



## INTERVIEW QUESTIONS on PV, PVC , Storage Class, CSI Driver.

### Understanding Storage in EKS (Kubernetes)

Kitchen/Restaurant (ECS Cluster). POD(Chef) Fridge(Disk/Storage) Cooking ingredience.

- Pods are **ephemeral** — they come and go. But container might need to store something.

So, you need **persistent storage** — a place to keep your data **outside** the Pod.

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#### Why Can't We Just Attach Storage Directly?

In Kubernetes:

- Pods are **ephemeral** — they come and go.
- Containers inside pods are stateless by default.
- So, for **databases, logs, or files**, you need a way to:
  - Store data **even if the pod restarts**
  - Possibly share it with **multiple pods** (like shared folders)

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#### 1. Persistent Volume (PV) – *The Actual Disk*

- Think of a **PV** like a **physical disk or drive** that exists **in the cluster**.
- It's **pre-created or dynamically created** by Kubernetes.
- Examples: **AWS EBS (like a USB drive)** or **EFS (like a network folder)**.

◆ It's **not tied to any pod**, just sits there waiting to be claimed.

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#### 2. Persistent Volume Claim (PVC) – *The Pod's Request*

- A **PVC** is like a **form** a pod fills out saying:

"I need 10GB of storage, please give me something I can write to."

- Kubernetes looks at available **PVs**, finds a match, and **binds it to the PVC**.

So **PVCs** are what **pods use to ask for storage**, and **PVs** are the actual storage.

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#### 3. StorageClass

A **StorageClass** is like a **template** or **policy** for creating PVs.

- It defines:
  - **What type** of storage (e.g., EBS gp3, EFS)
  - **How fast** (IOPS, throughput)
  - **Where** (Availability Zone)

Without this, you'd have to manually create disks every time someone needs storage.

So:

- Pod → uses PVC → refers to a StorageClass → which creates a PV behind the scenes.

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Deployment → Pod → needs persistent data  
→ attaches PVC (storage request)  
↓  
Matches StorageClass  
↓  
Kubernetes provisions PV using CSI driver (like EBS or EFS)  
↓  
Pod uses the mounted storage

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### Example Use Case: Database Pod

You deploy **MySQL** on EKS. But MySQL needs disk storage to store data files. If the pod is deleted, you don't want to lose the database!

#### You do this:

1. Define a **StorageClass** using EBS.
2. Create a **PVC** requesting 10GB.
3. MySQL Pod attaches this PVC to /var/lib/mysql.
4. Data is stored on an EBS volume (PV).
5. Pod restarts? No problem — the PV is still there!

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### Key AWS Storage Types

Storage Type	Description	Good For	CSI Driver
<b>EBS</b>	Block storage, one EC2 at a time	Databases, single pod	aws-ebs-csi-driver
<b>EFS</b>	Shared file system	Multi-pod access, logs	aws-efs-csi-driver
<b>S3</b>	Object storage (not PV-compatible)	Backups, binaries	Not directly mountable

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### Example YAML Snippet (EBS)

#### StorageClass

yaml

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```
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: ebs-sc
provisioner: ebs.csi.aws.com
volumeBindingMode: WaitForFirstConsumer
parameters:
  type: gp3
```

#### PVC

yaml

-----

```
apiVersion: v1
```

```

kind: PersistentVolumeClaim
metadata:
  name: my-ebs-pvc
spec:
  accessModes:
    - ReadWriteOnce
  resources:
    requests:
      storage: 10Gi
  storageClassName: ebs-sc

```

### Pod Using PVC

yaml

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```

apiVersion: v1
kind: Pod
metadata:
  name: my-db
spec:
  containers:
    - name: mysql
      image: mysql
      volumeMounts:
        - mountPath: /var/lib/mysql
          name: mysql-storage
  volumes:
    - name: mysql-storage
      persistentVolumeClaim:
        claimName: my-ebs-pvc

```

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Concept	Think Of It As...	Purpose
<b>PV</b>	A disk in your cluster	Holds data for a pod
<b>PVC</b>	A request form for a disk	Pod asks for storage
<b>StorageClass</b>	Blueprint for how to create a disk	Auto-create PVs dynamically
<b>CSI Driver</b>	Bridge between AWS and Kubernetes	Allows EKS to create AWS storage

### ◆ 73. What are Persistent Volumes (PVs) and Persistent Volume Claims (PVCs)?

Imagine you're renting storage lockers (PVs), and people (pods) request a locker (PVC).

- **PV (Persistent Volume)**  
Think of it like a **storage locker** already set up in your system (e.g., EBS, EFS).
  - Created and managed by the Kubernetes system (admin).
  - It exists even if no one is using it right now.
  - It could be backed by AWS EBS, EFS, or NFS.
- **PVC (Persistent Volume Claim)**  
This is a **request for storage**.

- A pod says: “I need 10GB of storage that can be read and written by one pod.”
- Kubernetes finds a matching PV and gives it to the pod.

 **Analogy:** PV = available locker. PVC = a request to use a locker.

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#### ◆ 74. How do you integrate EBS volumes with EKS?

 **Amazon EBS = like attaching a USB drive to one specific server (node).**

Steps:

1. Make sure the pod and EBS volume are in the **same Availability Zone**.
2. Install the **EBS CSI driver** (a plugin to use EBS in EKS):

bash

-----

```
eksctl create addon --name aws-ebs-csi-driver --cluster <cluster-name> --service-account-role-arn <role-arn>
```


3. Define a **StorageClass** that tells Kubernetes how to use EBS:

yaml

-----

```
kind: StorageClass
metadata:
  name: ebs-sc
provisioner: ebs.csi.aws.com
volumeBindingMode: WaitForFirstConsumer
```

4. Create a **PVC** that uses this StorageClass.

 EBS is best when **only one pod** (like a database) needs to read/write the data.

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#### ◆ 75. How do you use EFS with EKS for shared storage?

 **Amazon EFS = a shared network drive (like Google Drive shared folder) that multiple pods can access together.**

Steps:

1. Create an **EFS file system** and **mount targets** in your VPC.
2. Install the **EFS CSI driver**:

bash

-----

```
eksctl create addon --name aws-efs-csi-driver --cluster <cluster-name> --service-account-role-arn <role-arn>
```


3. Create an **Access Point** (like a doorway to the EFS folder).
4. Define a **StorageClass** using the EFS driver:

yaml

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```
provisioner: efs.csi.aws.com
```

5. Create a **PVC** that uses this StorageClass.

 Use EFS when **multiple pods need to share files** (e.g., ML models, logs, shared websites).

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#### ◆ 76. What are StorageClasses in Kubernetes?

 **A StorageClass is a recipe for how to create storage** in Kubernetes.

- It defines:

- **What type** of storage to create (EBS, EFS, SSD, HDD)
- **How fast** (IOPS, throughput)
- **Where** to create it (region, AZ)

Example:

yaml

-----

apiVersion: storage.k8s.io/v1

kind: StorageClass

metadata:

name: fast

provisioner: ebs.csi.aws.com

parameters:

type: gp3

✚ StorageClass allows **automatic/dynamic storage** creation instead of manually creating PVs.

## ◆ 77. How do you handle dynamic volume provisioning in EKS?

✚ **Dynamic provisioning** = Kubernetes creates storage automatically when your pod asks for it.

Steps:

1. Define a **StorageClass** with a **CSI driver** (like EBS or EFS).
2. Your pod (via PVC) requests storage using that StorageClass.
3. Kubernetes creates a matching **Persistent Volume (PV)** automatically.

✚ EKS supports this via:

- aws-ebs-csi-driver (for block storage like EBS)
- aws-efs-csi-driver (for shared storage like EFS)

## ◆ 78. What are the different access modes for persistent volumes?

📖 **Access Modes** = How many pods can use the storage and in what way.

Access Mode	Description	EBS	EFS
ReadWriteOnce	One pod can read/write at a time	✓	✓
ReadOnlyMany	Many pods can read, but not write	✗	✓
ReadWriteMany	Many pods can read/write together	✗	✓

✚ Use:

- **EBS**: For single pod workloads (e.g., MySQL, MongoDB)
- **EFS**: For multi-pod workloads (e.g., web apps, file sharing)

## Which analogy best describes PV and PVC?

- A. PV = fridge, PVC = recipe
- B. PV = locker, PVC = request for locker
- C. PV = electricity, PVC = battery
- D. PV = database, PVC = query

✓ **Answer: B**

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**Which of the following is TRUE about Amazon EBS?**

- A. It can be mounted on multiple pods at the same time
- B. It works across all Availability Zones in one cluster
- C. It is suitable for single-pod storage needs
- D. It is used to store S3 objects

✓ **Answer: C**

📝 Explanation: EBS is like a **USB drive**, mounted to one node only  
— ideal for DB pods.

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**Amazon EFS is best suited for which of the following use cases?**

- A. Mounting as local block storage to one pod
- B. Sharing files between multiple pods
- C. Storing container logs temporarily
- D. Serving as a backup to S3

✓ **Answer: B**

📝 Explanation: EFS is like a **shared Google Drive folder**, accessible by many pods.

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**Before using EFS with EKS, what must you do? (Choose all that apply)**

- A. Install the aws-efs-csi-driver
- B. Create an EFS access point
- C. Define an S3 bucket
- D. Configure a StorageClass

✓ **Answer: A, B, D**

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**What is a StorageClass used for in Kubernetes?**

- A. Defining how to schedule a pod
- B. Assigning roles to users
- C. Creating and configuring storage automatically
- D. Connecting to RDS databases

✓ **Answer: C**

📝 Explanation: StorageClass is a **template** to create storage (like EBS/EFS) dynamically.

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**What parameters can be defined in a StorageClass?**

- A. CPU limit, memory limit
- B. Region, instance type
- C. Type of storage, IOPS, throughput
- D. Cluster name and AZ

✓ **Answer: C**

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### What is dynamic provisioning in Kubernetes?

- A. Manually attaching S3 buckets
- B. Automatically deleting unused volumes
- C. Kubernetes creates a PV automatically when a PVC is created
- D. Pods automatically delete unused storage

 **Answer: C**

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### Which access modes are supported by EBS volumes in EKS?

- A. ReadWriteOnce
- B. ReadWriteMany
- C. ReadOnlyMany
- D. WriteManyOnce

 **Answer: A**

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### You are deploying a MySQL pod in EKS. Which storage option is best?

- A. EFS with ReadWriteMany
- B. S3 bucket
- C. EBS with ReadWriteOnce
- D. Ephemeral storage

 **Answer: C**

 Explanation: MySQL is a **single-pod workload**, so EBS is ideal.