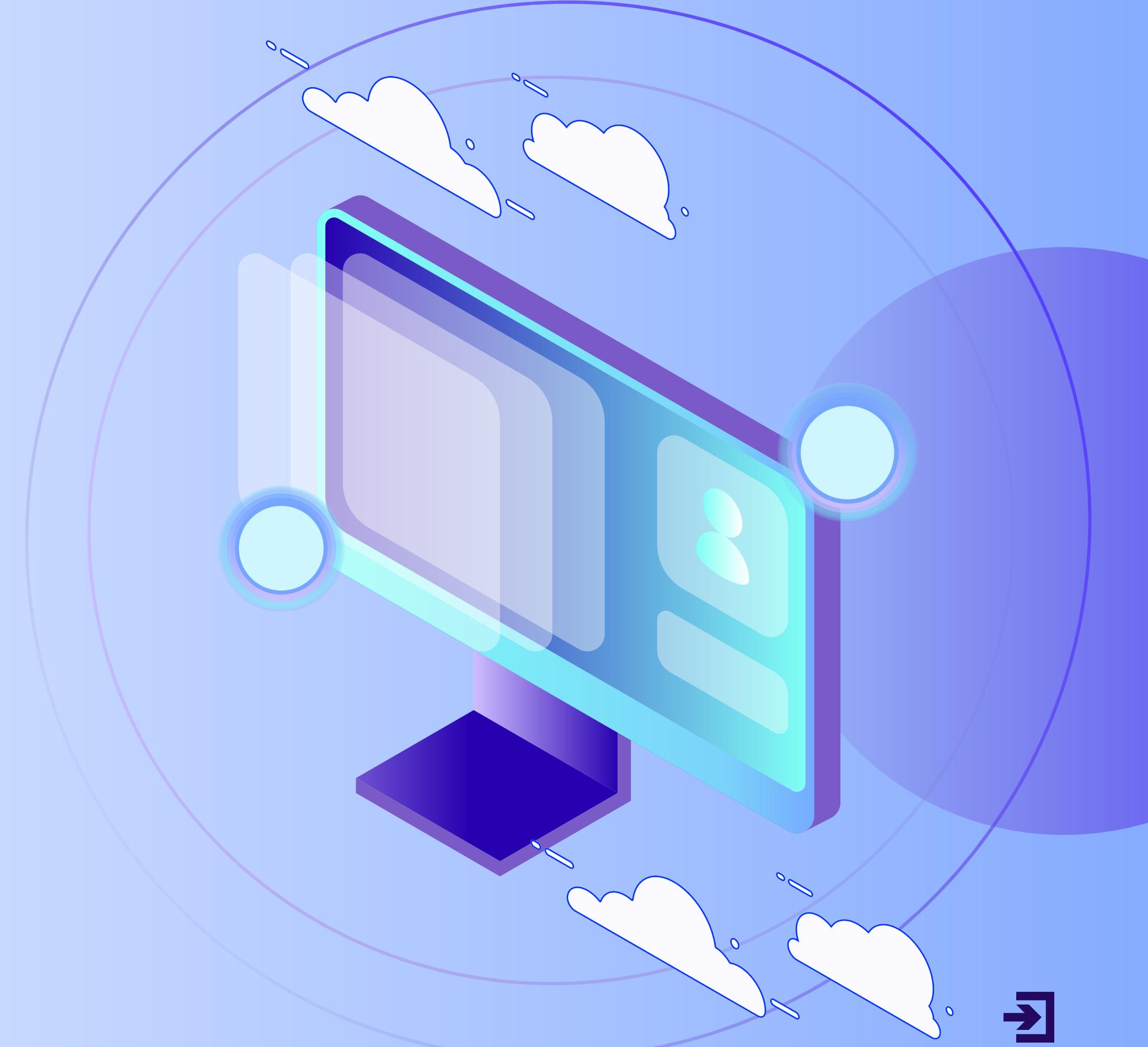




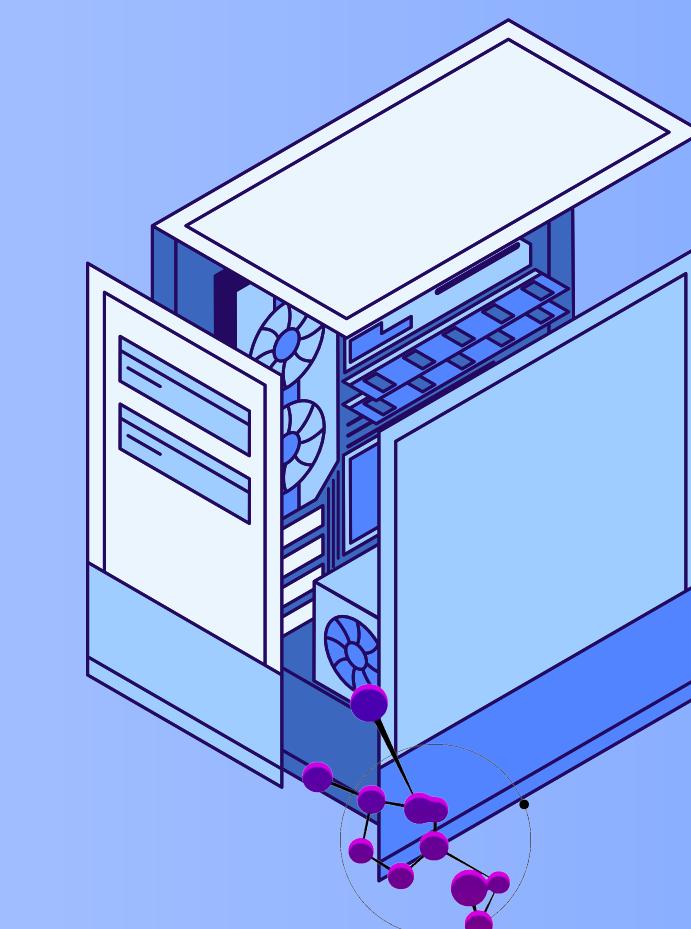
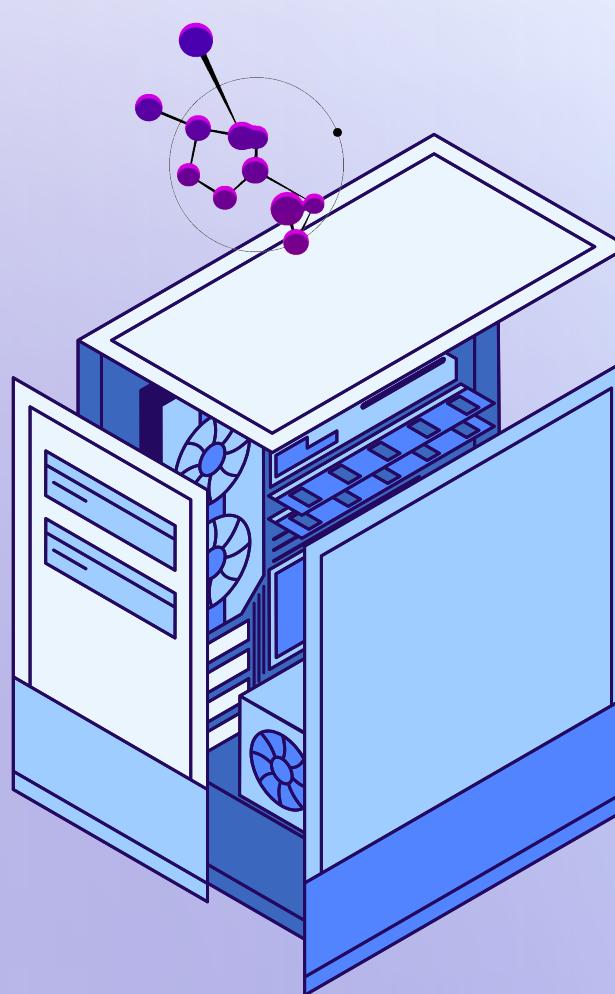
Amazon Web Services

AWS S3 AND EC2

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INTRODUCTION



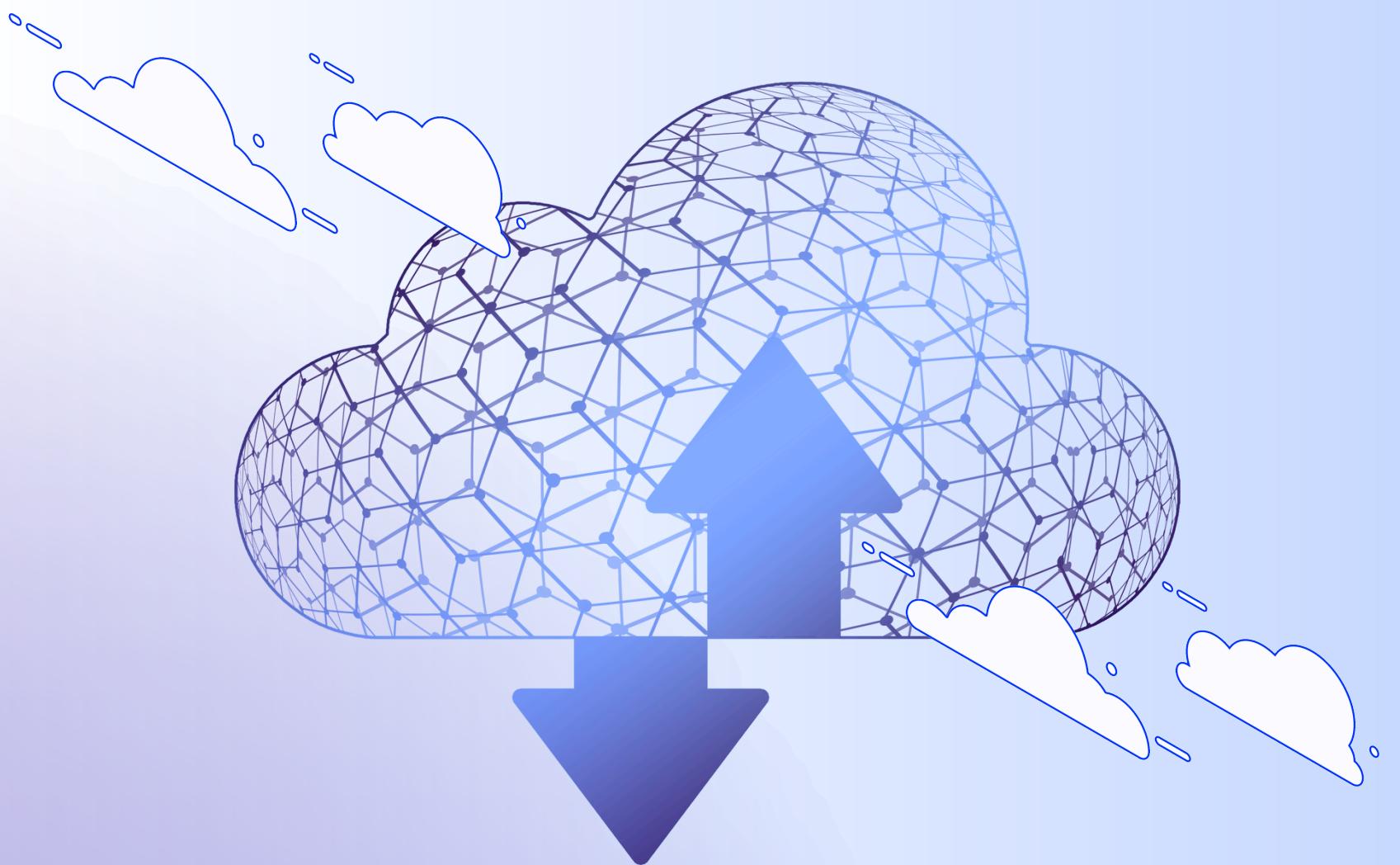
In today's digital world, businesses are running websites, storing data, and handling large amounts of information that require a lot of computing power.

But how can they do so without owning a bunch of expensive hardware?

That's where **cloud computing** comes in.



CLOUD COMPUTING



Instead of buying and maintaining physical servers, businesses can use computing power, storage, and other resources over the internet. This makes things cheaper, scalable, and way more flexible.

Today, several major companies provide cloud computing services, making it easier for businesses to access the technology they need.

Some of the biggest cloud providers include **Amazon Web Services (AWS)**, **Microsoft Azure**, and **Google Cloud Platform (GCP)**.



AWS

Amazon Web Services (AWS) is one of the leading cloud computing platforms in the market. It launched its first cloud services in 2006, and today, it offers **100+ cloud services** spanning a wide range of domains, such as computing power, databases, networking, storage, and security.

Some of AWS's widely used services are:

- **Amazon EC2** – Virtual servers for computing power.
- **Amazon S3** – Scalable object storage for data.
- **Amazon IAM** – Securely manages access to AWS services and resources with policies and permissions.
- **Amazon RDS** – Managed relational database service.
- **Amazon CloudTrail** – Provides governance, compliance, and auditing by logging AWS account activity.



BENEFITS OF AWS

Many businesses ranging from startups to global enterprises such as **Sony**, **Adobe**, and **Netflix** trust AWS for their operations.



- **Security** – A secure, durable platform with end-to-end privacy and compliance.
- **Experience** – Benefit from Amazon's years of expertise in infrastructure management.
- **Flexibility** – Choose your preferred OS, programming language, and database.
- **Ease of Use** – Quickly host applications with a user-friendly interface.
- **Scalability** – Scale applications up or down based on demand.
- **Pay-as-you-go pricing structure** – You only pay for the resources you use thus offering cost efficiency and flexibility.

Now, let's take a look at 2 of AWS' most widely used web services – Amazon EC2 and Amazon S3.





AWS EC2

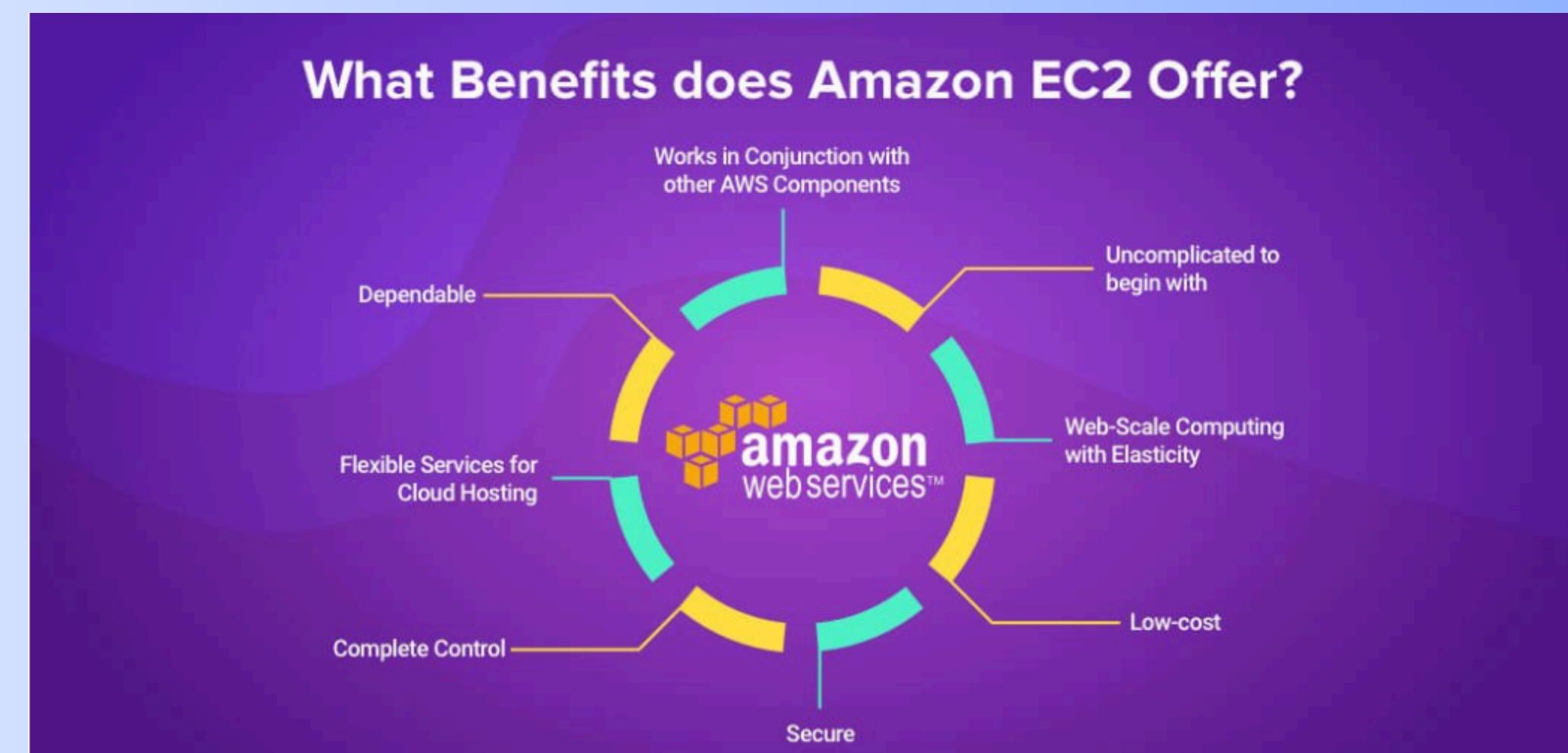


Amazon EC2 (Elastic Compute Cloud) is a cloud-based virtual server that allows users to rent compute power on-demand. Instead of buying physical servers, you can launch virtual machines (VMs) in minutes, scale them up or down, and pay only for what you use.



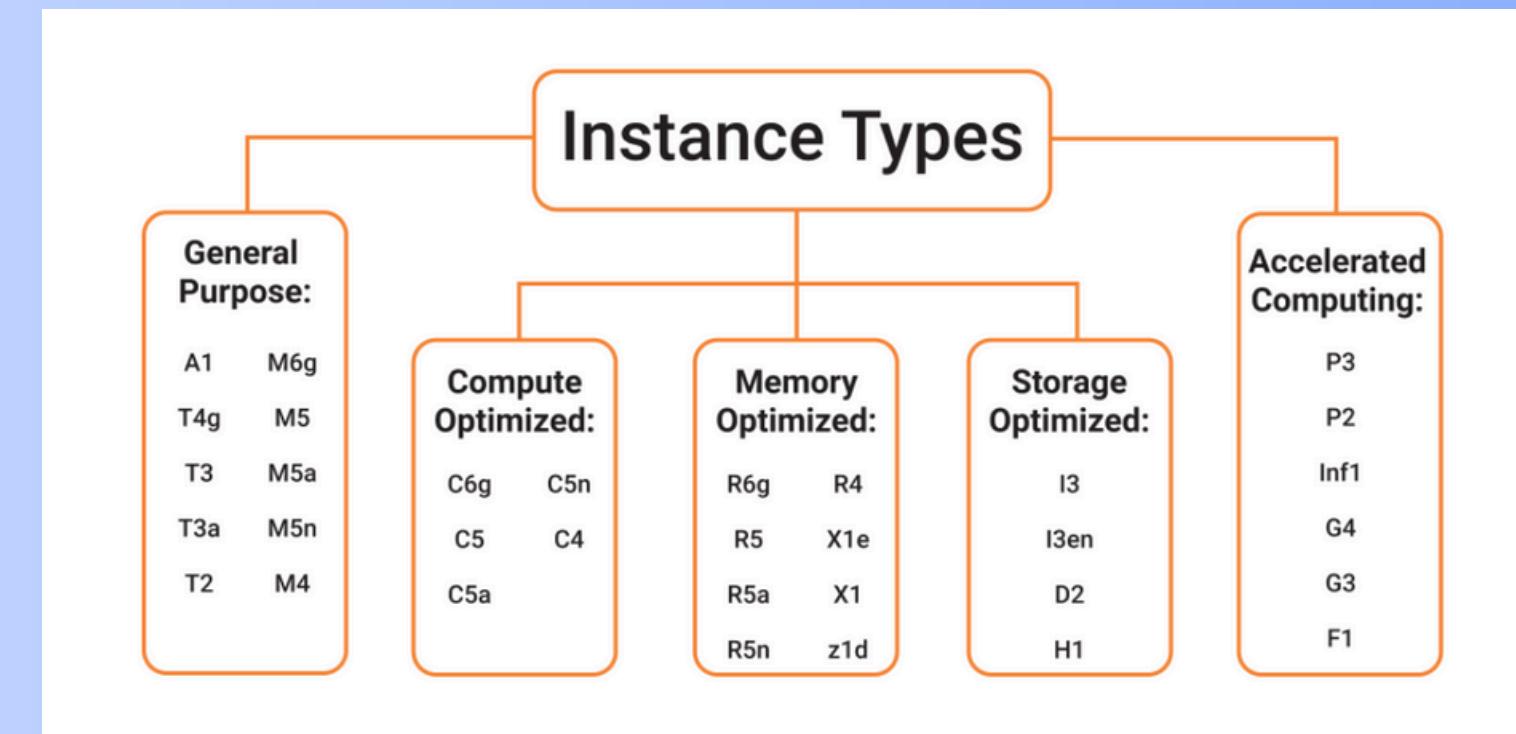
FEATURES & BENEFITS

- Elasticity & Scalability
- Multiple Instance Types
- Flexible Pricing Models
- High Security
- Auto Scaling .
- Elastic Load Balancing (ELB)
- High-Performance Networking
- EBS (Elastic Block Store)
- Seamless AWS Integration



INSTANCE TYPES

- **General Purpose** – Balanced compute, memory, and networking. Examples: t3, t3a, m6i, m7g
- **Compute-Optimized** – High-performance processors for intensive workloads. Examples: c6i, c7g
- **Memory-Optimized** – More RAM for large in-memory databases and real-time analytics. Examples: r6g, x2idn
- **Storage-Optimized** – High-speed storage for heavy disk I/O applications. Examples: i3, d2, h1
- **GPU-Optimized** – Designed for machine learning (ML) and graphics-intensive applications. Examples: g5, p4d, inf2



Scalable from nano to 48xL



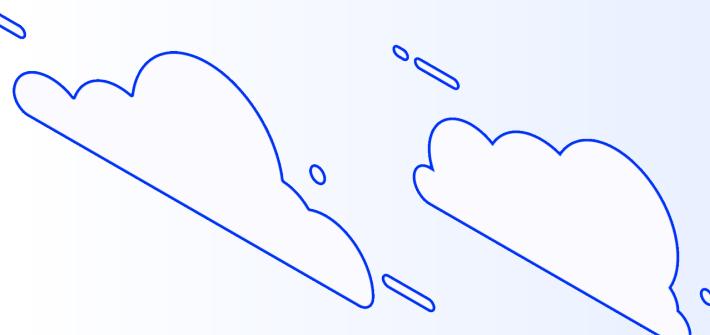
AUTO SCALING & LOAD-BALANCING



Auto Scaling

- Automatically scales instances up/down based on demand
- Ensures high availability during traffic spikes
- Reduces costs by removing idle instances

Example: A food delivery app gets more traffic at lunch/dinner. Auto Scaling adds instances during peak hours and removes them later to save costs.



Elastic Load Balancing – Distribute Traffic Efficiently

- Distributes incoming traffic across multiple EC2 instances
- Prevents overloading of a single instance
- Ensures fault tolerance by redirecting traffic if an instance fails

Example: A ride-sharing app uses an Application Load Balancer to send user requests to the nearest available server, ensuring fast response times.



CASE STUDY



Anna is a data scientist working on a startup project. She wants to move from her on-premises setup to AWS for better scalability, cost-efficiency, and reliability.

Her Goals:

- Run machine learning models without worrying about hardware limits.
- Ensure the setup can handle sudden spikes in traffic.
- Optimize costs while maintaining good performance.

What EC2 configuration would best suit her needs?

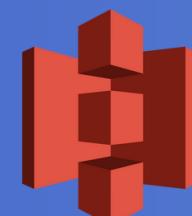


Factor	Options	Best Choice for Anna
Performance Needs	General computing High-memory workloads Machine learning & deep learning	Machine learning & deep learning
Storage Option	Instance Store (Temporary) EBS (Elastic Block Store, Persistent)	EBS for long-term storage
Networking	Standard 5 Gbps 10 Gbps Enhanced Networking	10 Gbps Networking – Fast data transfer
Pricing Model	On-Demand (Flexible, but costly) Reserved (Long-term savings) Spot Instances (Up to 90% cheaper, but interruptible)	Spot Instances – Cost-effective for training ML models
Instance Type	Compute-Optimized (C6i, C7g) Memory-Optimized (R6g, X2idn) GPU-Optimized (G5, P4d)	G5 (GPU-Optimized) – Best for ML training



AWS

S3



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



FEATURES



- **Unlimited Object Storage** – Store any amount of data without capacity limits.
- **11 9's Durability (99.99999999%)** – Data is automatically replicated across multiple Availability Zones.
- **Multiple Storage Classes** – Optimize costs with S3 Standard, Intelligent-Tiering, Glacier, etc.
- **Scalability & High Performance** – Handles high request rates and large-scale workloads.
- **Strong Security & Compliance** – Supports encryption, IAM roles, bucket policies, and compliance standards.
- **Event-Driven Automation** – Triggers AWS Lambda, SNS, SQS based on object changes.
- **S3 Select & Athena** – Query structured data directly from S3 without moving it.
- **Cross-Region Replication (CRR)** – Automatically replicate data across AWS regions.



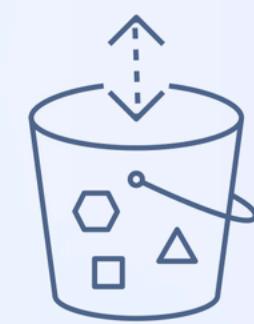
STORAGE CLASSES



S3 Standard



S3 Intelligent-Tiering



S3 Standard-IA



S3 One Zone-IA



S3 Glacier



S3 GlacierDeep Archive

Frequent

- Active, frequently accessed data
- Milliseconds access
- > 3 AZ
- Monitoring fee per object
- Min storage duration

Access frequency

- Data with changing access patterns
- Milliseconds access
- > 3 AZ
- Retrieval fee per GB
- Min storage duration
- Min object size

- Infrequently accessed data
- Milliseconds access
- > 3 AZ
- Retrieval fee per GB
- Min storage duration
- Min object size

- Re-creatable, less accessed data
- Milliseconds access
- 1 AZ
- Retrieval fee per GB
- Min storage duration
- Min object size

- Archive data
- Select minutes or hours
- > 3 AZ
- Retrieval fee per GB
- Min storage duration
- Min object size

Archive

CASE STUDY...



Category	S3 Configuration	Purpose
Storage Classes	S3 Standard, Intelligent-Tiering, Glacier	Optimize cost & performance for ML datasets and models.
Performance	S3 Transfer Acceleration, CloudFront, S3 Select	Faster uploads, global caching, and efficient querying.
Scalability & Traffic	S3 + AWS Lambda, S3 + SageMaker, S3 + EC2 Spot Instances	Auto-trigger model training & inference, handle traffic spikes.
Security	S3 IAM Policies, SSE-KMS Encryption, Object Lock, Versioning	Secure access, encryption, prevent data loss.
Cost	Lifecycle Policies, EC2 Spot + S3, Storage Lens	Reduce storage & compute costs while maintaining performance.

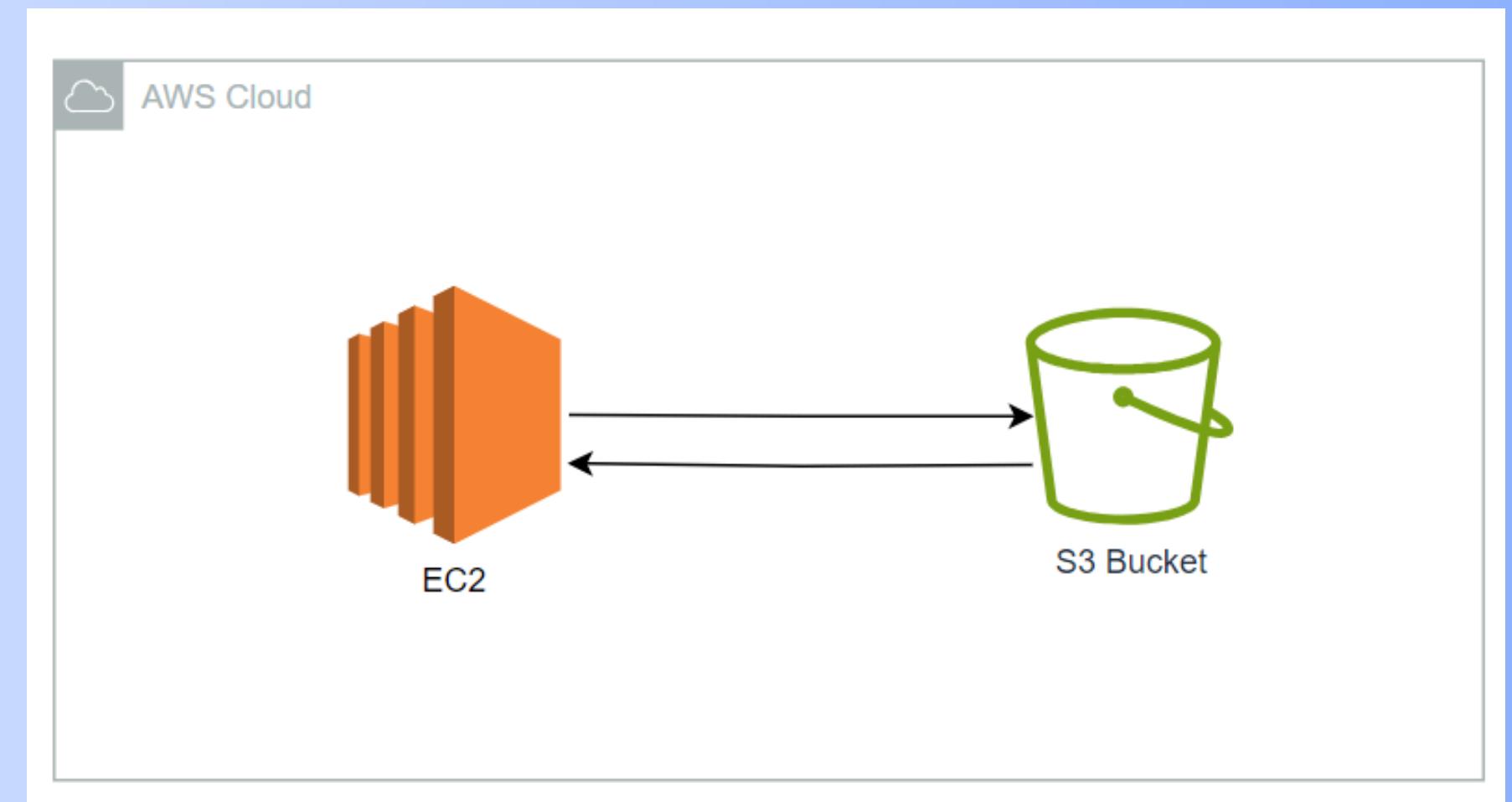
EC2 EBS VS S3

- Amazon S3 is ideal for storing and retrieving large amounts of unstructured data, such as images, videos, and backups. It offers high durability, availability, and scalability at a lower cost, making it suitable for data storage, data lakes, and content distribution.
- Amazon EBS, on the other hand, provides block-level storage volumes for use with EC2 instances. It offers low-latency access to data and is well-suited for applications that require frequent updates, such as databases and file systems.

EC2 IN SYNC WITH S3

Why Use EC2 with S3?

- Decoupled Storage & Compute → Store large files in S3, process them on EC2.
- Scalability → S3 provides unlimited storage, while EC2 scales compute power as needed.
- Cost Efficiency → Store static data in S3 (cheaper) instead of EC2 disk (EBS).
- Durability & Backup → EC2 logs, snapshots, and backups can be stored in S3.



USE CASES

- **Big Data Processing** → EC2 retrieves datasets from S3 for analytics.
- **Web Applications** → Host static website files in S3, use EC2 for dynamic content.
- **Machine Learning** → Store training datasets in S3, run models on EC2.
- **Backup & Recovery** → Store EC2 snapshots, logs, and backups in S3.



CONCLUSION

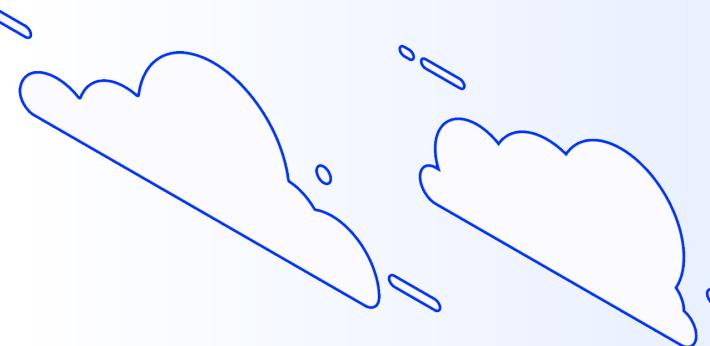
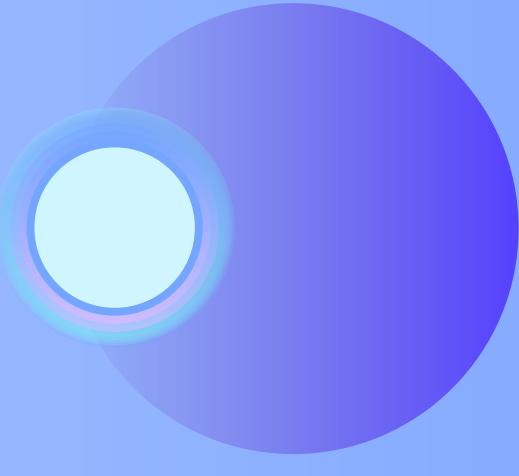
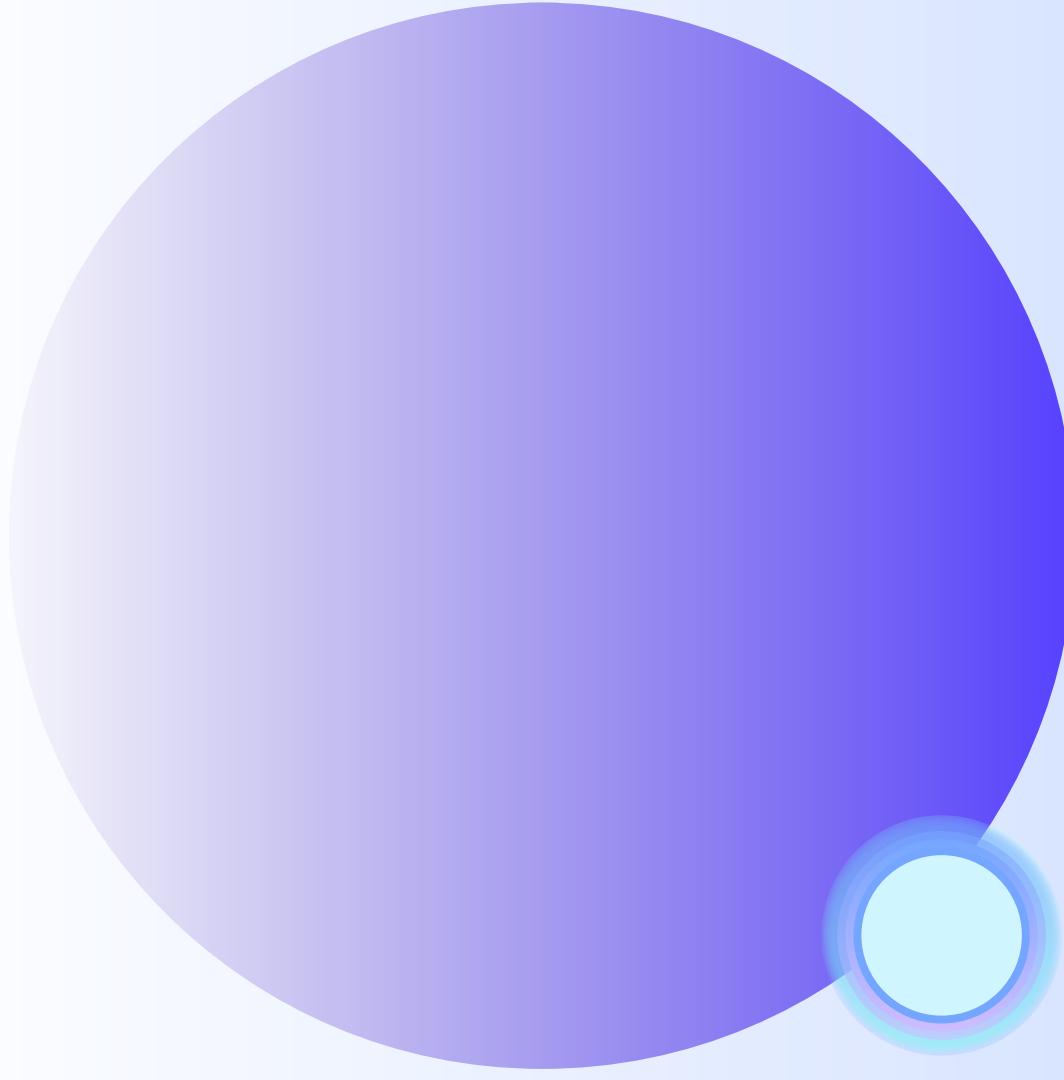
AWS EC2 and S3 are foundational cloud services that provide scalable computing and secure storage for a wide range of applications.

- **Amazon EC2** offers flexible, resizable compute capacity, enabling businesses to deploy applications efficiently without investing in physical hardware.
- **Amazon S3** provides highly durable, scalable object storage, making it ideal for backups, data lakes, media hosting, and large-scale data processing.

Companies like AdRoll have successfully leveraged EC2 for computing power and S3 for efficient storage, allowing them to scale seamlessly and optimize costs. Volonghi credits AWS with providing the scalability and capacity on demand that AdRoll needed to build its business:

"When our business was growing really fast, using AWS allowed us to scale and optimize our algorithms—and get rid of extra capacity. AWS saves us time and money. We don't need a bigger data center, we don't need to get more operations people on board, and we don't need to acquire more machines just because we have to scale up."

[Read more](#)



THANK YOU!