**1. How do you deploy Docker containers on AWS?**

You can deploy Docker containers on AWS using different methods:

* **Amazon ECS (Elastic Container Service):** AWS-managed container service.
* **Amazon EKS (Elastic Kubernetes Service):** Runs Kubernetes-based containers.
* **AWS Fargate:** Serverless option, no need to manage servers.
* **Amazon EC2:** Runs containers on virtual machines manually.

**Using EC2 (Elastic Compute Cloud):**

1. Launch an EC2 Instance
   * Go to AWS EC2 dashboard and create a new instance.
   * Select instance type, configure security groups, and launch the instance.
2. Connect to the Instance
   * Use SSH to connect to your EC2 instance:

ssh -i my-key.pem ec2-user@your-ec2-ip

1. Install Docker (If Not Pre-installed)
   * Update and install Docker:

Sudo yum update -y

Sudo yum install -y docker

1. Start Docker:

sudo service docker start

1. Pull and Run a Docker Container
   * Pull an image from Docker Hub:

docker pull nginx

* + Run the container:

docker run -d -p 80:80 nginx

* + Your application is now running on port 80 of the EC2 instance.

1. Expose the Application to the Internet
   * Edit EC2 security group to allow inbound traffic on port 80.
   * Access your application using http://your-ec2-ip in a browser.
2. Persist Data Using Docker Volumes
   * Mount a volume to save data:

docker run -d -p 80:80 -v /mydata:/var/lib/nginx nginx

1. Stop and Remove a Container
   * Stop a running container:

docker stop <container\_id>

* + Remove a container:

docker rm <container\_id>

**2. What is Amazon ECR (Elastic Container Registry)?**

Amazon ECR is a private container image storage service. It helps store, manage, and deploy Docker images securely.

**Benefits:**

* Secure storage with AWS IAM authentication.
* Works with ECS, EKS, and Lambda.
* Scalable and fast.

**3. Difference between ECS and EKS in AWS?**

| **Feature** | **Amazon ECS (AWS-native)** | **Amazon EKS (Kubernetes-based)** |
| --- | --- | --- |
| Complexity | Easy to set up | More complex, requires Kubernetes knowledge |
| Cost | Lower | Higher due to Kubernetes management |
| Scaling | AWS Fargate or EC2 | Kubernetes autoscaling |
| Best for | AWS users | Kubernetes workloads |

**4. How does Docker integrate with AWS CI/CD pipelines?**

AWS CodePipeline automates Docker deployment:

1. **CodeCommit** (stores code)
2. **CodeBuild** (builds Docker images)
3. **Amazon ECR** (stores the images)
4. **CodeDeploy** (deploys containers to ECS or EKS)

Example Buildspec.yml file:

version: 0.2

phases:

build:

commands:

- docker build -t my-app .

- docker tag my-app:latest <aws\_account\_id>.dkr.ecr.<region>.amazonaws.com/my-app:latest

- docker push <aws\_account\_id>.dkr.ecr.<region>.amazonaws.com/my-app:latest

**5. What is AWS Fargate?**

AWS Fargate is a serverless container service that runs containers without managing EC2 instances.

**Benefits:**

* No need to manage infrastructure.
* Automatically scales.
* Pay only for running containers.

**6.How to scale Docker containers on AWS?**

You can scale containers using:

* **ECS Auto Scaling** (based on CPU/memory usage).
* **EKS Horizontal Pod Autoscaler** (Kubernetes autoscaling).
* **AWS Fargate Auto Scaling** (adjusts automatically).
* **Application Load Balancer (ALB)** (distributes traffic).

Example to scale an ECS service:

aws ecs update-service --service my-service --desired-count 5

**7.What is Docker Compose, and how to use it with AWS?**

A Docker Compose file (docker-compose.yml) defines multi-container applications. You can deploy it to AWS ECS using AWS Copilot CLI.

Example Compose file:

version: "3"

services:

web:

image: nginx

ports:

- "80:80"

Deploy using Copilot:

copilot init

copilot deploy

**8. How to monitor Docker containers in AWS?**

* **Amazon CloudWatch Logs** – Collects logs from ECS/EKS.
* **AWS X-Ray** – Helps trace application performance.
* **AWS CloudTrail** – Tracks API activity.
* **Prometheus & Grafana** – Used for Kubernetes monitoring.

Example to check ECS logs:

aws logs tail /aws/ecs/my-cluster --follow

**9.How to secure Docker containers on AWS?**

Use **IAM Roles** – Restrict permissions.

Enable **VPC Security Groups** – Control network access.

**Scan Images** with Amazon ECR for security issues.

Store secrets in **AWS Secrets Manager**.

Use **AWS WAF** to protect against attacks.

Example to scan an ECR image:

aws ecr start-image-scan --repository-name my-app --image-id imageTag=latest

**10.How to optimize cost when running Docker on AWS?**

**Use AWS Fargate** – Avoid EC2 instance costs.

**Use Spot Instances** – Run non-critical workloads at lower prices.

**Right-size Containers** – Avoid over-allocating CPU/memory.

**Auto-scale** – Reduce instances during low traffic.

**Use AWS Savings Plans** – Get long-term discounts.

Example to run ECS tasks on Spot Instances:

aws ecs create-service --cluster my-cluster --launch-type EC2 --spot