MASTERING AWS CORE SERVICES: EC2, ECS, EKS, S3, IAM, VPC, ALB & CLOUDWATCH

Introduction

Amazon Web Services (AWS) provides a powerful suite of cloud computing services that enable businesses to scale, automate, and secure their infrastructure. Whether you're a **DevOps engineer**, **developer**, or **cloud enthusiast**, understanding AWS core services is essential for **designing high-availability architectures** and **optimizing cloud performance**.

Here are the **dive** into eight fundamental AWS services—**EC2, ECS, EKS, S3, IAM, VPC, ALB, and CloudWatch**—with real-world applications and hands-on exercises.

1 Amazon EC2 (Elastic Compute Cloud)

What is EC2?

Amazon EC2 is a virtual machine (VM) service that allows users to deploy and manage **scalable compute power** in the cloud.

Key Features:

- **Instance Types:** General, Compute-Optimized, Memory-Optimized, etc.
- **Elastic IPs:** Persistent IP addresses for instances.
- **Auto Scaling:** Automatically adjusts the number of instances.
- **Spot Instances:** Low-cost computing for flexible workloads.

Real-World Use Cases:

- Hosting web applications and databases.
- Running microservices and backend APIs.
- Machine learning model training.

Hands-on Exercise:

- Launch an EC2 Instance
- Set Up Auto Scaling

2 Amazon ECS (Elastic Container Service)

What is ECS?

Amazon ECS is a **container orchestration** service that allows you to deploy, manage, and scale **Docker containers** on AWS.

Key Features:

- **Cluster Management:** Grouping EC2 instances or Fargate containers.
- **Task Definitions:** Predefined container configurations.
- **Service Auto Scaling:** Dynamically adjusts running containers.
- **Integration with ALB & IAM:** Securely expose services.

Real-World Use Cases:

- Running microservices architectures.
- Managing scalable and serverless applications.

Hands-on Exercise:

- Deploy a Web App on ECS
- ECS with Fargate

3 Amazon EKS (Elastic Kubernetes Service)

What is EKS?

Amazon EKS is a managed **Kubernetes** service that simplifies deployment and scalability of containerized applications.

Key Features:

- **Managed Control Plane:** AWS handles Kubernetes master nodes.
- **Cluster Autoscaler:** Automatically adds/removes worker nodes.
- **IAM for Service Accounts (IRSA):** Secure access control.

Real-World Use Cases:

- Running Kubernetes workloads in a managed environment.
- Deploying scalable microservices applications.

Hands-on Exercise:

- Deploy Kubernetes Cluster on EKS

"Great things never come from comfort zones. Step up, take risks, and create something legendary!"

4 Amazon S3 (Simple Storage Service)

What is S3?

S3 is **object storage** for securely storing any type of data, including files, logs, and backups.

Key Features:

- **Buckets:** Organize and store objects.
- **Lifecycle Policies:** Automate data retention and deletion.
- **Versioning:** Maintain previous versions of objects.
- **S3 Encryption:** Secure data at rest and in transit.

Real-World Use Cases:

- Storing website assets (images, videos, CSS/JS files).
- Backups and disaster recovery.
- Data lakes for analytics.

Hands-on Exercise:

- Create an S3 Bucket
- Host a Static Website on S3

5 AWS IAM (Identity and Access Management)

What is IAM?

IAM is a security service that manages **permissions and authentication** for AWS resources.

Key Features:

- **Users & Groups:** Assign permissions to people.
- **Roles:** Assign permissions to AWS services.
- **Policies:** Define access rules using JSON.
- **MFA (Multi-Factor Authentication):** Enhance account security.

Real-World Use Cases:

- Granting developers access to specific AWS services.
- Securing AWS accounts with MFA and IAM roles.

Hands-on Exercise:

- Create IAM Users & Roles
- Setup MFA for AWS

6 Amazon VPC (Virtual Private Cloud)

What is VPC?

VPC is a **networking service** that allows you to define an isolated cloud environment.

Key Features:

- **Subnets:** Public and private network zones.
- **Route Tables:** Define traffic flow.
- **Internet Gateway (IGW):** Connect VPC to the internet.
- **NAT Gateway:** Allow private subnets to access the internet securely.

Real-World Use Cases:

- Running secure applications within a **private network**.
- Hosting databases in **private subnets** with restricted access.

Hands-on Exercise:

- Create a VPC with Public & Private Subnets

7 AWS ALB (Application Load Balancer)

What is ALB?

ALB is a **load balancing service** that distributes incoming traffic across multiple backend resources.

Key Features:

- **Path-Based Routing:** Direct requests based on URL patterns.
- **Host-Based Routing:** Direct requests based on domain names.
- **Target Groups:** Manage backend instances dynamically.

Real-World Use Cases:

- Load balancing microservices.
- Distributing traffic across EC2 and ECS containers.

Hands-on Exercise:

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- Set Up ALB & Attach EC2 Instances

8 Amazon CloudWatch

What is CloudWatch?

CloudWatch is an AWS monitoring and logging service for tracking application performance.

Key Features:

- **Metrics:** CPU, Memory, Network, Disk usage.
- **Alarms:** Trigger notifications based on thresholds.
- **Logs:** Capture and analyze application logs.

Real-World Use Cases:

- Monitoring **EC2, Lambda, ECS performance**.
- Setting up **alerts for critical failures**.
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Hands-on Exercise:

- Create CloudWatch Alarms for EC2