Vault

CERTIFIED
OPERATIONS
PROFESSIONAL

Describe the Security Implications of Running Vault in Kubernetes

Running Vault on Kubernetes

Vault

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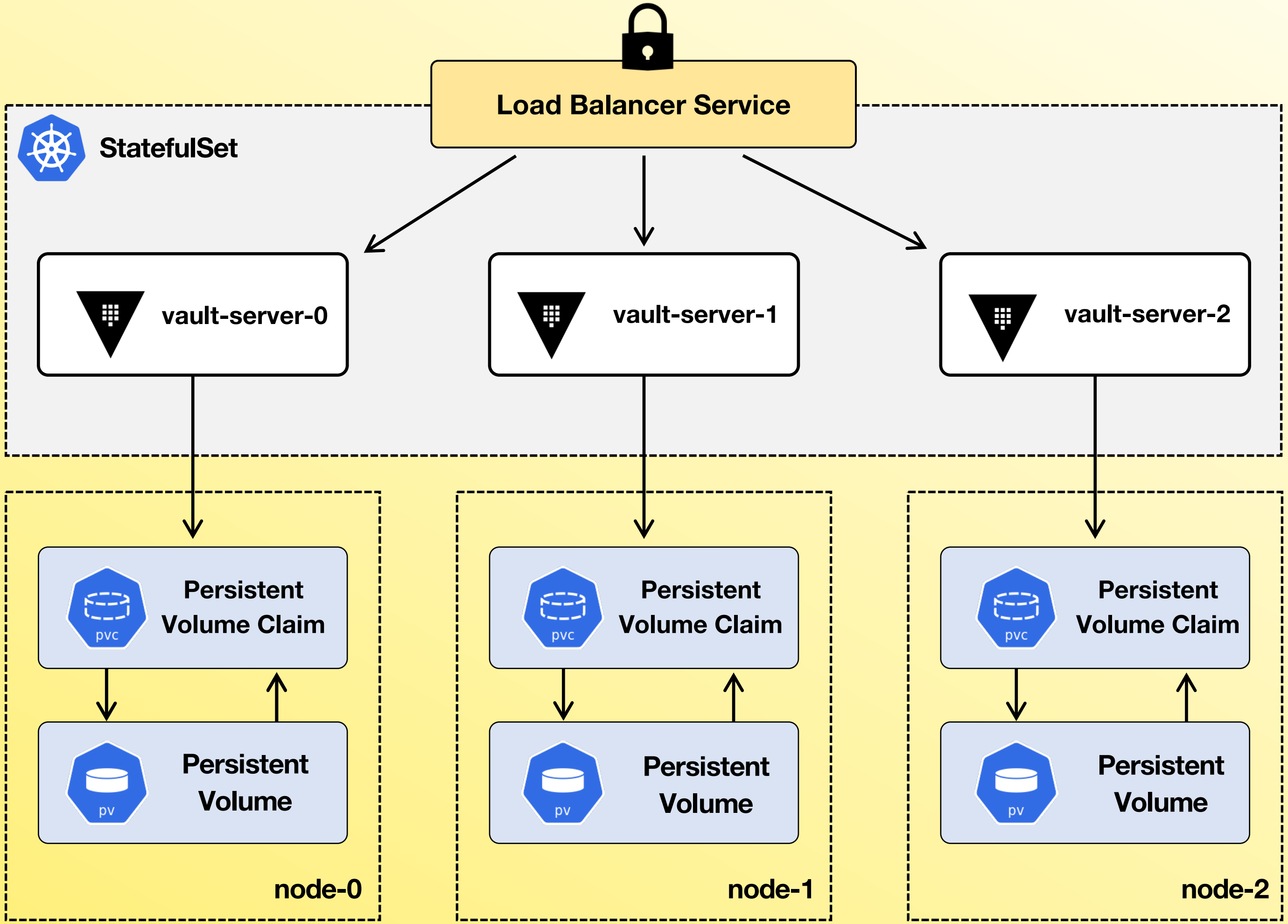
- As a consultant, I'm seeing more and more customers looking to deploy Vault on Kubernetes, including EKS, AKS, GKE, and OpenShift

- The easiest way to deploy Vault on Kubernetes is to use the official Helm chart

- The Vault security model assumes that Vault will be run on VMs/physical hardware and not necessarily containers, so HashiCorp provides additional recommendations specifically for containerization

TLS – End-to-End-Encryption



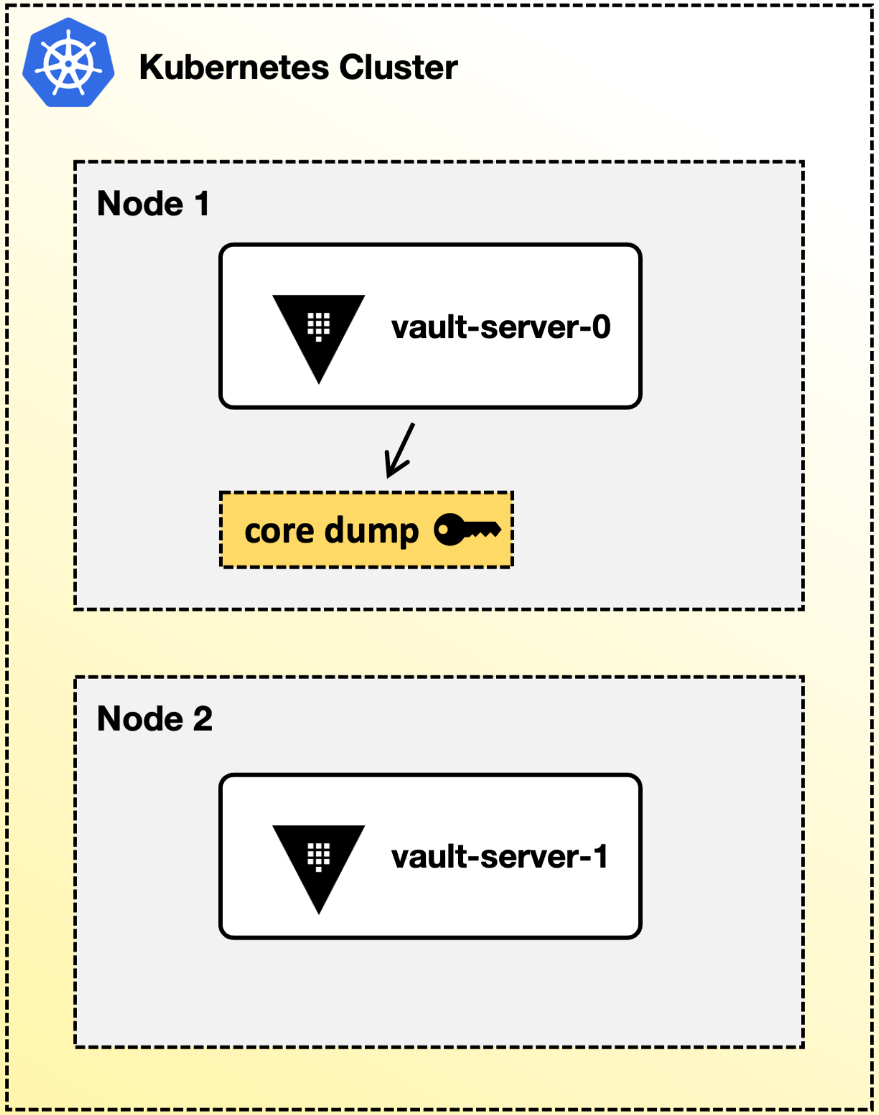
- Don't offload TLS at the load balancer
- Ensures end-to-end encryption from the client to the Vault node
- Use TLS certificates signed by a trusted Certificate Authority (CA)
- Require TLS 1.2+

Disable Core Dumps

- Most commonly, Vault pods are scheduled to run on a separate cluster to reduce/eliminate shared resources

- Core dump files may include Vault's encryption keys

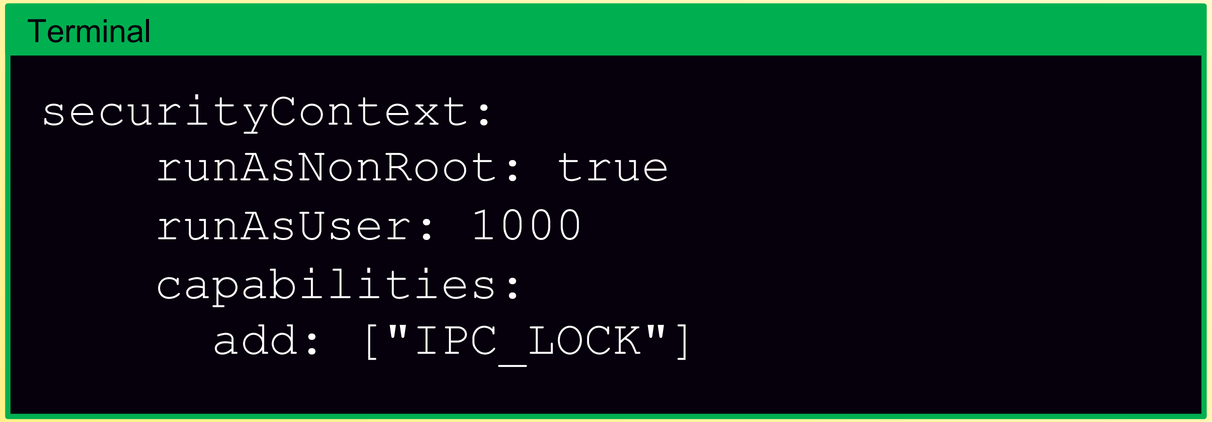
- Ensure `RLIMIT_CORE` is set to 0 or use the `ulimit` command with the core flag (`ulimit -c 0`) inside the container to ensure your container processes can't core dump.



Ensure mlock is Enabled

- Memory lock ensures memory from a process on a Linux system isn't swapped to disk. Additional configurations are needed for containerized deployments

- The process that starts the container that runs the mlock call must have IPC_LOCK capabilities

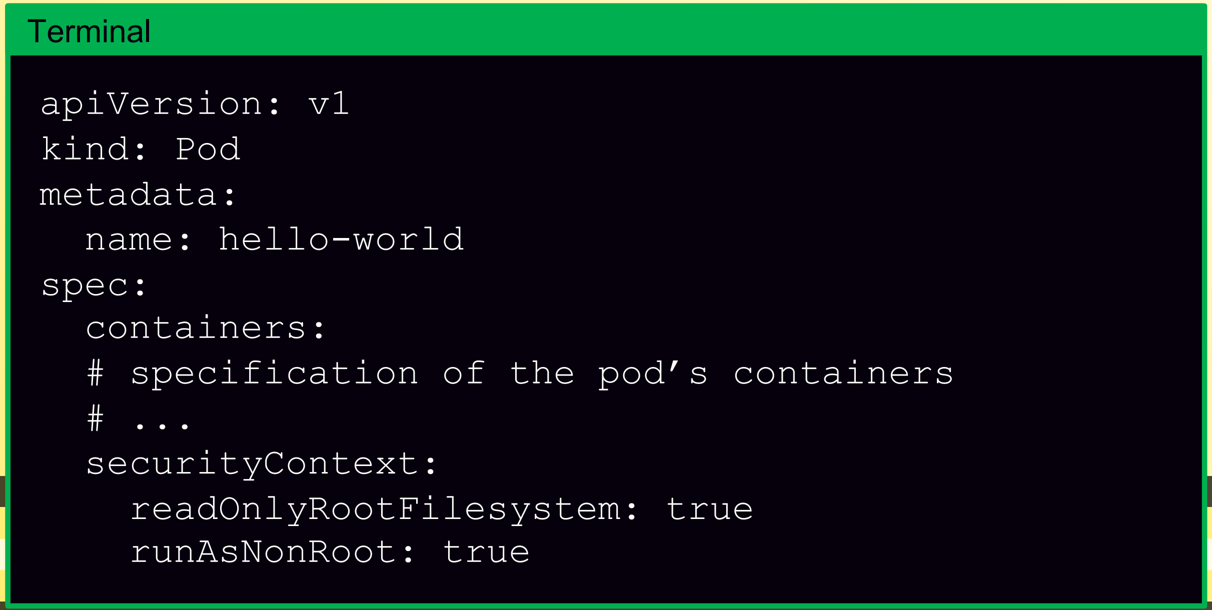


```
securityContext:
    runAsNonRoot: true
    runAsUser: 1000
    capabilities:
      add: ["IPC_LOCK"]
```

Container Supervisor

- If your container starts as root, the processes that might escape that container will also have root on the node

- Mitigations can be used to prevent starting your container as root
  - SecurityContext → runAsNonRoot
  - PodSecurityContext → runAsNonRoot



```
apiVersion: v1
kind: Pod
metadata:
  name: hello-world
spec:
  containers:
  # specification of the pod’s containers
  # ...
  securityContext:
    readOnlyRootFilesystem: true
    runAsNonRoot: true
```

Don't Run Vault as Root

- Vault is designed to run as an unprivileged user – regardless of the platform

- Elevated privileges can potentially expose the Vault process memory and allow access to Vault encryption keys