Workshop

Manage your Cloud Native Secrets with Vault

With Henrik Høegh

What is HashiCorp Vault?

PRAQMA

- **We need to manage secrets**
  - **The lifecycle of secrets**
    - When to create, upgrade and delete secrets in our system
  - **Storage of secrets**
    - Where do we store our secrets in a secure way?
    - How do we pass them on to our environment without exposing it?
  - **Access to secrets**
    - Who and what have access to our secrets
    - How do we manage access

Why?

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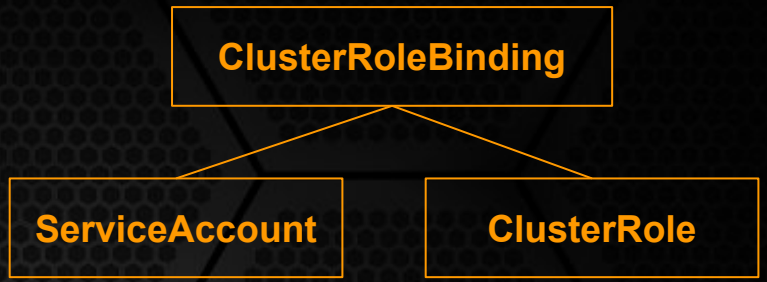
ServiceAccount
An identity for processes.

ClusterRole
A cluster-wide set of permissions.

ClusterRoleBinding
Grants **ClusterRole** to a **ServiceAccount**.



Vocabulary - Kubernetes

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Auth Kubernetes
A plugin that connects Vault to Kubernetes. Holds **ServiceAccount** to **Policy** mappings

Policies
Provide a declarative way to grant or forbid access to certain paths and operations.

Vocabulary - Vault

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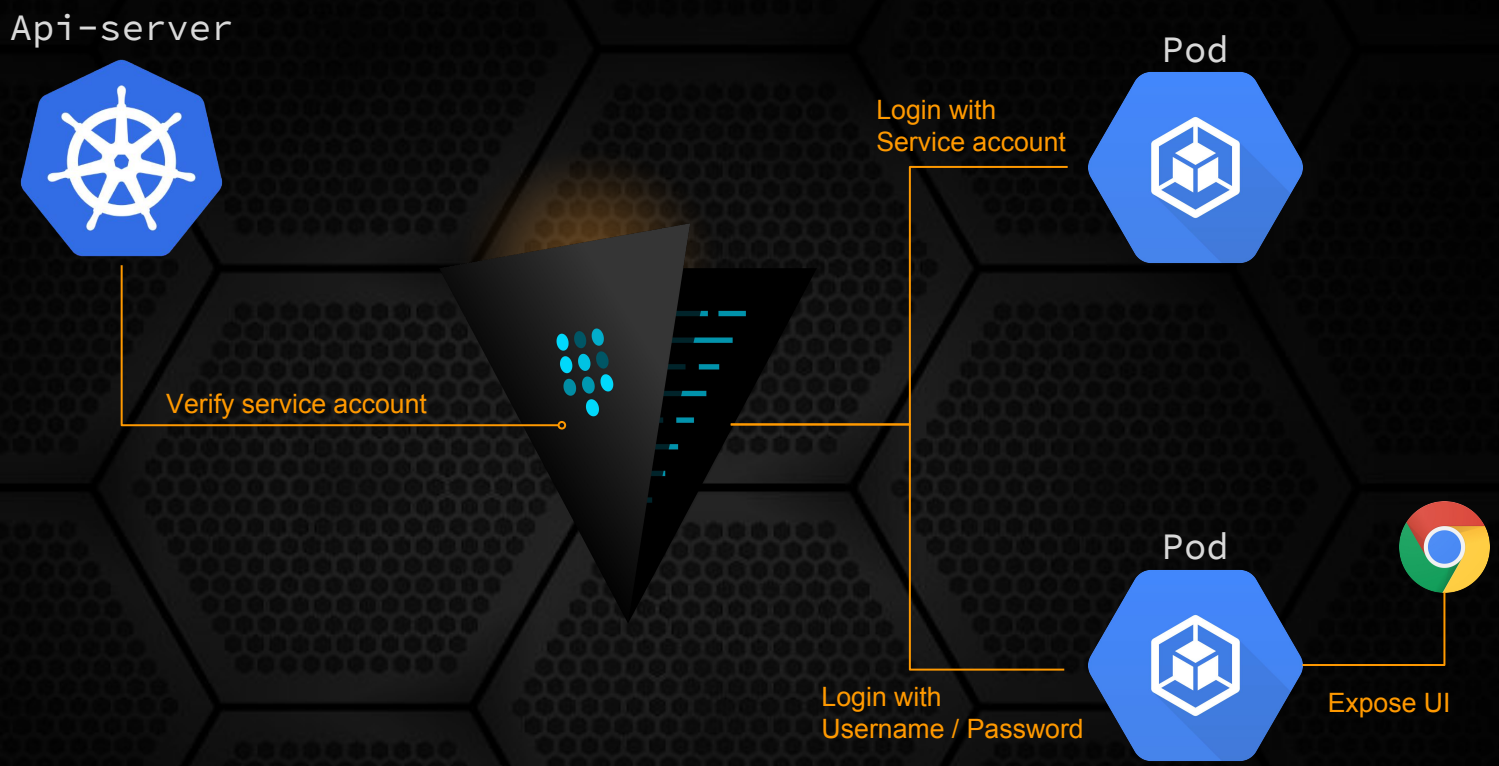

Our journey today

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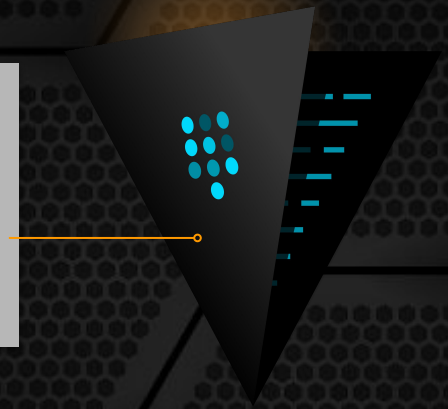
Vault

```
# Exec into container
kubectl exec -it vault-2186619123-4xzk3 /bin/sh

# Set connection environment variable
$ export VAULT_ADDR=http://127.0.0.1:8200

# Init Vault
$ vault operator init
```



Output

```
# vault operator init
Key 1: m0kEP6N/M4pavLhgZWu86HO/R//FMQx825W...
Key 2: kuQlPA8bJH/KQQi7IbqAUra66h+iHyVTYT5...
Key 3: zCxQhafifnE2R7NcjH4T5MFwiMgMWc2xzDb...
Key 4: 0OOs3WVWLBPntjYSFR5jhQDePDBcFWSa7Dt...
Key 5: av93HNFBDvmzW4yoyScBVOLeV67LvKdjurO...

Initial Root Token:
012fccfd-1ed4-66b8-c030-36b2260d75c7

# Unseal Vault
$ vault operator unseal m0kEP6N/M4pavLh...
$ vault operator unseal zCxQhafifnE2R7N...
$ vault operator unseal av93HNFBDvmzW4y...
```

Initialize and unseal Vault

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Vault

```
# Create admin policy file
$ vi /vault/admin-policy.hcl
path "*"{
    capabilities = [ "create",
                     "read",
                     "update",
                     "list" ]
}

# Create dev policy file
vi /vault/dev-policy.hcl
path "*"{
    capabilities = [ "read", "list" ]
}

# Login as root
$ vault login 012fccfd-1ed4-66b8-c030-36...

# Write policies to Vault
$ cd /vault
$ vault policy write admin admin-policy.hcl
$ vault policy write dev   dev-policy.hcl
```

Prepare Vault policies

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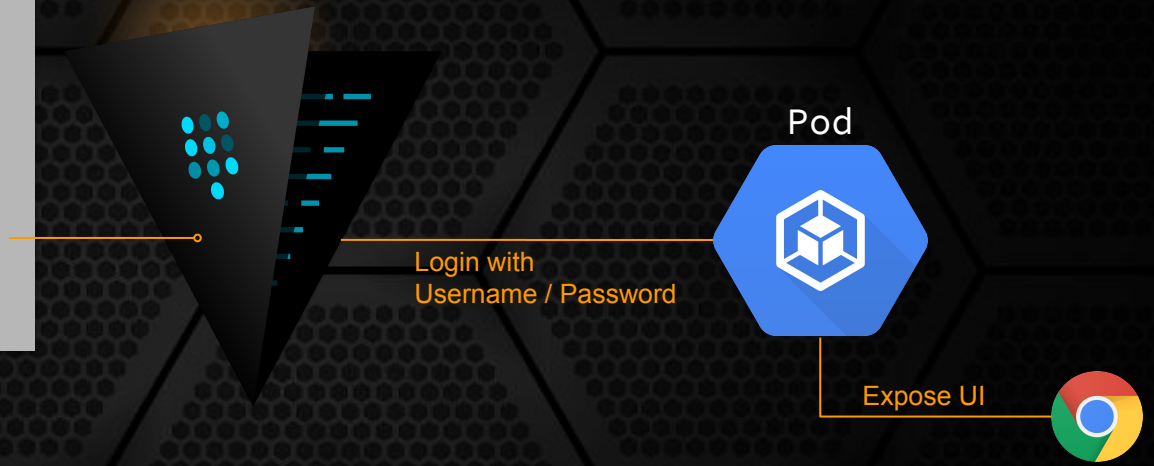
Vault

```
# Enable userpass authentication plugin
$ vault auth enable userpass

# Create an admin user
$ vault write auth/userpass/users/praqma \
  password="password" \
  policies="admin"

# Create an dev user
$ vault write auth/userpass/users/praqma-dev \
  password="password" \
  policies="dev"

# Test login from cli
$ vault login -method="userpass" \
  username="praqma"
```



Prepare Vault for UI

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Service Account

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: vault-admin
```

Service Account

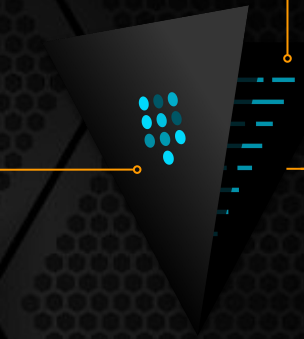
Pod

```
apiVersion: extensions/v1beta1
kind: Deployment
metadata:
  name: nwtool
spec:
  replicas: 1
  template:
    metadata:
      labels:
        app: nwtool
    spec:
      serviceAccountName: vault-admin
      containers:
      - name: nwtool
        image: praqma/network-multitool
        ports:
        - containerPort: 80
          name: nwtool
```

Token

Policy <> Service account mapping

```
vault write auth/kubernetes/role/admin
bound_service_account_names=vault-admin
bound_service_account_namespaces=default
policies=admin
ttl=10h
```



Validate

Service Account

```
apiVersion: v1
kind: ServiceAccount
metadata:
  name: vault-auth
```

TokenReview API

Create service accounts

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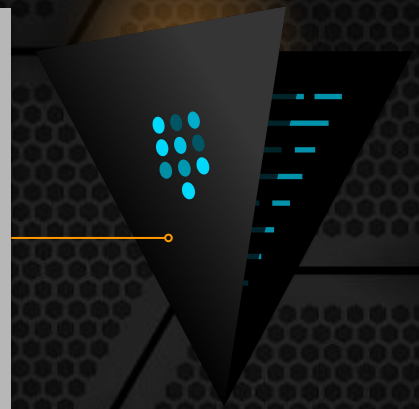
Vault

```
# Exec into container
kubectl exec -it nwtool-982403051-qr96n bash

# Find secret token
$ cd /var/run/secrets/kubernetes.io/serviceaccount
$ cat token

# Login with Curl
$ curl \
    --request POST \
    --data '{"jwt": "<TOKEN>", "role": "admin"}' \
    http://vault:8200/v1/auth/kubernetes/login
```



Output

```
# Output from Curl
{
  ....
  "auth": {
    "client_token":
        "c2029c0e-cca4-516e-aac3-59795e3...",
    "accessor": "07e5fca8-32b0-dea3-c425-8...",
    "policies": [
      "default",
      "admin"
    ],
    "metadata": {
      "role": "admin",
      "service_account_name": "vault-admin",
      "service_account_namespace": "default",
      "service_account_secret_name":
          "vault-admin-token-xtt46",
      ....
    },
    "lease_duration": 36000,
    ....
  }
}
```

Get access from pod

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Vault

```
# Put Vault token in variable
$ export VAULT_TOKEN="c2029c0e-cca4-51..."

# Create new secret cloud
$ curl \
   --header "X-Vault-Token: $VAULT_TOKEN" \
   --request POST \
   --data '{"cloud": "native"}' \
   http://vault:8200/v1/secret/foo

# Retrieve the secret with Curl
$ curl \
   --header "X-Vault-Token: $VAULT_TOKEN" \
   http://vault:8200/v1/secret/foo
```

Output

```
# Output from Curl
{
  "data": {
    "cloud": "native"
  },
  "lease_duration": 2764800,
  "renewable": false,
  "request_id": "5e246671-ec05-6fc8-9f93-4fe..."
}
```

Test access from pod

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