

Certificação AWS Cloud Practitioner



Como estudar?

Com experiência na AWS

- Sequência normal: Domínios 1, 2, 3 e 4

Sem experiência na AWS

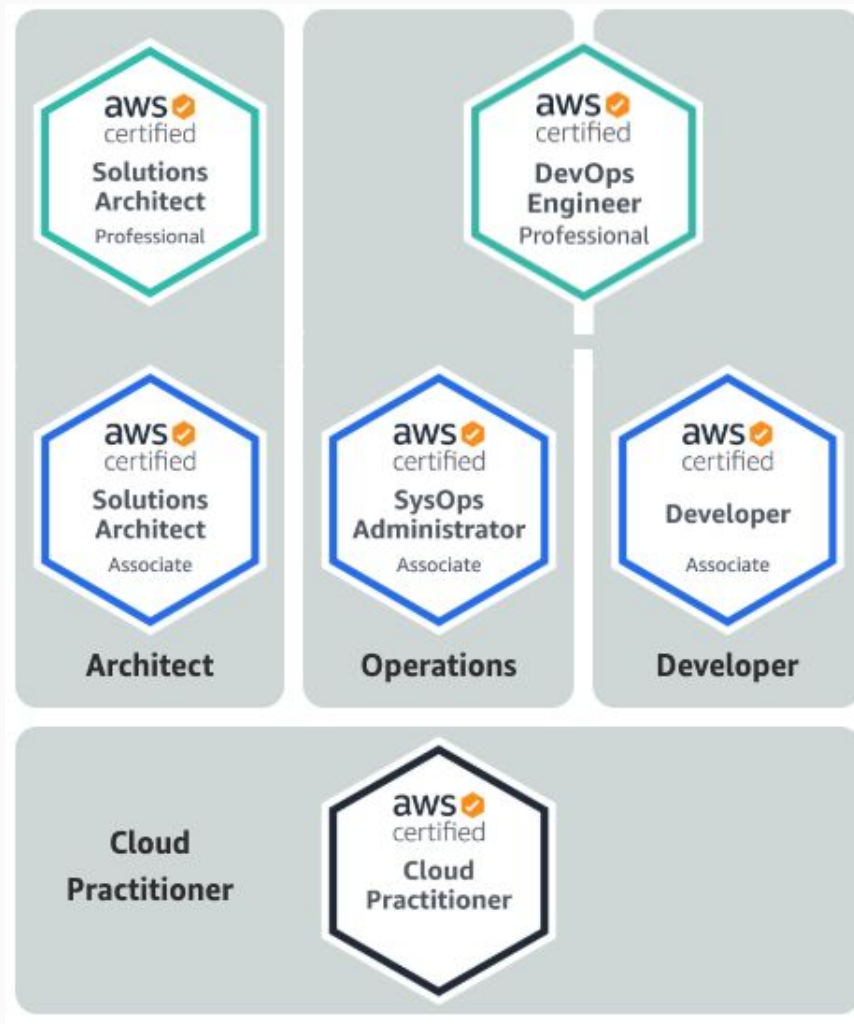
- Começar pelo domínio 3 para adquirir visão dos serviços

Certificações AWS

- Foundational
- Associate
- Professional
- Specialty

<https://aws.amazon.com/pt/certification>

Certificações



Níveis de Certificação

Professional - Dois anos de soluções experiência abrangente criando, operando e solucionando problemas usando a Nuvem AWS

Associate - Um ano de experiência na solução de problemas e implementação de soluções usando a Nuvem AWS

Foundational - Seis meses de Nuvem AWS fundamental e conhecimento do setor

Certificações

Especialista



Níveis de Certificação

Specialty

Experiência técnica em Nuvem AWS no domínio Specialty conforme especificado no guia de exame

Por que certificar?

- Validar sua experiência com a nuvem da AWS
- Atesta e valoriza suas habilidades
- Maior visibilidade no mercado de trabalho

Sobre a Certificação ACP



Certificação CCP - Público Alvo

- Profissionais de TI
- Consultores
- Gerentes de Projetos
- Gestores
- ...

Detalhes da certificação

- Multipla escolha, Múltiplas respostas
- Duração 90 minutos
- Custo 100 USD*
- Idioma - Inglês, japonês, coreano e chinês
- Como é o Exame: Presencial ou Online

Como se preparar?

- Curso
- Documentação oficial AWS
- Whitepapers AWS
- Experiência Prática (6 meses) - Recomendação da AWS

Quais temas serão abordados no ACP?

- Definições da nuvem da AWS
- Compreender e explicar o modelo de responsabilidade compartilhada da AWS.
- Compreender as práticas recomendadas de segurança da AWS Cloud.
- Compreender os custos, a economia e as práticas de cobrança da AWS Cloud.
- Descrever e apontar os principais serviços da AWS, incluindo computação, rede, bancos de dados e armazenamento.
- Identificar os serviços da AWS para casos de uso comuns.

Divisão da Prova

Exam_guide

Domain	% of Examination
Domain 1: Cloud Concepts	26%
Domain 2: Security and Compliance	25%
Domain 3: Technology	33%
Domain 4: Billing and Pricing	16%
TOTAL	100%

Nota para aprovação: ≥ 70

Estrutura do Curso

Domain 1: Cloud Concepts

- 1.1 Define the AWS Cloud and its value proposition
- 1.2 Identify aspects of AWS Cloud economics
- 1.3 List the different cloud architecture design principles

Domain 2: Security and Compliance

- 2.1 Define the AWS shared responsibility model
- 2.2 Define AWS Cloud security and compliance concepts
- 2.3 Identify AWS access management capabilities
- 2.4 Identify resources for security support

Domain 3: Technology

- 3.1 Define methods of deploying and operating in the AWS Cloud
- 3.2 Define the AWS global infrastructure
- 3.3 Identify the core AWS services
- 3.4 Identify resources for technology support

Domain 4: Billing and Pricing

- 4.1 Compare and contrast the various pricing models for AWS
- 4.2 Recognize the various account structures in relation to AWS billing and pricing
- 4.3 Identify resources available for billing support

Domain 1: Cloud Concepts

What is Cloud Computing?

Cloud computing is the **on-demand** delivery of compute power, database storage, applications, and other IT resources through a cloud services platform **via the Internet** with **pay-as-you-go pricing**. Whether you are running applications that share photos to millions of mobile users or you're supporting the critical operations of your business, a cloud services platform provides **rapid access** to **flexible** and **low-cost** IT resources.

What is Cloud Computing?

With cloud computing, you don't need to make large **upfront investments** in hardware and **spend a lot of time** on the heavy lifting of **managing that hardware**. Instead, you can **provision exactly** the right type and size of computing resources **you need** to power your newest bright idea or operate your IT department. You can access as many resources as you need, almost **instantly**, and only **pay for what you use**

6 Advantages of Cloud Computing

- Trade capital expense for variable expense
- Benefit from massive economies of scale
- Stop guessing capacity
- Increase speed and agility
- Stop spending money running and maintaining data centers
- Go global in minutes

1-Trade capital expense for variable expense

Instead of having to invest heavily in data centers and servers before you know how you're going to use them, you can pay only when you consume computing resources, and pay only for how much you consume

2-Benefit from massive economies of scale

By using cloud computing, you can achieve a lower variable cost than you can get on your own. Because usage from hundreds of thousands of customers is aggregated in the cloud, providers such as AWS can achieve higher economies of scale, which translates into lower pay as-you-go prices.

3-Stop guessing capacity

Eliminate guessing on your infrastructure capacity needs. When you make a capacity decision prior to deploying an application, you often end up either sitting on expensive idle resources or dealing with limited capacity. With cloud computing, these problems go away. You can access as much or as little capacity as you need, and scale up and down as required with only a few minutes' notice

4-Increase speed and agility

In a cloud computing environment, new IT resources are only a click away, which means that you reduce the time to make those resources available to your developers from weeks to just minutes. This results in a dramatic increase in agility for the organization, since the cost and time it takes to experiment and develop is significantly lower

5-Stop spending money running and maintaining data centers

Focus on projects that differentiate your business, not the infrastructure. Cloud computing lets you focus on your own customers, rather than on the heavy lifting of racking, stacking, and powering servers.

6-Go global in minutes

Easily deploy your application in multiple regions around the world with just a few clicks. This means you can provide lower latency and a better experience for your customers at minimal cost.

Types of Cloud Computing

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS) contains the **basic building blocks** for cloud IT and typically provide access to **networking features, computers (virtual or on dedicated hardware), and data storage space**. IaaS provides you with the **highest level** of **flexibility** and **management** control over your IT resources and is most similar to existing IT resources that many IT departments and developers are familiar with today.

Platform as a Service (PaaS)

Platform as a Service (PaaS) removes the need for your organization to manage the underlying infrastructure (usually hardware and operating systems) and allows you to focus on the deployment and management of your applications. This helps you be more efficient as you don't need to worry about resource procurement, capacity planning, software maintenance, patching, or any of the other undifferentiated heavy lifting involved in running your application.

Software as a Service (SaaS)

Software as a Service (SaaS) provides you with a **completed product** that is **run and managed by the service provider**. In most cases, people referring to Software as a Service are referring to **end-user applications**. With a SaaS offering **you do not have to think** about how the **service is maintained** or how underlying **infrastructure is managed**; you only need to think about how you will use that particular piece of software.

Cloud Computing Models

- Public
- Hybrid
- Private (On-premises)

Public

A cloud-based application is fully deployed in the cloud and all parts of the application run in the cloud. Applications in the cloud have either been created in the cloud or have been migrated from an existing infrastructure to take advantage of the benefits of cloud computing. Cloud-based applications can be built on low-level infrastructure pieces or can use higher level services that provide abstraction from the management, architecting, and scaling requirements of core infrastructure

<https://aws.amazon.com/pt/what-is-cloud-computing/>

Hybrid

A hybrid deployment is a way to connect infrastructure and applications between cloud-based resources and existing resources that are not located in the cloud. The most common method of hybrid deployment is between the cloud and existing on-premises infrastructure to extend, and grow, an organization's infrastructure into the cloud while connecting cloud resources to the internal system.

<https://aws.amazon.com/pt/hybrid/>

Private (On-premises)

The deployment of resources on-premises, using virtualization and resource management tools, is sometimes called the "private cloud." On-premises deployment doesn't provide many of the benefits of cloud computing but is sometimes sought for its ability to provide dedicated resources. In most cases this deployment model is the same as legacy IT infrastructure while using application management and virtualization technologies to try and increase resource utilization.

Domain 2:

Security and Compliance

Cloud Security

Cloud security at AWS is the **highest priority**. As an AWS customer, you will benefit from a data center and network architecture built to meet the requirements of the most security-sensitive organizations. In the cloud, you use **software-based security tools** to monitor and protect the flow of information into and of out of your cloud resources.

Benefits of AWS Security

- **Keep Your Data Safe:** All data is stored in highly secure AWS data centers.
- **Meet Compliance Requirements:** AWS manages dozens of compliance programs in its infrastructure.
- **Save Money:** Cut costs by using AWS data centers. Maintain the highest standard of security without having to manage your own facility
- **Scale Quickly:** Security scales with your AWS Cloud usage.

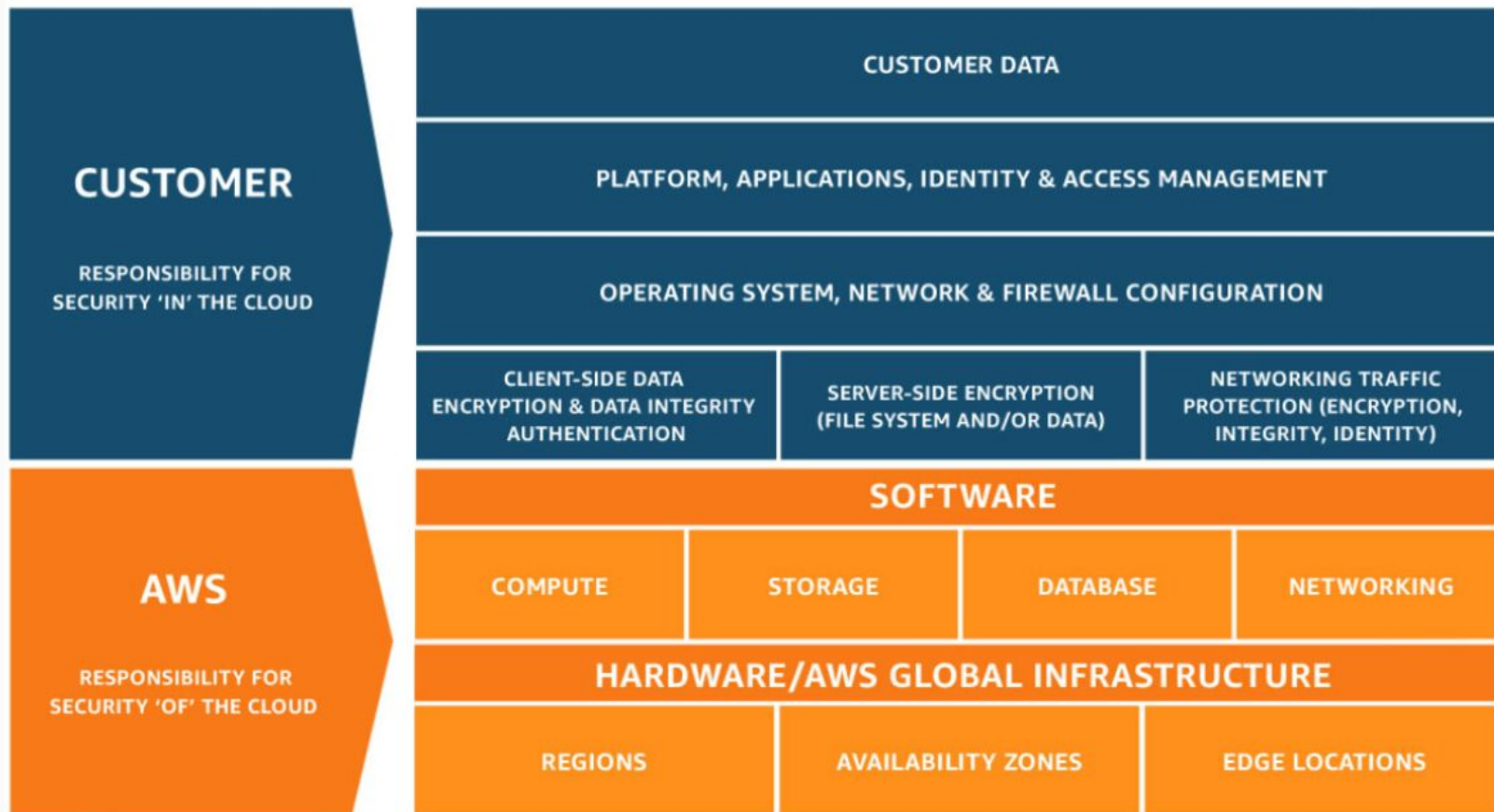
Shared Responsibility Model

Security and Compliance is a shared responsibility between AWS and the customer. This shared model can help relieve the customer's operational burden as AWS operates, manages and controls the components from the host operating system and virtualization layer down to the physical security of the facilities in which the service operates. The customer assumes responsibility and management of the guest operating system (including updates and security patches), other associated application software as well as the configuration of the AWS provided security group firewall.

Shared Responsibility Model

Customers should carefully consider the services they choose as their responsibilities vary depending on the services used, the integration of those services into their IT environment, and applicable laws and regulations. The nature of this shared responsibility also provides the flexibility and customer control that permits the deployment. The differentiation of responsibility is commonly referred to as Security "of" the Cloud versus Security "in" the Cloud.

Shared Responsibility Model



AWS responsibility “Security of the Cloud”

AWS is responsible for protecting the infrastructure that runs all of the services offered in the AWS Cloud. This infrastructure is composed of the hardware, software, networking, and facilities that run AWS Cloud services.

Customer responsibility “Security in the Cloud”

Customer responsibility will be determined by the AWS Cloud services that a customer selects. This determines the amount of configuration work the customer must perform as part of their security responsibilities.

Customer responsibility “Security in the Cloud”

A service such as Amazon Elastic Compute Cloud (Amazon EC2) is categorized as Infrastructure as a Service (IaaS) and, as such, requires the customer to perform all of the necessary security configuration and management tasks.

Customers that deploy an Amazon EC2 instance are responsible for management of the guest operating system (including updates and security patches), any application software or utilities installed by the customer on the instances, and the configuration of the AWS-provided firewall (called a security group) on each instance.

Customer responsibility “Security in the Cloud”

For abstracted services, such as Amazon S3 and Amazon DynamoDB, AWS operates the infrastructure layer, the operating system, and platforms, and customers access the endpoints to store and retrieve data. Customers are responsible for managing their data (including encryption options), classifying their assets, and using IAM tools to apply the appropriate permissions.

AWS Cloud Complice

AWS Compliance enablers build on traditional programs. This helps customers to establish and operate in an AWS security control environment.

The IT infrastructure that AWS provides to its customers is designed and managed in alignment with best security practices and a variety of IT security standards.

Compliance Programs

- SOC 1/ISAE 3402, SOC 2, SOC 3
- FISMA, DIACAP, and FedRAMP
- PCI DSS Level 1
- ISO 9001, ISO 27001, ISO 27017, ISO 27018

<https://aws.amazon.com/compliance/programs/>

AWS Artifact

AWS Artifact features a comprehensive **list** of access-controlled documents relevant to **compliance** and **security** in the AWS cloud.

Services - Security, Identity, & Compliance

Console - [Services](#)

- WAF , Shield
- Inspector, Trusted Advisor, CloudTrail
- Cloudwatch, AWS Config
- Athena, Macie

AWS WAF

AWS WAF is a web application firewall that helps protect your web applications or APIs against common web exploits that may affect availability, compromise security, or consume excessive resources. AWS WAF gives you control over how traffic reaches your applications by enabling you to create security rules that block common attack patterns, such as SQL injection or cross-site scripting, and rules that filter out specific traffic patterns you define.

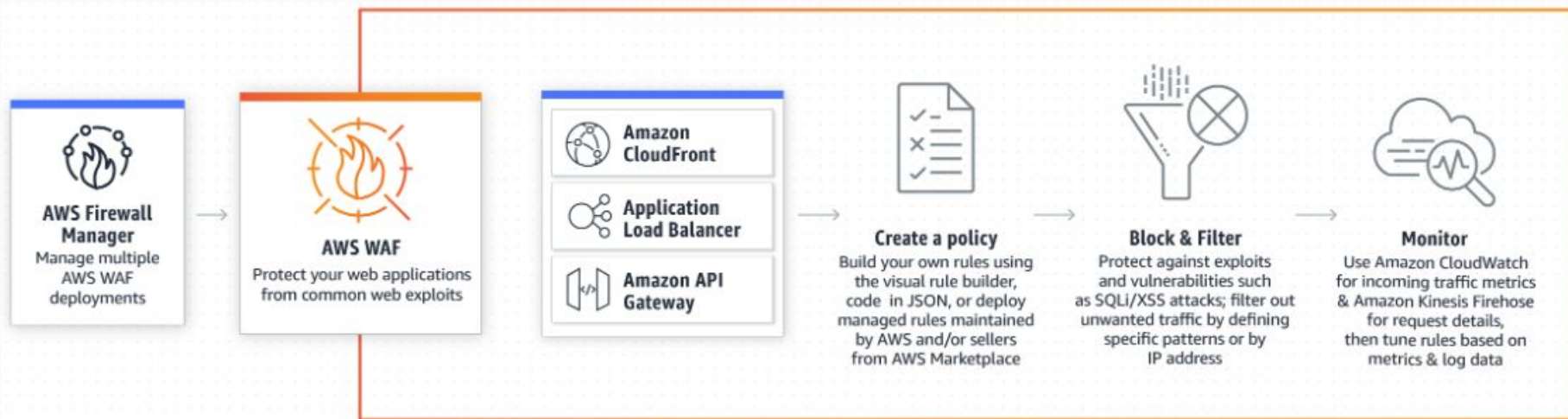
AWS WAF

AWS WAF, **you pay only for what you use**. The pricing is based on how many rules you deploy and how many web requests your application receives. There are no upfront commitments.

You can deploy AWS WAF on Amazon **CloudFront** as part of your CDN solution, the **Application Load Balancer** that fronts your web servers or origin servers running on EC2, or Amazon API Gateway for your APIs.

<https://aws.amazon.com/waf/pricing/>

AWS WAF



AWS Shield - DDoS Protection

AWS Shield is a managed Distributed Denial of Service (DDoS) protection service that safeguards applications running on AWS. AWS Shield provides always-on detection and automatic inline mitigations that minimize application downtime and latency, so there is no need to engage AWS Support to benefit from DDoS protection. There are two tiers of AWS Shield - Standard and Advanced.

AWS Shield Standard

AWS Shield Standard provides always-on network flow monitoring which inspects incoming traffic to AWS and uses a combination of traffic signatures, anomaly algorithms and other analysis techniques to detect malicious traffic in real-time

AWS Shield Advanced

You can also mitigate application layer DDoS attacks by writing rules using AWS WAF. With AWS WAF you only pay for what you use.

AWS Shield Advanced

AWS Shield Advanced provides enhanced detection, inspecting network flows of traffic to your protected Elastic IP address, Elastic Load Balancing (ELB), Amazon CloudFront, AWS Global Accelerator or Amazon Route 53 resources.

Using additional techniques like resource specific monitoring, AWS Shield Advanced uses resource and region specific granular detection of DDoS attacks. AWS Shield Advanced also detects application layer DDoS attacks like HTTP floods or DNS query floods by baselining traffic on your resource and identifying anomalies.

AWS Shield - Standard vs. Advanced

Standard

- Automatically available on all AWS services.

Advanced

- Amazon Route 53
- Amazon CloudFront
- Elastic Load Balancing
- AWS Global Accelerator
- Elastic IP (Amazon Elastic Compute Cloud and Network Load Balancer)

<https://aws.amazon.com/shield/pricing/>

Amazon Inspector

Amazon Inspector is an automated security assessment service that helps improve the security and compliance of applications deployed on AWS.

Amazon Inspector automatically assesses applications for exposure, vulnerabilities, and deviations from best practices. After performing an assessment, Amazon Inspector produces a detailed list of security findings prioritized by level of severity. These findings can be reviewed directly or as part of detailed assessment reports which are available via the Amazon Inspector console or API.

Amazon Inspector

Amazon Inspector security assessments help you check for unintended network accessibility of your **Amazon EC2** instances and for vulnerabilities on those EC2 instances.

Trusted Advisor

AWS Trusted Advisor is an **online tool** that provides you **real time guidance** to help you provision your resources following AWS best practices.

Whether establishing new workflows, developing applications, or as part of ongoing improvement, take advantage of the recommendations provided by Trusted Advisor on a regular basis to help keep your solutions provisioned optimally.

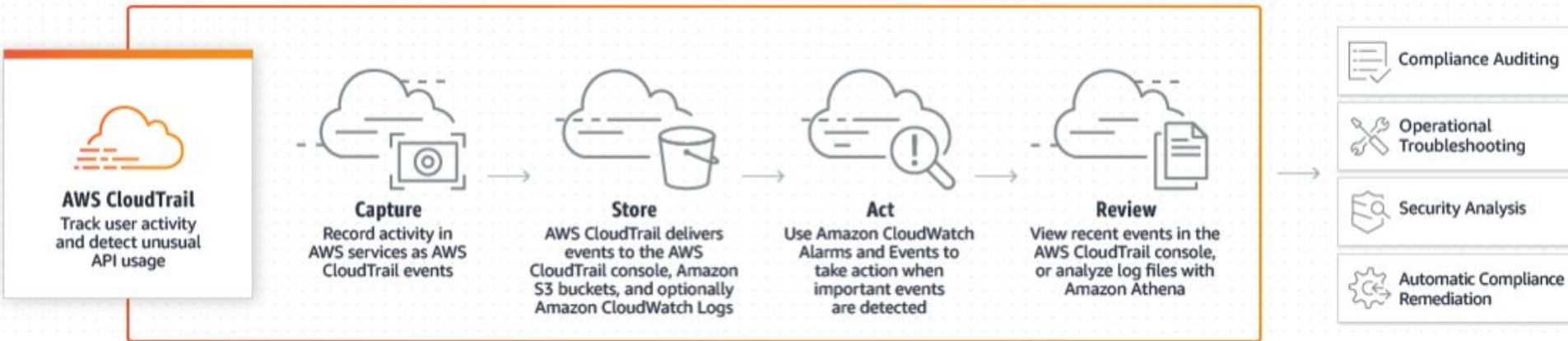
Trusted Advisor



CloudTrail

AWS CloudTrail is a service that enables governance, compliance, operational auditing, and risk auditing of your AWS account. With CloudTrail, you can log, continuously monitor, and retain account activity related to actions across your AWS infrastructure. CloudTrail provides event history of your AWS account activity, including actions taken through the AWS Management Console, AWS SDKs, command line tools, and other AWS services. This event history simplifies security analysis, resource change tracking, and troubleshooting. In addition, you can use CloudTrail to detect unusual activity in your accounts.

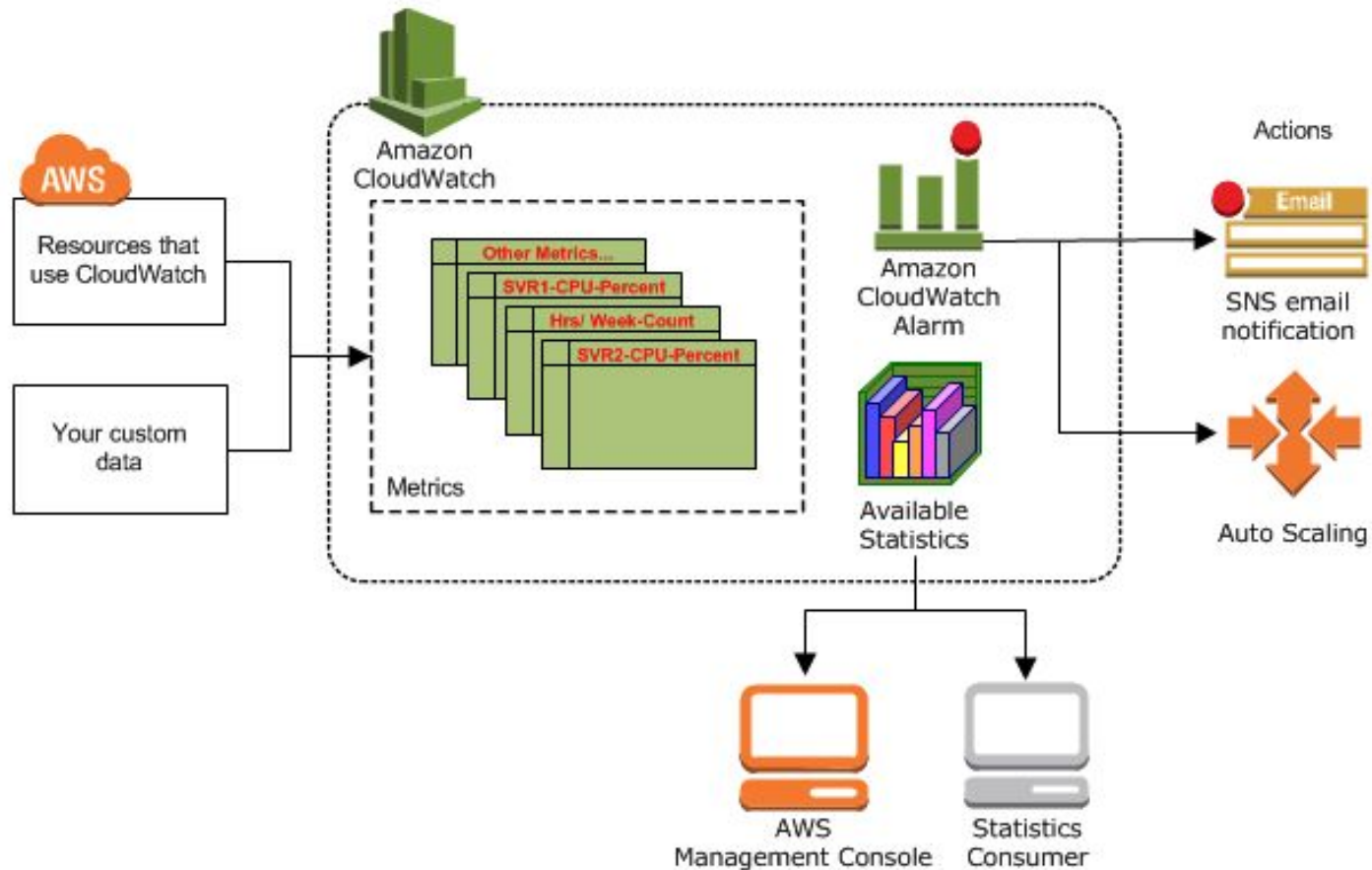
CloudTrail



CloudWatch

Amazon CloudWatch provides you with data and actionable insights to monitor your applications, respond to system-wide performance changes, optimize resource utilization, and get a unified view of operational health. CloudWatch collects monitoring and operational data in the form of logs, metrics, and events, providing you with a unified view of AWS resources, applications, and services that run on AWS and on-premises servers. You can use CloudWatch to detect anomalous, set alarms, visualize logs and metrics side by side, take automated actions and troubleshoot issues.

CloudWatch



AWS Config

AWS Config is a service that enables you to **assess, audit, and evaluate** the configurations of your AWS resources. Config continuously monitors and records your AWS resource configurations and allows you to automate the evaluation of recorded configurations against desired configurations. With Config, you can **review changes in configurations** and relationships between AWS resources, dive into detailed resource configuration histories, and determine your overall compliance against the configurations specified in your internal guidelines.

AWS Config



Configuration change occurs in your AWS resources.



AWS Config

AWS Config records and normalizes the changes into a consistent format.



AWS Config automatically evaluates the recorded configurations against the configurations you specify.



**AWS Config
APIs & Console**



Amazon SNS



**Amazon
CloudWatch**



Amazon S3

Access change history and compliance results using the console or APIs. CloudWatch Events or SNS alert you when changes occur. Deliver change history and snapshot files to your S3 bucket for analysis.

Athena

Amazon Athena is an **interactive query** service that makes it **easy to analyze data in Amazon S3 using standard SQL**. Athena **is serverless**, so there is no infrastructure to manage, and you **pay only for the queries that you run**.

Simply point to your data in Amazon S3, define the schema, and start querying using standard SQL. With Athena, there's no need for complex ETL jobs to prepare your data for analysis. This makes it easy for anyone with SQL skills to quickly analyze large-scale datasets.

Macie

Amazon Macie is a security service that uses machine learning to automatically discover, classify, and protect sensitive data in AWS. Amazon Macie recognizes sensitive data such as personally identifiable information (PII) or intellectual property, and provides you with dashboards and alerts that give visibility into how this data is being accessed or moved. The fully managed service continuously monitors data access activity for anomalies, and generates detailed alerts when it detects risk of unauthorized access or inadvertent data leaks.

Macie

Today, Amazon Macie is available to protect data stored in Amazon S3, with support for additional AWS data stores coming later this year.

Resumo dos serviços

- AWS WAF (Web Application Firewall) → Stop hackers (layer 7)
- AWS Shield → Stop DDOS attacks (standard / advanced)
- AWS Inspector → EC2 vulnerabilities
- AWS Trusted Advisor → Inspect Account (Cost, Performance, Fault Tolerance)

Resumo dos serviços

- CloudWatch → Monitoring
- AWS CloudTrail → “Logs”
- AWS Config → Gerenciamento das configs
- Athena → Interactive query service (data stored in S3)
- Macie → AI to analyze data in S3 (PII)

Domain 3: Technology

Global Infrastructure

The AWS Cloud infrastructure is built around AWS **Regions** and **Availability Zones**. An AWS Region is a **physical location** in the world where we have multiple **Availability Zones**. **Availability Zones** consist of one or more discrete data centers, each with redundant power, networking, and connectivity, housed in separate facilities. These Availability Zones offer you the ability to operate production applications and databases that are **more highly available, fault tolerant, and scalable** than would be possible from a single data center.

Global Infrastructure

The AWS Cloud operates in over 69 Availability Zones within over 22 geographic Regions around the world, with announced plans for more Availability Zones and Regions.

Regions & Availability Zones



Regions

Each Amazon Region is designed to be completely isolated from the other Amazon Regions. This achieves the greatest possible fault tolerance and stability.

Availability Zone

Each Availability Zone is **isolated**, but the Availability Zones in a Region are **connected** through **low-latency links**. AWS provides you with the flexibility to place instances and store data within multiple geographic regions as well as across multiple Availability Zones within each AWS Region. **Each Availability Zone is designed as an independent failure zone.**

Minimum of 2 availability zones per region

Availability Zone

Availability Zones are physically separated within a typical metropolitan region and are located in lower risk flood plains (specific flood zone categorization varies by AWS Region). In addition to discrete uninterruptible power supply (UPS) and onsite backup generation facilities, they are each fed via different grids from independent utilities to further reduce single points of failure. Availability Zones are all redundantly connected to multiple tier-1 transit providers.

Edge Locations

Edge Locations are endpoints for AWS which are used for caching content. Typically this consists of CloudFront, Amazon's Content Delivery Network (CDN)

Infrastructure

Edge Locations > Availability Zones > Regions

Choosing the AWS Region

- data storage laws
- latency to end users
- aws services

Access to Services

- AWS Management Console
- Command Line Interface (CLI)
- Software Development Kits (SDKs).

Methods of Deploying and Operating in the AWS Cloud

- Elastic Beanstalk
- CloudFormation
- OpsWorks
- Code Commit
- Code Deploy
- CodePipeline
- EC2 Container Services

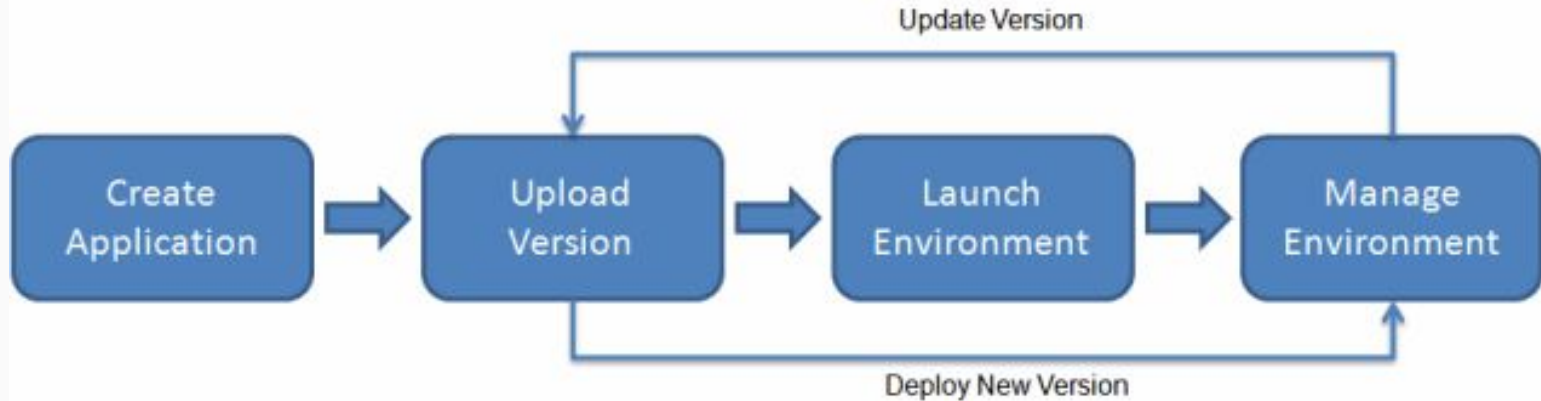
AWS Elastic Beanstalk

AWS Elastic Beanstalk is a service for **deploying** and **scaling web applications** and **services** developed with Java, .NET, PHP, Node.js, Python, Ruby, Go, and Docker on familiar servers such as Apache, Nginx, Passenger, and IIS.

You can simply **upload your code** and **Elastic Beanstalk automatically handles the deployment, from capacity provisioning, load balancing, auto-scaling to application health monitoring.**

There is no additional charge for Elastic Beanstalk

AWS Elastic Beanstalk



CloudFormation

AWS CloudFormation provides a **common language** for you to model and provision AWS and third party application resources in your cloud environment. AWS CloudFormation allows you to use programming languages or a **simple text file** to model and provision, in an automated and secure manner, all the resources needed for your applications across all regions and accounts.

CloudFormation



OpsWorks

AWS OpsWorks is a configuration management service that provides managed instances of Chef and Puppet. Chef and Puppet are automation platforms that allow you to use code to automate the configurations of your servers.

OpsWorks lets you use Chef and Puppet to automate how servers are configured, deployed, and managed across your Amazon EC2 instances or on-premises compute environments.

CodeCommit

AWS CodeCommit is a fully-managed **source control service** that hosts secure **Git-based repositories**. It makes it easy for teams to collaborate on code in a secure and highly scalable ecosystem. CodeCommit eliminates the need to operate your own source control system or worry about scaling its infrastructure. You can use CodeCommit to securely store anything from source code to binaries, and it works seamlessly with your existing Git tools.

Code Deploy

AWS CodeDeploy is a fully managed deployment service that automates software deployments to a variety of **compute services** such as **Amazon EC2**, **AWS Fargate, AWS Lambda**, and your on-premises servers.

CodePipeline

AWS CodePipeline is a **fully managed continuous delivery service** that helps you automate your release pipelines for fast and reliable application and infrastructure updates. CodePipeline automates the **build, test, and deploy** phases of your release process every time there is a code change, based on the release model you define. AWS CodePipeline, **you only pay for what you use.**
There are no upfront fees or long-term commitments.

EC2 Container Services

Amazon Elastic Container Service (Amazon ECS) allows you to easily run, scale, and secure Docker container applications on AWS. Amazon ECS eliminates the need to install, operate, and scale your own container orchestration and cluster management infrastructure, and allows you to focus on the resource needs and availability requirements of your containerized application.

Global Services

- **IAM** → Identity and Access Management
- **Route53** → DNS
- **CloudFront** → CDN
- **SNS** → Notification
- **SES** → Email Service

S3*** → Regional Service with Global Vision

Services “On Premise”

- **Snowball** → Data Transfer (Service / Hardware)
- **Storage Gateway** → Hybrid cloud storage with local caching
- **CodeDeploy** → Automate code deployments to maintain application uptime
- **Opsworks** → Automate Operations with Chef and Puppet
- **IoT Greengrass** → extends cloud capabilities to local devices

Basic Services

IAM - Identity and Access Management

S3 - Amazon Simple Storage Service

EC2 - Amazon Elastic Compute Cloud

IAM Roles - Permissions

Databases - RDS, DynamoDB

IAM - Identity and Access Management

AWS Identity and Access Management (IAM) enables you to securely control access to AWS services and resources for your users. Using IAM, you can create and manage AWS users and groups, and use permissions to allow and deny their access to AWS resources.

IAM - Identity and Access Management

- Manage IAM users and their access
- Manage IAM roles and their permissions
- Manage federated users and their permissions

S3

Amazon Simple Storage Service (Amazon S3) is an **object storage** service that offers industry-leading scalability, data availability, security, and performance.

Amazon S3 is designed for **99.999999999%** (11 9's) of durability, and stores data for millions of applications for companies all around the world.

S3 Features

- Object-based
- File size - 0 to 5TB
- Key (name of the object)
- Unlimited Storage
- Storage in Buckets

S3 - Storage Classes

	S3 Standard	S3 Intelligent-Tiering*	S3 Standard-IA	S3 One Zone-IA†	S3 Glacier	S3 Glacier Deep Archive
Designed for durability	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)
Designed for availability	99.99%	99.9%	99.9%	99.5%	99.99%	99.99%
Availability SLA	99.9%	99%	99%	99%	99.9%	99.9%
Availability Zones	≥3	≥3	≥3	1	≥3	≥3
Minimum capacity charge per object	N/A	N/A	128KB	128KB	40KB	40KB
Minimum storage duration charge	N/A	30 days	30 days	30 days	90 days	180 days
Retrieval fee	N/A	N/A	per GB retrieved	per GB retrieved	per GB retrieved	per GB retrieved
First byte latency	milliseconds	milliseconds	milliseconds	milliseconds	select minutes or hours	select hours
Storage type	Object	Object	Object	Object	Object	Object
Lifecycle transitions	Yes	Yes	Yes	Yes	Yes	Yes

EC2 - Elastic Compute Cloud

- Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides **secure, resizable compute capacity** in the cloud. It is designed to make web-scale computing easier for developers.
- Amazon EC2 **reduces** the **time** required to obtain and boot new server instances (called Amazon EC2 instances) **to minutes**, allowing you to quickly scale capacity, both up and down, as your computing requirements change.
- Amazon EC2 changes the economics of computing by allowing you to **pay only for capacity that you actually use**.

EC2 Instance Types: On Demand

- On-Demand Instances—With On-Demand instances, you pay for compute capacity by the hour with no long-term commitments. You can increase or decrease your compute capacity depending on the demands of your application and only pay the specified hourly rate for the instances you use.
- The use of On-Demand instances frees you from the costs and complexities of planning, purchasing, and maintaining hardware and transforms what are commonly large fixed costs into much smaller variable costs. On-Demand instances also remove the need to buy “safety net” capacity to handle periodic traffic spikes.

EC2 Instance Types: Reserved Instances

Reserved Instances provide you with a significant discount (up to 75%) compared to On-Demand instance pricing. You have the flexibility to change families, operating system types, and tenancies while benefitting from Reserved Instance pricing when you use Convertible Reserved Instances.

EC2 Instance Types: Spot Instances

Spot Instances are available at up to a 90% discount compared to On-Demand prices and let you take advantage of unused EC2 capacity in the AWS Cloud. You can significantly reduce the cost of running your applications, grow your application's compute capacity and throughput for the same budget, and enable new types of cloud computing applications.

EC2 Instance Types: Dedicated Hosts

An Amazon EC2 Dedicated Host is a **physical server** with EC2 instance capacity **fully dedicated** to your use. Dedicated Hosts can help you address compliance requirements and reduce costs by allowing you to use your existing **server-bound software licenses**.

IAM Roles

An IAM role is an IAM entity that defines a set of permissions for making AWS service requests. IAM roles are **not associated with a specific user or group**. Instead, trusted entities assume roles, such as IAM users, applications, or AWS services such as EC2.

IAM roles allow you to delegate access with defined permissions to trusted entities **without** having to share long-term **access keys**.

Amazon RDS

Amazon **Relational Database** Service (Amazon RDS) provides cost-efficient and resizable capacity while automating time-consuming administration tasks such as hardware provisioning, database setup, patching and backups.

Amazon RDS is available on several database instance types - optimized for memory, performance or I/O - and provides you with six familiar database engines to choose from, including **Amazon Aurora, PostgreSQL, MySQL, MariaDB, Oracle Database, and SQL Server.**

DynamoDB

Amazon DynamoDB is a **key-value** and **document** database that delivers single-digit millisecond performance at any scale. It's a fully managed, **multiregion**, multimaster database with built-in security, backup and restore, and in-memory caching for internet-scale applications. DynamoDB can handle more than 10 trillion requests per day and support peaks of more than 20 million requests per second.

DynamoDB is a **NoSQL** database

Elastic Load Balance (ELB) & Auto Scaling

Elastic Load Balancing (ELB) automatically distributes incoming application traffic across multiple targets, such as Amazon EC2 instances, containers, and IP addresses. It can handle the varying load of your application traffic in a single Availability Zone or across multiple Availability Zones. Elastic Load Balancing offers three types of load balancers that all feature the high availability, automatic scaling, and robust security necessary to make your applications fault tolerant.

ELB Types

- **Application Load Balancer** is best suited for load balancing of HTTP and HTTPS traffic
- **Network Load Balancer** is best suited for load balancing of TCP traffic where extreme performance is required.
- **Classic Load Balancer** operate at both the request level and connection level. Classic Load Balancer is intended for applications that were built within the EC2-Classic network.

Auto Scaling

Amazon EC2 Auto Scaling helps you maintain **application availability** and allows you to **automatically add** or **remove** EC2 instances according to conditions you define.

You can also use the **dynamic** and **predictive** scaling features of Amazon EC2 Auto Scaling to add or remove EC2 instances. Dynamic scaling responds to changing demand and predictive scaling automatically schedules the right number of EC2 instances based on predicted demand.

Well-Architected Framework

The Well-Architected Framework has been developed to help cloud architects build secure, high-performing, resilient, and efficient infrastructure for their applications. Based on five pillars — operational excellence, security, reliability, performance efficiency, and cost optimization — the Framework provides a consistent approach for customers and partners to evaluate architectures, and implement designs that will scale over time.

[Well-Architected Framework](#)

AWS Support

AWS Support offers a range of plans that provide access to tools and expertise that support the success and operational health of your AWS solutions. All support plans provide 24x7 access to customer service, AWS documentation, whitepapers, and support forums. For technical support and more resources to plan, deploy, and improve your AWS environment, you can select a support plan that best aligns with your AWS use case.

Support Plans

- **Basic** - **FREE**
- **Developer** - If you are experimenting or testing in AWS.
- **Business** - If you have production workloads in AWS.
- **Enterprise** - If you have business and/or mission critical workloads in AWS.

<https://aws.amazon.com/premiumsupport/plans/>

Domain 4: Billing and Pricing

How do you pay for AWS?

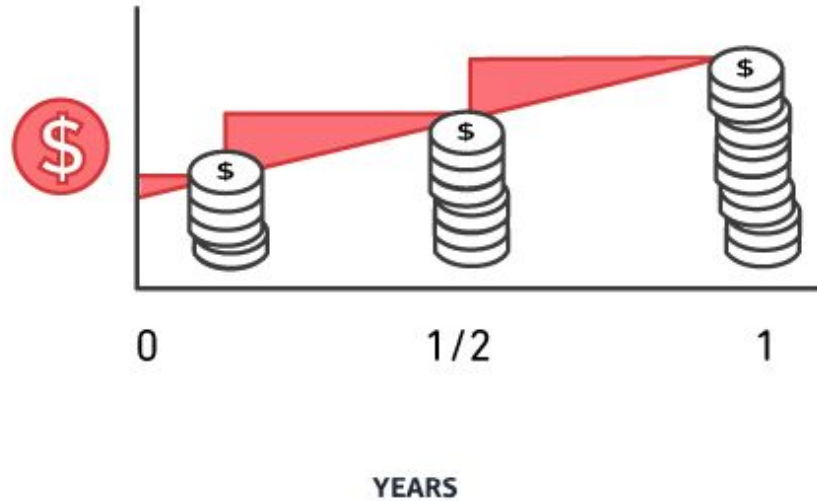
- Pay-as-you-go
- Save when you reserve
- Pay less by using more

Pay-as-you-go

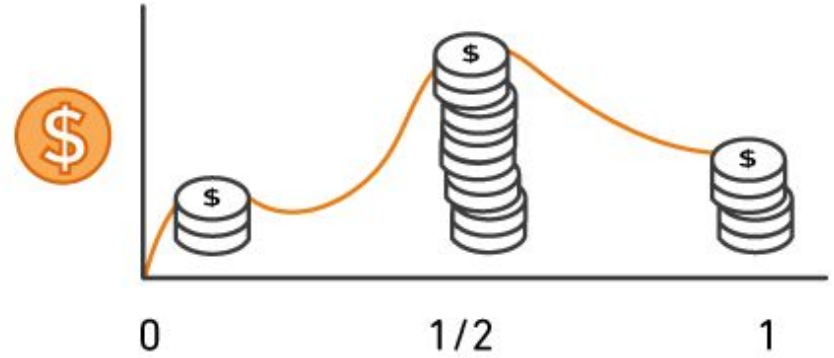
Pay-as-you-go pricing allows you to easily adapt to changing business needs without overcommitting budgets and improving your responsiveness to changes. With a pay as you go model, you can adapt your business depending on need and not on forecasts, reducing the risk of over provisioning or missing capacity.

Pay-as-you-go

On Premises/Colocation



AWS



UNDERUTILIZATION

Save when you reserve

For certain services like **Amazon EC2** and **Amazon RDS**, you can invest in reserved capacity. With Reserved Instances, you can save up to **75% over equivalent on-demand capacity**.

Reserved Instances are available in 3 options:

- All up-front (AURI)
- Partial up-front (PURI)
- No upfront payments (NURI)

Save when you reserve

EC2
m4.
large

1 Year No Upfront

\$955/year (On
Demand)

vs.

\$650/year
(NURI)



32% SAVINGS

EC2
m4.
large

1 Year Partial Upfront

\$955/ year (On
Demand)

vs.

\$554/year
(PURI)



42% SAVINGS

EC2
m4.
large

1 Year All Upfront

\$955 (On
Demand)

vs.

\$545/year
(AURI)



43% SAVINGS

Pay less by using more

With AWS, you can get volume based discounts and realize important savings as your usage increases. For services such as S3 and data transfer OUT from EC2, pricing is tiered, meaning the more you use, the less you pay per GB. In addition, data transfer IN is always free of charge. As a result, as your AWS usage needs increase, you benefit from the economies of scale that allow you to increase adoption and keep costs under control.

Pay less by using more



UP to 50TB Storage



51-100TB Storage



500TB+ Storage



0.023 GB/month



0.022 GB/mont



0.021 GB/month

Understand the fundamentals of pricing

There are **three** fundamental drivers of cost with AWS: **compute**, **storage**, and **outbound data transfer**. These characteristics vary somewhat, depending on the AWS product and pricing model you choose.

In **most cases**, there is no charge for **inbound** data transfer or for **data transfer between other AWS services within the same region**. There are some exceptions, so be sure to verify data transfer rates before beginning.

https://d1.awsstatic.com/whitepapers/aws_pricing_overview.pdf

AWS Billing and Cost Management

AWS Billing and Cost Management is the service that you use to pay your AWS bill, monitor your usage, and analyze and control your costs.

Features in Billing and Cost Management

- Estimate and plan your AWS costs
- Receive alerts if your costs exceed a threshold that you set
- Assess your biggest investments in AWS resources
- Simplify your accounting if you work with multiple AWS accounts

AWS Budgets & Cost Explorer

AWS Budgets gives you the ability to set custom **budgets** that **alert** you when your costs or usage exceed (or are forecasted to exceed) your budgeted amount.

BEFORE

AWS Cost Explorer has an easy-to-use interface that lets you **visualize, understand, and manage** your AWS costs and usage over time.

AFTER

Free Services

- Amazon VPC
- Elastic Beanstalk
- CloudFormation
- IAM
- AutoScaling
- Opsworks

AWS Free Tier

The AWS Free Tier enables you to gain free, hands-on experience with the AWS platform, products, and services. AWS Free Tier includes offers that expire 12 months after sign-up, Always free and Trials.

<https://aws.amazon.com/free/>

Estimating Amazon EC2 costs

- Clock hours of server time
- Instance type
- Pricing model
- Number of instances
- Load balancing
- Detailed monitoring
- Auto Scaling
- Elastic IP addresses
- Operating systems and software packages

AWS Lambda pricing

Duration is calculated from the time your code begins executing until it returns or otherwise terminates, rounded up to the nearest 100 milliseconds. The price depends on the amount of memory you allocate to your function.

How Amazon EBS is priced

- Volumes
- Snapshots
- Data Transfer

Estimating Amazon S3 storage costs

- Storage Class
- Storage
- Requests
- Data transfer

Estimating Amazon RDS costs

- Clock hours of server time
- Database characteristics
- Database purchase type
- Number of database instances
- Provisioned storage
- Additional storage
- Requests
- Deployment type
- Data transfer

Resource Groups

You can use resource groups to **organize** your AWS resources. Resource groups make it easier to manage and automate tasks on large numbers of resources at one time.

Tags for Cost Allocation

AWS Cost Explorer and detailed billing reports support the ability to break down AWS costs by tag. Typically, customers use business tags such as cost center/business unit, customer, or project to associate AWS costs with traditional cost-allocation dimensions. However, a cost allocation report can include any tag. This allows customers to easily associate costs with technical or security dimensions, such as specific applications, environments, or compliance programs.

AWS Organizations

AWS Organizations is an account management service that enables you to consolidate multiple AWS accounts into an organization that you create and centrally manage. AWS Organizations includes account management and consolidated billing capabilities that enable you to better meet the budgetary, security, and compliance needs of your business. As an administrator of an organization, you can create accounts in your organization and invite existing accounts to join the organization.

Features

- Manage and define your organization and accounts
- Control access and permissions
- Audit, monitor, and secure your environment for compliance
- Share resources across accounts
- Centrally manage costs and billing

AWS Account Structures

AWS Organizations to create hierarchical and logical groupings to better manage accounts. Note that there is a soft **limit of 20 accounts per organization**, and a hard limit of one level of billing hierarchy; for example, a master (paying) account cannot be in the same organization as another master (paying) account.

<https://aws.amazon.com/answers/account-management/aws-multi-account-billing-strategy/>

AWS Calculators

- AWS Pricing Calculator
- TCO Calculator

AWS Pricing Calculator

The calculator allows you to estimate individual or multiple prices and use templates to appraise complete solutions.

<https://calculator.aws/>

TCO Calculator

The AWS TCO calculator gives you the option to evaluate the savings from using AWS and **comparing** against **on premises** and **co-location** environments. The TCO calculator matches your current infrastructure to the most cost effective AWS offering. This tool takes into consideration all the costs to run a solution, including **physical facilities, power and cooling**, providing a realistic end-to-end comparison of your costs.

<https://aws.amazon.com/tco-calculator/>