Company's solution was to re-design its big data platform, forecasting systems, and applications to run natively in a cloud environment. This strategy would allow The Weather Company to scale while maintaining control over the environment and costs. It would also allow the company to create developer-friendly APIs that product teams across the organization could use to innovate and create new products without worrying about infrastructure.

Why Amazon Web Services

AWS is a key component of The Weather Company's cloud strategy. "We need to be within 100 milliseconds of everyone on the planet - and we leverage the global reach and availability of AWS to deliver on that strategy," says Bryson Koehler, Executive Vice President, and CIO.

Generating Four Terabytes of Data Every Hour

Weather is a volatile dataset that changes every 15 minutes or less. To scale quickly on a global basis, the company pushes four gigabytes per second of forecasting data through AWS services. For forecasting, the company designed a new weather forecast and data services platform powered by NoSQL-distributed databases like Basho's Riak, Redis, and Cassandra. These NoSQL databases are leveraged to handle massive data movement, replication, and data distribution in a cloud-based, distributed environment. The Weather Company reaches audiences worldwide by deploying the platform across multiple Availability Zones in the US East (Northern Virginia), US West (Northern California), EU (Ireland), and Asia Pacific (Singapore) Regions. Riak stores historical data from satellites, radars, forecast models, users, and weather stations.

The platform consists of the following three layers

- Dynamic Integrated Forecast (DICast), a statistical weather forecasting engine producing "first-guess" forecast grids
- A forecast-on-demand layer that applies human forecaster influence to the "first-guess" forecasts in real-time and publishes a consumption-ready "finished" forecast for the user's precise location
- The SUN (Storage Utility Network) platform, a public-facing API caching layer

The Weather Company covers the entire globe with a grid of 37 million four-kilometer squares and updates this grid of first-guess weather forecasts as new numeric model guidance is received, often several times an hour. This allows the company to report current weather conditions accurately and predict the weather for each grid point days or weeks in advance.

The platform ingests information from more than 100 different sources and generates close to one-half terabyte (TB) of data each time it updates. The information is mapped and processed into forecast points that can be retrieved in real-time, based on queries coming into the system. All data is stored in Amazon Simple Storage Service (Amazon S3), leveraging the efficiency of cloud storage as opposed to an on-premises storage solution and eliminating the hassle of managing a storage platform.

Amazon Redshift is The Weather Company's data analytics platform, providing analytical data for services such as the WeatherFX ad engine, which looks at how the weather affects retail sales.

Developers worldwide can take advantage of an API-driven platform

The weather forecast and data platform use AWS APIs to automate application development and the launch of new environments. "Building and designing for the cloud is a different philosophy and mindset, and certainly a different technical approach," Koehler says. "We deploy about 90 percent of our applications and systems on AWS — and we have the flexibility to easily port applications and systems as necessary for the business."

The Weather Channel uses AWS APIs to give its developers flexibility. Any developer can use what the company refers to as data cartridges to develop services for the data platform, other cloud environments, or on-premises hardware. "This gives us extremely high volume and reaches both within the company and by external developers," says Koehler. "More than 150,000 external developers worldwide are registered to use the platform. Anyone from a hobbyist to an external developer building a large-scale system can use our APIs to build products."

The Benefits

Since joining The Weather Company, Koehler has transformed the IT organization to support the company's business growth strategy. "AWS offers a responsive environment with massive data movement, replication, and synchronization to help meet the demands of our digital transformation at scale and on a global distribution level," he says. "The Weather Company's business strategy is focused on four S's: science, safety, storytelling, and services. Using AWS allows us to focus on the most important aspects in our business cost-effectively."

By launching an API-driven platform on AWS, The Weather Company has been able to bring products and services to market faster. "Using AWS means that we're not hamstrung by infrastructure," says Koehler. "When we wanted to launch a new forecasting system, the requirements for doing that internally would have taken as much time, money, and effort as it would write the code. We started the project in

April 2013. Now our weather API is one of the world's most-used public APIs. The platform is robust enough to handle between 10 and 15 billion transactions each day at 100,000 to 150,000 per second, depending on the weather."

The Weather Company's cloud strategy has reduced its on-premises environments from 13 to six data centers. "The less my engineers have to worry about power, cooling, racking, stacking, and other operations tasks, the more they can focus on the business," says Koehler. "They can focus on being application engineers, building resiliency into the apps, and improving network and application efficiencies. Those sorts of savings are hard to measure, but you can't go from 13 data centers down to six without realizing significant savings in time and management."

Running on AWS has also been cost-effective for The Weather Company. "Anyone who thinks running on the cloud is more expensive hasn't totaled up all the true costs," says Koehler. "A forecasting system like ours is a steady-state load; it runs all the time. That is not a traditional cloud computing value proposition, but by running on AWS instead of on-premises, we are saving almost \$1 million per year on just one application. If I can get a win on a forecasting application that runs consistently 24/7, I believe that anyone can get a win on applications, especially those with spikes in demand."

CASE 3

NEW YORK TIMES MOVES GAMING AND CROSSWORD PLATFORM TO GOOGLE APP ENGINE FROM AWS

The New York Times has announced it has moved its games platform to Google App Engine from Amazon Web Services (AWS).

Having first published its daily crossword in 1942, the NYTimes built its first website in 1996, with the digital daily crossword starting life as a web-based Java applet. Since then, the publisher has overseen growth into a suite of mobile apps and a website with more than 300,000 paid subscribers. The further introduction of a free daily mini crossword three years ago put a lot of strain on the company's architecture, according to JP Robinson, the NYTimes principal software engineer.

"As the crossword grew in popularity, our architecture started to hit its scaling limitations for handling game traffic," explained Robinson in a post announcing the move. "Due to the inelastic architecture of our legacy system, we needed to have the systems scaled up to handle our peak traffic at 10pm when the daily puzzle is published.

"The legacy stack leaned on technologies that required some level of human interaction and could take hours to scale up and down. We needed to scale within minutes," he added. "The system is generally at that peak traffic for only a few minutes a day, so this setup was very costly for the New York Times games team."

Among the features of Google App Engine that Robinson and the games team have taken advantage of is combined access and app logging - helping simplify debugging - API security and autoscaling, although noting the 10pm daily peak caused problems at first.

Robinson added that while the migration to Google Cloud Platform (GCP) was undertaken seven months ago, all games API traffic now goes through App Engine, with 90% of traffic served purely by App Engine services and GCP databases. The publisher also claims it has cut infrastructure costs by half as a result of the move.

AWS has been creating some interesting headlines of its own in recent weeks. As this publication has previously reported, in June Walmart told technology companies and vendors to move off Amazon's cloud or risk losing the retail giant's business. Last month, columnist David Auslander argued that the potential winners in such a move could be Microsoft and Google, AWS's primary rivals in cloud infrastructure, adding that while AWS remains the "clear leader" in public cloud provisioning, it "also makes them the hunted."

Since then, Walmart's anti-Amazon feeling has become more pronounced. According to a note from Trip Chowdhry of Global Equities Research – first spotted by Barron's – Walmart should expect to go "full steam" on NVIDIA, utilizing its graphics chips to create its NVDA GPU Clusters on 'Walmart Cloud', or, rather, OneOps, which the company acquired in 2013. Similarly, Walmart last month announced it was teaming up with Google for voice-enabled commerce – again with Amazon in its sights.

Despite all this, of course, Amazon remains by far and away from the market leader. AWS hit \$4.1 billion in revenue for its most recent quarter and cited Discovery Communications, Ancestry California Polytechnic State University as among its latest customer wins, the latter two going 'all-in' on the Amazon cloud.

CASE 9

BRITISH MEDICAL JOURNAL EXPANDS TO CHINA WITH HELP OF ALIBABA CLOUD AND DATAPIPE

More and more companies are trying to get a foothold in China as part of their international expansion – and the British Medical Journal (BMJ) is one, having worked with managed cloud services provider Datapipe to enter the Chinese market using Alibaba Cloud.

Datapipe has been working with Alibaba as a global managed service provider of its cloud arm since 2016, and was also named the leading Asia Pacific managed cloud company by Frost & Sullivan. For BMJ, the concept was straightforward, needing a partner on the ground in China with knowledge of the market to take advantage of Alibaba's local public cloud infrastructure.

"We have now fully realized the strategy that we first mapped out two years ago when we started our cloud journey," said Alex Hooper, BMJ head of operations. "In the first year, we were able to fully virtualize our infrastructure using Datapipe's private cloud, and in the process, move to a new, agile way of working. In this second year, we have embraced the public cloud and taken our services over to China."

This is not the BMJ's first dalliance with Datapipe; the company had previously used the managed service provider to help refresh its legacy technology stack, moving from one release a month on average to up to four times a day, with Sharon Cooper, chief digital officer, describing the working relationships between dev, ops, test and business need as 'unrecognizable' from before.

As regular readers of this publication will be aware, Alibaba is making concerted cloud strides. Last month, with the publication of its financial results, CEO Daniel Zhang said its cloud business "continues to enjoy high growth at scale" and the recent passing of the one million customer mark is "merely a starting point."

Writing for this publication last month, Alibaba Cloud noted the importance of not falling into various traps when moving into the Chinese market. "China is a highly competitive market, and consumers expect a smooth and secure online experience," the company wrote. "The flexibility, scalability, and security offered by the cloud provides an optimal solution to boost your website in China's competitive online space."

CASE 10

HEAD IN THE CLOUD: WHY MEDIA PRODUCTION TEAMS ARE ADOPTING CLOUD-BASED SOLUTIONS FOR A POST-COVID WORLD

"Change is inevitable ... growth is optional," says John C Maxwell, internationally recognized leadership expert, and best-selling author.

As a renowned leadership guru, Maxwell may have been talking in general terms, but for media organizations in these tumultuous times, change has come along like an unstoppable tidal wave, with solutions to the challenge of remote working needing to be found. The question is – sink or swim?

So, how do traditional media organizations, or any business with a digital community, prepare for this new remote working reality in a way that is sustainable into the future? Here's why organizations should be looking to the cloud.

Collaboration

For content teams of photographers, social media managers, or journalists, the ability to share multimedia from anywhere in the world, at any time, is critical.

Remotely uploading multimedia content onto a traditional in-house server, via a VPN for instance, is cumbersome at best, while other means of sharing content, via WhatsApp or file-sharing platforms, is inefficient, wasting valuable time, with no standard workflow or centralized archive in place.

Cloud-based workflow platforms solve this problem by allowing content producers to access and share media in real-time on any device, negating geographical limitations and standardizing the way media is collected from the field.

MojoReporter is an AWS-powered media workflow platform that increases the amount of valuable, monetizable media produced, allowing private teams to collect and submit digital content via mobile or the web to an access-controlled web dashboard – not only simplifying and speeding up the remote production process but centralizing incoming multimedia assets in the cloud for future use and republishing.

Protecting your digital assets

It's not just media organizations that need to protect their valuable digital assets; brands of all kinds are operating more and more like media organizations, communicating to customers and wider digital communities via multimedia content on social media, web, or app platforms.

A centralized repository for storing, safeguarding, and distributing your digital assets is crucial, but a physical server that relies on on-site hardware and software is expensive to set up and maintain and offers little in terms of full-scale integration with your other digital platforms or remote accessibility.

A cloud storage solution like BiblioDAM has many benefits, providing a single view of digital assets across multiple business units while allowing authorized users to access assets in the clouds from any device, anywhere in the world.

Multiple taxonomy layers, coupled with a powerful Elasticsearch engine, meaning no matter how much media you collect, searches are lightning-fast – ensuring you're never forced to scratch around in folders on a network drives, or external hard drives, to find the media assets you require for your social media post, campaign, news item or more.

Remote distribution

Simplicity: When it comes to distribution, it's what every media organization craves right now, given the complexity of executing a content strategy in a remote environment. But with modern audiences demanding choice in the way they consume content, simplicity is becoming harder to find, with media platforms to name a few – to satisfy audiences' consumption habits.

Cloud CMS platforms like BaobabSuite enable centralized publishing, media distribution, and, most importantly, monetization of digital content from anywhere in the world, on practically any device, meaning you could be publishing organizational content from your home office, or a beach in Mauritius, while maintaining centralized control of content across multiple apps and websites.

What's more, your overworked media department will thank you, with a platform that is integrated and accessible anytime, anywhere on any device; allowing them to focus on what they do best – telling great stories.

CASE 11

Israel opts for Amazon and Google cloud services

The Israeli Government has penned a \$1 billion+ deal with Amazon Web Services (AWS) and Google for the public sector and military cloud services.

The tech giants are thought to have beaten Microsoft, Oracle, and IBM to a tender in April 2021 for the four-phase project, dubbed Nimbus.

It will not be a centralized system due to there being two providers and, although not all data will be stored on it, Israeli finance ministers expect to start moving data to the cloud this summer.

The different phases of the undertaking include acquisition and construction of cloud infrastructure, formulating government policy for migrating to the cloud, integration, and migration, and control and optimization of cloud activity.

Semekh Chaikin-KPMG has already been selected to provide services for phase two. A tender for local suppliers has been issued for phase three, while the tender for the fourth phase is yet to be issued.

Israel's Government Procurement Administration director, Gal Amir, said: "This project is the product of a vision, high professional capabilities, commitment and investment, and with an emphasis on cross-government cooperation led by the Nimbus team - an integrative inter-ministerial team that has brought the vision to fruition."

"We are now embarking on a long process of partnership with the winning suppliers."

As part of the deal, AWS and Google are committed to spending at least 20% of the value of the contract on Israeli products and services.

CASE 12

WORLDLINK TO BUILD 14 SMALL DATA CENTERS ACROSS NEPAL

Nepalese Internet service provider WorldLink has announced plans to build 14 data centers across Nepal over the next three years.

The ISP aims to have at least one data center in every one of the country's seven provinces. Its Kathmandu data center will reportedly be the largest and will be Tier III certified, while the remaining facilities will be Tier II certified.

The company says it will invest Rs 3 billion (\$25.6 million) over the next three years to deliver the carrier-neutral facilities. The company says it will start with the Kathmandu facility.

Helping improve Nepal's Internet speeds

"Nepal is also witnessing exponential growth in Internet traffic with robust growth in the use of digital services. Therefore, for a better Internet experience, there is a need of having servers locally, to store the content as near as possible," said WorldLink CEO Keshav Nepal.

"With these IDC [Internet data center] facilities, everyone will get Internet content faster, cheaper, and more reliably. Even the government and private organizations will find a very secure and reliable world-class facility to host their digital contents and cloud infrastructure."

Founded in September 1995, WorldLink is the largest Internet and Network Service Provider in Nepal. The company currently offers colocation, hosting, and private cloud services from its data center in Pulchowk, Lalitpur, to the south of the capital city Kathmandu.

The data centers are reportedly part of the Government's Digital Nepal Framework strategy to modernize and introduce more digital services to the country to drive economic growth. Other elements of the framework include increased spectrum availability and 5G deployment as well as a national optical fiber network.

CASE 13

ALIBABA CLOUD PARTNERS WITH TELENET TO INTRODUCE CLOUD COMPUTING IN NEPAL

Alibaba Cloud, the cloud computing arm of Alibaba Group, today announced a partnership with Telenet Pvt. Ltd, a Lucky group company, to bring powerful, secure, reliable, and cost-effective cloud computing products and services in the Nepal market. This is going to help local businesses to get more opportunities presented by digital transformation.

Telenet Pvt. Ltd is a Lucky Group company and is already engaged in Digital Business in Nepal like Telecom VAS with IVR, Web, App and WAP-based solutions, Digital Transformation, IoT, Tele-voting platforms for all major TV shows & reality shows, etc. and expanding more in the domain. Together with it, Alibaba Cloud will help drive the digital transformation for local businesses in this digital age.

Alibaba Cloud offers high-performance, elastic computing capabilities in the cloud and the services are available on Subscription and pay-as-you-go models. This includes storage, relational databases, big-data processing and analytics, advanced security, and content delivery networks (CDN). At the same time, Alibaba Cloud is committed to the research and development of large database systems and advanced big data technologies. R&D efforts include the advancement of IoT (Internet of Things) technology, virtual reality, smart homes, automotive networking and information systems, and cloud-based mobile-device operating systems.

Cloud adoption in Nepal is gaining momentum. With enhanced connectivity and increasing trade activities in the region are bringing growth opportunities to companies in Nepal equipped with cloud computing technology. By leveraging Alibaba Cloud's global infrastructure, companies in this region can expand their geographic reach to support international operations and better compete in global trade.

"Alibaba Cloud has always been dedicated to empowering enterprises of all sizes to tap into opportunities in the digital age by offering future proof technology in markets that we operate. We aim to become the preferred cloud service provider for all sizes of business in Nepal by providing a full range of cloud solutions and combining this with Telenet's local expertise. Working with knowledgeable and well-connected local partners will help us better enable the market, as well as reinforce Alibaba Cloud's foothold when it comes to helping local companies internationalize and seize opportunities in this digital age," said Dr. Alex Li, General Manager, Alibaba Cloud India.

"We are very excited to partner with Alibaba Cloud in Nepal. We see the growing demand for cloud-based products in different sectors of Nepal. We have seen a large growth of web development, E-commerce, and Tech-based companies in Nepal in the last 5 years. Today Nepal's enterprise market is very receptive to new technologies such as the cloud that provide strategic business advantages and this demand is on an upward trend. The partnership with Alibaba Cloud will expand our digital portfolio for our enterprise customers. We are also eagerly looking forward to working with our channel partner ecosystem to provide better value to the end-user through greater choice and more flexible offerings," commented Pratik Jalan, Chairman, Telenet Pvt. Ltd.

CASE 14

LET THERE BE NO SERVER BREAKDOWN

As offices in Nepal have been facing several server downs every single day, cloud computing can be a reliable option to provide services to people.

Now and then, people end up failing to get their work done from the government offices because their server is down. Not all Nepalis know what server. Officers explain by saying 'computer is not working' they have to come back another day, and only if they are lucky enough, their work will be done.

The fundamental right of consumers to receive quality service is connected with 'luck' which is irrational. There is a high need for providing expert consultation to service providers about the importance of service delivery on time, and the receiver (general citizens) that services not being provided at the exact time is unacceptable and they should not be tolerating it.

Except for a handful of people who understand servers being down, others have no interest in understanding the problem and finding the solution. This mentality is a virus of our governance system which affects not only one office and an individual but the whole system.

In this rapidly moving world of digitization, everyone must understand the basic concept of servers. I this article, I explain the idea of servers in the simplest possible manner so that next time a service receiver from a non-technical background goes to a government office they can speak up for their basic rights.

What is a server?

A server is a special computer that provides services. It is a computer linked with all the computers in the office within a network that stores data, information, and everything that is needed in the specific office. For example, the licensing department is responsible for issuing, renewing, or dismissing the license of millions of individuals. All the information of the consumers is stored in that server and every time a client computer in a network adds or asks for information, it is automatically stored or provided by the server.

Few big private hospitals also store information about an individual's health details and when the same individual goes to the hospital, his/her health history is already present there. All these are stored in the server computer which is accessible only by the authority and administration. A server computer needs proper care and management. Some fundamental criteria must be fulfilled to keep the server up and running.

The first criterion is an uninterrupted power supply, ubiquitous network connection, physical security that includes security from theft, cold and direct sunlight, etc. Server computers need to be safeguarded against mice as the wires could be devoured and other things such as hard disk failure, CPU crash due to load, motherboard failure, memory crash also create problems in their functioning. It is important to designate dedicated employees especially to safeguard and manage the physical servers.

With rapid development in technology, there is also an increase in the number of digital services. The concept of server computers arose only in the 90s and since then, it has been progressing and being updated.

If we look back to prehistory, our forefathers used to carve rocks and woods to write information, some of which can be found in history museums all across the world. Storage devices such as floppy disks, memory cards, punch cards, punch tape, disc, etc from recent history can also be found in museums now.

Let us move with time

The system in the world is rapidly changing and there is a high need for us to adapt to modern ways and configure the current functions to keep ourselves moving. The concept of digital governance is also in peak as system-oriented services have high chances of accuracy and transparency over manual works. The government of Nepal has also been trying to move towards digitization in a full-fledged manner. However, infrastructural hurdles, commission, and corruption have hindered the process.

The highest authority responsible for the adaptation of modern technologies is undoubtedly the government of Nepal. The concept of digital governance is not new for the government and they seem to be putting their efforts at it as well. Acts and regulations related to digital data entry; social media engagements are some steps towards it. Installing the Disaster Recovery (DR) Site in Hetauda is an example of the government's seriousness. The DR site is a backup or secondary site which is responsible to take prompt action in case the primary server (site) goes down. Generally, in case of disasters, the servers may be affected or be damaged disrupting all the works. Therefore, to keep the work going, the DR site comes into effect and DR needs to be in a different physical and geographical location than the primary site. In our case, the primary server is located in Singh Durbar at the National Data Center which is responsible for the operation of all government offices, portals, and digital archives. There is a need for the

dedication of extra time and skillful employees to manage and safeguard the servers as the government portals and servers keep going down. In simple words, servers should never go down.

Cloud alternative

The best alternative for servers is next-generation servers such as cloud servers or Cloud Computing Services. Big companies like Amazon, IBM, Google, Microsoft, etc have been providing cloud computing services all across the world. The idea of cloud computing is renting the compute, storage, and processing capacity, which simply means outsourcing the server requirements. While the conversation of cloud computing has slowly started in Nepal, the question of data security and privacy arises. The companies that provide cloud computing services have their compliance met from well-known providers to maintain data privacy, data security, scalability, and high availability. The good thing about cloud services is that consumers can rely on the server without having to create big infrastructure at their place. The reliability of cloud computing is high and the accuracy level is also second to none which is why many government and private corporations have started using it.

For example, gov.uk—the official website of the UK government—is in the public cloud. The UK Home Ministry, Ministry of Law, and Singapore government also operate in cloud computing. Manipur (India), State of Arizona (US), US Navy are other big names on the list. Similarly, NASA uses cloud computing for many works it does. The National Geospatial-Intelligence of the US is in the cloud too.

The question here is not about whether to fully go on cloud computing but to invest in servers rationally. To stress on servers now is to keep the promises of digital governance and being accountable to citizens.

As offices in Nepal have been facing several server downs every single day, cloud computing can be a reliable option to provide services to the people and respecting the rights of consumer enshrined in the constitution of Nepal that states every consumer shall have the right to obtain quality goods and services and a person who has suffered injury from any substandard goods or services shall have the right to obtain compensation following the law.

It is the right of the citizens to get uninterrupted and quality services. This is how we can march forward towards better governance and efficiency.

CASE 15

CAN NEPAL INVEST IN THE CLOUD?

A group of young overseas Nepalis based in the UK wanted to invest in cloud computing in Nepal. They were already doing work for Amazon, Microsoft, and Alibaba and were attracted by Nepal's lower labor cost, as well as the availability of professional software engineers.

It took one year for them to just register the company. At that same time, a company they set up in Bangladesh was not only registered but had already started its work. In Nepal, they were given the runaround, sent from one ministry to another, and spent a year explaining what cloud computing was.

After much toing and froing, the company was finally registered, and once fully operational it will employ 500 young Nepali IT engineers and spend more than \$100,000 a month here.

"Not only does Nepal not even have rules about cloud computing, but people in government also have no idea what it is. If this goes on, no foreign investors are going to come here to invest in information technology," said an investor involved in the project.

According to the National Planning Commission, Nepal needs Rs20.25 trillion worth of investment to reach the United Nations Sustainable Development Goals in 10 years. While most of these investments will have to be in infrastructure and transportation, the country needs to make it easier for foreign investors to bring in new technology and resources so Nepal can leapfrog into the IT age.

However, as our example shows, Nepal does not seem to be technically and mentally prepared for IT investors. Talk earlier this year about the need to register social media platforms before they can operate here shows how regressive the government's mentality is. None of the multinational giants involved in IT do all their work at headquarters. They outsource it to parts of the world with lower costs and know-how,

like Vietnam, the Philippines, Indonesia, Cambodia, or India. Those countries have given IT investors tax holidays, as well as streamlined repatriation of profits. The greatest potential for foreign investment in Nepal is in the IT sector — in third-party contracts for developing apps, web design and maintenance, animation, digital mapping, etc. Nepal has competitive labor costs, and the country produces 7,500 IT graduates a year. We have to cash in on this potential, which would provide jobs for youth who would otherwise emigrate to find work. But first, we need to streamline the bureaucracy and legal process and update our investment laws.

CASE 16

ABP NEWS NETWORK INCREASES PAGE VIEWS BY 70% USING AWS

- ABP News Network needed a robust, scalable, and cost-effective infrastructure to meet traffic spikes and demands of its digital consumers
- The company is running its services including websites, mobile apps, and a video content management system on AWS
- Cuts video uploading times from seven minutes to less than one minute
- Supported growth from 150 million to 500 million page views
- Scaled to support traffic spikes of up to six times during peak periods

About ABP News Network

ABP News Network (ANN) — one of the largest TV networks in India — operates five news channels in Indian languages such as Hindi, Marathi, Bengali, Punjabi, and Gujarati, and reaches out to more than 150 million TV audiences per week.

Like most media businesses worldwide, ANN has been disrupted by new technologies and rising consumer demand for immediate and ubiquitous access to content. Unlike some industry participants, however, the Noida-headquartered business has seized the opportunities presented by the digital age. Its online news website — www.ABPLive.in — and app — ABP Life — caters to more than 40 million monthly visitors.

The Challenge

News in India can occur in a more dynamic, volatile, and unpredictable way compared to other international markets. This means spikes in traffic to digital and mobile news services can occur at any time of the day with minimal warning. A major breaking news story can increase traffic by three times, rising to six times for elections that may occur as often as once a year.

It was therefore extremely important for ANN to scale the technology infrastructure quickly to support these traffic spikes. Furthermore, similarly to international consumers, Indian audiences were increasingly consuming news through digital and mobile services, as well as through broadcast and print. Videos uploaded online were increasingly complementing broadcast and text-based news services. In 2013, ANN predicted extending its digital presence from a single website to a range of services could increase its page views from 150 million to over 500 million. The business had to sustain this growth cost-effectively while delivering the responsiveness and reliability that digital consumers demanded. "Considering all the factors in play, we wanted a robust, cost-optimized infrastructure that was reliable and highly scalable," says RiteshGondal, head of digital technology at ANN.

Unfortunately, ANN's existing managed service provider technology infrastructure could not meet these challenges. The business's agreement with this provider made scaling its website at short notice to support traffic spikes difficult and expensive. Furthermore, ANN could not gain the visibility to control and optimize its use of infrastructure resources.

The business also risked ceding the competitive advantage to rival media companies by delivering new websites, mobile services, and other products to market in months rather than weeks. The limitations of the infrastructure meant editors would be forced to take up to seven minutes to upload a news video several times longer than a media business operating in a highly competitive marketplace could tolerate.

Ultimately, ANN risked not being able to deliver news quickly to meet viewer demands for immediacy and secure a strong position in the competitive digital news market in India. Furthermore, the business could not position itself to enter new geographic markets seamlessly and cost-effectively.

Why Amazon Web Services

ANN brought its web infrastructure back into an on-premises data center as an intermediate step toward moving to a public cloud. To prepare for that move, the company started conducting due diligence on leading public cloud services with Amazon Web Services (AWS).

ANN's business and technology leaders were acutely aware that selecting the right cloud provider was critical to the future of the business. Despite ceding first-mover advantage in digital news to rival media companies, ANN was keen to secure market leadership among key readership demographics by providing compelling news content over a range of digital and mobile channels.

This required working with a cloud provider that could scale quickly to support traffic spikes and longer-term growth in traffic to the web, mobile, and video news services. In 2014, the company decided to migrate its infrastructure, applications, and services to AWS.

"We selected AWS because of the flexibility to align our infrastructure costs and consumption with demand, and the ease and simplicity with which we could move to the AWS Cloud," says Gondal. "AWS also specializes in infrastructure services that enable businesses like ours to distribute video content and mobile applications to users' smartphones, tablets, and personal computers."

ANN completed its initial migration to AWS in only four months and has continued to expand the services running in the public cloud architecture to include additional websites, mobile applications, and a video content management system. "We evaluated all the video content management service providers in our market but determined the best option was to develop a system in-house and use workflow, storage, and video file conversion tools provided by AWS," says Gondal. ANN uses Amazon Simple Storage Service (Amazon S3) to store video files and Amazon Elastic Compute Cloud (Amazon EC2) to run the system used to manage the video content. Amazon Elastic Transcoder converts ANN's video files from source to different formats for viewing on a range of devices.

The business also opted to develop a video analytics system in-house. "We tested the market and either the costs of the solutions were too high, or they could not deliver the type of data we wanted to collate," says Gondal. "We elected to deploy our solution to analyze video usage and service quality using data streaming, collection, loading, warehousing, and processing tools provided by AWS." ANN is using Amazon Kinesis to load streaming data into an Amazon S3 bucket and an Amazon Redshift data warehouse, with Amazon EMR, used to complete data processing activities.

The key to ANN's success is its choice of AWS services to run its mobile applications. According to a Morgan Stanley report quoted in the Economic Times, India is expected to overtake the United States as the world's second-largest smartphone market in 2017. According to the publication, the researchers estimate the Indian market will grow by a compound annual growth rate of 23 percent through 2018 and account for 30 percent of global growth during the period. This trend is creating a huge market for mobile applications to deliver a range of content, including news, features, and analysis. ANN elected to use AWS Lambda to deliver an architecture that seamlessly updates content feeds served from Amazon S3 to mobile users without requiring the management and maintenance of a single server.

The Benefits

Using AWS has enabled ANN to support its increase in page views from 150 million to 500 million and accommodate sharp spikes in traffic with high performance when significant news events, including elections, occur. "Breaking news in India can result in a dramatic surge in traffic. We implemented a first of its kind serverless architecture deployed over Amazon S3 which helps us manage traffic to an unlimited number," says Gondal.

ANN has also successfully extended its portfolio of products and services from a single website to several websites, video content, and a mobile application, since migrating to the AWS Cloud. "The scalability factor of AWS has given us peace of mind and enabled us to think more about what we want to achieve

"with our applications rather than how to manage them," says Ramakrishnan Laxman, head of digital business at ANN. Furthermore, through competitive pricing offered by AWS, including regular reductions and being able to pay only for the infrastructure resources used, ANN has been able to control costs and budget effectively. "We are now doing 500 million page views for the same infrastructure cost as we incurred previously for 150 million page views," says Gondal.

Aside from controlling costs, the business is now able to deliver new products and services far more quickly and cost-effectively than its previous managed-service environment. Editors can now upload videos in less than one minute to meet the demand for immediacy, rather than the six to seven minutes required in traditional infrastructure. This has positioned ANN to compete more effectively with its rivals. Furthermore, AWS's global footprint has given ANN the option of expanding beyond its home market into new regions.

"The AWS team has always let us know about the new cloud services it is launching, and how we can use AWS to optimize our existing workflows," says Gondal.

Using AWS has given ANN the confidence to evaluate using advanced tools such as machine learning and artificial intelligence to deliver on a range of new products. "Our experience using AWS has been extremely good," says Gondal. "While we were quite late to enter the digital news and video content space, we've been able to expand quickly and become one of the leaders in providing these services to consumers in India and beyond by using AWS."

CASE 17

AMERICAN AIRLINES MOVES CONSUMER-FACING APPS TO THE CLOUD – WITH IBM'S HELP

American Airlines is moving critical applications, including its customer-facing mobile app and check-in kiosks, to IBM's cloud, the latter has announced.

The move builds upon the two companies' partnership, first announced last year, with the airline also moving workloads and tools such as its Cargo customer website to the IBM cloud.

The two companies have agreed to rewrite applications to IBM's cloud platform as a service (PaaS), as well as establishing a cloud-native architecture. American Airlines will work with IBM Global Services to help create applications through a micro-services architecture, DevOps, agile methodology, and lean development.

"In selecting the right cloud partner for American, we wanted to ensure the provider would be a champion of Cloud Foundry and open-source technologies so we don't get locked down by proprietary solutions," said Daniel Hendry, VP of customer technology and enterprise architecture at American. "We also wanted a partner that would offer us the agility to innovate at the organizational and process levels and have deep industry expertise with security at its core."

"We feel confident that IBM is the right long-term partner to not only provide the public cloud platform but also enable our delivery transformation," Henry added.

IBM has helped several companies – in particular airlines – with their digital transformations of late. Earlier this month it was revealed that Singapore Airlines was using various apps to help increase productivity and customer experience, while United Airlines and Finnair are also using IBM to provide iOS apps to devices and employees.

"American Airlines is embracing IBM Cloud as a true business enabler to lead the way in innovative customer experiences," said David Kenny, SVP IBM Watson, and Cloud Platform. "It is the foundation of American's digital transformation and enables the airline to take its delivery speed to the next level with increased scalability, performance and agility to improve business processes and customer experiences at the same time."

CASE 18

WHY THE HEALTHCARE INDUSTRY'S MOVE TO CLOUD COMPUTING IS ACCELERATING

Physicians are targeting breast and ovarian cancer through research that crunches massive amounts of information from more than 2,000 DNA sequences at the Icahn School of Medicine at Mount Sinai. The data set is gigantic — more than 100 terabytes — and the analysis happens aboard a secure cloud-based platform through Amazon Web Services.

"By using AWS, we can store source files securely and cost-effectively with significant durability and accessibility," one of the researchers said. "We wouldn't be able to conduct our research without it."

The case illustrates several reasons the healthcare industry's use of the cloud is growing aggressively. As Mount Sinai researchers hunt for the genetic causes of these cancers, their research platform helps them meet three key needs: The platform is secure, maintaining the confidentiality of patient information; it is scalable, allowing economic growth as the data set increases and performance needs change; and it is collaborative, enabling researchers to work with external partners.

These needs drove \$3.73 billion in healthcare spending on cloud services last year and will push that number nearly threefold to \$9.5 billion by 2020. Cloud-based computing is on the rise in healthcare as physicians, hospital administrators, and patients demand cost efficiency, access to information, and security.

The Tipping Point is Here

Two years ago, healthcare professionals largely depended on cloud-based solutions for back-office needs, such as email and data storage, or supporting the secure exchange of patient information. A survey of 105 healthcare industry IT and leadership professionals this year shows the use case is expanding quickly.

For example, 59% of respondents said they're using or planning to use cloud solutions for big data analysis, as in the Mount Sinai case. Virtual care, or telemedicine, is expected to explode in the next few years as researchers note that 70% of routine doctor visits don't require face-to-face interaction. Virtual care will become commonplace, with 80 percent of patient interactions relying on the Internet of Things and big data — which both benefit from cloud computing solutions — to bolster patient care by 2021.

Meanwhile, 73% of industry professionals will use the cloud to host patient empowerment tools — another key driver toward the cloud. This means healthcare providers are increasingly using cloud-based applications to put resources into the hands of patients that will allow them to educate themselves, monitor their health, and store and share their health records.

SweetSpot Diabetes Care is doing just that with a cloud-based application that empowers diabetics to take greater control of their glucose data. The company's application takes data from a variety of web-enabled metering devices and lets patients analyze, store, and share their glucose data with healthcare professionals in a format that's easy to evaluate.

Why is the cloud so critical?

Of all their options, why are healthcare organizations choosing the cloud to address their needs? Cloud-based applications can easily scale up or down as demand changes; from a development perspective, they're flexible and accessible. They can be updated centrally and rolled out from their test environment easily. They can potentially perform better on cloud platforms dispersed around the country or the world, improving access.

That flexibility extends to include collaboration, creating increased opportunity. Big companies can partner with smaller innovators or third-party developers to execute business and customer engagement strategies in a secure, agile, and cost-efficient environment.

And, yes, it certainly comes down to cost in the end.

Today's healthcare IT professionals are under pressure to shift from capital-intensive technology investments to operational expenses that offer flexibility and center on their core business. Healthcare leaders want to funnel capital into cash flow-generating activities that allow them to deliver improved outcomes. Cloud computing lets healthcare organizations focus on healthcare rather than data centers, digital real estate to house them, and skilled professionals to maintain and operate them.

What about the future?

The explosion in the healthcare industry's reliance on cloud-based computing — coupled with the industry's need to be flexible, collaborative, and consumer-focused — means that healthcare will inevitably adopt new ways of utilizing the cloud. This leads to several predictions about emerging trends.

- More patient-clinician interaction: Look for more two-way communication between healthcare providers and patients as care is increasingly delivered through mobile devices, wearable technology, instant alerts, and digital healthcare reminders.
- Records in real-time: Connected devices will give both patients and healthcare professionals real-time access to health records, painting a more holistic picture of our health as it happens. The trend could also give us the benefit of information aggregated from a population level, exposing community and public healthcare issues more quickly.
- More ownership of our data: Expect developers to create tools to help individuals take more ownership of their health and connect their experiences with schools, government organizations, legislative bodies, and beyond. Think of it as a virtual health information exchange.

The cloud is a highly effective platform for healthcare organizations to leverage, made more relevant by the industry's evolution toward a consumer-driven approach to care and its need for greater collaboration to serve long-term growth.

Creating innovative, agile, and collaborative cloud environments for healthcare in which all players can participate helps to simplify, organize, and streamline its many moving parts. With cloud-based solutions, organizations can stop fretting over the small stuff and start focusing on improving the big picture for their patients.

CASE 19

AMAZON.COM

About Amazon.com

Amazon.com is the world's largest online retailer. In 2011, Amazon.com switched from tape backup to using Amazon Simple Storage Service (Amazon S3) for backing up the majority of its Oracle databases. This strategy reduces complexity and capital expenditures, provides faster backup and restore performance, eliminates tape capacity planning for backup and archive, and frees up administrative staff for higher-value operations. The company was able to replace their backup tape infrastructure with cloud-based Amazon S3 storage, eliminate backup software, and experienced a 12X performance improvement, reducing restore time from around 15 hours to 2.5 hours in select scenarios.

The Challenge

As Amazon.com grows larger, the sizes of their Oracle databases continue to grow, and so does the sheer number of databases they maintain. This has caused growing pains related to backing up legacy Oracle databases to tape and led to the consideration of alternate strategies including the use of Cloud services of Amazon Web Services (AWS), a subsidiary of Amazon.com. Some of the business challenges Amazon.com faced included:

- Utilization and capacity planning is complex, and time and capital expense budget are at a premium. Significant capital expenditures were required over the years for tape hardware, data center space for this hardware, and enterprise licensing fees for tape software. During that time,

managing tape infrastructure required highly skilled staff to spend time with setup, certification, and engineering archive planning instead of on higher-value projects. And at the end of every fiscal year, projecting future capacity requirements required time-consuming audits, forecasting, and budgeting.

- The cost of backup software required to support multiple tape devices sneaks up on you. Tape robots provide basic read/write capability, but to fully utilize them, you must invest in proprietary tape backup software. For Amazon.com, the cost of the software had been high and added significantly to overall backup costs. The cost of this software was an ongoing budgeting pain point, but one that was difficult to address as long as backups needed to be written to tape devices.
- Maintaining reliable backups and being fast and efficient when retrieving data requires a lot of time and effort with tape. When data needs to be durably stored on tape, multiple copies are required. When everything is working correctly, and there is minimal contention for tape resources, the tape robots and backup software can easily find the required data. However, if there is a hardware failure, human intervention is necessary to restore from tape. Contention for tape drives resulting from multiple users' tape requests slows down restore processes even more. This adds to the recovery time objective (RTO) and makes achieving it more challenging compared to backing up to Cloud storage.

Why Amazon Web Services

Amazon.com initiated the evaluation of Amazon S3 for economic and performance improvements related to data backup. As part of that evaluation, they considered the security, availability, and performance aspects of Amazon S3 backups. Amazon.com also executed a cost-benefit analysis to ensure that migration to Amazon S3 would be financially worthwhile. That cost-benefit analysis included the following elements:

- Performance advantage and cost competitiveness. The overall costs of the backups are needed not to increase. At the same time, Amazon.com required faster backup and recovery performance. The time and effort required for backup and recovery operations proved to be a significant improvement over the tape, with restoring from Amazon S3 running from two to twelve times faster than a similar restore from tape. Amazon.com required any new backup medium to provide improved performance while maintaining or reducing overall costs. Backing up to on-premises disk-based storage would have improved performance, but missed on cost competitiveness. Amazon S3 Cloud-based storage met both criteria.
- Greater durability and availability. Amazon S3 is designed to provide 99.99999999% durability and 99.99% availability of objects over a given year. Amazon.com compared these figures with those observed from their tape infrastructure and determined that Amazon S3 offered significant improvement.
- Less operational friction. Amazon.com DBAs had to evaluate whether Amazon S3 backups would be viable for their database backups. They determined that using Amazon S3 for backups was easy to implement because it worked seamlessly with Oracle RMAN.
- Strong data security. Amazon.com found that AWS met all of their requirements for physical security, security accreditations, and security processes, protecting data in flight, data at rest, and utilizing suitable encryption standards.

The Benefits

With the migration to Amazon S3 well along the way to completion, Amazon.com has realized several benefits, including:

- Elimination of complex and time-consuming tape capacity planning. Amazon.com is growing larger and more dynamic each year, both organically and as a result of acquisitions. AWS has enabled Amazon.com to keep pace with this rapid expansion and to do so seamlessly. Historically, Amazon.com business groups have had to write annual backup plans, quantifying the amount of tape storage that they plan to use for the year and the frequency with which they will use the tape resources. These plans are then used to charge each organization for their tape usage, spreading the

cost among many teams. With Amazon S3, teams simply pay for what they use and are billed for their usage as they go. There are virtually no upper limits as to how much data can be stored in Amazon S3, and so there are no worries about running out of resources. For teams adopting Amazon S3 backups, the need for formal planning has been all but eliminated.

Reduced capital expenditures. Amazon.com no longer needs to acquire tape robots, tape drives, tape inventory, data center space, networking gear, enterprise backup software, or predict future tape consumption. This eliminates the burden of budgeting for capital equipment well in advance as well as the capital expense.

Immediate availability of data for restoring - no need to locate or retrieve physical tapes. Whenever a DBA needs to restore data from tape, they face delays. The tape backup software needs to read the tape catalog to find the correct files to restore, locate the correct tape, mount the tape, and read the data from it. In almost all cases the data is spread across multiple tapes, resulting in further delays. This, combined with contention for tape drives resulting from multiple users' tape requests, slows the process down even more. This is especially severe during critical events such as a data center outage when many databases must be restored simultaneously and as soon as possible. None of these problems occur with Amazon S3. Data restores can begin immediately, with no waiting or tape queuing - and that means the database can be recovered much faster.

Backing up a database to Amazon S3 can be two to twelve times faster than with tape drives. As one example, in a benchmark test, a DBA was able to restore 3.8 terabytes in 2.5 hours over gigabit Ethernet. This amounts to 25 gigabytes per minute or 422MB per second. In addition, since Amazon.com uses RMAN data compression, the effective restore rate was 3.37 gigabytes per second. This 2.5 hour compares to, conservatively, 10-15 hours that would be required to restore from tape.

Easy implementation of Oracle RMAN backups to Amazon S3. The DBAs found it easy to start backing up their databases to Amazon S3. Directing Oracle RMAN backups to Amazon S3 requires only a configuration of the Oracle Secure Backup Cloud (SBC) module. The effort required to configure the Oracle SBC module amounted to an hour or less per database. After this one-time setup, the database backups were transparently redirected to Amazon S3.

Durable data storage is provided by Amazon S3, which is designed for 11 nines durability. On occasion, Amazon.com has experienced hardware failures with tape infrastructure - tapes that break, tape drives that fail, and robotic components that fail. Sometimes this happens when a DBA is trying to restore a database and dramatically increases the meantime to recover (MTTR). With the durability and availability of Amazon S3, these issues are no longer a concern.

Freeing up valuable human resources. With tape infrastructure, Amazon.com had to seek out engineers who were experienced with very large tape backup installations - a specialized, vendor-specific skill set that is difficult to find. They also needed to hire data center technicians and dedicate them to problem-solving and troubleshooting hardware issues - replacing drives, shuffling tapes around, shipping and tracking tapes, and so on. Amazon S3 allowed them to free up these specialists from day-to-day operations so that they can work on more valuable, business-critical engineering tasks.

Elimination of physical tape transport to an off-site location. Any company that has been storing Oracle backup data offsite should take a hard look at the costs involved in transporting, securing, and storing their tapes offsite - these costs can be reduced or possibly eliminated by storing the data in Amazon S3.

As the world's largest online retailer, Amazon.com continuously innovates to provide an improved customer experience and offer products at the lowest possible prices. One such innovation has been to replace the tape with Amazon S3 storage for database backups. This innovation can be easily replicated by other organizations that back up their Oracle databases to tape.

CASE 20**ANGRY BIRDS' SOARS ONLINE WITH GOOGLE APP ENGINE**

Rovio, the creator of the blockbuster "Angry Birds" game series, turned to Google App Engine when it came time to adapt its mobile apps for web browsers. The Finland-based company needed a platform that could support explosive demand and provide robust capabilities to deliver a superior user experience. Google App Engine provides both while requiring minimal maintenance, which gives the company's developers time to focus on improving the games.

Rovio knew that bringing its games online presented an enormous opportunity. In early 2011, a development team began planning a version of "Angry Birds" for Google Chrome. The company wanted to launch the game at Google's annual I/O conference that spring, just a few months away. The developers needed a platform that would scale effortlessly: The mobile app had already hit more than 140 million downloads, and the team expected demand for the free online version to be overwhelming. They also wanted a low-maintenance system that would make it easy to update features and bring new titles online.

The developers chose Google App Engine to build the game because they knew it would allow them to work quickly and provide the scalability needed to support an enormous user base. "Angry Birds Chrome" finished on schedule, followed by other titles such as "Angry Birds Google+" and "Angry Birds Friends." Rovio also created customized versions for companies, sports teams, and other partners.

"Google App Engine allows us to launch games very quickly with teams of one or two developers per game," says Stefan Hauk, Rovio's lead server developer for web games. "Because Google manages all the servers, there is little required of us in terms of maintenance." Hauk and his fellow developers use several App Engine features to improve the games, including:

- High-Replication Datastore for scalable, long-term storage of game data
- Memcache API to boost performance by providing temporary, high-speed data access through a high-performance memory cache
- Task queues to run certain complex operations in the background, improving game responsiveness for users
- Users API to authenticate users with their Google usernames and passwords, which provides a seamless experience when accessing a game

App Engine allows the developers to add new features easily and continuously improve the games for users. They can deploy new versions with a single command and switch back to the previous version if needed. They can also rely on App Engine to scale automatically to support heavy demand from the moment of the launch of the game.

"Because our web games are popular immediately, we don't have the option of scaling them over time," Hauk says. "Google App Engine makes the process painless since it can instantly launch as many servers as we need and scale back down when a game has passed its usage peak."

Millions of gamers have flocked to Rovio's web games since their launch. The company's most popular offering, the Facebook game "Angry Birds Friends," logs more than 13 million users every month. Since the developers don't need to install or maintain hardware, they can devote their attention to enhancing the games, which have received overwhelmingly positive reviews. "Google App Engine automates a lot of processes, which has made our jobs easier," Hauk says. "At other companies, I've been with, there was always a need to be on call after hours to deal with server problems. This isn't necessary here, because Google App Engine just works." The ability to build and deploy quickly has allowed Rovio to capitalize on expanding its audience and to act on business opportunities. "There have been times when we've been asked to build a customized game in a week or two," Hauk says. "We know that App Engine will enable us to do this and that it will scale for us no matter how many users we get."

SIGNIFICANT OUTAGES OF MICROSOFT AZURE

These are some of the significant outages that have occurred over the years:

- February 29, 2012. A disruption occurred as a result of the leap day bug.
- July 26, 2012. The West Europe region experienced an interruption that lasted for about two and a half hours.
- February 22, 2013. A major outage prevented customers across all regions from being able to access Windows Azure Storage Blobs, Tables, and Queues using HTTPS.
- October 30, 2013. Users across the United States, Europe, and Asia experienced an outage lasting for about eight hours. This outage was attributed to an issue with swapping virtual IP addresses.
- November 18, 2014. An outage lasting for nearly 10 hours caused storage connectivity issues.
- December 3, 2015. Many customers in Europe were unable to access Office 365 for approximately four hours.
- September 15, 2016. A DNS issue caused problems for Azure users around the world for several hours.
- March 15, 2017. An issue in one of Microsoft's data centers spread around the world and ultimately affected 26 of Microsoft's 28 datacenters, resulting in a worldwide outage that lasted for about 7 hours.
- September 29, 2017. A seven-hour outage occurred in northern Europe due to the accidental discharge of a fire suppression system.
- June 20, 2018. Customers in northern Europe experienced an outage lasting nearly 11 hours following a temperature issue at one of the data centers.
- September 4, 2018. Lightning strikes caused a voltage increase in a south-central United States data center, resulting in issues with the cooling system. Customers across 10 regions were ultimately affected because of service dependencies.
- May 2, 2019. A DNS outage caused several Azure services to become unavailable for nearly three hours.

5 SERIOUS CLOUD FAILURES & DISASTERS OF 2011

Five cloud computing outages in the year 2011 include reputed and popular names like Google, Amazon, and Microsoft.

5. Google Doc's September Disaster

Although Google Doc is a public cloud platform where users can upload, share, and access information, it still can face troubleshooting issues.

Example: A managed cloud provider that used Google Docs extensively. As Google Docs is known for its flexible public cloud architecture, most of the company's daily tasks were performed with the help of using Google Docs. Activities like arranging important events, conferences, sharing files and documents amongst team members or clients at the time employees are out of office, Google Docs helped out big time. However, there came a day when Google Docs suffered approximately an hour outage due to which work in terms of daily tasks came to a standstill. The word processor faced downtime at 10 pm in the UK. It also made US organizations suffer a lot from it as they could not access or share files with others. This proved to be a major setback for Managed Cloud Provider in terms of monetary losses the company suffered as well as its reputation in the market.

Solutions to this problem are that organizations should be always prepared for disaster recovery and keep their clients well informed about the possibilities of cloud downtime so that they can get away from the embarrassment at later stages.

4. Action Replay for Google Docs.

Yet another cloud outage erupted with a bang when Google Docs collapsed in the Google HQ. Although the problem that affected the San Francisco and Budapest regions of the US were instantly handled and rectified, there is no specific reason why such an outage happened for the second time.

3. Microsoft's Office 365 Cloud Disaster

In August and September, Microsoft launched its Office 365 cloud productivity suite, but just a few months after its launch, media broke the news of its collapse that shattered the hopes of Microsoft applications users. The company also experienced a global outage with DNS servers falling into the trash. With all these examples, it is proved that outages or technical faults like these are a common affair with even a flexible environment like cloud computing. The only thing organizations need to take care of is the fact keep working on improving and enhancing their in-house IT infrastructures.

2. Bad Weather Conditions Can Result in Cloud Disaster

According to the reports, Dublin invites several European and US countries to enter its territories for availing cloud services. Nevertheless, with all the facts in mind, the country's prevailing bad weather conditions are also not hidden. It all happened in August that both Microsoft and Amazon's cloud data centers had blown off by a thunder lightning strike. Both the cloud servers collapsed because of it, which led big and small organizations to suffer hugely. Servers did not give any access and remained non-functional for two consecutive days. Companies not only suffered monetary losses but also had a hard time recovering.

1. AMAZON ELASTIC CLOUD COMPUTE OUTAGE

Yet another cloud disaster occurred when Amazon EC2 or Elastic Cloud Compute hit the East coast of the US making big-time players like Reddit, Hootsuite, Quora, and Sqaurefoot suffer tremendously. To add more to its numbers, approximately 170 SMBs also suffered a major setback as they found it extremely tough to run their businesses during an 8-hour downtime that Amazon EC2 cloud showed to them. As per the reports, there were frequent and timely updates regarding the troubleshooting that erupted from Amazon, it put almost all the IT organizations running their businesses or daily tasks on that platform to a standstill. Thus, one thing or lesson organizations must take from this incidence is that always keep a backup plan for important clients to keep and maintain a healthy relationship with them.

CASE 23

5 CLOUD COMPUTING FAILURES THAT SHOCKED THE WORLD

«Even the most prominent cloud providers have had their bad days. From service disruptions that have lasted for hours to a loss of customer data, unexpected cloud disasters have hit the most popular of cloud vendors. Take Amazon Web Services (AWS), for instance. The market leader for the public cloud took a major blow a few days ago, causing embarrassment all around. The reasons have been myriad—from power outages to data centers going bust to human errors. They have left behind a bad aftertaste of utter disruption of personal and professional lives.

HERE'S HOW CLOUD COMPUTING MISFIRES IMPACTED THE WORLD IN RECENT TIMES:

- Salesforce goes down:** On May 9, 2016, the Silicon Valley NA14 instance of Salesforce.com went offline, resulting in an outage that lasted for more than 24 hours. Extensive business damage was inevitable, with customers losing hours and hours of data. Salesforce moved to Amazon Web Services for most of its workloads thereafter as a result.
- A bad Christmas for Netflix:** It was Christmas Eve in 2012, a time of cheer and uninterrupted entertainment that families looked forward to. However, AWS's Elastic Load Balancing service went awry, resulting in Netflix downtime. The aftermath was a whole bunch of disgruntled customers

who were depending on the streaming service for a good Christmas. As if this souring relationship between Netflix and AWS was not enough, two years later Netflix rebooted 218 of its production nodes during an AWS update, and 22 failed to reboot—an additional instance of differences between AWS and Netflix.

3. **Microsoft Azure goes bust:** On November 18, 2014, the Azure Storage Service was hit by a massive outage as a result of software updates for performance increases. A similar one followed in December 2015.
4. **Dyn sees a bad day:** On October 21, 2016, Dyn DNS underwent a series of Distributed Denial of Service (DDoS) attacks. Dozens of websites and their businesses were hit, such as those of Airbnb, Twitter, Amazon, Ancestry, Netflix, and PayPal. This alerted the world to the practical threat of large-scale Internet of Things (IoT) attacks.
5. **The Office 360 joke:** Now this is an ongoing discredit given to Microsoft's Office 365. On June 30, 2016, scores of Office 365 clients saw their email services going offline for more than 12 hours. In the past too, several similar instances followed throughout 2015 and continued through 2016. The standing joke persists that Office 365 is indeed Office 360, with an average downtime of five days off a year.

There are enough and more instances that indicate the widespread damage that faulty cloud computing mechanisms can cause. While some may be temporary, like email downtime, others are long-lasting and high impact. It is high time that IT experts decode how to fortify the cloud to make it as infallible as possible. Only then can one expect businesses to place their faith in the cloud.

CASE 24

THE 10 BIGGEST CLOUD OUTAGES OF 2020

Microsoft Azure, March 3

A six-hour outage, starting at 9:30 a.m. ET, struck the U.S. East data center for Microsoft's Azure cloud, limiting the availability of Azure cloud services for some North American customers. A few days later Microsoft disclosed that a cooling system failure was to blame. Malfunctioning building automation controls caused a reduction in airflow, and the subsequent temperature spikes throughout the data center hampered the performance of network devices, rendering compute and storage instances inaccessible. Microsoft ultimately reset the cooling system controllers, and once the temperature fell, engineers' power-cycled hardware to resume services.

Microsoft Azure, March 24-26

Microsoft confirmed a series of March outages impacting European customers were caused by strains placed on several cloud services by the COVID-19 pandemic. Developers were uniquely impacted, as the first casualty on March 24 was Azure Pipelines, a continuous delivery service used by DevOps teams. For the next few days, software development pipelines experienced significant delays. "This incident was caused by VM capacity constraints arising from the global health pandemic that led to increased machine reimaging times and then increased wait times for available agents," Microsoft later explained.

By the end of the week, Microsoft accepted blame for not promptly addressing the failure. "On the first day, when the impact was most severe, we did not acknowledge the incident for approximately five hours, which is substantially worse than our target of 10 minutes," Engineering Director Chad Kimes said.

Google Cloud Platform, March 26

Google users started reporting problems accessing several cloud services on March 26. Many tweeted they encountered Google's 500 and 502 error codes—the 500 code relates to requests that fail due to an internal error; the 502 code denotes a bad gateway error. Google ultimately described the outage as having to do with its "infrastructure components."

GitHub, April 21

GitHub, the source code repository owned by Microsoft, saw multiple outages near the end of April. GitHub services first struggled for more than an hour on April 21. The next day, there were two

back-to-back outages again stalling the work of developers who rely on the platform, and then another affecting multiple GitHub services for more than an hour the following day as well. Git Operations, API requests, pull requests and other functionalities that software engineers rely on as part of their day-to-day work were degraded. Developers went to Twitter to criticize Microsoft for a lack of transparency as the rolling outages continued through the week.

IBM Cloud, June 9

IBM blamed a third-party networking failure for a serious cloud outage that brought many Big Blue customers, including some popular websites, to a sudden halt. Customers across the U.S. lost access to their environments, their status screens, and consoles, and they had "no sense of what was happening." It affected everything and the whole environment was down."The IBM Cloud status page, which also was briefly down during the disruption, reported a slew of issues that were resolved."The network operations team adjusted routing policies to fix an issue introduced by a 3rd party provider and this resolved the incident," the IBM status page explained.

Cloudflare, July 17

A Cloudflare outage caused by a malfunctioning router on the CDN provider's global backbone network brought down a slew of web services across many parts of the world. Cloudflare quickly rerouted operations from a dozen data centers to get affected customers back online as complaints flooded Twitter. The outage appears to have lasted less than a half-hour. Cloudflare later posted on its status page: "This afternoon we saw an outage across some parts of our network. It was not a result of an attack. It appears a router on our global backbone announced bad routes and caused some portions of the network to not be available. We believe we have addressed the root cause and are monitoring systems for stability now."

Salesforce, Aug. 11

After hiccups in mitigating a virtual server problem, Salesforce resolved a disruption that took some customers offline for almost four hours. The service disruption affected users hosted on Salesforce's NA89 instance. The instance—one of nearly 200 for North America—runs in data centers in Phoenix and Washington, D.C., with transactions replicated across those locations for redundancy. Salesforce reported: "We have identified a potential cause of the Live Agent issue and are urgently working on implementing a fix to resolve the impact to customers." The outage lasted for three-hour, and 43-minute.

Zoom, Aug. 24

Zoom experienced a partial outage on the morning of Aug. 24 that prevented users from accessing their meetings and video webinars. The San Jose, Calif.-based company, whose cloud-based online videoconferencing platform has become a linchpin during the new work-from-home era forced by the coronavirus pandemic. Zoom acknowledged that it was receiving reports of users being unable to visit the Zoom website (Zoom.us) and unable to start and join Zoom Meetings and Webinars. An hour later, Zoom said it had identified the issue and was working to resolve it. The company also had to mitigate problems with the web portal and web client for its website.

Other Zoom capabilities, including Zoom Phone, Chat, a conference room connector, cloud recording, meeting telephony services, and the Zoom developer platform remained operational throughout the incident.

Microsoft 365 and Azure, Sept. 28

A problem with Azure Active Directory locked users from across the U.S. out of their Microsoft Office 365 accounts, halting many businesses in their tracks that afternoon. The five-hour outage impacted Microsoft 365 and some Azure Cloud services. On its status page, Microsoft said customers encountered errors attempting to authenticate logins to Microsoft 365, Azure, Dynamics 365, and custom applications using its Azure Active Directory single sign-on service. Only users not already signed in saw those authentication request failures.

Microsoft's preliminary analysis found "a combination of three separate and unrelated issues" behind the problem: a code defect in a service update; a tooling error in the Azure AD safe deployment system that impacted regional scoping; and a code defect in Azure AD's rollback mechanism, which delayed an attempt to revert the service update.

The outage mostly affected customers in the Americas because the problem was "exacerbated by load," Microsoft said, although other regions may have also seen disruptions.

Microsoft Office 365, Oct. 7

Microsoft Teams, Outlook, SharePoint Online, OneDrive for Business, and Outlook.com all saw degraded functionality after Microsoft attempted to update its network infrastructure on Oct. 7. The Microsoft 365 Status account on Twitter acknowledged the outage. Microsoft later said on its status page: "Further investigation has confirmed that a recent update to network infrastructure resulted in impact to Microsoft 365 services. Our telemetry indicates continued recovery within the environment following the reversion of the update." Microsoft Teams was among the first services to fully recover, while Exchange Online and Outlook.com took longer.

CASE 25

GLOBAL HOSTING OUTAGE CRASHES UK GOVT WEBSITE AND MEDIA SITES & APPS LIKE FT, NYT, GUARDIAN

Several major websites across the world, including the UK government's Gov.uk website, crashed for some time on Tuesday due to an outage at global website hosting service Fastly. The affected sites, which included media organizations Financial Times' and Guardian' among others, displayed a message saying "503 Service Unavailable".

San Francisco-based Fastly, a global online content delivery network (CDN), reported an outage across its network affecting the sites which use its platform. The firm said there were issues with its global content delivery network (CDN) and was implementing a fix.

In a statement, Fastly said: "We identified a service configuration that triggered disruption across our POPs (points of presence) globally and have disabled that configuration. Our global network is coming back online."

Fastly runs what is known as an "edge cloud", which is designed to speed up loading times for websites, as well as protect them from denial-of-service attacks and help them when traffic is peaking.

According to the BBC, the outage-related problems seem localized, affecting specific locations across Europe and the US.

Media websites like CNN and the New York Times were also hit.

Fastly supports news sites and apps like CNN, the Guardian, the New York Times, and many others. It also provides content delivery for Twitch, Pinterest, HBO Max, Hulu, Reddit, Spotify, and other services.

CASE 26

MICROSOFT IS CLOSING THE GAP WITH AMAZON'S CLOUD WHILE GOOGLE CLOUD IS GROWING FASTEST AMONG LARGE COMPANIES

While cloud adoption is growing across the board, Microsoft is increasingly closing the gap with Amazon Web Services, according to a recently published survey of 750 professionals, while Google Cloud is seeing the fastest growth among large businesses.

The report, which IT management firm Flexera conducts annually, surveyed cloud decision-makers from organizations with 100 to over 10,000 employees between October and November 2020.

Amazon Web Services and Microsoft are competing for toe-to-toe, with 76% of respondents saying they use AWS and 73% of respondents using Microsoft. Google Cloud took third place at 47%, while Oracle's cloud took fourth place at 29%. (Percentages add up to much greater than 100% because many respondents use multiple clouds.)

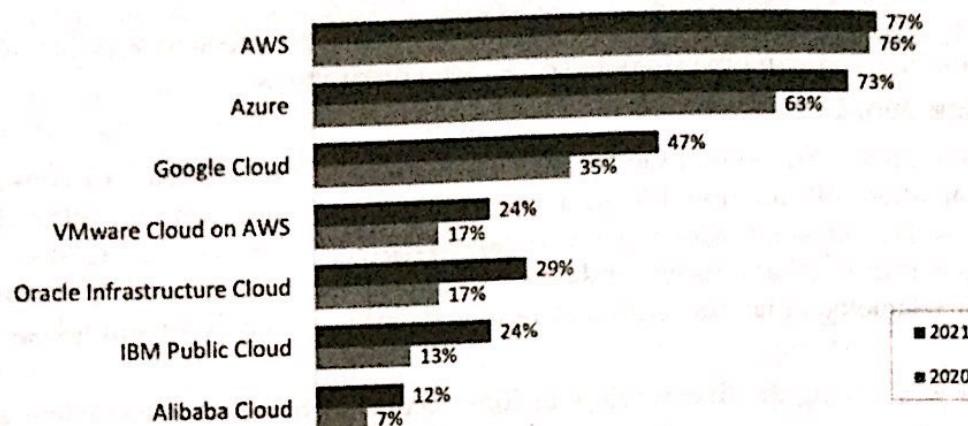


Figure: Public Cloud Adoption (% of all respondents)

Google Cloud – which has invested heavily in hybrid cloud and building a bigger salesforce – saw especially high growth among enterprises, defined as companies with 1,000 or more workers. Nearly half (49%) of enterprise respondents said they use Google Cloud, up 15% from the previous report. In comparison, Azure usage grew to 76% this year from 69% last year, and AWS usage grew to 79% from 76% last year.

The gap between AWS and Azure is bigger when respondents were asked specifically about significant workloads: Half of the enterprise respondents said they run significant workloads on AWS, while 44% of respondents said they run them on Microsoft. In comparison, 23% of enterprise respondents said they run significant workloads on Google Cloud.

AWS dominates for small and medium-sized businesses with less than 1,000 employees: 53% of respondents from those businesses say they run significant workloads on AWS, compared to 22% on Azure and 20% on Google Cloud. A recent survey by Bank of America similarly found small businesses using AWS most frequently, which it attributed "perhaps due to how accessible/easy it is to spin up an AWS instance using just a credit card."

Overall, half of all respondents from all company sizes run significant workloads on AWS, compared to 41% on Azure and 22% on Google Cloud.

That lines up, directionally, with Gartner's most recent report on cloud giant market share, which showed that AWS held 45% of the market, compared to 17.9% for Microsoft, and 5.3% for Google Cloud.

CASE 27

AXIATA DOUBLES DOWN ON GOOGLE CLOUD

Regional telecoms group Axiata will be expanding its use of Google Cloud services across the six telco brands under its fold in South and Southeast Asia.

The telcos, including Dialog in Sri Lanka, Celcom in Malaysia, XL Axiata in Indonesia, Robi in Bangladesh, Ncell in Nepal, and Smart in Cambodia, will start using Google Cloud's compute, storage, and networking services to modernize their infrastructure.

The move follows XL Axiata's adoption of Anthos in 2020 to power its hybrid and multi-cloud computing needs. With a target to move 70% of its workloads to the cloud within three years, the Indonesian telco is looking to automate, manage and scale workloads across its hybrid- and multi-cloud environments. In Malaysia, Celcom is already using Google Cloud to power its payment gateway and advance its digital customer journey. It also plans to use the cloud supplier's artificial intelligence tools to build personalization and recommendation models to enhance customer experience.

By the end of this year, the six telcos, which have a total subscriber base of over 157 million, will also offer Google Workspace as part of their integrated ICT portfolio and services to small and medium-sized enterprises (SMEs).

"Axiata and Google Cloud have a shared vision of helping businesses digitize and grow as they build greater resilience for the long haul," said Gopi Kurup, CEO of Axiata's enterprise business. "With nations increasingly stepping up on digitalization for economic recovery and growth, we stand at a critical

juncture to support businesses, especially small and medium players in their efforts to adjust and adapt to new digital norms for survival.

"The power of Google Cloud's advanced technologies combined with Axiata's market intelligence enables companies to access advanced tools to boost their collaboration and productivity and generate data-based insights to strengthen their evolving customer engagement strategies," he added.

Ruma Balasubramanian, managing director of Google Cloud in Southeast Asia, said to resource-strapped SMEs, cloud technology is a game-changer that will help them compete with larger players in the market. In the enterprise space, Google Cloud also counts some of the largest conglomerates, including Indonesia's Salim Group, as clients as it ramps up its business across the region.

"We're seeing lots of demand in the traditional enterprise and a year ago that may not have been true," Balasubramanian told Computer Weekly earlier this year. "The pandemic has created a sense of urgency." Balasubramanian, a former Cisco executive who took up the region's top job in December 2020, said retailers, for example, are doing "interesting things around sales events and gamification" while building their digital front door on the cloud.

Such initiatives were more of nice-to-have a year ago but have taken off in the past six to 12 months, she said. "They've just had a lot more momentum in terms of shifting to the cloud."

FAMOUS SAYINGS ON CLOUD COMPUTING THAT SAY IT ALL

"I don't need a hard disk in my computer if I can get to the server faster... carrying around these non-connected computers is byzantine by comparison."  Steve Jobs, Co-founder, Apple Inc.

If you look back over the history of computing, it started as mainframes or terminals. As PCs or workstations became prevalent, computing moved to the edge, and we had applications that took advantage of edge computing and the CPU and processing power at the edge. Cloud computing brought things back to the center.

 Peter Levine, Venture Capital Investor

"If someone asks me what cloud computing is, I try not to get bogged down with definitions. I tell them that, simply put, cloud computing is a better way to run your business."

 Marc Benioff, Founder, Salesforce

"Line-of-business leaders everywhere are bypassing IT departments to get applications from the cloud and paying for them like they would a magazine subscription."

 Daryl Plummer, Managing VP, Gartner

"Cloud computing is empowering, as anyone in any part of the world with internet connection and a credit card can run and manage applications in the state of the art global datacenters; companies leveraging cloud will be able to innovate cheaper and faster."

 Jamal Mazhar, Head of the infrastructure at Sprinklr

"The interesting thing about cloud computing is that we've redefined cloud computing to include everything that we already do. I can't think of anything that isn't cloud computing with all of these announcements. The computer industry is the only industry that is more fashion-driven than women's fashion. Maybe I'm an idiot, but I have no idea what anyone is talking about. What is it? It's complete gibberish. It's insane. When is this idiocy going to stop?"

 Larry Ellison, Chairman, Oracle

"Cloud computing is the third wave of the digital revolution."  Lowell McAdam, CEO of Verizon
"We're entering a new world in which data may be more important than software."

 Tim O'Reilly, founder of O'Reilly

The cloud has become the next-generation supercomputer, and the smartphone has provided the revolution to spur its use.  Jerry Yang, Founder of Yahoo!

"Today, computing mainly automates things for you, but when we connect all these things, you can truly start assisting people in a more meaningful way. If I go and pick up my kids, it would be good for my car to be aware that my kids have entered the car and change the music to something appropriate for them."

 Sundar Pichai, CEO of Google

"Cloud computing is a great euphemism for centralization of computer services under one server."

 Evgeny Morozov, Author and Technology Skeptic

Cloud is about how you do computing, not where you do computing."  Paul Maritz, CEO of VMware