Admission Controller Demo

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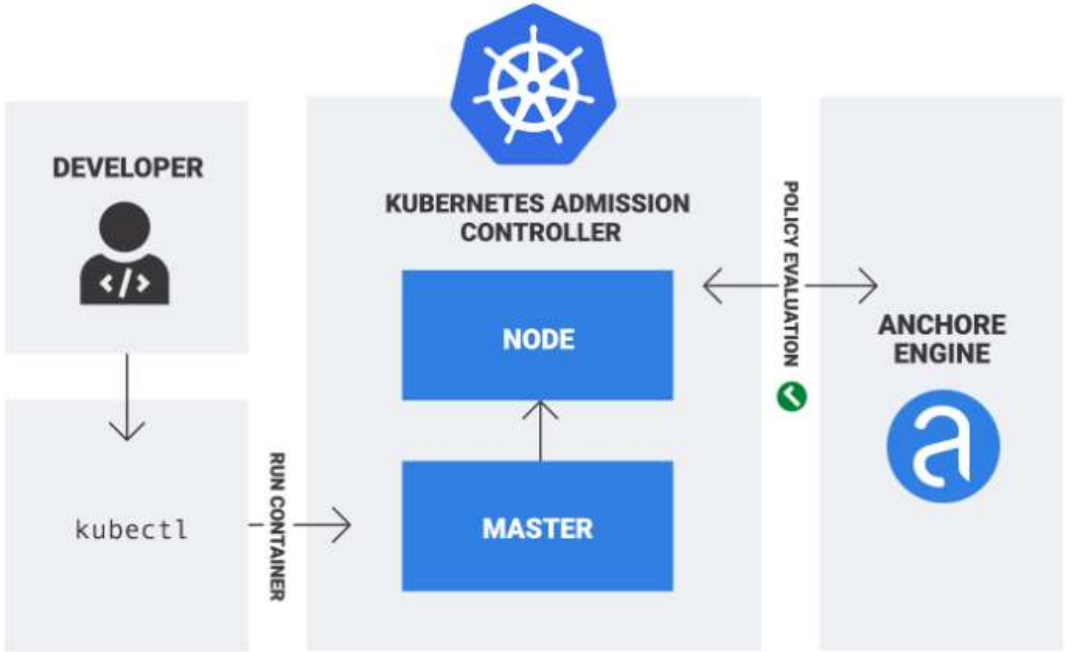
BLUF

Develop a prototype implementation of a policy-based admission controller for Kubernetes, using technologies such as Open Policy Agent, Sysdig, and Anchore Gatekeeper as needed, and a prototype policy to demonstrate compliance with Anchore scan results for cluster admission. Must have the ability to allow administrative override of scan decisions.

- Multiple possible solutions to the problem
- Demonstration of the following:
  - How to configure Anchore Admission Controller
  - How to write a basic Anchore policy bundle
  - A basic demonstration of an image denial by policy, followed by an exemption

Filtering Vulnerable Images Using an Admission Controller

Basic Architecture



Step One: Deploy a Cluster in Azure and Deploy Anchore

```
I $ ~/D/p/l/admission_controller  azure/opa-demo  helm upgrade --install anchr-adm-ctrlr a
26:26 2021
W0629 20:26:37.087298   35452 warnings.go:70] admissionregistration.k8s.io/v1beta1 ValidatingWebhookConfi
W0629 20:26:37.109378   35452 warnings.go:70] admissionregistration.k8s.io/v1beta1 ValidatingWebhookConfi
W0629 20:26:37.137290   35452 warnings.go:70] admissionregistration.k8s.io/v1beta1 ValidatingWebhookConfi
Release "anchr-adm-ctrlr" has been upgraded. Happy Helming!
NAME: anchr-adm-ctrlr
LAST DEPLOYED: Tue Jun 29 20:26:36 2021
NAMESPACE: anchore
STATUS: deployed
REVISION: 5
TEST SUITE: None
NOTES:
Anchore admission controller is now installed.
```

Step Two: Configure Helm Chart For Policy Bundles

The values provided during chart deployment provide Selectors for Policy Bundles. They're in an order of precedence.

```
existingCredentialsSecret: anchore-credentials
anchoreEndpoint: https://anchore-opa-demo.eastus.cloudapp.azure.com/v1/
policySelectors:
  - Selector:
      ResourceType: namespace
      SelectorKeyRegex: name
      SelectorValueRegex: ^emoji$
    PolicyReference:
      Username: admin
      PolicyBundleId: allowlist001
    Mode: policy
  - Selector:
      ResourceType: "image"
      SelectorKeyRegex: ".*"
      SelectorValueRegex: ".*"
    PolicyReference:
      Username: "admin"
      # This is the default bundle id in anchore engine
      PolicyBundleId: "2c53a13c-1765-11e8-82ef-23527761d060"
    # Mode is one of: "policy", "analysis", or "breakglass".
    # policy=>require policy pass, analysis=>require image analyzed,
    # breakglass=>do nothing
    Mode: policy
```

Configure a Policy Bundle (Anchore Admission Controller)

Default policy is to fail any “high” vulns. This policy bundle allows a whitelist exemption for an image deployed to a specific namespace. This is a version-controlled artifact.

```
{
  "id": "allowlist001",
  "version": "1_0",
  "name": "Allow emojivoto for emoji ns",
  "comment": "Allowlist for emojivoto when deployed to emoji ns",
  "whitelisted_images": [
    {
      "name": "AllowlistEmojivoto",
      "registry": "docker.l5d.io",
      "repository": "buoyantio/emojivoto-emoji-svc",
      "image": { "type": "tag", "value": "v11" }
    }
  ],
  "blacklisted_images": [],
  "mappings": [],
  "whitelists": [],
  "policies": []
}
```

Policy Bundles Can Be Changed, Based on Environment

Test –VS– Prod

Example:

- List Available Policies
- Activate a Policy, based on the deployment target

```
I 1 $ ~/D/p/l/admission_controller  azure/opa-demo  anchore-cli policy list
26:58 2021
Policy ID                                Active      Created                  Updated
allowlist001                             True        2021-06-29T20:11:29Z     2021-06-29T20:24:30Z
2c53a13c-1765-11e8-82ef-23527761d060     False       2021-06-29T16:11:21Z     2021-06-29T20:24:30Z
```

```
I $ ~/D/p/l/admission_controller  azure/opa-demo  anchore-cli policy activate 2c53a13c-1765-11e
27:09 2021
Success: 2c53a13c-1765-11e8-82ef-23527761d060 activated
```

This Image Will Fail Policy, Based on High Vulns

```
I 1 $ ~/D/p/l/admission_controller  azure/opa-demo  anchore-cli image vuln docker.lSd.io/buoyantio/emojivoto-emoji-svc:v11 all
Vulnerability ID        Package                                 Severity        Fix                                     CVE Refs        Vulnerability URL
CVE-2020-10878          perl-base-5.28.1-6                      High            5.28.1-6+deb10u1                                        https://security-tracker.deb
CVE-2021-20231          libgnutls30-3.6.7-4+deb10u3             High            3.6.7-4+deb10u7                                         https://security-tracker.deb
CVE-2021-20232          libgnutls30-3.6.7-4+deb10u3             High            3.6.7-4+deb10u7                                         https://security-tracker.deb
CVE-2021-3177           libpython3.7-minimal-3.7.3-2+deb10u2    High            3.7.3-2+deb10u3                                         https://security-tracker.deb
CVE-2021-3177           libpython3.7-stdlib-3.7.3-2+deb10u2     High            3.7.3-2+deb10u3                                         https://security-tracker.deb
CVE-2021-3177           python3.7-3.7.3-2+deb10u2               High            3.7.3-2+deb10u3                                         https://security-tracker.deb
CVE-2021-3177           python3.7-minimal-3.7.3-2+deb10u2       High            3.7.3-2+deb10u3                                         https://security-tracker.deb
CVE-2021-3517           libxml2-2.9.4+dfsg1-7+b3                High            2.9.4+dfsg1-7+deb10u2                                   https://security-tracker.deb
CVE-2021-3520           liblz4-1-1.8.3-1                        High            1.8.3-1+deb10u1                                         https://security-tracker.deb
CVE-2020-13434          libsqlite3-0-3.27.2-3                   Low             3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2020-13435          libsqlite3-0-3.27.2-3                   Low             3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2020-13632          libsqlite3-0-3.27.2-3                   Low             3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2020-15358          libsqlite3-0-3.27.2-3                   Low             3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2021-24031          libzstd1-1.3.8+dfsg-3                   Low             1.3.8+dfsg-3+deb10u1                                    https://security-tracker.deb
CVE-2021-24032          libzstd1-1.3.8+dfsg-3                   Low             1.3.8+dfsg-3+deb10u2                                    https://security-tracker.deb
CVE-2011-3389           libgnutls30-3.6.7-4+deb10u3             Medium          None                                                    https://security-tracker.deb
CVE-2017-18258          libxml2-2.9.4+dfsg1-7+b3                Medium          2.9.4+dfsg1-7+deb10u1                                   https://security-tracker.deb
CVE-2018-14404          libxml2-2.9.4+dfsg1-7+b3                Medium          2.9.4+dfsg1-7+deb10u1                                   https://security-tracker.deb
CVE-2018-14567          libxml2-2.9.4+dfsg1-7+b3                Medium          2.9.4+dfsg1-7+deb10u1                                   https://security-tracker.deb
CVE-2019-1551           libssl1.1-1.1.1d-0+deb10u3              Medium          1.1.1d-0+deb10u5                                        https://security-tracker.deb
CVE-2019-1551           openssl-1.1.1d-0+deb10u3                Medium          1.1.1d-0+deb10u5                                        https://security-tracker.deb
CVE-2019-16168          libsqlite3-0-3.27.2-3                   Medium          3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2019-19923          libsqlite3-0-3.27.2-3                   Medium          3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2019-19925          libsqlite3-0-3.27.2-3                   Medium          3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2019-19956          libxml2-2.9.4+dfsg1-7+b3                Medium          2.9.4+dfsg1-7+deb10u1                                   https://security-tracker.deb
CVE-2019-19959          libsqlite3-0-3.27.2-3                   Medium          3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2019-20218          libsqlite3-0-3.27.2-3                   Medium          3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2019-20388          libxml2-2.9.4+dfsg1-7+b3                Medium          2.9.4+dfsg1-7+deb10u1                                   https://security-tracker.deb
CVE-2020-10543          perl-base-5.28.1-6                      Medium          5.28.1-6+deb10u1                                        https://security-tracker.deb
CVE-2020-12723          perl-base-5.28.1-6                      Medium          5.28.1-6+deb10u1                                        https://security-tracker.deb
CVE-2020-13630          libsqlite3-0-3.27.2-3                   Medium          3.27.2-3+deb10u1                                        https://security-tracker.deb
CVE-2020-13777          libgnutls30-3.6.7-4+deb10u3             Medium          3.6.7-4+deb10u4                                         https://security-tracker.deb
```

Deployment Fails to Default Namespace

```
I $ ~/D/p/l/admission_controller  azure/opa-demo  kubectl --kubeconfig $KUBECONFIG --namespace default apply
31:43 2021
Error from server: error when creating "emojivoto_in_the_cloud.yaml": admission webhook "anchore-admission-controller-admiss
af3b56f958fe48e99a84bbfc15a768e15546" FAILED policy checks for policy bundle "2c53a13c-1765-11e8-82ef-23527761d060"
```

Decision time:

- Determine how to handle the failure. By default, items simply do not deploy.
- If it must be deployed, a policy exemption must be written.

Deployment Succeeds to Targeted Namespace

```
I $ ~/D/p/l/admission_controller  azure/opa-demo kubectl --kubeconfig $KUBECONFIG --namespace emoji apply
31:32 2021
pod/emojivoto created
```

- A determination was made to deploy this container anyway.
- The policy bundle from slide seven allows this to deploy to the custom namespace.
- The policy bundles are placed into version control and applied using automation.

Questions?