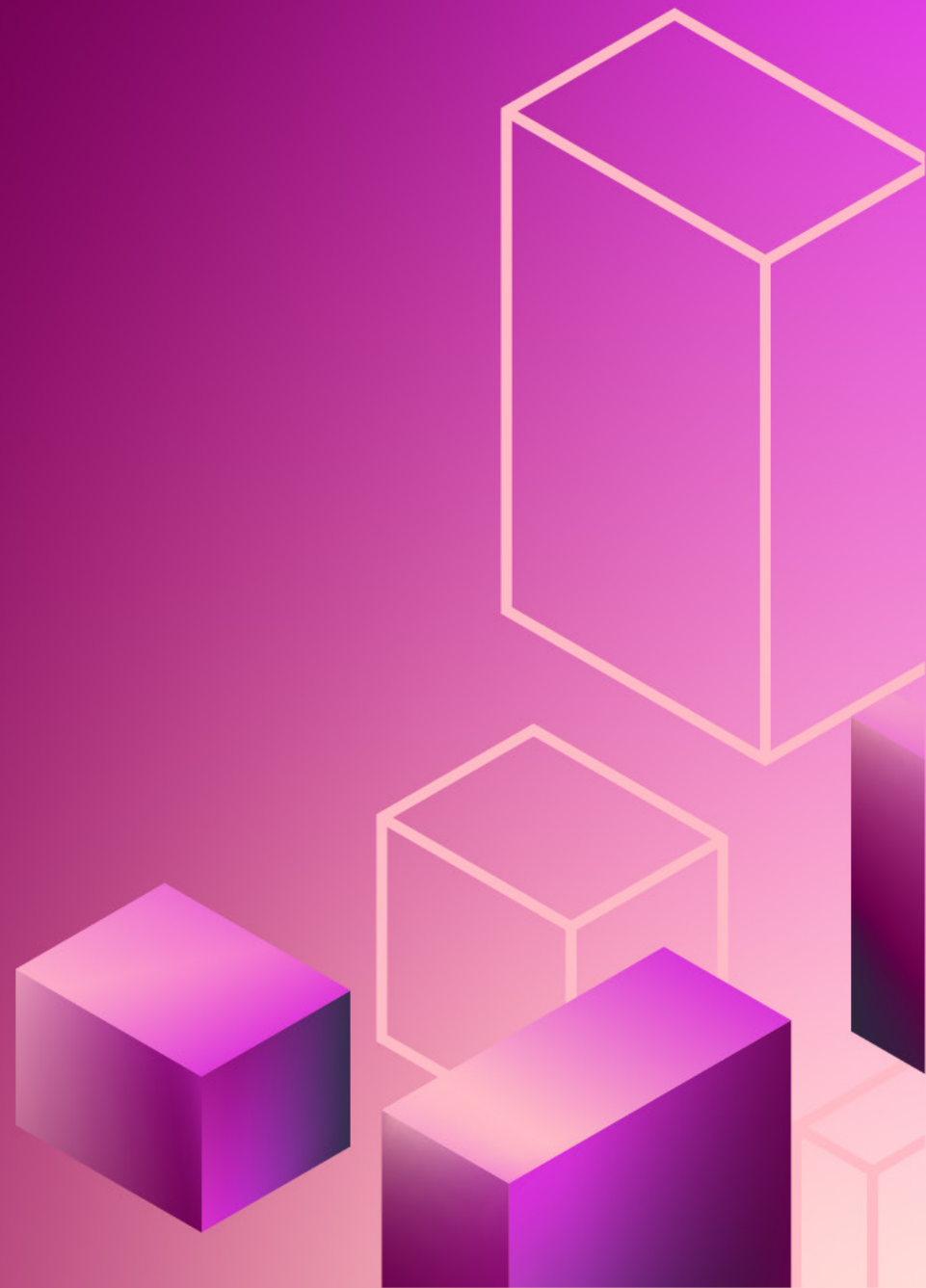
Unlock digital transformation by modernizing with containers



Driving agility with containers

As organizations look to accelerate their pace of innovation, they are increasingly modernizing their digital backbone of applications and development practices. Building a modern application means building with the latest technologies and development techniques that support greater agility and improved performance, security, and reliability while lowering the total cost of ownership (TCO). Today, many modern applications are built and deployed as a collection of modular services running on managed container orchestrators and serverless compute technologies that support agility and reduce operational overhead. By modernizing with containers, organizations can deliver better services to customers and keep pace in a competitive landscape. This eBook will discuss containerization and how container services on Amazon Web Services (AWS) can help organizations wherever they are on their modernization journey.

Meet growing demands with application modernization on AWS

Digital transformation empowers companies of all sizes to find new ways to leverage technology to boost their agility and better respond to evolving customer needs. Businesses continue to face customer expectations to deliver services swiftly and efficiently. For many companies, an initial step toward digital transformation is modernizing their applications and taking advantage of the managed services, scale, and automation offered by the cloud.

A common approach to modernizing applications is container-based deployment. Containers in the cloud, on premises, or in a hybrid environment are a powerful way for developers to package and deploy their applications. Whether an organization is new to containers or seeks to improve its existing container strategy, AWS provides choices to help reduce operational efforts and achieve performance excellence, all while delivering cost benefits.

The benefits of containerization with AWS

Modernizing applications with containers on AWS empowers organizations with scalability, security, agility, availability, and overall better cost performance.

Scalability: Containers on AWS deliver efficient scaling

AWS container services simplify the scaling of your containerized applications. AWS offers serverless orchestration and compute options that take care of all the scaling and infrastructure management required to run containers across flexible compute options and automatic integrations with other supporting AWS services. You can describe your application and the resources required, and the services can automatically scale your application across multiple **AWS Availability Zones** based on changing demands. They can also adjust scaling based on set policies with the performance, reliability, and availability of AWS.

Security: AWS infrastructure and container services elevate security

Containerized applications inherently improve security because they can run as isolated processes and operate independently of other containers. To ensure strong security isolation between containers, AWS provides the latest security updates and lets users set granular access permissions for every container. AWS offers over 210 security, compliance, and governance services, as well as key features to best suit organizational needs.

Agility: Containers on AWS streamline development

AWS has solutions that help remove the undifferentiated heavy lifting of infrastructure management from development teams. Before containers, IT teams had to consider the compatibility restrictions of each new environment and write additional code to ensure that the application would function. Containers now package the application with its dependencies, configuration files, and interfaces, allowing developers to use a single image that moves seamlessly between hosts.

Availability: AWS high availability improves experiences and minimizes latency

It is critically important that service remains available even in the event of partial failures. AWS container orchestration in the cloud runs on the best global infrastructure and across all **AWS Availability Zones**. AWS delivers the highest network availability of any cloud provider. Each region is fully isolated and comprised of multiple Availability Zones, which are fully isolated partitions of our infrastructure. Services that require high availability need some amount of redundancy, as well as headroom to absorb burst. Our distributed approach helps improve availability, reduce costs, and avoid unexpected outcomes that can result from undesirable infrastructure configurations.

Cost performance: Improve efficiency and optimize cloud spend on AWS

Building modern, scalable container applications on AWS delivers exceptional cost-efficiency. That's because AWS services provide the tools and techniques to improve overall TCO. Auto scaling and instance scheduling ensure that a cluster service is running at optimal efficiency. Purchase options such as **Amazon Elastic Compute Cloud (Amazon EC2) Spot Instances** take advantage of unused capacity in the AWS Cloud and allow users to run applications in containers and obtain an average savings of 65 percent on infrastructure without impacting the applications. Our silicon, **AWS Graviton**, is designed to deliver the best price performance for cloud workloads, providing up to 40 percent better price performance over comparable x86-based instances. AWS also offers **Compute Savings Plans** with discounts in exchange for a usage commitment.

Getting started with containers on AWS

Combining the agility of containers with the elasticity and security of the cloud and integration with other AWS services, AWS container services help you run your modern applications in the most secure, reliable, and scalable environment. AWS offers two primary pathways to get started modernizing with containers:

Build new applications for speed and productivity with **Amazon Elastic Container Service** (Amazon ECS) on Amazon EC2 or serverless with Amazon serverless compute options. Amazon opinionated container services simplify operations and reduce application management overhead as users accelerate their release cycles and increase performance, enabling development teams to move from idea to application faster.

Run secure and scalable Kubernetes-based applications on the most reliable cloud provider while streamlining application management across environments with **Amazon Elastic Kubernetes Service** (Amazon EKS). Amazon EKS manages key tasks and provides native integrations with a broad choice of integrated AWS services. By choosing Amazon EKS, organizations can eliminate undifferentiated heavy lifting and focus on delivering value to their customers.

When deciding which container services are suitable for a specific use case, consider the following in the context of desired business outcomes:

Provisioning and orchestration ›

Networking ›

Observability ›

Security ›

Automation ›

Provisioning and orchestration

For organizations running containers in on-premises or customer-managed cloud environments, deploying and managing servers, applications, network components, storage, and edge devices can take considerable effort. AWS container services make it easier to manage the underlying infrastructure, whether on premises or in the cloud, so organizations can focus on innovation.

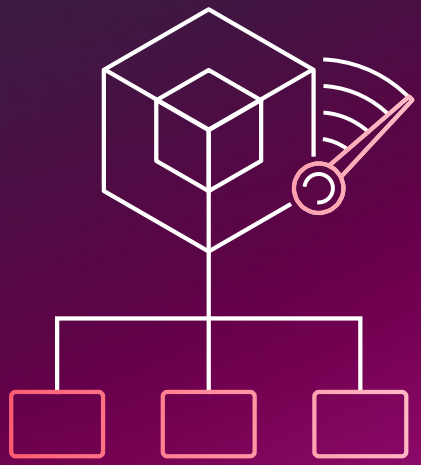
AWS container services help organizations provision and manage the infrastructure at the level of control desired:

Amazon ECS: Amazon ECS is a fully managed opinionated container orchestration service that provides the easiest way for organizations to deploy and manage containerized applications at any scale.

Amazon EKS: Amazon EKS is a fully managed Kubernetes service that provides the most secure, reliable, and scalable way to run Kubernetes in the cloud and in on-premises data centers.

AWS Fargate: With Fargate serverless compute engine, both Amazon ECS and Amazon EKS support serverless container orchestration, delivering more AWS operational excellence around scaling, maintaining availability, and securing containerized workloads. Modernizing applications with serverless containers improves agility so teams can innovate faster and save on infrastructure costs by improving utilization and offloading many server management tasks to AWS.

Amazon ECS Anywhere, Amazon EKS Anywhere, and AWS Outposts: Amazon ECS Anywhere and Amazon EKS Anywhere are self-managed container services that let organizations run and manage container workloads on their infrastructure, helping meet data sovereignty and latency requirements without sacrificing on-premises investments. Outposts is a fully managed solution delivering AWS infrastructure and services to virtually any on-premises or edge location for a truly consistent hybrid experience using the same APIs, tools, and console that are used in the cloud.



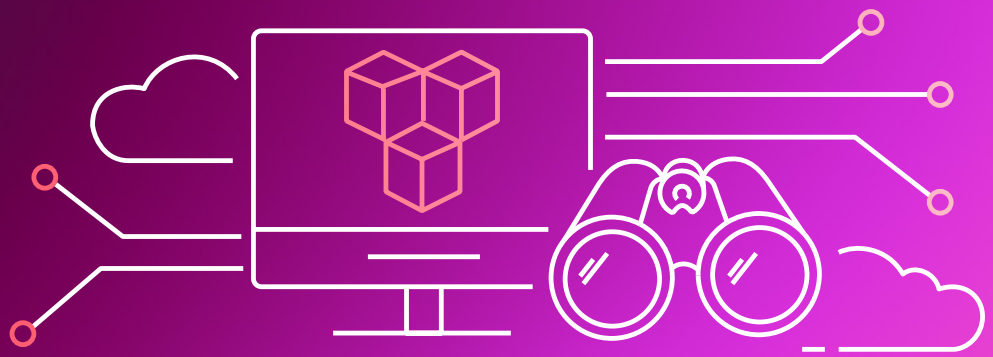
Networking

Once an application is running, it's important to ensure that traffic is always distributed across the containers, enabling end users to access the application without interruption. AWS networking services help deliver highly available applications to users. Optionally, Amazon ECS and Amazon EKS can be configured to use **Elastic Load Balancing** (ELB) to distribute traffic evenly across the service tasks. This helps users easily access applications using sophisticated load-balancing algorithms that are natively integrated with AWS container services. **AWS Global Accelerator** also helps ensure that an application is highly performant and can be accessed by users around the world and served from **AWS Regions** closest to them.

Amazon ECS Service Connect simplifies service discovery, connectivity, and traffic observability for Amazon ECS. It helps users build applications faster by letting them focus on the application code as opposed to networking infrastructure. Additionally, **Amazon VPC Lattice** allows for service connectivity to be simplified and automated to discover and securely connect services across virtual private clouds (VPCs) and accounts.

Observability

Container monitoring and observability involves tracking the health of containerized applications and microservices environments to gain insights and improve the performance of applications and infrastructure. Modern AWS monitoring solutions provide robust capabilities to track potential failures, as well as granular insights into container behavior. **Amazon CloudWatch** Application Insights is available to monitor the health and wellness of applications running in containers deployed in Amazon ECS, Amazon EKS, or Kubernetes on Amazon EC2. AWS provides several tools to allow users to observe container metrics, such as **Amazon Managed Grafana** for Amazon ECS, Amazon EKS, and self-managed Kubernetes running on AWS, on premises, and in other clouds. **Amazon Managed Service for Prometheus** is a Prometheus-compatible service that monitors and provides alerts on containerized applications and infrastructure at scale. The service is integrated with Amazon ECS, Amazon EKS, and **AWS Distro for OpenTelemetry**.



Security

Security considerations have shifted left into the earlier stages of the development cycle. With more autonomy and preemptive control, developers can more readily adapt their code to address the latest security threats. However, security must be a priority across the organization. One way to support prioritization is to make security efforts as transparent as possible and define an architecture upfront that takes security best practices and tools into account.

AWS provides multiple tools to control access to container images. **AWS Identity and Access Management** (AWS IAM) can determine who is authenticated (signed in) and authorized (has permission) to use resources. **Amazon Virtual Private Cloud** (Amazon VPC) logically isolates container tasks or pods in a virtual network that are defined by a user. Security groups can be defined to create a virtual firewall between Amazon EC2 instances.

By using an image scanning solution like **Amazon Inspector**, security teams can detect vulnerabilities of container images or image dependencies. They can perform scans on these containers or image dependencies and then publish pre-approved resources that developers can consume with confidence.

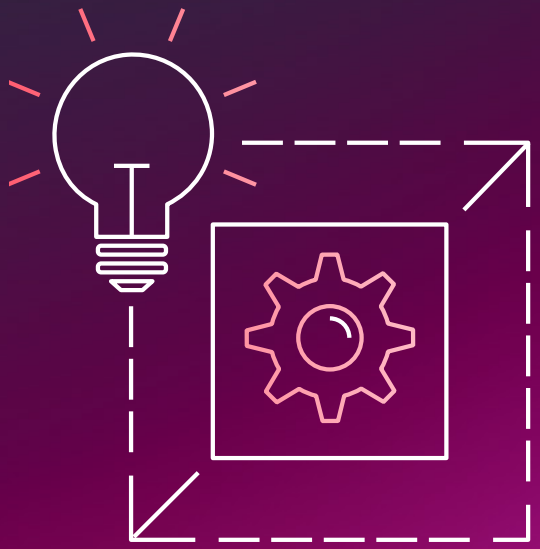
Amazon GuardDuty is an intelligent threat-detection service that continuously monitors AWS accounts and serverless and container workloads for malicious activity and delivers detailed security findings for visibility and remediation. GuardDuty also offers **EKS Runtime Monitoring** to detect runtime threats from over 30 security findings to protect Amazon EKS clusters.

Automation

When an organization's infrastructure includes hundreds or thousands of containers, automatically optimizing for availability and cost performance is of the utmost importance. Automatic scaling is the ability to automatically increase or decrease the desired count of tasks in a service, allowing faster scaling and minimizing the risk of human error. DevOps or systems engineers can improve efficiency and speed resolution by adding automation, such as alerts to dynamically trigger scaling operations. **AWS Auto Scaling** monitors applications and automatically adjusts capacity to maintain steady, predictable performance at the lowest possible costs.

You can automatically increase or decrease your desired task count by integrating Fargate with CloudWatch alarms and **Application Auto Scaling**. When CloudWatch alarms trigger an auto scaling policy, task counts are set to a new desired count based on the configured scaling policy.

A continuous integration and continuous delivery (CI/CD) pipeline helps developers automate steps in the software delivery process, such as initiating automatic builds and deploying to Amazon EC2 instances. To speed up development cycles and build governance into their CI/CD pipelines, teams can build reactive tooling and scripts into their standard orchestration by using metrics from AWS monitoring solutions. **Developer tools on AWS** and **Amazon CodeCatalyst** incorporate actions-based CI/CD workflows that can automate the response to changes in data from these monitoring solutions.



Build innovative solutions with container services on AWS

Combining the agility of containers with the elasticity and security of the cloud, AWS is the best cloud to build and operate modern container applications. It has the broadest range of fully managed and serverless services, including container orchestrators and Kubernetes services. AWS container services are deeply integrated with other AWS services by design, allowing organizations to take advantage of the breadth and depth of AWS, no matter what the business needs.

Ready to get started?

AWS and our vast partner ecosystem can provide the tools needed to get started. Reach out to an **AWS sales associate**, talk with a preferred AWS Partner, or find more information on our **AWS containers** webpage.

Explore customer stories ›

See how our customers use AWS container services to build, package, and run applications quickly and reliably while improving resource utilization and reducing costs.