
KubeCon
CloudNativeCon
North America 2022
BUILDING FOR THE ROAD AHEAD
DETROIT 2022
TiKV
TiKV
HELM

KubeCon CloudNativeCon North America 2022
BUILDING FOR THE ROAD AHEAD
DETROIT 2022

Migrating from PodSecurityPolicy

Sam Stoelinga, Google
Tim Allclair, Google


R. I. P.
PodSecurityPolicy
v1.3 - v1.25

What's up with Pod Security Admission?

Stable as of v1.25 🎉

In brief, 1 of 3 predefined standards are applied **per-namespace** as labels:

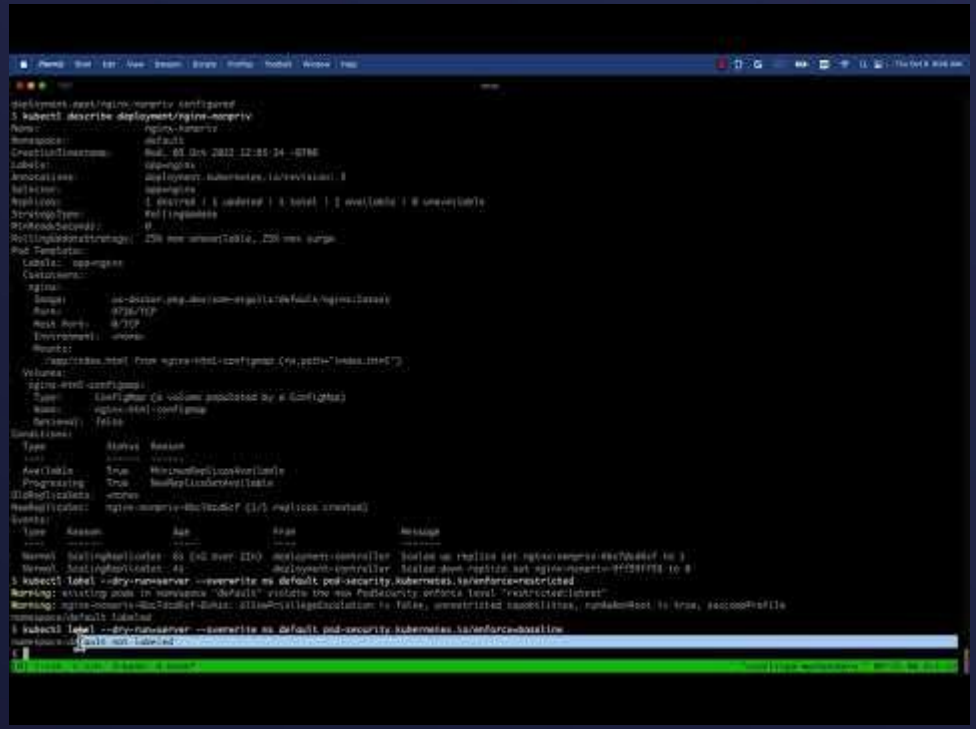
1. **Privileged** - Anything goes
2. **Baseline** - Allow pod defaults, but not much more
3. **Restricted** - Additional requirements to meet hardening best practices

docs.k8s.io/concepts/security/pod-security-standards/

Agenda

- [x] ~~Introduction~~
- [ ] **Demo**: quick and dirty migration
- [ ] Gotchas of the fast path
- [ ] **Demo**: more careful migration
- [ ] Extending beyond Pod Security Admission
- [ ] Conclusion & Resources

Demo!
Fast Path



Not so fast …

Problem: No representative pods

Examples: On-demand controllers, Scaled-to-zero workloads, Cronjobs, etc.

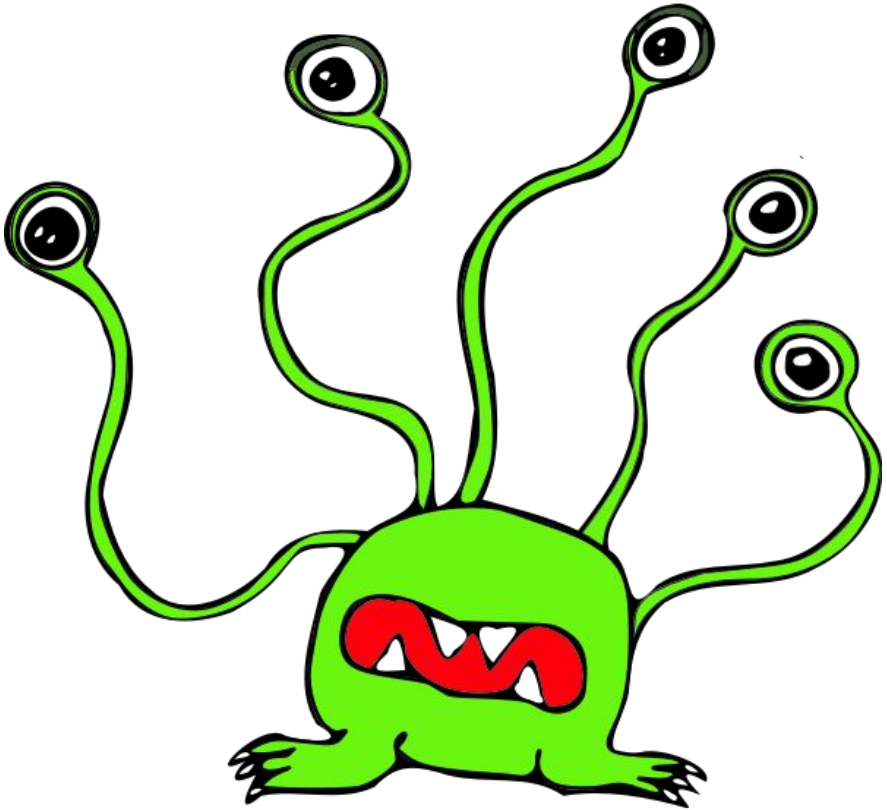
Warn mode: `pod-security.kubernetes.io/warn=$LEVEL`

- User-facing feedback on `kubectl` commands
- Applied to pods AND workloads (Deployment, StatefulSet, etc.)

Audit mode: `pod-security.kubernetes.io/audit=$LEVEL`

- Like warn mode, but captured in audit logs:
  `pod-security.kubernetes.io/audit-violations`

Problem: Mutations!



Quiz: Which PSP fields are mutating?

`defaultAddCapabilities`

`requiredDropCapabilities`

`runAsUser`

`fsGroup`

"Mapping PodSecurityPolicies to Pod Security Standards" - docs.k8s.io/reference/access-authn-authz/psp-to-pod-security-standards/

`readOnlyRootFilesystem`

`defaultAllowPrivilegeEscalation`

`allowPrivilegeEscalation`

Full list of Mutating PSP fields

"Mapping PodSecurityPolicies to Pod Security Standards" - docs.k8s.io/reference/access-authn-authz/psp-to-pod-security-standards/

`defaultAddCapabilities`

`requiredDropCapabilities`

`seLinux`

`runAsUser`

`runAsGroup`

`supplementalGroups`

`fsGroup`

Only with a MustRunAs* strategy

`readOnlyRootFilesystem`

`defaultAllowPrivilegeEscalation`

`allowPrivilegeEscalation`

`runtimeClass.defaultRuntimeClassName`

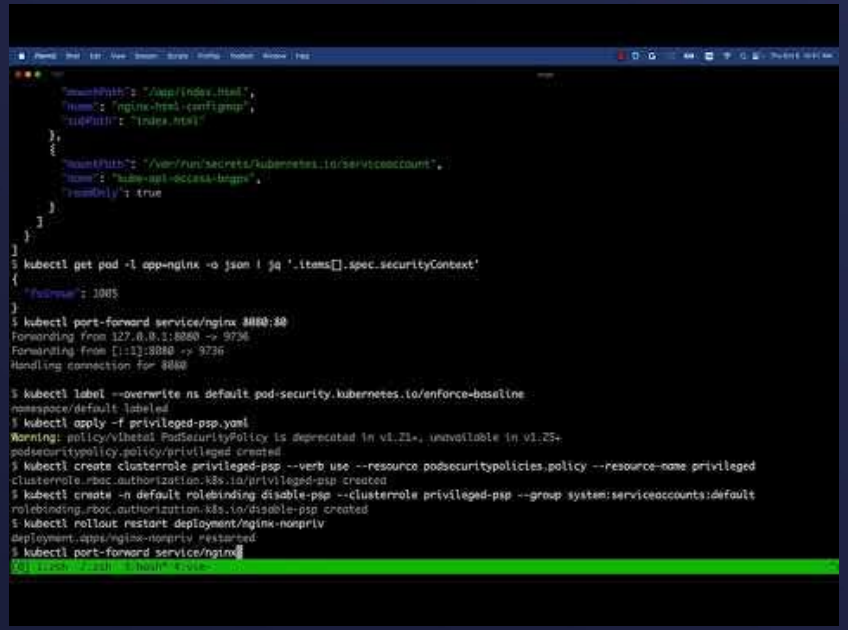
Annotations:

`seccomp.security.alpha.kubernetes.io/defaultProfileName`

`apparmor.security.beta.kubernetes.io/defaultProfileName`

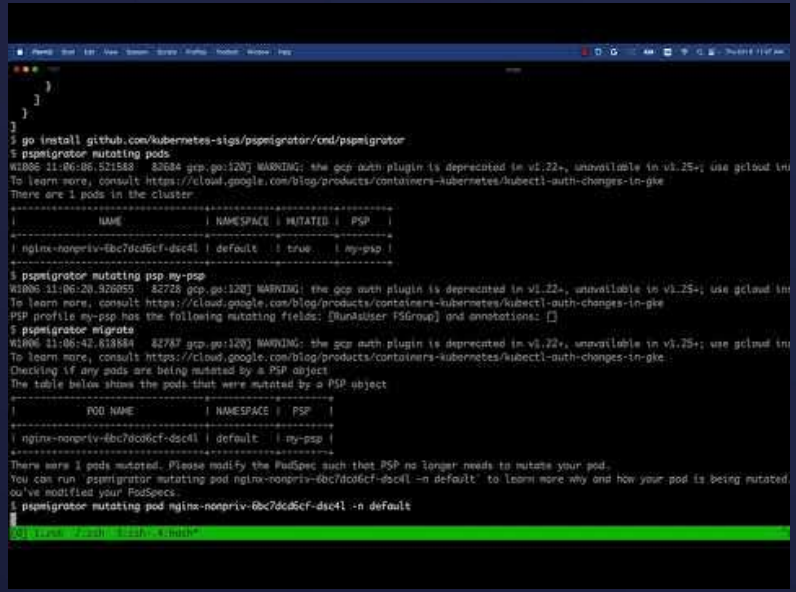
Demo!

The Hard way



Demo!

pspmigrator



Limitations of Pod Security Admission

1. Controlled by namespace labels
2. No profile customization: privileged, baseline or restricted
3. No mutations!
4. Applies namespace-wide*

Pod Security Alternatives

1. Open Policy Agent (OPA) / GateKeeper
   - gatekeeper-library/pod-security-policy
2. Kyverno

   … *and other 3rd party controllers*
3. *(coming soon)* CEL Admission
   - Webhook Fatigue? You're Not Alone: Introducing the CEL Expression Language Features Solving This Problem - Joe Betz, Google
   - KEP-3488: CEL for Admission Control
4. Roll your own *Easier than you might think!*
   - Kubebuilder - Admission Webhooks

Why not both?

- Defense in depth!
- Pod Security Admission is low-overhead
- Minimize custom policies
- Pod Security Standards maintained by K8s OSS
  - New Feature? No problem, the Pod Security Standard will get updated
  - Remember ephemeral containers?

Recommendation:

Apply the minimum viable Pod Security Standard using PSA, and layer on additional controls with a custom approach

Conclusion

- Start early & take it slow - unblock your v1.25 upgrade!
- Use an incremental approach: one namespace at a time
- Considerations: mutations, scaled-to-zero & occasional workloads

Thank you!

KubeCon CloudNativeCon North America 2022

Resources:

PSP Migration Guide - docs.k8s.io/tasks/configure-pod-container/migrate-from-psp/

Pod Security Standards - docs.k8s.io/concepts/security/pod-security-standards/

PSP Spec Mapping - docs.k8s.io/reference/access-authn-authz/psp-to-pod-security-standards/

`pspmigrator` tool - sigs.k8s.io/pspmigrator

Please give us feedback!

Alternatives:

Open Policy Agent (OPA) - openpolicyagent.org/docs/latest/kubernetes-introduction/

GateKeeper - open-policy-agent.github.io/gatekeeper/website/docs/

- PSP library - github.com/open-policy-agent/gatekeeper-library/blob/master/library/pod-security-policy/

Kyverno - kyverno.io