Microservices

Build highly available microservices to power applications of any size and scale.

Get Started with Microservices on AWS

What are Microservices?

Microservices are an architectural and organizational approach to software development where software is composed of small independent services that communicate over well-defined APIs. These services are owned by small, self-contained teams.

Microservices architectures make applications easier to scale and faster to develop, enabling innovation and accelerating time-to-market for new features.

Monolithic vs. Microservices Architecture

With monolithic architectures, all processes are tightly coupled and run as a single service. This means that if one process of the application experiences a spike in demand, the entire architecture must be scaled. Adding or improving a monolithic application's features becomes more complex as the code-base grows. This complexity limits experimentation and makes it difficult to implement new ideas. Monolithic architectures add risk for application availability because many dependent and tightly coupled processes increase the impact of a single process failure.

With a microservices architecture, an application is built as independent components that run each application process as a service. These services communicate via a well-defined interface using lightweight APIs. Services are built for business capabilities and each service performs a single function. Because they are independently run, each service can be updated, deployed, and scaled to meet demand for specific functions of an application.

Breaking a monolithic application into microservices

Characteristics of Microservices

Autonomous

Each component service in a microservices architecture can be developed, deployed, operated, and scaled without affecting the functioning of other services. Services do not need to share any of their code or implementation with other services. Any communication between individual components happens via well-defined APIs.

Specialized

Each service is designed for a set of capabilities and focuses on solving a specific problem. If developers contribute more code to a service over time and the service becomes complex, it can be broken into smaller services.

Benefits of Microservices

Agility

Microservices foster an organization of small, independent teams that take ownership of their services. Teams act within a small and well understood context, and are empowered to work more independently and more quickly. This shortens development cycle times. You benefit significantly from the aggregate throughput of the organization.

Flexible Scaling

Microservices allow each service to be independently scaled to meet demand for the application feature it supports. This enables teams to right-size infrastructure needs, accurately measure the cost of a feature, and maintain availability if a service experiences a spike in demand.

Easy Deployment

Microservices enable continuous integration and continuous delivery, making it easy to try out new ideas and to roll back if something doesn't work. The low cost of failure enables experimentation, makes it easier to update code, and accelerates time-to-market for new features.

Technological Freedom

Microservices architectures don't follow a "one size fits all" approach. Teams have the freedom to choose the best tool to solve their specific problems. As a consequence, teams building microservices can choose the best tool for each job.

Reusable Code

Dividing software into small, well-defined modules enables teams to use functions for multiple purposes. A service written for a certain function can be used as a building block for another feature. This allows an application to bootstrap off itself, as developers can create new capabilities without writing code from scratch.

Resilience

Service independence increases an application's resistance to failure. In a monolithic architecture, if a single component fails, it can cause the entire application to fail. With microservices, applications handle total service failure by degrading functionality and not crashing the entire application.

The Most Complete Platform for Microservices

AWS has integrated building blocks that support any application architecture, regardless of scale, load, or complexity.

Compute

Processing power for microservices.

Containers

Amazon Elastic Container Service

A highly scalable, high performance container management service that supports Docker containers and allows you to easily run applications on a managed cluster of Amazon EC2 instances.

Learn More »

Serverless

AWS Lambda

AWS Lambda lets you run code without provisioning or managing servers. Just upload your code and Lambda manages everything that is required to run and scale your code with high availability.

Learn more »

coursera

Using Amazon ECS, Coursera can now deploy software changes in minutes instead of hours in a resource-isolated environment.

Learn More »

Localytics

Localytics used AWS Lambda to build microservices that allowed their development team to build custom analytics without central support. Learn More »

Storage & Databases

Scalable, durable, and secure data storage.

Caching

Amazon ElastiCache

Amazon ElastiCache improves service performance by allowing you to retrieve information from fast, managed, in-memory caches, instead of relying entirely on slower disk-based databases. Learn More »

Object Storage

Amazon S3

Amazon S3 provides developers and IT teams highly reliable, secure, and scalable object storage for all of their data, large or small. Learn More »

NoSQL Databases

Amazon DynamoDB

A fully managed, fast, and flexible NoSQL database service for all applications that need consistent, single-digit, millisecond latency at any scale. Learn more »

Relational Databases

Amazon RDS

Easily setup, operate, and scale a relational database in the cloud. Choose from six familiar database engines, including Oracle, Microsoft SQL Server, PostgreSQL, MySQL and MariaDB. Learn more »

Amazon Aurora

A relational database engine that combines the speed and reliability of high-end commercial databases with the simplicity and cost-effectiveness of open source databases. Deliver up to 5x the throughput of standard MySQL running on the same hardware. Learn more »

remind

Remind reduced application response times 250% by building a PaaS for microservices on Amazon ECS.

Learn More »

Networking

Networking services with high-throughput and sub-millisecond latency.

Service Discovery

AWS Cloud Map

AWS Cloud Map is service discovery for all your cloud resources. With Cloud Map, you can define custom names for your application resources, and it maintains the updated location of these dynamically changing resources.

Learn more »

Service Mesh

AWS App Mesh

AWS App Mesh makes it easy to monitor and control microservices running on AWS. App Mesh standardizes how your microservices communicate, giving you end-to-end visibility and helping to ensure high-availability for your applications.

Learn more »

Elastic Load Balancing

Application Load Balancer

The Application Load Balancer load balances HTTP and HTTPS traffic at the application layer (level 7) providing advanced request routing that is targeted at the delivery of modern application architectures, including microservices and containers.

Learn More »

Network Load Balancer

The Network Load Balancer offers high performance load balancing that operates at the network connection layer (level 4) and allows you to route connections to microservices based on IP protocol data. The Network Load Balancer can handle millions of requests per second while maintaining ultra-low latencies.

Learn more »

API Proxy

Amazon API Gateway

Amazon API Gateway offers a comprehensive platform for API management. Amazon API Gateway allows you to process hundreds of thousands of concurrent API calls and handles traffic management, authorization and access control, monitoring, and API version management.

Learn more »

DNS

Amazon Route 53

Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service that effectively connects requests to infrastructure that is running in AWS. It can be used for IP health checks and service discovery for microservices.

Learn more »

airtime

Airtime provides its social experience to customers faster, more reliably, and with no lag time after redesigning its app as microservices running on AWS. Learn More »

Messaging

Publish and coordinate inter process communications.

Message Publishing & Subscription

Amazon Simple Notification Service (Amazon SNS)

Amazon SNS is a fully managed pub/sub messaging service that makes it easy to decouple and scale microservices, distributed systems, and serverless applications.

Learn more »

Message Queueing

Amazon Simple Queue Service (Amazon SQS)

Amazon SQS is a fully managed message queuing service that makes it easy to decouple and scale microservices, distributed systems, and serverless applications.

Learn more »

Lyft uses AWS to move faster as a company and manage its exponential growth, leveraging AWS products to support more than 100 microservices that enhance every element of its customers' experience. Learn More »

Logging and Monitoring

Monitor service performance and resource utilization. Trace across complex architectures for troubleshooting and optimization.

API Monitoring

AWS CloudTrail

With CloudTrail, you can log, continuously monitor, and retain account activity related to actions across your infrastructure. CloudTrail event history simplifies security analysis, resource change tracking, and troubleshooting.

Learn more »

Application and Resources Monitoring

Amazon CloudWatch

Use Amazon CloudWatch to collect and track metrics, collect and monitor log files, set alarms, and automatically react to changes across your running services and AWS resources.

Learn more »

Distributed Tracing

AWS X-Ray

Get an end-to-end view of requests as they travel through your application and see a map of your application's underlying components. As a set of microservices works together to handle a request, AWS X-Ray can provide a centralized view of logic, allowing you to monitor and troubleshoot complex interactions. Learn more »

shippable

By using microservices hosted on Amazon ECS, Shippable has been able to focus on delivering features to its customers and has sped feature deployment times from once a week to multiple per day. Learn More »

DevOps

Manage the code lifecycle from commit to run.

Container Image Repository

Amazon Elastic Container Registry (Amazon ECR)

A fully managed Docker container registry that you can use to store, manage, and deploy Docker container images. Amazon ECR is integrated with Amazon Elastic Container Service (Amazon ECS), simplifying development to production workflow for containers. Learn more »

Continuous Delivery

AWS Developer Tools

AWS Developer Tools is a set of services that enable developers and IT operations professionals practicing DevOps to rapidly and safely deliver software. Together, these services help you securely store and version control your application's source code, and automatically build, test, and deploy your application to AWS or your on-premises environment. Learn more »

GILT

Gilt moved from an on-premises data center to AWS to leverage the speed and efficiency of a cloud-based microservices infrastructure.

Learn More »

Get Started

Start building microservices today with these resources.

Whitepapers

Microservices on AWS
Containerized Microservices on AWS
AWS Serverless Multi-Tier Architectures
Docker on AWS

Open Source Projects

Serverless Application Model (SAM)
Go Microservices
Node.js Microservices
Java Microservices

Blogs

Microservices without the Servers
Deploying Java Microservices on Amazon Elastic Container Service
Building Scalable Applications and Microservices
Run Containerized Microservices with Amazon ECS and ALB
Using Amazon API Gateway with microservices deployed on Amazon ECS
Service Discovery: An Amazon ECS Reference Architecture

Documentation

Amazon ECS
AWS Lambda
Amazon Elasticache
Amazon S3
Amazon RDS
Amazon Route 53
Elastic Load Balancing
Amazon SNS
Amazon SQS
AWS CloudTrail
Amazon CloudWatch
AWS X-Ray
Amazon ECR
Developer Tools

Workshops

Zombie Serverless Microservices
Containerized Microservices: Break the Monolith!
Training: Running Container-Enabled Microservices on AWS

GET STARTED WITH AWS

Learn how to start using AWS in minutes

AWS FREE TIER

Gain free, hands-on experience with AWS for 12 months

FREE AWS TRAINING

Access 500+ free digital courses across roles, skill levels, and domains to build your AWS Cloud skills