Persistent Volume & Persistent Volume Claim in Kubernetes

Persistent Volume (PV):

- PV is a cluster-level resource that represents a piece of storage in the cluster.
- It is provisioned by the cluster administrator and can be of different types like hostPath, NFS, or cloud storage.

Persistent Volume Claim (PVC):

- PVC is a request for storage by a user or pod.
- It specifies the desired access mode and storage requirements.
- PVCs are used by pods to claim a specific PV that matches their requirements.

Access Modes:

- Access modes define how the volume can be accessed by pods, for example,
- **ReadWriteOnce (RWO):** It allows read-write by a single pod.
- **ReadOnlyMany (ROX):** It allows read-only by multiple pods.
- **ReadWriteMany (RWX):** It allows read-write by multiple pods simultaneously.

Reclaim Policy:

- Reclaim policy determines what happens to the PV's data when the PVC is deleted.
- **Retain:** The PV and its data are retained even after the PVC is deleted, requiring manual cleanup.
- **Delete:** The PV and its data are automatically deleted when the associated PVC is deleted.

Binding a PVC to a PV:

- Kubernetes binds a PVC to a PV based on the requested resources and access modes specified in the PVC.
- If there is no PV available in the cluster that matches the PVC's requirements, the PVC remains in a pending state.

Storage Class:

- A Storage Class is a cluster-level resource that provides a way to dynamically provision PVs and their respective storage on the clouds or locally.
- It defines the properties of the storage, such as the type, provisioning method, and parameters.