



What drives cloud adoption? Whether you're ensuring business continuity for work-from-home employees, wanting more application uptime and scalability, or looking to create a competitive advantage with modernization initiatives, cloud has the power to accelerate your business strategy with greater innovation, productivity and team effectiveness. These benefits can yield even more growth by speeding the introduction of new services to market, improving customer satisfaction and increasing revenue.

Amazon Web Services (AWS), an industry leader in cloud infrastructure, offers a clear path to those benefits and more through cloud migration. Read on as we share seven compelling advantages of modernizing with AWS, complete with examples of how we've helped our clients benefit from their AWS initiatives.

1. Highly available

In an IDC survey of North American enterprises, organizations reported an average of 67 hours per year of unplanned downtime across hyperconverged systems, the majority of which were a result of human error.¹ Cloud computing prevents unnecessary system outages and related business costs through its core pillar of continuous system availability. Designed and built with system redundancy across tiers, AWS achieves highly available systems with multiple facilities connected through low-latency high-bandwidth links within availability zones that are geographically dispersed. This approach protects against natural disasters while providing immediate failover that ensures the reliable uptime of your systems to customers, partners and employees, regardless of where they are in the world.

In addition, AWS services are built with fault tolerance in mind to ensure the ongoing availability of critical services — like Amazon Simple Storage Service (S3) and Elastic Load Balancing — that help distribute application traffic, routing users to healthy instances to ensure availability.

HomeAway, which connects consumers with the perfect vacation rental, wanted to help ensure families that Santa will still be able to find them if they aren't home on Christmas. The answer: RerouteSanta.com, a website parents could use to alert Santa of their child's location on Christmas. To help the company launch RerouteSanta, we created a fast — loading at sub 1 second — scalable and global solution that was highly available. If a single instance went down, the website would stay up, with an AWS autoscaling architecture that met demand across eight different markets and seven different languages.

Although high availability was important for HomeAway to meet its booking goals and grow customer satisfaction, it can also serve a more demanding use case. Take, for example, the emergency communications provider we worked with to meet its service-level agreement (SLA) goals. We built a high-availability solution where we containerized the company's communications applications and created consistent images for all environments, giving the provider the ability to deploy, update, orchestrate and scale its applications reliably. We also created an application-aware custom load balancer layer for additional depth of availability, ensuring first responders arrive to the scene as quickly as possible.

2. Scalable

Closely aligned to availability is scalability. Say goodbye to the costs associated with provisioning for worst-case spikes in demand or under-provisioning and upsetting customers. With AWS's unlimited on-demand compute, you can easily balance supply and demand, paying only for what you use. By scaling to meet variable demand needs instead of designing for maximum capacity, AWS allows you to address spikes in demand at optimal cost.

In addition to on-demand compute, proactive organizations can build in scalability with AWS autoscaling. When a resource need arises, automation resolves the issue. Even for systems not horizontally scaling, such as databases, several scalability techniques can be employed.

Caching is another technique you can use to achieve a scalable strategy. It takes advantage of a content delivery network (CDN) like Amazon CloudFront, which caches requests, so when a similar request comes in, it can be resolved without touching a server. This makes caching very efficient and highly scalable, improving the customer experience. In addition, caching can be used between an application and a database, decreasing the number of requests to the database, making for a much more efficient, scalable solution because you can serve more users from any size database.

Rent-A-Center (RAC) "...wanted a complete, 360 view of the customer and also wanted to be able to enable some self-service capabilities and for customers to be able to rent online for the first time," according to Hemanth Jayaraman, RAC's DevOps director at AWS re:Invent.² RAC selected SAP Hybris as its platform of choice to achieve these goals. Although SAP Hybris is a stateful application that can't autoscale, we worked with the RAC team to make it stateless to achieve the full power of AWS autoscaling features. As a result, RAC's ecommerce system served a 42% increase in traffic, with more than 9 million hits, over Black Friday without missing a beat.³

3. Agile and flexible

By shifting to the cloud, enterprises can provision new servers in minutes, which means greater agility and flexibility. When coupled with cloud-native technologies and frameworks like Infrastructure as Code and AWS Serverless Application Model (SAM), it becomes even easier to deploy infrastructure and applications in AWS. This allows you to treat servers as replaceable components that create space for rapid experimentation and greater innovation. Amazon even extends this agility and flexibility to hybrid cloud models with AWS Outposts for workloads that must remain onsite. It's this extreme flexibility that allows you to tailor cloud services to your technology and process needs. And it helps achieve business goals through the creative application of automation.

In a video series named "This Is My Architecture," AWS features customers with innovative solutions tailored to meet unique use cases. A recent installment highlighted our work with Toyota Research Institute (TRI). The episode shows how two technologies – Amazon Elastic Compute Cloud (EC3) P3 GPU instances and AWS Service Catalog – enable TRI data scientists to quickly progress their research in support of Toyota's autonomous vehicle efforts. TRI combines Python scripts, AWS Service Catalog, Amazon S3 buckets, Amazon FSx for Lustre, GPU clusters and machine learning models in a solution where scientists can deploy AWS Service Catalog products that are available to them on-demand. The products automatically trigger P3 compute clusters that process TRI machine learning data sets. AWS flexibility enables TRI to speed experimentation and innovation, creating market-ready solutions faster⁴

4. Secure



In what AWS calls the Shared Responsibility Model, AWS assumes responsibility for security “of” the cloud, protecting everything from the host OS and virtualization layer down. Customers are responsible for security “in” the cloud, meaning the guest operating system (OS) up, including the firewall. However, AWS’s advanced flexibility and configurability mean that hundreds of decisions must still be made to create a secure, extendable cloud foundation. If you’re new to AWS, this extreme customizability can result in lengthy analysis as you learn about the system to avoid making poor design choices.

To help you avoid missteps that can lead to security risk, unscalable systems and inefficiencies that slow cloud migration, NTT DATA can help you build a cloud foundation to make the right decisions faster, speeding the architectural design and build processes.⁵ AWS landing zones help you achieve automation that reduce human errors and ensure consistent, secure account creation and operation while providing security best practices built into a foundational architecture that speeds the deployment of high-value applications.

To ensure consistency and repeatability, several AWS services can establish a safe foundation for workloads before an application is even deployed. Services, such as AWS Control Tower, AWS Organizations, AWS Identity and Access Management (IAM), AWS Single Sign-On (SSO), AWS CloudTrail, AWS Security Hub, AWS Config and Amazon GuardDuty, when paired with a sound architectural design, create a secure starting point. And while these services aren’t automatically enabled, working with a provider like NTT DATA helps you ensure all AWS services are deployed with best practices.

Once you have a secure cloud foundation, you can begin to take advantage of other cloud security features, such as immutable infrastructure, automatic remediation of unauthorized or unexpected changes, data encryption, secret management, security monitoring and much more.

A global broadband services company with managed WiFi hotspots around the world sought to build an environment for its customer payment processing application. Working together, we built a fast and robust environment with automated security. Because consistency of service is integral to business success, a fast, elastic environment that was able to scale when needed was a critical requirement. The company achieved this flexibility and passed its Level 1 PCI DSS audit by an independent qualified security assessor, simultaneously realizing effective operations, solid security and PCI compliance. In fact, the assessor who audited the systems was very impressed with how well the environment was described, remarking that everything he wanted was in the code. As a result, this audit was the fastest and least painful the organization had gone through.

5. Cost efficient

Moving to the cloud gives you greater control, including greater cost control. Because you're moving from capital expenditure to operational expense, you can adjust based on business demand and cost management initiatives. Although paying for what you use is a powerful value proposition, AWS helps you take this one step further by integrating cloud cost optimization as a pillar in its Well-Architected Framework. With the help of AWS tools like the free AWS Cost Explorer, you can quickly get an understanding of your cloud spend and how to optimize it.

AWS also provides various ways to manage those costs. For example, Amazon EC2 Spot Instances, Amazon EC2 Reserved Instances and AWS Savings Plans all help map your resource needs to the right-size instances. When it comes to optimizing costs, many things working in tandem can add up to hundreds of thousands in savings.

An S&P 500 research and advisory company sought to maintain its market leadership position and gain the advantages of a highly available high-uptime service running on AWS.⁶ With over 400 applications to replatform or refactor, we helped our client identify more than 200 applications as systems of innovation and differentiation, and subsequently migrated these apps to the cloud. Following its migration, the company adopted a new AWS resource tagging and enforcement regime that, along with other cost management techniques, saved the company \$250,000 a quarter.

6. Standardized

AWS offers purpose-built tools that improve standardization efforts. By architecting for AWS, you can ensure optimal results from your infrastructure and applications. The level of standardization increases efficiency and productivity because servers can be easily replaced, unlike unique servers that require special care and attention to keep up and running. This gives teams more time to spend on innovation and other strategic initiatives.

Standardization also increases efficiency and productivity, as teams will switch between different contexts less often. Tribal knowledge becomes less

important, because teams no longer rely on one person to understand the quirks of the different systems, allowing expertise to grow across the team.

Hardening systems with operational and security best practices builds consistent standards, making it easier and more efficient to manage risk and overall system efficacy. By adopting standard migration patterns enabled by tools like AWS CloudFormation, Ansible and Jenkins, teams can help ensure a standard cloud adoption process. Adhering to such standards speeds time to migration and time to market. The time saved can be spent replatforming or refactoring certain applications to the cloud, further accelerating cloud-native benefits.

We helped a broadband company migrate to AWS, building a framework and patterns that included golden AWS Amazon Machine Images (AMIs) – a template EC2 machine image that contains a preconfigured OS and well-defined stack of server software fully configured to run an application – with standard Ansible playbooks applied on top. Codifying golden AWS AMIs as best practices helped this firm build stable applications, speed deployment and grow security. The solution enables Development teams to leverage self-service options to deploy Amazon Elastic Container Service (ECS) clusters. Using AWS Config Rules and CIS hardening practices, it also builds confidence in the Operations and InfoSec teams, knowing that the developers' on-demand clusters are built with compliance and corporate security policy.



7. Innovative

Many organizations are being asked to do more with the same — or fewer — resources. AWS cloud-native technologies and processes can help address this challenge in a few important ways. First, with managed services, IT can leave much of the underlying management tasks to AWS and focus more time and resources on strategic tasks. Second, automation helps make IT processes faster and more reliable and frees them from manual intervention.

Infrastructure as Code (IaC) can be a boon to streamlining the process of provisioning and managing infrastructure. Managing systems with IaC increases consistency and repeatability while greatly reducing human error, and downtime due to problem resolution. IaC allows quick, easy and safe IT change management through templates that reduce manual involvement and ensure uniformity across corporate policies. For example, AWS CloudFormation uses templates that allow users to easily define, provision, manage and deploy resources on AWS. Users can even refine and test a stack of resources and then reuse that stack across the entire enterprise.

Continuous integration and continuous delivery (CI/CD) of code enables the easy, efficient delivery of quality software with orchestrated pipelines that streamline automated processes. Take, for example, a process that moves a piece of code from a developer's laptop to production. Taking it one step further, when paired with IaC and server configuration as code, enterprises can build CI/CD of code, server configuration and infrastructure. CI/CD of code helps optimize developer resources, allowing developers to autonomously try new ideas, which in turn accelerate innovation. At the same time, it promotes software quality by reducing the cost of failure, decreasing iteration time and improving continuity. AWS offers services to support CI/CD with AWS CodePipeline for CI/CD orchestration, AWS CodeCommit for source and version control, AWS CodeBuild for continuous integration of compiled source code and AWS CodeDeploy for automated software deployment.

Containerization enables microservices that improve employee utilization because small teams can work on their service independent of other teams, eliminating bottlenecks. Microservices speed releases because teams focus on delivery rather than coordination. They

also reduce risk, as microservices developers need only understand the simple code base of the service they work on. And, if an error is introduced into the code, it would only affect the service itself, which could easily be rolled back, leading to greater system stability and less risk. AWS continues to innovate in the area of containers with technologies like AWS Fargate, its serverless compute engine for containers, and Amazon Elastic Kubernetes Service (Amazon EKS).

A large wholesaler sought to increase uptime, scalability and security for its ecommerce applications by re-architecting them for AWS. Because these apps account for billions of dollars in revenue each year and any downtime is estimated to cost six times the industry average, this firm couldn't withstand the financial or reputational impact of a downtime event. We built a common DevOps platform for the company's ecommerce applications, migrating the underlying technology to a common stack consisting of Amazon ECS, AWS CloudFormation and open-source GoCD. We also built a CI/CD platform using AWS DevOps best practices, effectively reducing manual tasks and thereby increasing the team's ability to focus on strategic work. Part of doing so included migrating the re-architected applications to new AWS accounts using the new CI/CD platform, automating remediation, creating AWS IAM resources as IaC and delivering the new applications in a Docker container-based microservices environment. As a result, the team is happy to report that it's meeting its zero downtime SLA objectives, enabling continuous system availability and enhanced employee productivity.

NTT DATA Deploy Containers for AWS

Based on automation and deployment best practices from hundreds of client implementations, Deploy Containers for AWS speeds the deployment of containerized applications from months to as little as a week.⁷ By giving teams a sound foundation from which to start with a ready-to-use reference architecture, we've been able to shrink developer time spent on infrastructure setup and configuration as well as expedite the decision-making process while enabling efficient developer workflows with short feedback loops when developing application code.

Conclusion

AWS keeps innovating, which means new technologies and services are regularly available. Whether your evolving needs will rely more on expanding internet of things initiatives, optimizing high performance computing workloads for machine learning or something else, AWS is continuously creating new services to further your technology, process and business goals.



A skilled partner

Enterprises ready to migrate to AWS infrastructure face hundreds of critical questions. We can help increase the success and speed of your AWS migration with our certified AWS consulting team. Having migrated hundreds of workloads to AWS, we empower enterprises to migrate by providing infrastructure, automation and ongoing support through all project phases.

We specialize in cloud-native technology. Our award-winning services deliver best practices templates and build automation to migrate, manage and extend infrastructure for ongoing success. From planning to migration, and modernization to ongoing operations, we help grow your teams' skills and business confidence as you achieve a best-practice AWS architecture built to meet workload migration goals.

Our AWS experts can help you:

- **Tailor a migration approach.** Although there are many approaches to AWS migration, an experienced guide can help you create a strategy to achieve your goals. For example, we had the opportunity to work with an enterprise media group on its IT modernization project via AWS cloud migration. We began the project with a thorough assessment, which flagged 400 applications for cloud replatforming.

First, we designed a platform for innovation, starting with an AWS landing zone. Next, we separated the 400 apps into two groups, one consisting of external apps that drive profit for the company and the second consisting of internal, non-revenue generating apps. We developed two patterns (one for each group) to effectively manage the AWS cloud migration. The patterns gave the company's developers an agile, self-service workflow for migrating its applications to the cloud.

- **Pick a bright spot.** For organizations unsure of where to begin, an experienced consultant can help. Don't take on more than you can accomplish. Instead, start by identifying a bright spot. Taken from Dan and Chip Heath's book, a bright spot in this context is a project that can result in a quick win, illustrating the business value of your use case in the cloud.⁸ The idea behind a bright spot is not perfection, but rather good enough to prove applicability and success. To help you identify a bright spot, we ask, "What is the problem and what are you trying to achieve?" A bright spot project at Vision Graphics recently resulted in the company winning significant new business that created an ROI to fuel further cloud innovation.⁹

Successfully migrating to the cloud requires organizational focus and expertise. From discovery and planning to design and execution, it's important to build in security and operational best practices that set the stage for long-term success. With modernization as a linchpin to drive innovation and competitive advantage, leaders turn to our AWS migration experts, who deliver a strategic approach to cloud migration. We partner with you to help create AWS migration plans that meet your specific business needs. Achieve your governance, compliance and security requirements with our DevOps automation and AWS cloud-native services that help you speed the migration process.

Visit nttdataservices.com/cloud to reach our experts.

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