Admission Control in Kubernetes

By Use caution when authoring and installing mutating webhooks

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This page provides an overview of *admission controllers*.

An admission controller is a piece of code that intercepts requests to the Kubernetes API server prior to persistence of the resource, but after the request is authenticated and authorized.

Several important features of Kubernetes require an admission controller to be enabled in order to properly support the feature. As a result, a Kubernetes API server that is not properly configured with the right set of admission controllers is an incomplete server that will not support all the features you expect.

What are they?

Admission controllers are code within the Kubernetes API server that check the data arriving in a request to modify a resource.

Admission controllers apply to requests that create, delete, or modify objects. Admission controllers can also block custom verbs, such as a request to connect to a pod via an API server proxy. Admission controllers do *not* (and cannot) block requests to read (**get**, **watch** or **list**) objects, because reads bypass the admission control layer.

Admission control mechanisms may be *validating*, *mutating*, or both. Mutating controllers may modify the data for the resource being modified; validating controllers may not.

The admission controllers in Kubernetes 1.35 consist of the list below, are compiled into the `kube-apiserver` binary, and may only be configured by the cluster administrator.

Admission control extension points

Within the full list, there are three special controllers: MutatingAdmissionWebhook, ValidatingAdmissionWebhook, and ValidatingAdmissionPolicy. The two webhook controllers execute the mutating and validating (respectively) admission control webhooks which are configured in the API. ValidatingAdmissionPolicy provides a way to embed declarative validation code within the API, without relying on any external HTTP callouts.

You can use these three admission controllers to customize cluster behavior at admission time.

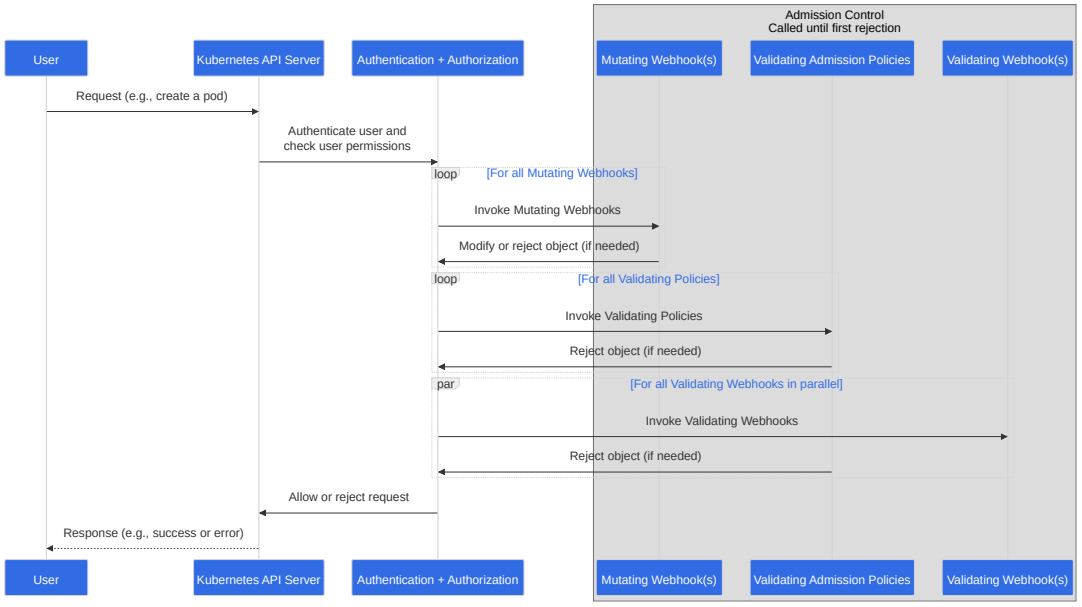
Admission control phases

The admission control process proceeds in two phases. In the first phase, mutating admission controllers are run. In the second phase, validating admission controllers are run. Note again that some of the controllers are both.

If any of the controllers in either phase reject the request, the entire request is rejected immediately and an error is returned to the end-user.

Finally, in addition to sometimes mutating the object in question, admission controllers may sometimes have side effects, that is, mutate related resources as part of request processing. Incrementing quota usage is the canonical example of why this is necessary. Any such side-effect needs a corresponding reclamation or reconciliation process, as a given admission controller does not know for sure that a given request will pass all of the other admission controllers.

The ordering of these calls can be seen below.



Why do I need them?

Several important features of Kubernetes require an admission controller to be enabled in order to properly support the feature. As a result, a Kubernetes API server that is not properly configured with the right set of admission controllers is an incomplete server and will not support all the features you expect.

How do I turn on an admission controller?

The Kubernetes API server flag `enable-admission-plugins` takes a comma-delimited list of admission control plugins to invoke prior to modifying objects in the cluster. For example, the following command line enables the `NamespaceLifecycle` and the `LimitRanger` admission control plugins:

```
kube-apiserver --enable-admission-plugins=NamespaceLifecycle,LimitRanger ...
```

Note:

Depending on the way your Kubernetes cluster is deployed and how the API server is started, you may need to apply the settings in different ways. For example, you may have to modify the systemd unit file if the API server

is deployed as a systemd service, you may modify the manifest file for the API server if Kubernetes is deployed in a self-hosted way.

How do I turn off an admission controller?

The Kubernetes API server flag `disable-admission-plugins` takes a comma-delimited list of admission control plugins to be disabled, even if they are in the list of plugins enabled by default.

```
kube-apiserver --disable-admission-plugins=PodNodeSelector,AlwaysDeny ...
```

Which plugins are enabled by default?

To see which admission plugins are enabled:

```
kube-apiserver -h | grep enable-admission-plugins
```

In Kubernetes 1.35, the default ones are:

```
CertificateApproval, CertificateSigning, CertificateSubjectRestriction, DefaultIngressClass, DefaultStorageClas
```

What does each admission controller do?

AlwaysAdmit

FEATURE STATE: `Kubernetes v1.13 [deprecated]`

Type: Validating.

This admission controller allows all pods into the cluster. It is **deprecated** because its behavior is the same as if there were no admission controller at all.

AlwaysDeny

FEATURE STATE: `Kubernetes v1.13 [deprecated]`

Type: Validating.

Rejects all requests. AlwaysDeny is **deprecated** as it has no real meaning.

AlwaysPullImages

Type: Mutating and Validating.

This admission controller modifies every new Pod to force the image pull policy to `Always`. This is useful in a multitenant cluster so that users can be assured that their private images can only be used by those who have the

credentials to pull them. Without this admission controller, once an image has been pulled to a node, any pod from any user can use it by knowing the image's name (assuming the Pod is scheduled onto the right node), without any authorization check against the image. When this admission controller is enabled, images are always pulled prior to starting containers, which means valid credentials are required.

CertificateApproval

Type: Validating.

This admission controller observes requests to approve CertificateSigningRequest resources and performs additional authorization checks to ensure the approving user has permission to **approve** certificate requests with the `spec.signerName` requested on the CertificateSigningRequest resource.

See Certificate Signing Requests for more information on the permissions required to perform different actions on CertificateSigningRequest resources.

CertificateSigning

Type: Validating.

This admission controller observes updates to the `status.certificate` field of CertificateSigningRequest resources and performs an additional authorization checks to ensure the signing user has permission to **sign** certificate requests with the `spec.signerName` requested on the CertificateSigningRequest resource.

See Certificate Signing Requests for more information on the permissions required to perform different actions on CertificateSigningRequest resources.

CertificateSubjectRestriction

Type: Validating.

This admission controller observes creation of CertificateSigningRequest resources that have a `spec.signerName` of `kubernetes.io/kube-apiserver-client`. It rejects any request that specifies a 'group' (or 'organization attribute') of `system:masters`.

DefaultIngressClass

Type: Mutating.

This admission controller observes creation of `Ingress` objects that do not request any specific ingress class and automatically adds a default ingress class to them. This way, users that do not request any special ingress class do not need to care about them at all and they will get the default one.

This admission controller does not do anything when no default ingress class is configured. When more than one ingress class is marked as default, it rejects any creation of `Ingress` with an error and an administrator must revisit their `IngressClass` objects and mark only one as default (with the annotation

"ingressclass.kubernetes.io/is-default-class"). This admission controller ignores any `Ingress` updates; it acts only on creation.

See the Ingress documentation for more about ingress classes and how to mark one as default.

DefaultStorageClass

Type: Mutating.

This admission controller observes creation of `PersistentVolumeClaim` objects that do not request any specific storage class and automatically adds a default storage class to them. This way, users that do not request any special storage class do not need to care about them at all and they will get the default one.

This admission controller does nothing when no default `StorageClass` exists. When more than one storage class is marked as default, and you then create a `PersistentVolumeClaim` with no `storageClassName` set, Kubernetes uses the most recently created default `StorageClass`. When a `PersistentVolumeClaim` is created with a specified `volumeName`, it remains in a pending state if the static volume's `storageClassName` does not match the `storageClassName` on the `PersistentVolumeClaim` after any default StorageClass is applied to it. This admission controller ignores any `PersistentVolumeClaim` updates; it acts only on creation.

See persistent volume documentation about persistent volume claims and storage classes and how to mark a storage class as default.

DefaultTolerationSeconds

Type: Mutating.

This admission controller sets the default forgiveness toleration for pods to tolerate the taints `notready:NoExecute` and `unreachable:NoExecute` based on the k8s-apiserver input parameters `default-not-ready-toleration-seconds` and `default-unreachable-toleration-seconds` if the pods don't already have toleration for taints `node.kubernetes.io/not-ready:NoExecute` or `node.kubernetes.io/unreachable:NoExecute`. The default value for `default-not-ready-toleration-seconds` and `default-unreachable-toleration-seconds` is 5 minutes.

DenyServiceExternalIPs

Type: Validating.

This admission controller rejects all net-new usage of the `Service` field `externalIPs`. This feature is very powerful (allows network traffic interception) and not well controlled by policy. When enabled, users of the cluster may not create new Services which use `externalIPs` and may not add new values to `externalIPs` on existing `Service` objects. Existing uses of `externalIPs` are not affected, and users may remove values from `externalIPs` on existing `Service` objects.

Most users do not need this feature at all, and cluster admins should consider disabling it. Clusters that do need to use this feature should consider using some custom policy to manage usage of it.

This admission controller is disabled by default.

EventRateLimit

FEATURE STATE: `Kubernetes v1.13 [alpha]`

Type: Validating.

This admission controller mitigates the problem where the API server gets flooded by requests to store new Events. The cluster admin can specify event rate limits by:

- Enabling the `EventRateLimit` admission controller;
- Referencing an `EventRateLimit` configuration file from the file provided to the API server's command line flag `--admission-control-config-file`:

```
 apiVersion: apiserver.config.k8s.io/v1
kind: AdmissionConfiguration
plugins:
  - name: EventRateLimit
    path: eventconfig.yaml
...
```

There are four types of limits that can be specified in the configuration:

- `Server`: All Event requests (creation or modifications) received by the API server share a single bucket.
- `Namespace`: Each namespace has a dedicated bucket.
- `User`: Each user is allocated a bucket.
- `SourceAndObject`: A bucket is assigned by each combination of source and involved object of the event.

Below is a sample `eventconfig.yaml` for such a configuration:

```
 apiVersion: eventratelimit.admission.k8s.io/v1alpha1
kind: Configuration
limits:
  - type: Namespace
    qps: 50
    burst: 100
    cacheSize: 2000
  - type: User
    qps: 10
    burst: 50
```

See the EventRateLimit Config API (v1alpha1) for more details.

This admission controller is disabled by default.

ExtendedResourceToleration

Type: Mutating.

This plug-in facilitates creation of dedicated nodes with extended resources. If operators want to create dedicated nodes with extended resources (like GPUs, FPGAs etc.), they are expected to taint the node with the extended resource name as the key. This admission controller, if enabled, automatically adds tolerations for such taints to pods requesting extended resources, so users don't have to manually add these tolerations.

This admission controller is disabled by default.

ImagePolicyWebhook

Type: Validating.

The ImagePolicyWebhook admission controller allows a backend webhook to make admission decisions.

This admission controller is disabled by default.

Configuration file format

ImagePolicyWebhook uses a configuration file to set options for the behavior of the backend. This file may be json or yaml and has the following format:

```
imagePolicy:
 kubeConfigFile: /path/to/kubeconfig/for/backend
 # time in s to cache approval
 allowTTL: 50
 # time in s to cache denial
 denyTTL: 50
 # time in ms to wait between retries
 retryBackoff: 500
 # determines behavior if the webhook backend fails
 defaultAllow: true
```

Reference the ImagePolicyWebhook configuration file from the file provided to the API server's command line flag `--admission-control-config-file`:

```
 apiVersion: apiserver.config.k8s.io/v1
kind: AdmissionConfiguration
plugins:
  - name: ImagePolicyWebhook
    path: imagepolicyconfig.yaml
...
```

Alternatively, you can embed the configuration directly in the file:

```
 apiVersion: apiserver.config.k8s.io/v1
kind: AdmissionConfiguration
plugins:
  - name: ImagePolicyWebhook
    configuration:
      imagePolicy:
        kubeConfigFile: <path-to-kubeconfig-file>
        allowTTL: 50
        denyTTL: 50
        retryBackoff: 500
        defaultAllow: true
```

The ImagePolicyWebhook config file must reference a kubeconfig formatted file which sets up the connection to the backend. It is required that the backend communicate over TLS.

The kubeconfig file's `cluster` field must point to the remote service, and the `user` field must contain the returned authorizer.

```
 # clusters refers to the remote service.
clusters:
  - name: name-of-remote-imagepolicy-service
    cluster:
      certificate-authority: /path/to/ca.pem    # CA for verifying the remote service.
      server: https://images.example.com/policy # URL of remote service to query. Must use 'https'.

# users refers to the API server's webhook configuration.
users:
  - name: name-of-api-server
    user:
      client-certificate: /path/to/cert.pem # cert for the webhook admission controller to use
      client-key: /path/to/key.pem          # key matching the cert
```

For additional HTTP configuration, refer to the kubeconfig documentation.

Request payloads

When faced with an admission decision, the API Server POSTs a JSON serialized `imagepolicy.k8s.io/v1alpha1` `ImageReview` object describing the action. This object contains fields describing the containers being admitted, as well as any pod annotations that match `*.image-policy.k8s.io/*`.

Note:

The webhook API objects are subject to the same versioning compatibility rules as other Kubernetes API objects. Implementers should be aware of looser compatibility promises for alpha objects and check the `apiVersion` field

of the request to ensure correct deserialization. Additionally, the API Server must enable the `imagepolicy.k8s.io/v1alpha1` API extensions group (`--runtime-config=imagepolicy.k8s.io/v1alpha1=true`).

An example request body:

```
{
  "apiVersion": "imagepolicy.k8s.io/v1alpha1",
  "kind": "ImageReview",
  "spec": {
    "containers": [
      {
        "image": "myrepo/myimage:v1"
      },
      {
        "image": "myrepo/myimage@sha256:beb6bd6a68f114c1dc2ea4b28db81bdf91de202a9014972bec5e4d9171d90ed"
      }
    ],
    "annotations": {
      "mycluster.image-policy.k8s.io/ticket-1234": "break-glass"
    },
    "namespace": "mynamespace"
  }
}
```

The remote service is expected to fill the `status` field of the request and respond to either allow or disallow access. The response body's `spec` field is ignored, and may be omitted. A permissive response would return:

```
{
  "apiVersion": "imagepolicy.k8s.io/v1alpha1",
  "kind": "ImageReview",
  "status": {
    "allowed": true
  }
}
```

To disallow access, the service would return:

```
{
  "apiVersion": "imagepolicy.k8s.io/v1alpha1",
  "kind": "ImageReview",
  "status": {
    "allowed": false,
    "reason": "image currently blacklisted"
  }
}
```

For further documentation refer to the `imagepolicy.v1alpha1` API.

Extending with Annotations

All annotations on a Pod that match `*.image-policy.k8s.io/*` are sent to the webhook. Sending annotations allows users who are aware of the image policy backend to send extra information to it, and for different backends implementations to accept different information.

Examples of information you might put here are:

- request to "break glass" to override a policy, in case of emergency.
- a ticket number from a ticket system that documents the break-glass request
- provide a hint to the policy server as to the imageID of the image being provided, to save it a lookup

In any case, the annotations are provided by the user and are not validated by Kubernetes in any way.

LimitPodHardAntiAffinityTopology

Type: Validating.

This admission controller denies any pod that defines `AntiAffinity` topology key other than `kubernetes.io/hostname` in `requiredDuringSchedulingRequiredDuringExecution`.

This admission controller is disabled by default.

LimitRanger

Type: Mutating and Validating.

This admission controller will observe the incoming request and ensure that it does not violate any of the constraints enumerated in the `LimitRange` object in a `Namespace`. If you are using `LimitRange` objects in your Kubernetes deployment, you MUST use this admission controller to enforce those constraints. LimitRanger can also be used to apply default resource requests to Pods that don't specify any; currently, the default LimitRanger applies a 0.1 CPU requirement to all Pods in the `default` namespace.

See the LimitRange API reference and the example of LimitRange for more details.

MutatingAdmissionWebhook

Type: Mutating.

This admission controller calls any mutating webhooks which match the request. Matching webhooks are called in serial; each one may modify the object if it desires.

This admission controller (as implied by the name) only runs in the mutating phase.

If a webhook called by this has side effects (for example, decrementing quota) it *must* have a reconciliation system, as it is not guaranteed that subsequent webhooks or validating admission controllers will permit the

request to finish.

If you disable the MutatingAdmissionWebhook, you must also disable the `MutatingWebhookConfiguration` object in the `admissionregistration.k8s.io/v1` group/version via the `--runtime-config` flag, both are on by default.

- Users may be confused when the objects they try to create are different from what they get back.
- Built in control loops may break when the objects they try to create are different when read back.
    - Setting originally unset fields is less likely to cause problems than overwriting fields set in the original request. Avoid doing the latter.
- Future changes to control loops for built-in resources or third-party resources may break webhooks that work well today. Even when the webhook installation API is finalized, not all possible webhook behaviors will be guaranteed to be supported indefinitely.

NamespaceAutoProvision

Type: Mutating.

This admission controller examines all incoming requests on namespaced resources and checks if the referenced namespace does exist. It creates a namespace if it cannot be found. This admission controller is useful in deployments that do not want to restrict creation of a namespace prior to its usage.

NamespaceExists

Type: Validating.

This admission controller checks all requests on namespaced resources other than `Namespace` itself. If the namespace referenced from a request doesn't exist, the request is rejected.

NamespaceLifecycle

Type: Validating.

This admission controller enforces that a `Namespace` that is undergoing termination cannot have new objects created in it, and ensures that requests in a non-existent `Namespace` are rejected. This admission controller also prevents deletion of three system reserved namespaces `default`, `kube-system`, `kube-public`.

A `Namespace` deletion kicks off a sequence of operations that remove all objects (pods, services, etc.) in that namespace. In order to enforce integrity of that process, we strongly recommend running this admission controller.

NodeDeclaredFeatureValidator

FEATURE STATE: `Kubernetes v1.35 [alpha]` (disabled by default)

Type: Validating.

This admission controller intercepts writes to bound Pods, to ensure that the changes are compatible with the features declared by the node where the Pod is currently running. It uses the `.status.declaredFeatures` field of the Node to determine the set of enabled features. If a Pod update requires a feature that is not listed in the features of its current node, the admission controller will reject the update request. This prevents runtime failures due to feature mismatch after a Pod has been scheduled.

This admission controller is enabled by default if the `NodeDeclaredFeatures` feature gate is enabled.

NodeRestriction

Type: Validating.

This admission controller limits the `Node` and `Pod` objects a kubelet can modify. In order to be limited by this admission controller, kubelets must use credentials in the `system:nodes` group, with a username in the form `system:node:<nodeName>`. Such kubelets will only be allowed to modify their own `Node` API object, and only modify `Pod` API objects that are bound to their node. kubelets are not allowed to update or remove taints from their `Node` API object.

The `NodeRestriction` admission plugin prevents kubelets from deleting their `Node` API object, and enforces kubelet modification of labels under the `kubernetes.io/` or `k8s.io/` prefixes as follows:

- **Prevents** kubelets from adding/removing/updating labels with a `node-restriction.kubernetes.io/` prefix. This label prefix is reserved for administrators to label their `Node` objects for workload isolation purposes, and kubelets will not be allowed to modify labels with that prefix.
- **Allows** kubelets to add/remove/update these labels and label prefixes:
  - `kubernetes.io/hostname`
  - `kubernetes.io/arch`
  - `kubernetes.io/os`
  - `beta.kubernetes.io/instance-type`
  - `node.kubernetes.io/instance-type`
  - `failure-domain.beta.kubernetes.io/region` (deprecated)
  - `failure-domain.beta.kubernetes.io/zone` (deprecated)
  - `topology.kubernetes.io/region`
  - `topology.kubernetes.io/zone`
  - `kubelet.kubernetes.io/` -prefixed labels
  - `node.kubernetes.io/` -prefixed labels

Use of any other labels under the `kubernetes.io` or `k8s.io` prefixes by kubelets is reserved, and may be disallowed or allowed by the `NodeRestriction` admission plugin in the future.

Future versions may add additional restrictions to ensure kubelets have the minimal set of permissions required to operate correctly.

OwnerReferencesPermissionEnforcement

Type: Validating.

This admission controller protects the access to the `metadata.ownerReferences` of an object so that only users with **delete** permission to the object can change it. This admission controller also protects the access to `metadata.ownerReferences[x].blockOwnerDeletion` of an object, so that only users with **update** permission to the `finalizers` subresource of the referenced *owner* can change it.

PersistentVolumeClaimResize

FEATURE STATE: `Kubernetes v1.24 [stable]`

Type: Validating.

This admission controller implements additional validations for checking incoming `PersistentVolumeClaim` resize requests.

Enabling the `PersistentVolumeClaimResize` admission controller is recommended. This admission controller prevents resizing of all claims by default unless a claim's `StorageClass` explicitly enables resizing by setting `allowVolumeExpansion` to `true`.

For example: all `PersistentVolumeClaim`s created from the following `StorageClass` support volume expansion:

```
 apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: gluster-vol-default
provisioner: kubernetes.io/glusterfs
parameters:
  resturl: "http://192.168.10.100:8080"
  restuser: ""
  secretNamespace: ""
  secretName: ""
allowVolumeExpansion: true
```

For more information about persistent volume claims, see PersistentVolumeClaims.

PodNodeSelector

FEATURE STATE: `Kubernetes v1.5 [alpha]`

Type: Validating.

This admission controller defaults and limits what node selectors may be used within a namespace by reading a namespace annotation and a global configuration.

This admission controller is disabled by default.

Configuration file format

`PodNodeSelector` uses a configuration file to set options for the behavior of the backend. Note that the configuration file format will move to a versioned file in a future release. This file may be json or yaml and has the following format:

```
podNodeSelectorPluginConfig:
 clusterDefaultNodeSelector: name-of-node-selector
 namespace1: name-of-node-selector
 namespace2: name-of-node-selector
```

Reference the `PodNodeSelector` configuration file from the file provided to the API server's command line flag `--admission-control-config-file`:

```
apiVersion: apiserver.config.k8s.io/v1
kind: AdmissionConfiguration
plugins:
- name: PodNodeSelector
  path: podnodeselector.yaml
...
```

Configuration Annotation Format

`PodNodeSelector` uses the annotation key `scheduler.alpha.kubernetes.io/node-selector` to assign node selectors to namespaces.

```
apiVersion: v1
kind: Namespace
metadata:
  annotations:
    scheduler.alpha.kubernetes.io/node-selector: name-of-node-selector
  name: namespace3
```

Internal Behavior

This admission controller has the following behavior:

1. If the `Namespace` has an annotation with a key `scheduler.alpha.kubernetes.io/node-selector`, use its value as the node selector.
2. If the namespace lacks such an annotation, use the `clusterDefaultNodeSelector` defined in the `PodNodeSelector` plugin configuration file as the node selector.
3. Evaluate the pod's node selector against the namespace node selector for conflicts. Conflicts result in rejection.
4. Evaluate the pod's node selector against the namespace-specific allowed selector defined the plugin configuration file. Conflicts result in rejection.

Note:

PodNodeSelector allows forcing pods to run on specifically labeled nodes. Also see the PodTolerationRestriction admission plugin, which allows preventing pods from running on specifically tainted nodes.

PodSecurity

FEATURE STATE: `Kubernetes v1.25 [stable]`

Type: Validating.

The PodSecurity admission controller checks new Pods before they are admitted, determines if it should be admitted based on the requested security context and the restrictions on permitted Pod Security Standards for the namespace that the Pod would be in.

See the Pod Security Admission documentation for more information.

PodSecurity replaced an older admission controller named PodSecurityPolicy.

PodTolerationRestriction

FEATURE STATE: `Kubernetes v1.7 [alpha]`

Type: Mutating and Validating.

The PodTolerationRestriction admission controller verifies any conflict between tolerations of a pod and the tolerations of its namespace. It rejects the pod request if there is a conflict. It then merges the tolerations annotated on the namespace into the tolerations of the pod. The resulting tolerations are checked against a list of allowed tolerations annotated to the namespace. If the check succeeds, the pod request is admitted otherwise it is rejected.

If the namespace of the pod does not have any associated default tolerations or allowed tolerations annotated, the cluster-level default tolerations or cluster-level list of allowed tolerations are used instead if they are specified.

Tolerations to a namespace are assigned via the `scheduler.alpha.kubernetes.io/defaultTolerations` annotation key. The list of allowed tolerations can be added via the `scheduler.alpha.kubernetes.io/tolerationsWhitelist` annotation key.

Example for namespace annotations:

```
 apiVersion: v1
kind: Namespace
metadata:
  name: apps-that-need-nodes-exclusively
  annotations:
    scheduler.alpha.kubernetes.io/defaultTolerations: '[{"operator": "Exists", "effect": "NoSchedule", "key": "
    scheduler.alpha.kubernetes.io/tolerationsWhitelist: '[{"operator": "Exists", "effect": "NoSchedule", "key":
```

This admission controller is disabled by default.

PodTopologyLabels

FEATURE STATE: `Kubernetes v1.35 [beta]` (enabled by default)

Type: Mutating

The PodTopologyLabels admission controller mutates the `pods/binding` subresources for all pods bound to a Node, adding topology labels matching those of the bound Node. This allows Node topology labels to be available as pod labels, which can be surfaced to running containers using the Downward API. The labels available as a result of this controller are the topology.kubernetes.io/region and topology.kuberentes.io/zone labels.

Note:

If any mutating admission webhook adds or modifies labels of the `pods/binding` subresource, these changes will propagate to pod labels as a result of this controller, overwriting labels with conflicting keys.

This admission controller is enabled when the `PodTopologyLabelsAdmission` feature gate is enabled.

Priority

Type: Mutating and Validating.

The priority admission controller uses the `priorityClassName` field and populates the integer value of the priority. If the priority class is not found, the Pod is rejected.

ResourceQuota

Type: Validating.

This admission controller will observe the incoming request and ensure that it does not violate any of the constraints enumerated in the `ResourceQuota` object in a `Namespace`. If you are using `ResourceQuota` objects in your Kubernetes deployment, you MUST use this admission controller to enforce quota constraints.

See the ResourceQuota API reference and the example of Resource Quota for more details.

RuntimeClass

Type: Mutating and Validating.

If you define a RuntimeClass with Pod overhead configured, this admission controller checks incoming Pods. When enabled, this admission controller rejects any Pod create requests that have the overhead already set. For Pods that have a RuntimeClass configured and selected in their `.spec`, this admission controller sets `.spec.overhead` in the Pod based on the value defined in the corresponding RuntimeClass.

See also Pod Overhead for more information.

ServiceAccount

Type: Mutating and Validating.

This admission controller implements automation for serviceAccounts. The Kubernetes project strongly recommends enabling this admission controller. You should enable this admission controller if you intend to make any use of Kubernetes `ServiceAccount` objects.

To enhance the security measures around Secrets, use separate namespaces to isolate access to mounted secrets.

StorageObjectInUseProtection

Type: Mutating.

The `StorageObjectInUseProtection` plugin adds the `kubernetes.io/pvc-protection` or `kubernetes.io/pv-protection` finalizers to newly created Persistent Volume Claims (PVCs) or Persistent Volumes (PV). In case a user deletes a PVC or PV the PVC or PV is not removed until the finalizer is removed from the PVC or PV by PVC or PV Protection Controller. Refer to the Storage Object in Use Protection for more detailed information.

TaintNodesByCondition

Type: Mutating.

This admission controller taints newly created Nodes as `NotReady` and `NoSchedule`. That tainting avoids a race condition that could cause Pods to be scheduled on new Nodes before their taints were updated to accurately reflect their reported conditions.

ValidatingAdmissionPolicy

Type: Validating.

This admission controller implements the CEL validation for incoming matched requests. It is enabled when both feature gate `validatingadmissionpolicy` and `admissionregistration.k8s.io/v1alpha1` group/version are enabled. If any of the ValidatingAdmissionPolicy fails, the request fails.

ValidatingAdmissionWebhook

Type: Validating.

This admission controller calls any validating webhooks which match the request. Matching webhooks are called in parallel; if any of them rejects the request, the request fails. This admission controller only runs in the validation phase; the webhooks it calls may not mutate the object, as opposed to the webhooks called by the `MutatingAdmissionWebhook` admission controller.

If a webhook called by this has side effects (for example, decrementing quota) it *must* have a reconciliation system, as it is not guaranteed that subsequent webhooks or other validating admission controllers will permit the request to finish.

If you disable the ValidatingAdmissionWebhook, you must also disable the `ValidatingWebhookConfiguration` object in the `admissionregistration.k8s.io/v1` group/version via the `--runtime-config` flag.

Is there a recommended set of admission controllers to use?

Yes. The recommended admission controllers are enabled by default (shown here), so you do not need to explicitly specify them. You can enable additional admission controllers beyond the default set using the `--enable-admission-plugins` flag (**order doesn't matter**).

Last modified February 19, 2026 at 3:34 PM PST: Fix some links in the En docs (95b7685f71)
