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Day22 Challenge: Kubernetes Backup and Restore with etcd and Velero

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Hello Learners,

Welcome back to another thrilling episode of the **DevOps SRE Daily Challenge!** 🎉

Today, you'll dive into the heart of Kubernetes resilience by **Mastering etcd backup and restore** processes. Your mission? To ensure your clusters are bulletproof against disasters, equipped with robust recovery strategies, and ready to tackle real-world challenges or ace Kubernetes certifications like CKA!

What You'll Learn:

1. How to back up and restore etcd, the core datastore of Kubernetes.
2. How to back up and restore an Amazon EKS cluster using Velero, a powerful Kubernetes backup tool.
3. The importance of backup strategies and how they minimize downtime during unexpected failures.

Challenge Tasks:

The Backup and Restore Theory Challenge:

Before you jump into action, let's set the foundation:

1. **What is etcd?**

- Define etcd and explain its role in Kubernetes.
- Why is it vital to back up etcd regularly?

2. Backup and Restore Best Practices:

- List essential practices for managing backups of etcd and Kubernetes clusters.
- Discuss the importance of automating backup workflows.

3. Velero Overview:

- What is Velero, and how does it simplify Kubernetes backups?
- Share a high-level overview of its architecture and components.

Practical: Ensuring Cluster Resilience

Time to roll up your sleeves and implement backup strategies!

Task 1: etcd Backup and Restore

Setup: Use a Kubernetes cluster deployed via Kubeadm for this task.

1. Backup etcd:

- Take a snapshot of the etcd datastore using etcdctl:
| ETCDCTL_API=3 etcdctl snapshot save <backup-file> --endpoints=<etcd-endpoint>
- Verify the snapshot is saved correctly.

2. Simulate Data Loss:

- Mimic a failure scenario by deleting a few pods from your cluster.

3. Restore etcd:

- Restore etcd from the snapshot using etcdctl snapshot restore:

- | `ETCDCTL_API=3 etcdctl snapshot restore <backup-file> --data-dir=<new-data-dir>`
- Reconfigure etcd to use the restored data directory and restart etcd.

4. **Validate Restore:**

- Confirm cluster functionality by running a few `kubectl` commands and verify previously deleted pods are running.
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Task 2: Backup and Restore EKS Cluster Using Velero

Setup: Use an Amazon EKS cluster for this task.

1. **Install and Configure Velero:**

- Set up Velero on your system, configured to use an S3-compatible storage backend.

2. **Backup Your EKS Cluster:**

- Use Velero to back up your cluster resources:
 - | `velero backup create <backup-name> --include-namespaces <namespace>`
- Verify the backup is stored in your storage bucket.

3. **Restore to a New EKS Cluster:**

- Create a new EKS cluster.
- Use Velero to restore the resources to the new cluster:

- | `velero restore create --from-backup <backup-name>`

4. **Validate Restore:**

- Ensure that all resources, such as deployments and services, are correctly restored in the new cluster.

Note: You can use `kubeadm` cluster instead of EKS cluster to perform the above tasks.

Bonus Task:

1. **Automate Backups:**

- Write a script to automate backups for etcd and EKS using etcdctl and Velero.
- Schedule the script to run periodically using cron or Kubernetes CronJobs.

2. Report Observations:

- Note any challenges, insights, or unusual configurations observed during the restore processes.

Submission Guidelines:

Submit the following:

- Answers to the theory section.
- Screenshots of:
 - etcd backup and restore steps.
 - Velero backup and restore workflows.
 - The restored cluster and resource validations.
- The script used for the bonus task.
- Your insights and observations from the task.
- Post your progress with the hashtags: **#ClusterResilience, #KubernetesBackup, #SRELife, #DevOpsForAll**

Resources to Help You:

- [etcd Backup and Restore - GitHub](#)
- [etcd Backup and Restore - Video](#)
- [Velero EKS Backup Guide - AWS Blog](#)
- [Kubernetes etcd Documentation](#)

If you missed any previous challenges, you can catch up by reviewing the problem statements on [GitHub](#).

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Best regards,
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