Cloud Director Object Storage Extension 3.0 Tech Preview Add-on Install Guide

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Download

Object Storage Extension Add-on ISO

Tech Preview Build (Jan 04, 2024)
Version – 3.0.0- 23063474
ISO File – The download link is provided separately.

Object Storage Extension Kubernetes Operator

Tech Preview Build (Jan 04, 2024)
Version – 3.0.0-23063474
Registry – pojects.registry.vmware.com/vcd-ose

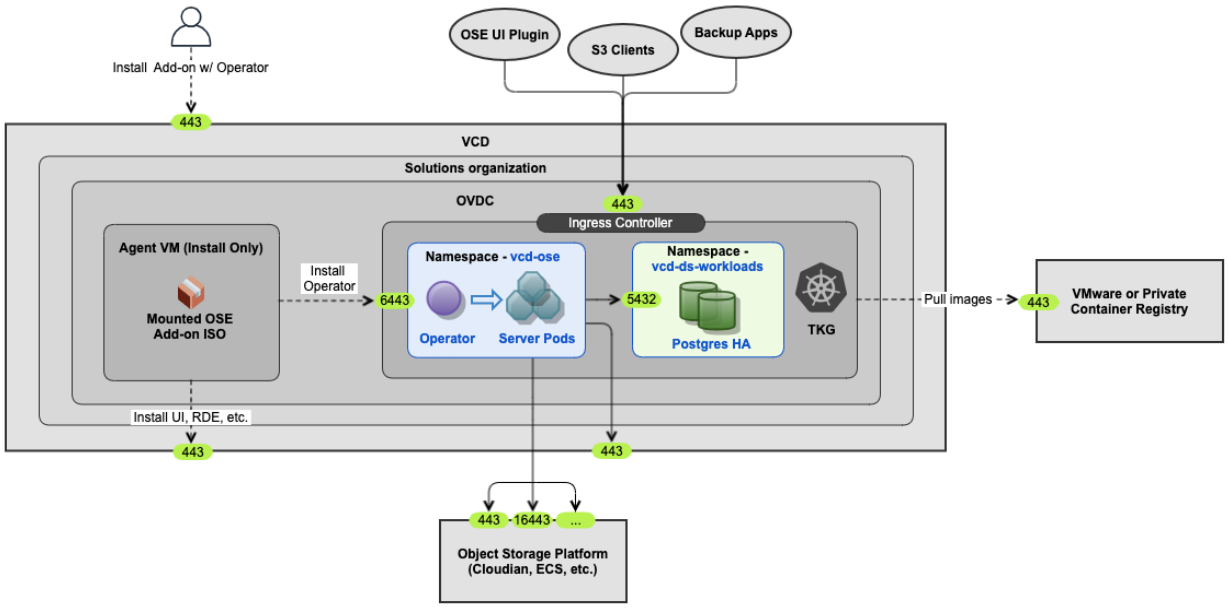
Deployment Architecture

Object Storage Extension add-on requires to install Object Storage Extension Kubernetes Operator and Server into a Kubernetes cluster. Object Storage Extension add-on supports two kinds of Kubernetes cluster locations:

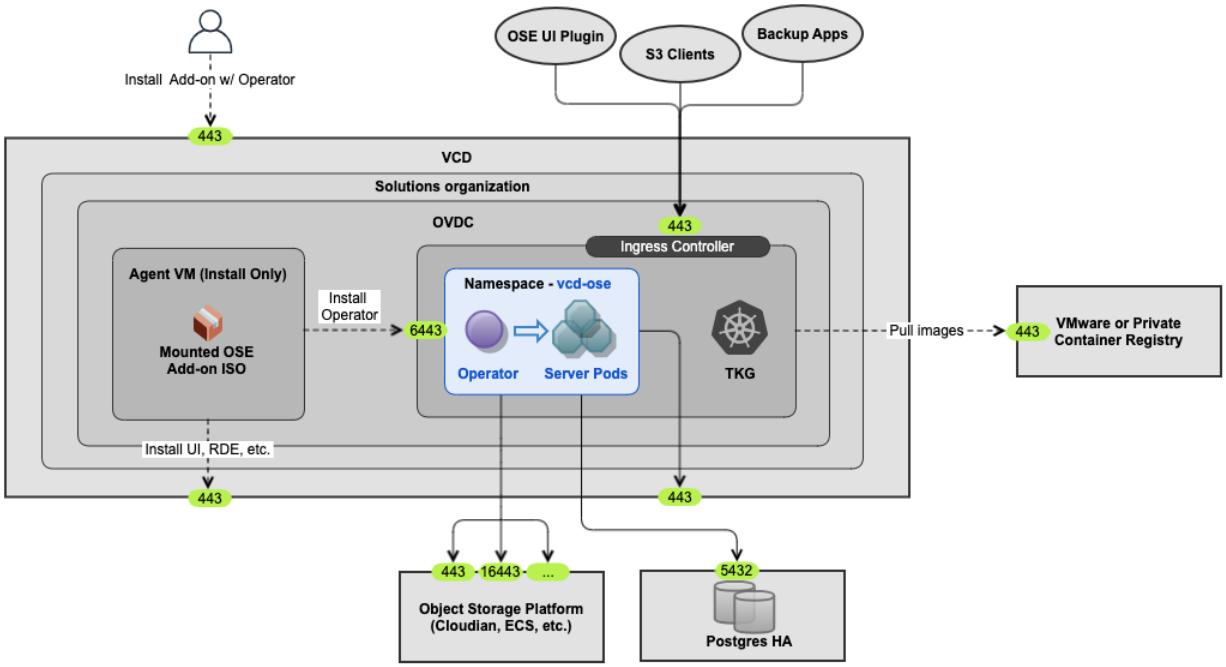
1. A Container Service Extension 4.1+ provisioned TKG cluster under Cloud Director Solutions organization's Solution Landing Zone (SLZ)
2. A vanilla Kubernetes cluster that is CNCF conformant (External)

Below diagrams show the deployment architecture under different conditions.

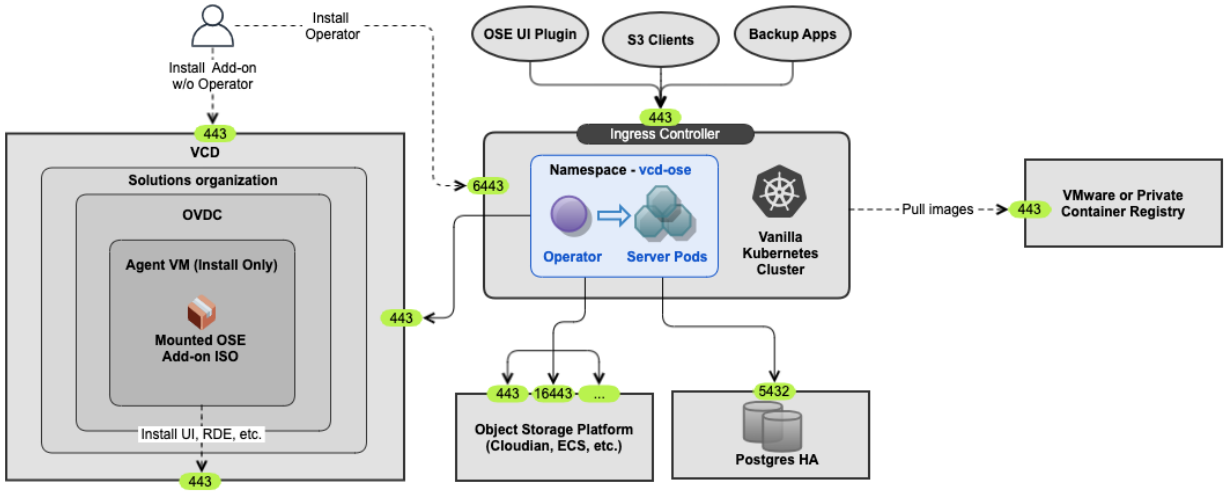
Scenario 1 - Object Storage Extension is installed to TKG cluster under Cloud Director Solutions organization's Solution Landing Zone, and Object Storage Extension consumes a Postgres High Aavailability (HA) provisioned by Cloud Director Data Solutions Extension (DSE) under the same Solutions organization.



Scenario 2 - Object Storage Extension is installed to TKG cluster under Cloud Director Solutions organization's Solution Landing Zone, and Object Storage Extension consumes a Postgres HA out sides of Cloud Director.



Scenario 3 - Object Storage Extension is installed to a vanilla Kubernetes cluster, and Object Storage Extension consumes a Postgres HA out sides of Cloud Director.



To put it simple, we call the Kubernetes cluster of scenario 1 & 2 "**SLZ**", and the one of scenario 3 "**EXTERNAL**" in the following sections.

Prerequisites

#	Product or Component	Version	Required	Detail Prerequisites
1	Cloud Director	10.5.1+	**True**	1. Cloud Director is installed. 2. Solution Add-on Landing Zone (SLZ) is configured. (documentation)
2	Domain Name Server (DNS)	-	**True**	Set DNS records for Object Storage Extension S3 endpoint, i.e. *s3.mycloud.local → 10.9.9.9*. Please note if you support virtual host style of S3 buckets for Object Storage Extension, your DNS server needs to route wildcard sub domains to the parent Object Storage Extension S3 endpoint. • ***<s3_zone>*** *→ Object Storage Extension S3 endpoint* • ****.<s3_zone>*** *→ Object Storage Extension S3 endpoint*

3	Container Service Extension	4.1+	False	This component is required for **SLZ** scenario.
				
				1. CSE is installed to Cloud Director.
				2. Edge network is configured for the Solutions organization. At least one external IP from the IP pool is reserved for Object Storage Extension S3 endpoint, i.e. *10.9.9.9.*
				3. A TKGm cluster is installed to the Solutions organization.
				    1. TKGm version is >= 2.1.1.
				    2. Kubernetes version is >= 1.23.
				    3. Below **tanzu-standard** packages are installed. (documentation)
				        1. Cert-Manager
				        2. Contour Ingress Controller
				4. TKGm cluster's pods have outbound access to the object storage platform.
				5. TKGm cluster's pods have outbound access to the Postgres database.
				6. TKGm cluster's pods have outbound access to VMware public registry or a private Harbor.

4	Vanilla Kubernetes Cluster	1.23+	False	This component is required for **EXTERNAL** scenario.
				
				1. Below packages are installed.
				    1. Cert-Manager
				    2. Ingress Controller
				    3. Prometheus
				    4. Grafana
				2. At least one external IP is reserved for Object Storage Extension S3 endpoint, i.e. *10.9.9.9.*
				3. Vanilla cluster's pods have outbound access to the object storage platform.
				4. Vanilla cluster's pods have outbound access to the Postgres database.
				5. Vanilla cluster's pods have outbound access to VMware public registry or a private Harbor.

5	Harbor	2.0+	False	This component is required for the case that your Kubernetes cluster cannot pull images from VMware public registry because of network constraints. 1. Harbor is installed. 2. A Harbor project is configured for Object Storage Extension Kubernetes Operator packages. 3. The project storage quota is at least 10 GB. 4. Object Storage Extension Kubernetes Operator package and server images are cloned to the Harbor project.

6	TLS Certificate	-	False	TLS certificate is required to setup HTTPS for your Object Storage Extension S3 endpoint. Object Storage Extension installation supports three TLS certificate types.
				
				▪ Cert- Manager Self-signed (default).
				  ▪ For this type, make sure the Cert-Manager in your Kubernetes cluster can produce self-signed certificates.
				▪ Cert-Manager Issuer
				  ▪ For this type, set up a ClusterIssuer in the Kubernetes cluster where the Object Storage Extension will be installed. Cert-Manager supports a wide variety of issuers. Please refer https://cert-manager.io/docs/configuration/ for the various options.
				▪ Import
				  ▪ For this type, prepare the server certificate, key of the certificate w/o passphrase, and CA bundle before the installation.

7	Linux OS machine	Any recent version	False	This component is required for CLI based add-on installation. Prepare a Linux machine for the installation of Object Storage Extension add-on with ISO. If using self-signed Harbor, users need to add the self-signed CA certificate to linux machine's trust store. To query the certificate from Harbor, users can use browsers or use this openssl command. # replace harbor-repo.vmware.com:443 with your domain and port openssl s_client -connect harbor-repo.vmware.com:443 -showcerts </dev/null

Please note supported versions for other interoperable products or components not mentioned in the above table are same to Cloud Director Object Storage Extension 2.2.3.

Installation

The installation of Object Storage Extension add-on can be done by either Cloud Director UI or command-line. Parameters are common for both installation.

Install Parameters

Built-in Parameter	Required	Scope	Description	Example
name	YES	CLI UI	Name of the instance to be created	ose-on-tkg-us-east-1
host	YES	CLI	Cloud Director hostname	vcd.mydomain.com
port		CLI	Cloud Director port (default 443)	443
username	YES *	CLI	Cloud Director username (exclusive with auth-token)	
password	YES *	CLI	Cloud Director password (exclusive with auth-token)	

Built-in Parameter	**Required**	**Scope**	**Description**	**Example**
auth-token	YES *	CLI	Cloud Director API/refresh token (exclusive with username and password)	
encryption-key		CLI	User defined key protecting sensitive data, the same key is also required by second day operations. If you set the encryption key, you cannot perform future upgrade or deletion through UI.	P@ssw0rd
iso		CLI	Upload the iso file to Cloud Director catalog during the installation. The future instance creation, upgrade and deletion will launch an agent VM in the Solutions organization's SLZ to complete the job.	
accept	YES	CLI	Accept the terms of EULA.txt and CEIP.txt	No value
certificate-file	YES	CLI	Cloud Director certificate file path on localhost	/root/Cloud Director.pem
Add-on Parameter	**Required**	**Scope**	**Description**	**Example**

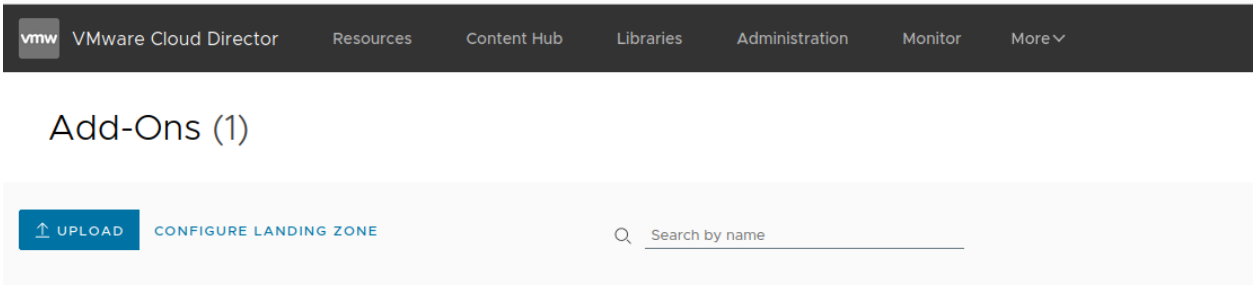
Built-in Parameter	Required	Scope	Description	Example
input-kube-cluster-location	YES	CLI UI	The kubeClusterLocation is used to specify the location to install Object Storage Extension Kubernetes Operator. • By **SLZ**, you specify an existing TKG cluster name in the Solutions organization and the add-on will install the operator into it. • By **EXTERNAL**, you install the operator by yourself into your Kubernetes cluster. Defaults to slz.	slz
input-Cloud Director-api-token	YES	CLI UI	This is a Cloud Director API token of provider user used by Object Storage Extension Kubernetes Operator installation. It should be from the user of System Administrator. (documentation)	
install-kube-cluster-name		CLI UI	This is the existing Kubernetes cluster name in the Solutions organization used to install Object Storage Extension deployment. This parameter is required by auto installation type. This parameter is required by **SLZ** type.	solution-tkg-1

Built-in Parameter	Required	Scope	Description	Example
input-registry-url		CLI UI	The container registry URL is used to pull Object Storage Extension container packages during installation, i.e., registry.mydomain.com/myproject. If you host Object Storage Extension container packages in a private registry, you must specify it here. Defaults to projects.registry.vmware.com/vcd-ose.	projects.registry.vmware.com/vcd-ose
input-registry-username		CLI UI	The username of the container registry for Basic authentication.	
input-registry-password		CLI UI	The password of the container registry for Basic authentication.	
input-registry-ca-bundle-file		CLI UI	This is CA bundle in PEM format of the container registry's TLS certificate.	
input-Object Storage Extension-operator-version		CLI UI	The Kubernetes Operator version of Object Storage Extension. This is needed when you want to customize the operator version.	3.0.0-123456
input-deploy-timeout		CLI UI	The deploy timeout is used to set the timeout in seconds for Object Storage Extension Kubernetes Operator installation. Defaults to 3600.	

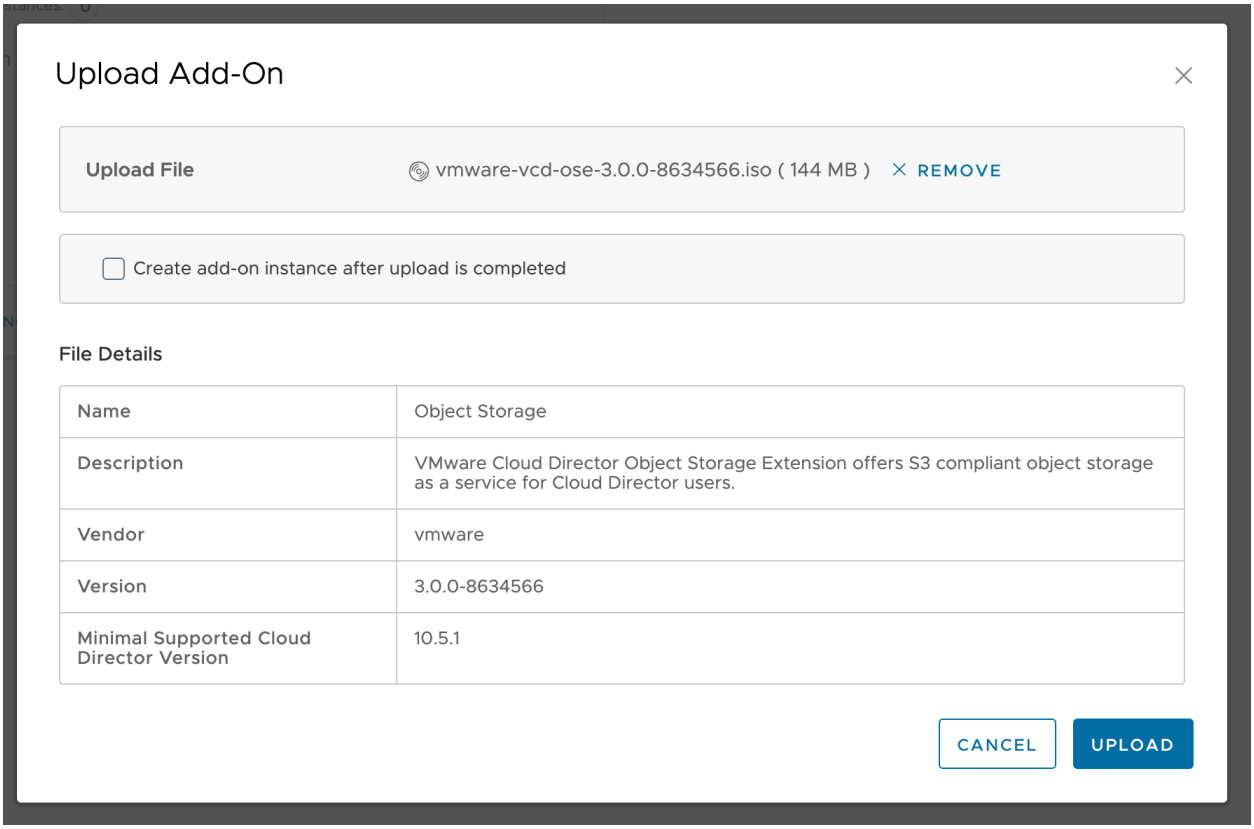
Install by UI

Log in to the provider portal as an administrator, navigate to the Solution Add-ons Management page, open the upload window by clicking on the upload button, select the ISO file you want to install.

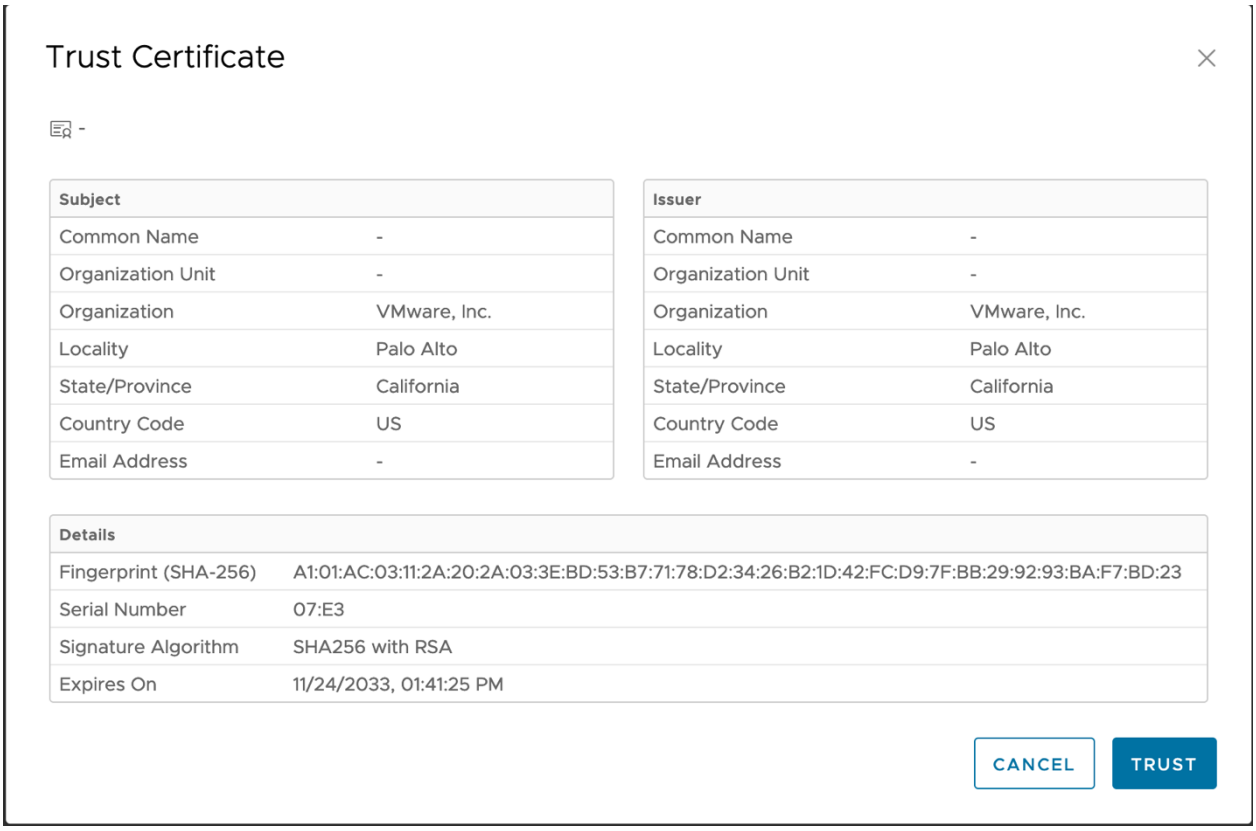
To create a new instance for this ISO you can either check the option "Create add-on instance after upload after is completed" or create a new instance by clicking the "NEW INSTANCE" button on the Object Storage Extension panel.



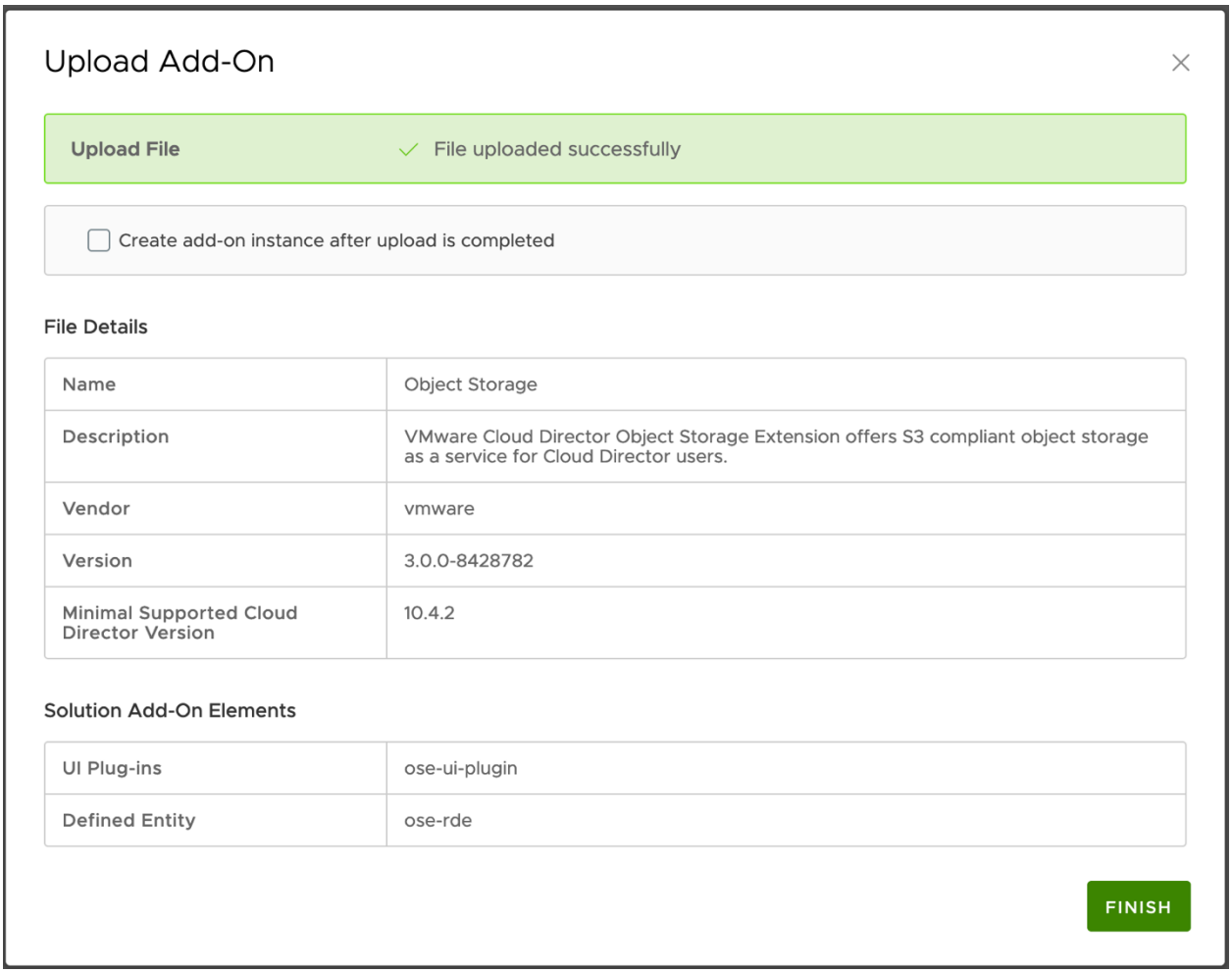
Confirm to upload the selected ISO files.



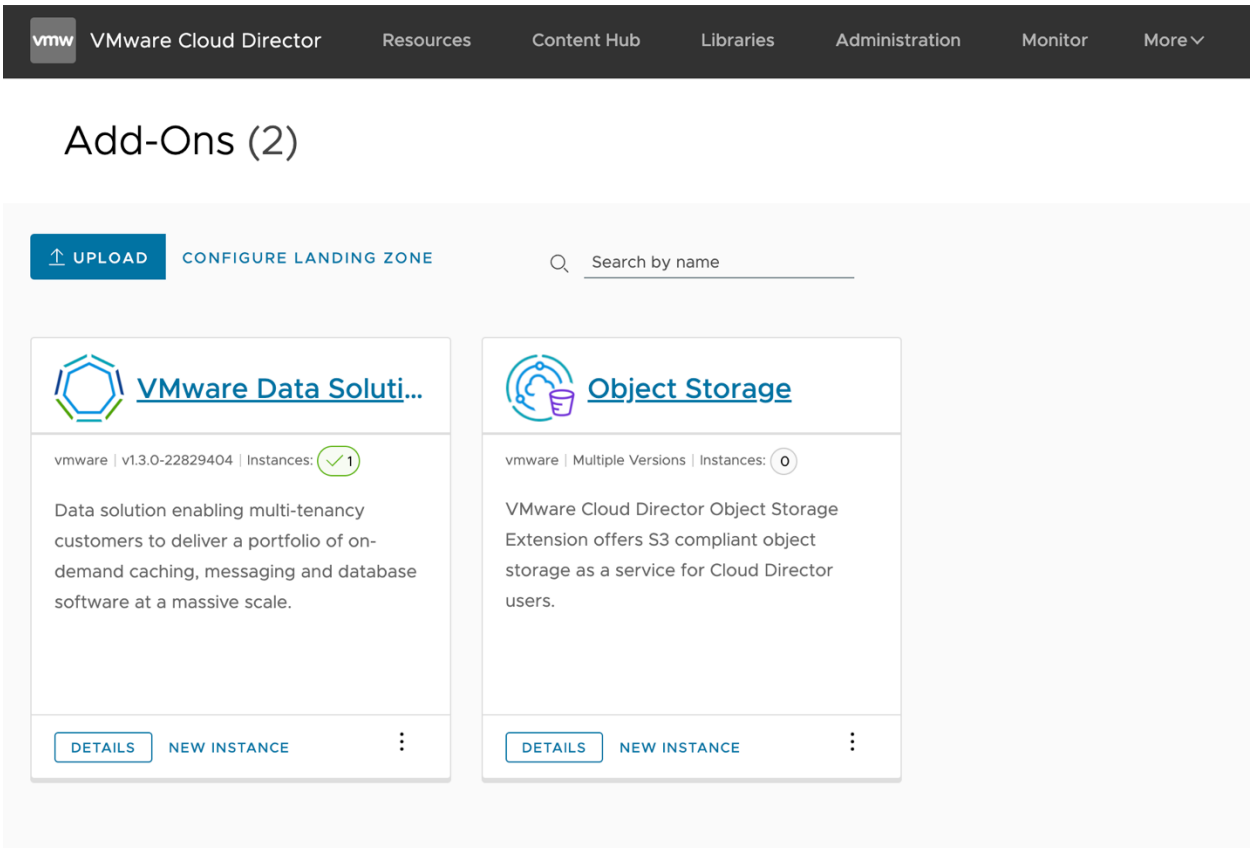
Trust the Cloud Director certificate.



After the uploading is completed, the UI shows the FINISH button.

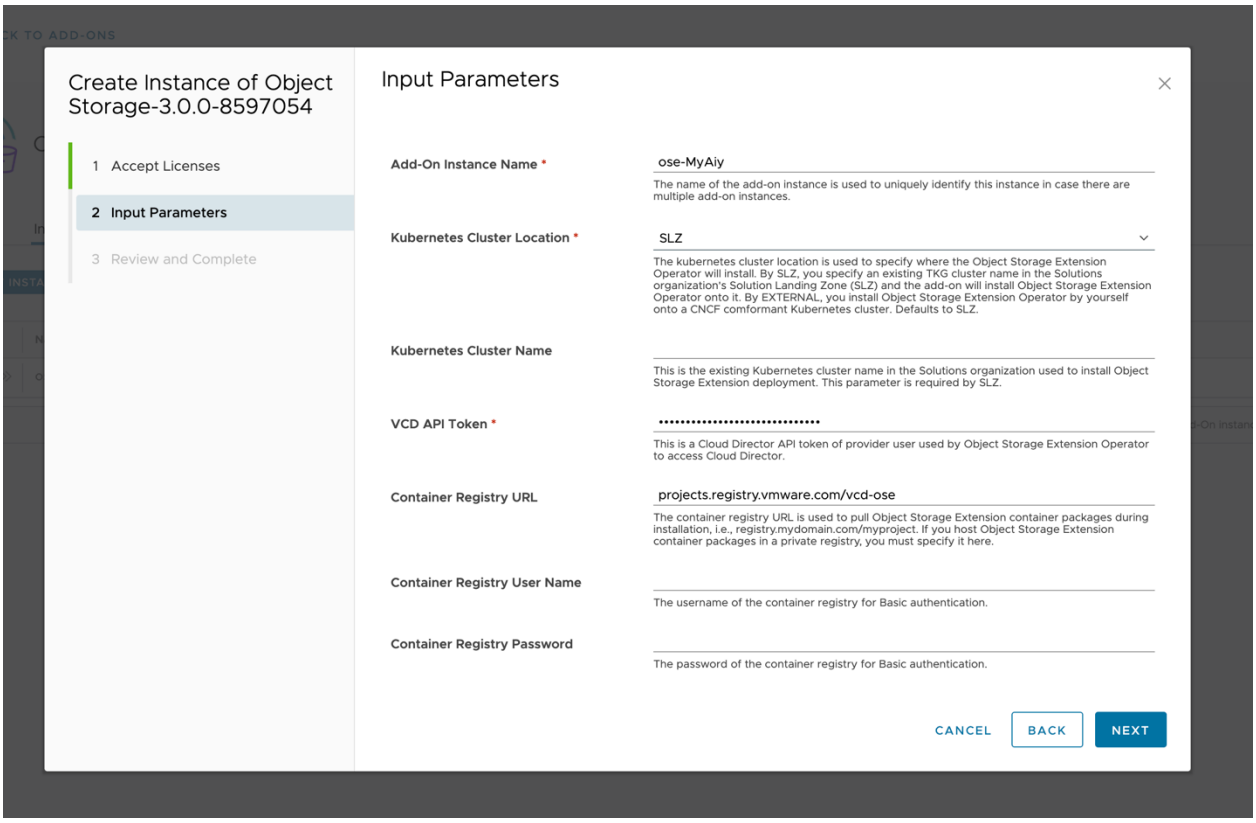


After the installation, you can see **Object Storage** solution in the landing zone.



Next, click NEW INSTNCE button to start the deployment of Object Storage Extension.

Before processing with the installation, you must accept the EULA license, then input parameters.



Install Operator to SLZ

If you have an existing TKG cluster in Solutions organization, choose Object Storage Extension Kubernetes Cluster Location **SLZ** (default).

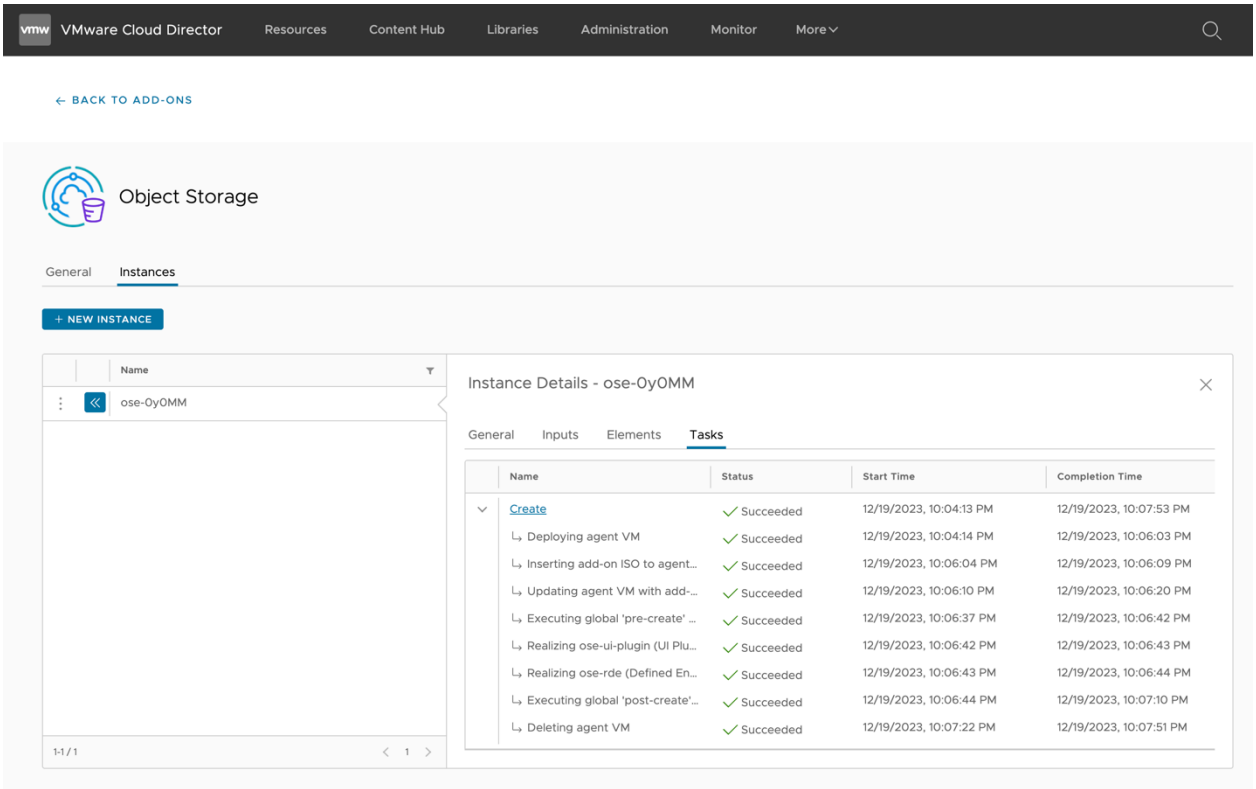
Object Storage Extension Kubernetes Operator will be automatically installed to the TKG cluster of the Solutions organization. You can jump to the section **Post Installation** after the add-on instance is created.

Install Operator to EXTERNAL

If you have a vanilla Kubernetes cluster outside of Solutions organization, choose Object Storage Extension Kubernetes Cluster Location **EXTERNAL**.

Object Storage Extension Kubernetes Operator won't be automatically installed. Instead, you need to complete the operator installation following the instruction from Object Storage Extension provider configuration. You can jump to the section **Install Operator to External Cluster** after the add-on instance is created.

The add-on instance creation is performed at the backend by an agent VM. You need to wait for a while until it's ready. You can click the instance name to see the event progress.



Install by Command-Line

Besides UI installation, Object Storage Extension add-on also supports Command-Line (CLI) installation. For CLI installation, please prepare a **Linux** machine. Download Object Storage Extension ISO file vmware-vcd-ose-3.0.0-123456.iso to the local machine.

1. Create a directory

In your local folder, create a new folder to mount the iso file, we take "Object Storage Extension_package" for example.

```
mkdir ose_package
```

2. Mount ISO

```
mount -o loop vmware-vcd-ose-3.0.0-123456.iso ose_package
```

3. Install

You can view help message by command <run> create instance -h.

```
$ ./linux.run create instance -h
```

Please note parameters with prefix **--input** are defined specific to Object Storage Extension.

4. Download Cloud Director Certificate

If you don't have the Cloud Director certificate file now, you can use this command to get it.

```
./linux.run get certificates  --host <vcd-hostname> -o <vcd-cert-file> --
accept
```

5. Trust Cloud Director Certificate

If you don't trust the Cloud Director certificate now, you can use this command to trust it.

```
./linux.run trust --host <vcd-hostname> --username <provider-user> --
password <password> --certificate-file <vcd-cert-file> --accept
```

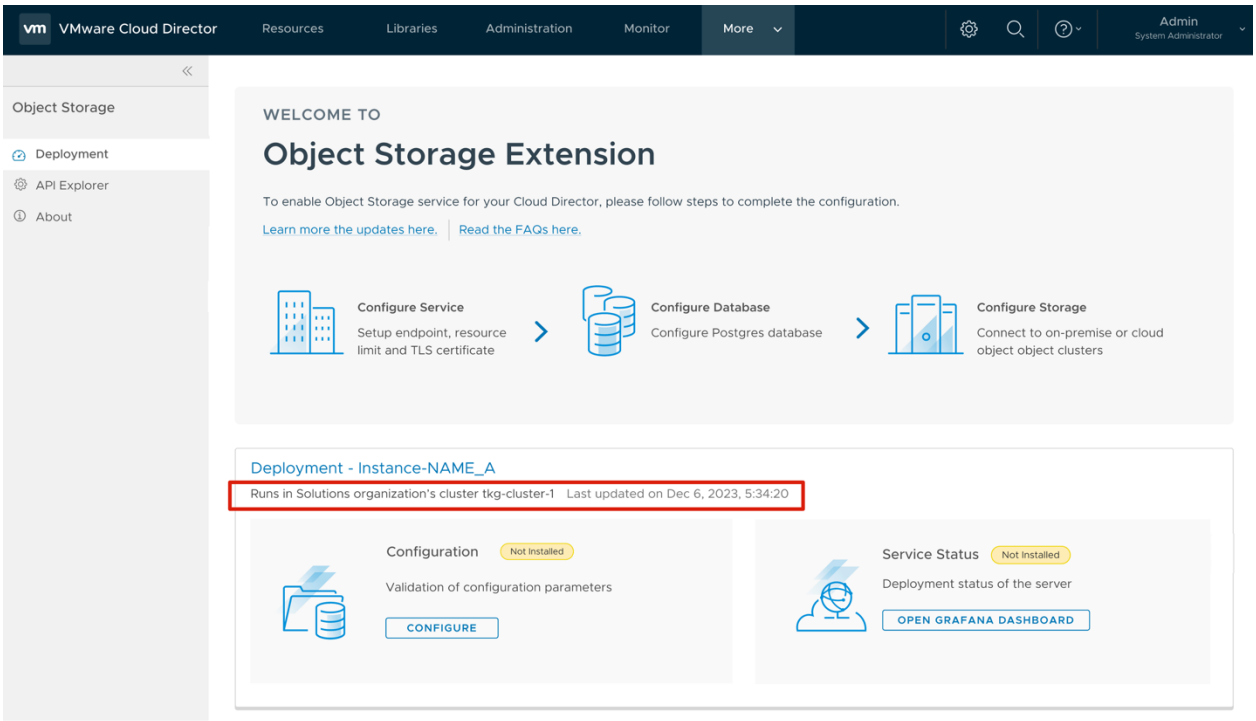
6. Install Add-on

```
./linux.run create instance --name <name> --host <vcd-hostname> --
username <provider-user> --password <password> --certificate-file <vcd-
cert-file> --accept --iso
```

Post Installation

After you create an Object Storage Extension add-on instance, Object Storage Extension UI plugin is installed to Cloud Director. You must refresh the web browser page to see Object Storage Extension UI plugin.

You start the configuration from Cloud Director **Provider Portal** > **More** > **Object Storage** > **Deployment**. If Object Storage Extension Kubernetes Operator is already installed, UI will show the Kubernetes cluster location under the deployment name.



If you see a message "The Kubernetes cluster where the server runs is not detected.", that indicates that Object Storage Extension Kubernetes Operator is not installed yet. This occurs when you choose Kubernetes Cluster Location EXTERNAL during the add-on instance creation. You can jump to the section Install Operator to External Cluster to proceed for the operator installation.

If you have the access to the Kubernetes cluster by **kubectl** command-line, you can also check a few things. Object Storage Extension Kubernetes Oerator and server pods are installed to the namespace **vcd-ose**.

Query Object Storage Extension Kubernetes Operator

```
% kubectl get apps -n vcd-ose
 NAME                DESCRIPTION           SINCE-DEPLOY   AGE
 vcd-ose-operator    Reconcile succeeded   7m59s          26h
```

Query Object Storage Extension resources within namespace

```
% kc get all -n vcd-ose
NAME                                                                READY
STATUS    RESTARTS   AGE
pod/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540-69f7bd5578-4s7mc   1/1
Running   0          17h
pod/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540-69f7bd5578-bkjbp   1/1
Running   0          17h
pod/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540-69f7bd5578-m45vn   1/1
Running   0          17h
pod/vcd-ose-controller-manager-7d8c8bbb6f-pxg68                    2/2
Running   0          23h
pod/vcd-ose-controller-manager-7d8c8bbb6f-wmpdr                    2/2
Running   0          23h

NAME                                                  TYPE        CLUSTER-
IP       EXTERNAL-IP   PORT(S)    AGE
service/vcd-ose-controller-manager-metrics-service   ClusterIP
100.67.190.125   <none>        8443/TCP   26h
service/vcd-ose-controller-manager-metrics-service   ClusterIP
100.67.190.125   <none>        8443/TCP   26h

NAME                                                            READY
UP-TO-DATE   AVAILABLE   AGE
deployment.apps/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540   3/3     3
3           23h
deployment.apps/vcd-ose-controller-manager                     2/2     2
2           23h

NAME
DESIRED   CURRENT   READY   AGE
replicaset.apps/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540-566d5cf94b
0         0         0       23h
replicaset.apps/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540-69f7bd5578
3         3         3       17h
replicaset.apps/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540-7cd54d495d
0         0         0       22h
replicaset.apps/vcd-ose-9acde567-a1c9-4519-abec-c233a886a540-c786459c4
0         0         0       23h
replicaset.apps/vcd-ose-controller-manager-7d8c8bbb6f
2         2         2       23h
```

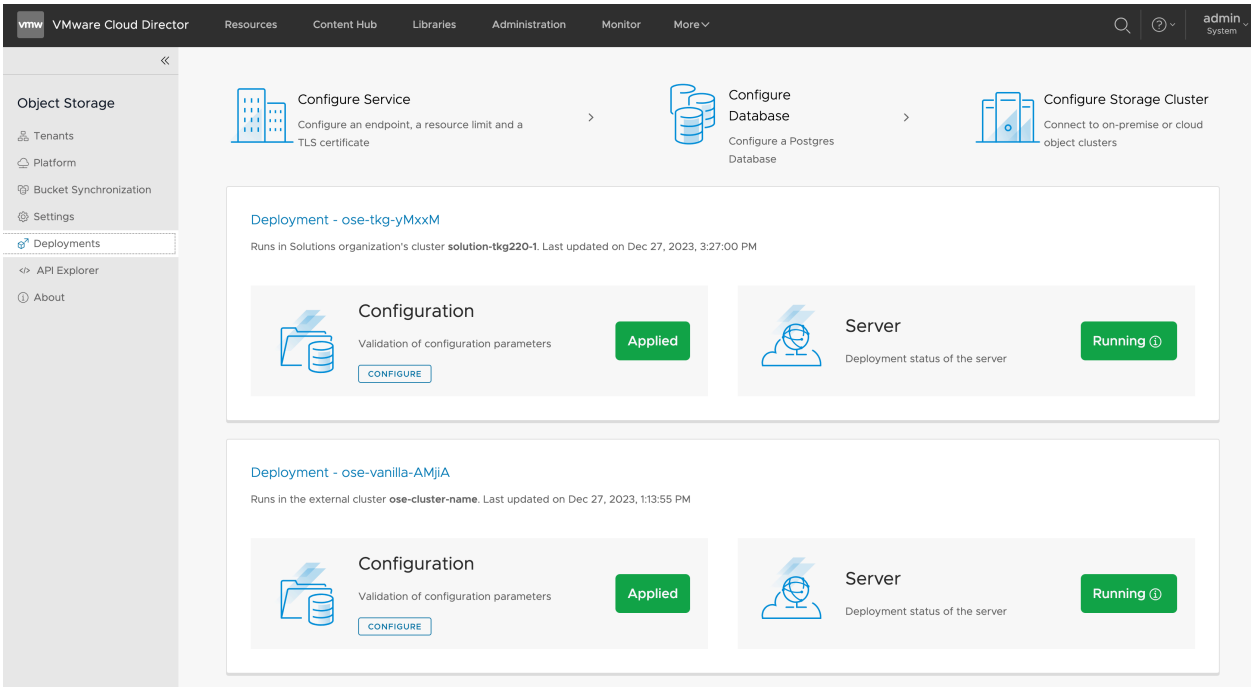
When you see the above information, it means the installation is so far so good. The next step is to configure Object Storage Extension to bring up the server.

Multi-region Consideration

You can create multiple Object Storage Extension instances (also known as deployments) for a single Cloud Director site when you want to support multi-region S3 endpoints for the site.

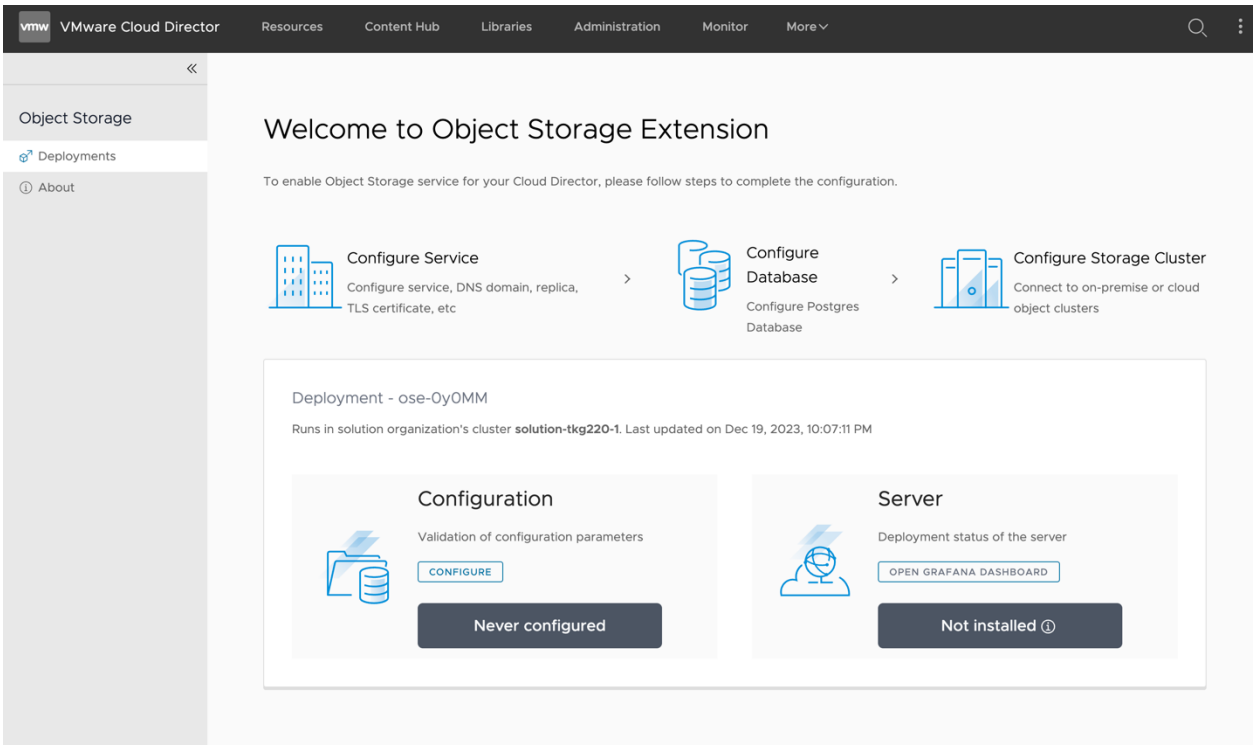
Please refer to Object Storage Extension documentation for the supported multi-region storage platforms.

Each instance of Object Storage Extension must be deployed to a separate Kubernetes cluster. Multi-region instances cannot share the same Kubernetes cluster or database.



Configuration

This section introduces how to configure Object Storage Extension server to enable S3 service. The configuration is performed on Cloud Director **Provider Portal** > **More** > **Object Storage** > **Deployments** page. You can see two cards **Configuration** and **Server** in initial states.

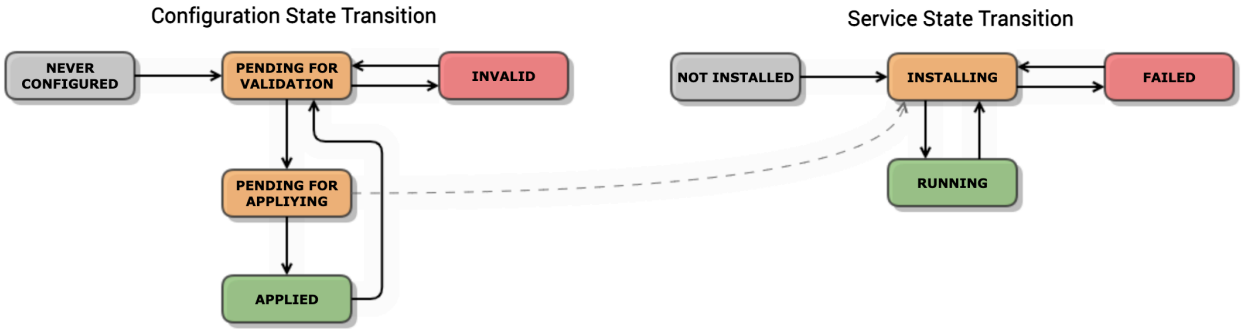


Understand Configuration and Service Status

Configuration - Configuration parameters, validation result, and applying status for Object Storage Extension deployment. The configuration update can be repeated. When the configuration is validated, server rolling out update will be triggered.

Service Status - Server deployment status for Object Storage Extension. It indicates S3 service state. For a multi node (replica > 1) deployment, the rolling out update can achieve no downtime update.

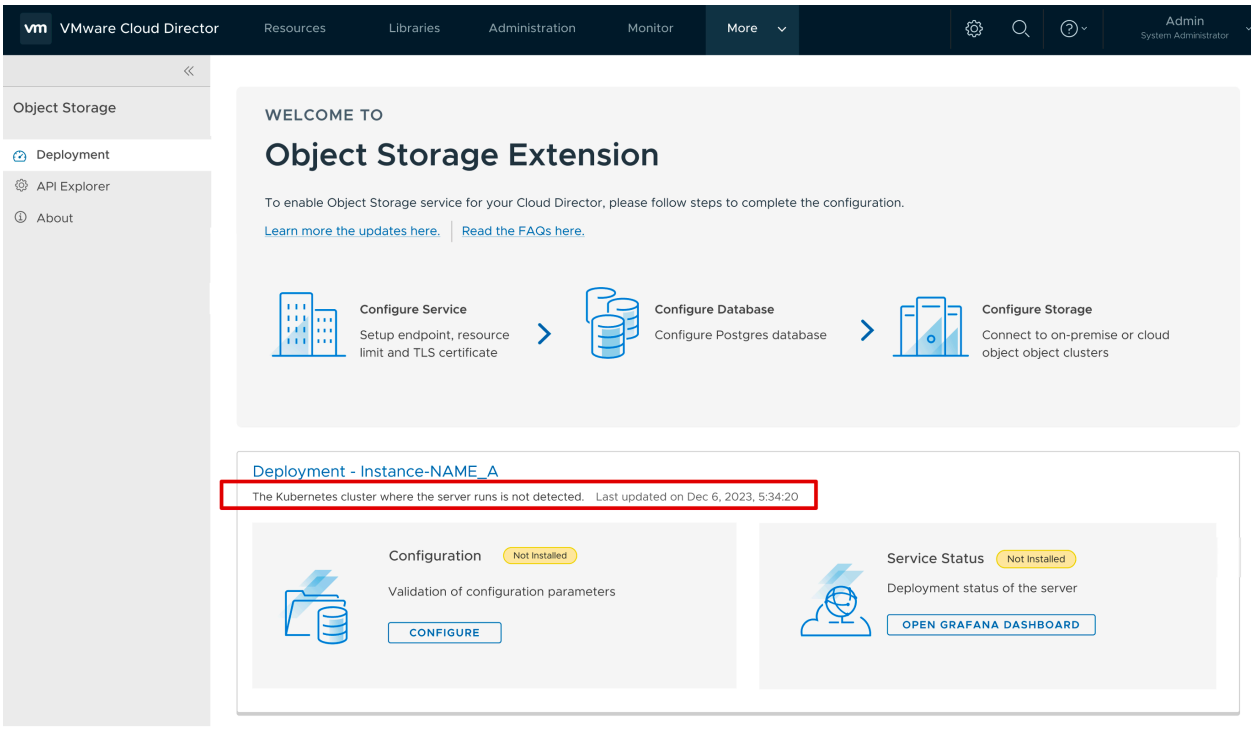
State transition for Configuration and Service Status is further illustrated in below diagram.



Install Operator to External Cluster

If you install Object Storage Extension Kubernetes Operator to SLZ location, you don't see the step **Install Operator**.

This step is required when you install Object Storage Extension Kubernetes Operator to the **EXTERNAL** location. On the Deployment page, you see a message "The Kubernetes cluster where the server runs is not detected.".



You click button **CONFIGURE** to install the operator. From UI, you generate and download the Kubernetes Resource YAML file.

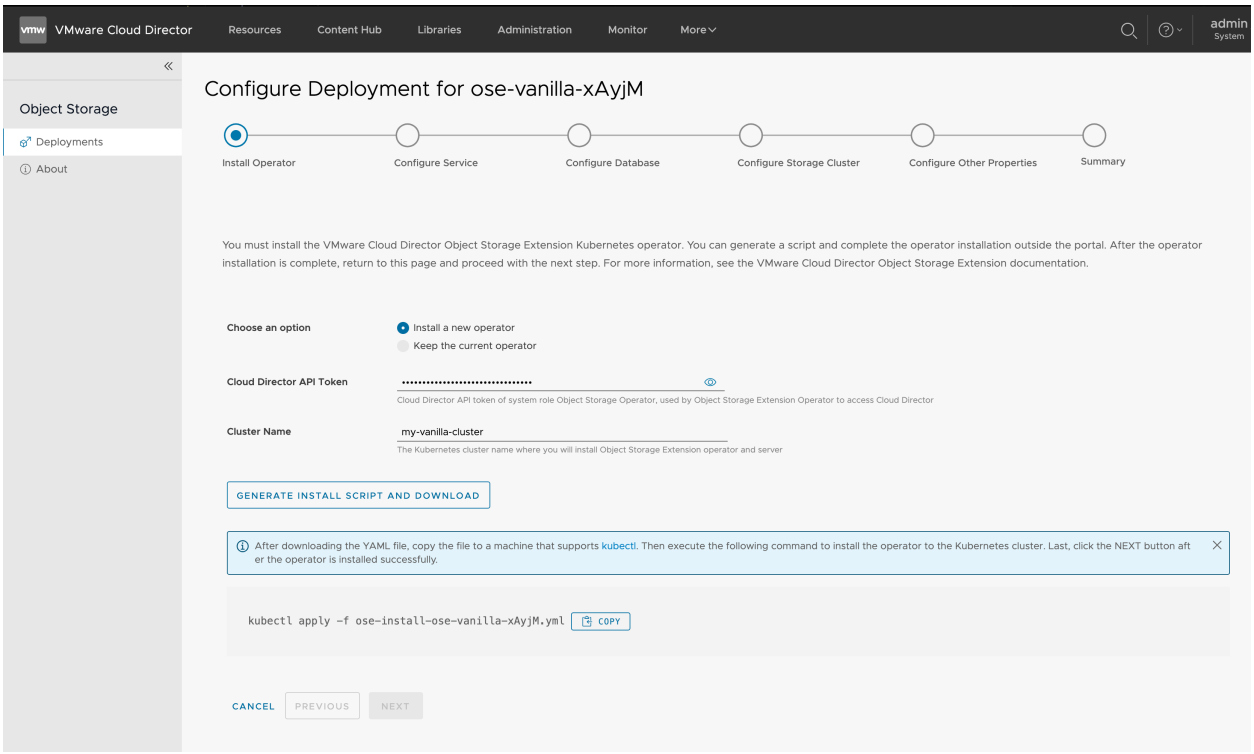
From a machine, you use **kubectl** command-line to install Object Storage Extension Kubernetes Operator manually.

The API token should be from a user of role **Object Storage Operator**. For now, you need to create this role manually in the system organization with below rights in OTHERS section.

```
vmware:objectStorageExtension: Administrator Full access
vmware:objectStorageExtension: Administrator View
vmware:objectStorageExtension: Full Access
vmware:objectStorageExtension: Modify
vmware:objectStorageExtension: View
```

Specify a name for your Kubernetes cluster to install Object Storage Extension.

Click the button GENERATE INSTALL SCRIPT AND DOWNLOAD to download a YAML file to your local path and install it to your Kubernetes cluster with command **kubectl**. This step installs Object Storage Extension Kubernetes Operator to the cluster.



After you finish the operator installation, you can check the box and move to the next step.

Configure Service

This step configures Object Storage Extension server pods and S3 endpoint.

Parameter	Description
CPU	CPU cores for one server node
Memory	Memory for one server node
Replicas	Number of server nodes
Region	S3 region name; must be same to storage platform's region.

S3 Endpoint	S3 public endpoint for Object Storage Extension; must be in HTTPS; for virtual hosted style S3 support, it's required to set the subdomain prefix **s3.** and resolve all wildcard subdomains to the same host. For instance, - s3.example.com - bucket1.example.com - bucket2.example.com - *.example.com
TLS Certificate	TLS certificate for HTTPS; support 3 different types. • **Self-signed** – Self-signed certificate is supported in the Certificate Manager of the Kubernetes cluster where you install Object Storage Extension • **Issuer** - Issuer is configured in the Certificate Manager of the Kubernetes cluster where you install Object Storage Extension • **Import** - Prepare the server certificate, key and CA bundle by external tools like OpenSSL; the key must not have passphrase.

Configure Database

This step configures Postgres database for Object Storage Extension.

Parameter	Description
Source	Source location for Postgres database; support 2 different types: • Data Solutions Extension (DSE) provisioned instance • Other existing instance For either type, you need to prepare the instance in advance.
Solution Instance	DSE Postgres instance from Solutions organization
Database Host	Postgres instance's hostname, i.e. psql.mydomain.com
Port	Port of Postgres
Database Name	Prepared database name; for DSE Postgres instance, the database name should be same to instance name.
Username	Admin user for the database
Password	Password for the user

CA Bundle	CA bundle for the Postgres port if SSL is enabled

If you use Postgres HA from Data Solutions Extension, the default database is the name of the instance itself unless you create a new database. The default DB server max connection count is 100, and the default Object Storage Extension server DB connection count is 90 on each node. So it's easy to exhaust the DB connections. You have two ways to address this issue:

1. Follow https://docs.vmware.com/en/VMware-SQL-with-Postgres-for-Kubernetes/2.2/vmware-postgres-k8s/GUID-configure-postgresql-server.html to set a larger max connection count.
2. Decrease the DB connection count on Object Storage Extension server at the step of Configure Other Properties.

Configure Storage Cluster

This step configures object storage platform. It supports 4 different types:

- Cloudian HyperStore
- DELL ECS
- Amazon S3
- OSIS Compliant Storage

HTTP only storage endpoints are not supported by this tech preview version.

Some endpoints require you to input the TLS certificate information. There are three options.

- **CA Bundle** – Use this option if the TLS certificate of the endpoint is privately signed by a Certificate Authority (CA)
- **Certificate Signature** – Use this option if the TLS certificate is standalone. Please note when the certificate is rotated on day 2, the saved signature with this option becomes invalid and you have to re-configure Object Storage Extension.
- **Publicly Signed** – Use this option if the TLS certificate of the endpoint is publicly signed by a well-known Certificate Authority (CA)

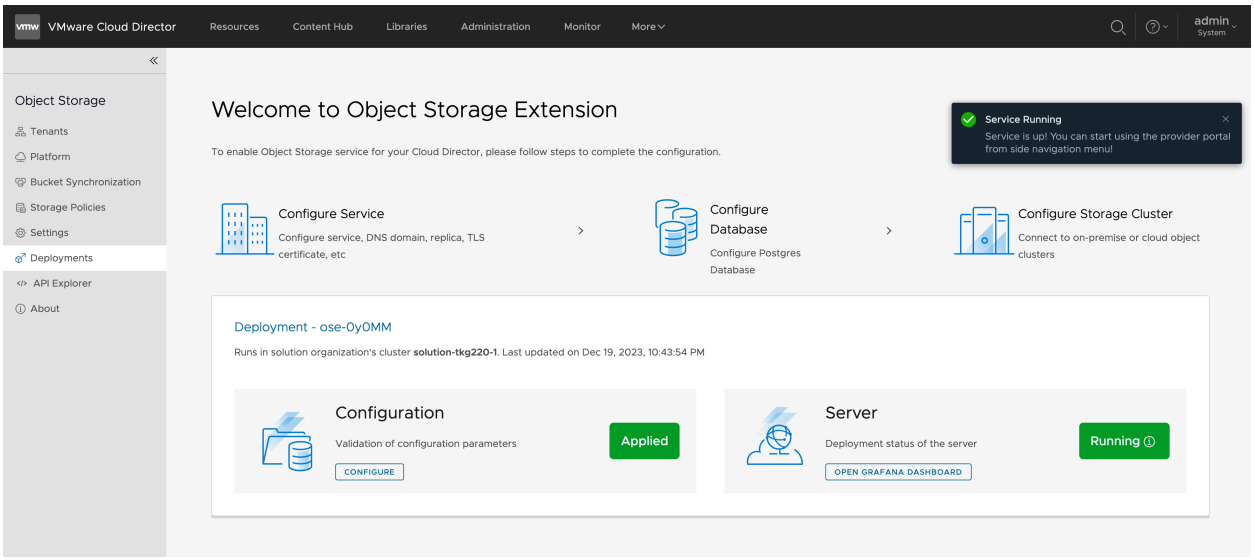
Configure Other Properties

This step allows you to add advanced runtime properties for the deployment. Some useful runtime properties are listed below:

Property	Default Value	Description
logging.level.com.vmware.voss	WARN	Logging for Object Storage Extension packages. For DEBUG mode, set the value DEBUG.
logging.level.org.apache.http	WARN	Logging for HTTP headers of communication between Object Storage Extension and its dependent parties. For DEBUG mode, set the value DEBUG.
logging.level.org.apache.http.wire	WARN	Logging for HTTP payloads of communication between Object Storage Extension and its dependent parties. For DEBUG mode, set the value DEBUG. Please be cautious that DEBUG mode of this setting could produce huge logs.
spring.datasource.hikari.maximumPoolSize	90	DB connection count from a single Object Storage Extension server node.
s3.client.upload.multipart.threshold	1073741824	Sets the size threshold, in bytes, for when to use multipart uploads.
s3.client.copy.multipart.threshold	1073741824	Sets the size threshold, in bytes, for when to use multi-part copy.
s3.client.max.object-keys	1000	The maximum number of keys to include in the response of list objects and versions.
s3.client.max.connections	1000	Sets the maximum number of allowed open S3 connections.
oss.k8s.velero.repository	velero/velero	The repository of Velero server image.
oss.scheduling.ecs.token.renew.rate	v1.11.1	The tag of Velero server image.

oss.k8s.velero.aws.plug.image	velero/velero-plugin-for-aws:v1.8.0	The location of Velero AWS plugin image.
oss.k8s.velero.restore-helper.image	velero/velero-restore-helper:v1.10.0	The location of Velero restore helper image.
oss.k8s.velero.node-agent.memory	2048Mi	The memory limit of Velero server pod.
oss.k8s.velero.node-agent.cpu	2000m	The CPU limit of Velero server pod.

After the configuration is applied and server is up running, both cards turn green.



Re-configure The Deployment

On day 2, you can re-configure the Object Storage Extension deployment by clicking the CONFIGURE button, for instance, for the purpose to increase the replica count of server pods, to replace a certificate, etc. The re-configuration supports rolling update, meaning that the service won't be down when it applies configuration changes.

Configuration changes will be validated before being applied. Please refer to Understand Configuration and Service Status for the state transitions.

Please note stored passwords or secrets are show as asterisks when you re-configure parameters. You cannot view their real values. If you don't intend to change them, keep those fields as they be. If you want to change, input new values in the fields.

Uninstallation

The uninstallation will shutdown and remove Object Storage Extension server, remove Object Storage Extension Kubernetes Operator, and remove Object Storage Extension add-on from Cloud Director in order.

Uninstall Kubernetes Operator

Uninstall from SLZ

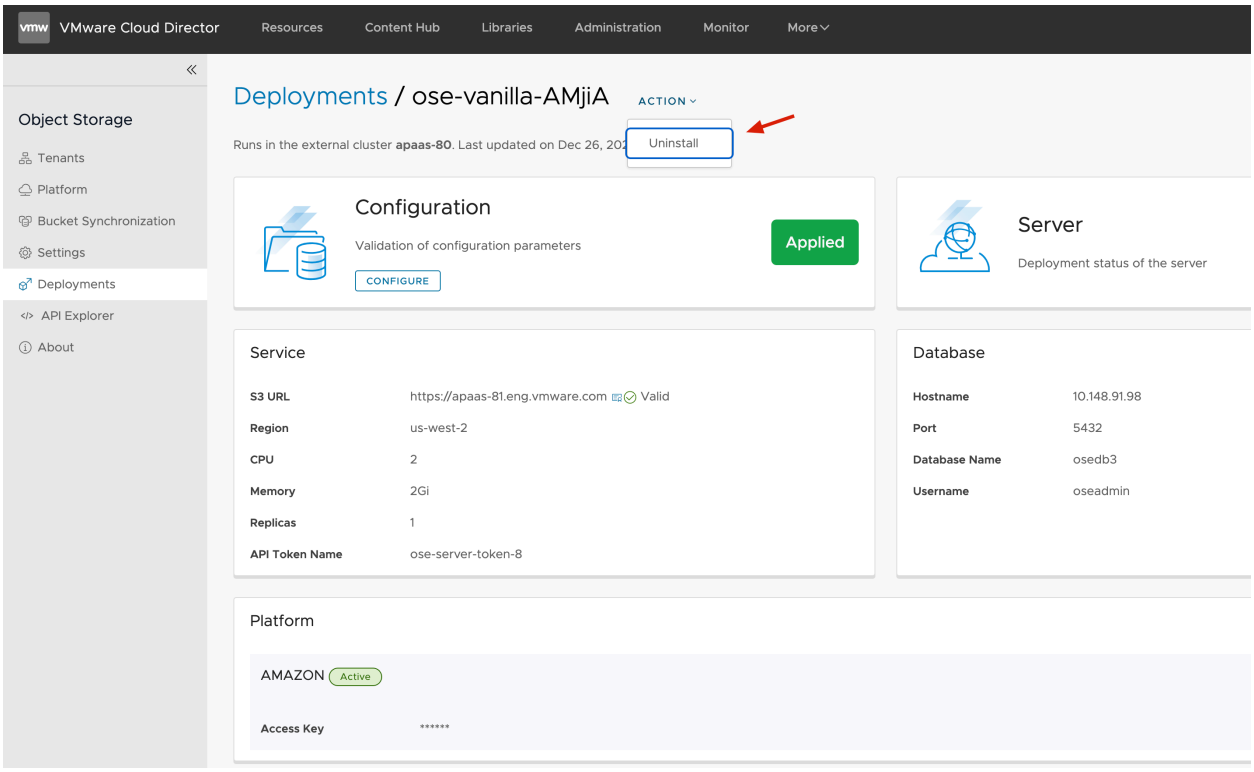
If you have installed Object Storage Extension to Kubernetes cluster location **SLZ**, the uninstallation of the operator and server is together with the add-on instance deletion. You don't need to do extra work other than removing the add-on instance from UI.

In case the operator and server are not deleted from the Kubernetes cluster automatically, you can perform below commands explicitly.

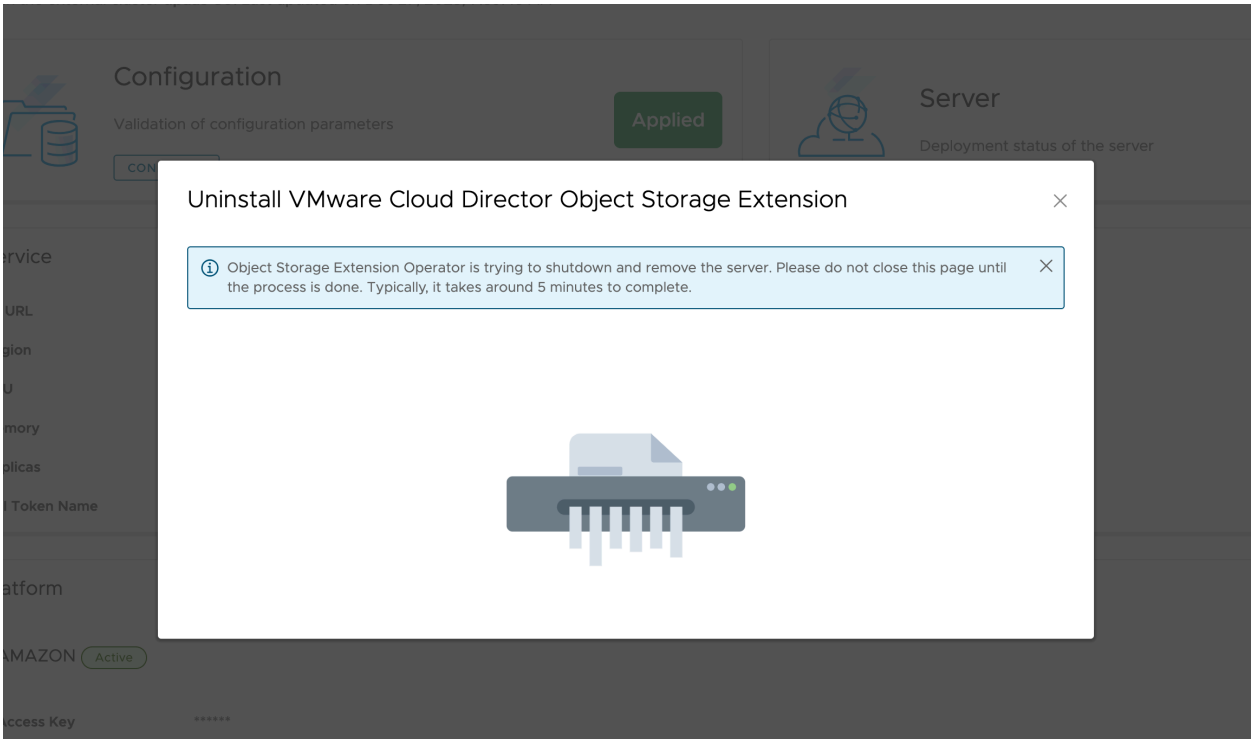
```
kubectl -n vcd-ose delete packageinstalls.packaging.carvel.dev vcd-ose-
operator
kubectl -n vcd-ose delete packagerepositories.packaging.carvel.dev vcd-ose-
package-repo
kubectl delete ns vcd-ose
```

Uninstall from EXTERNAL

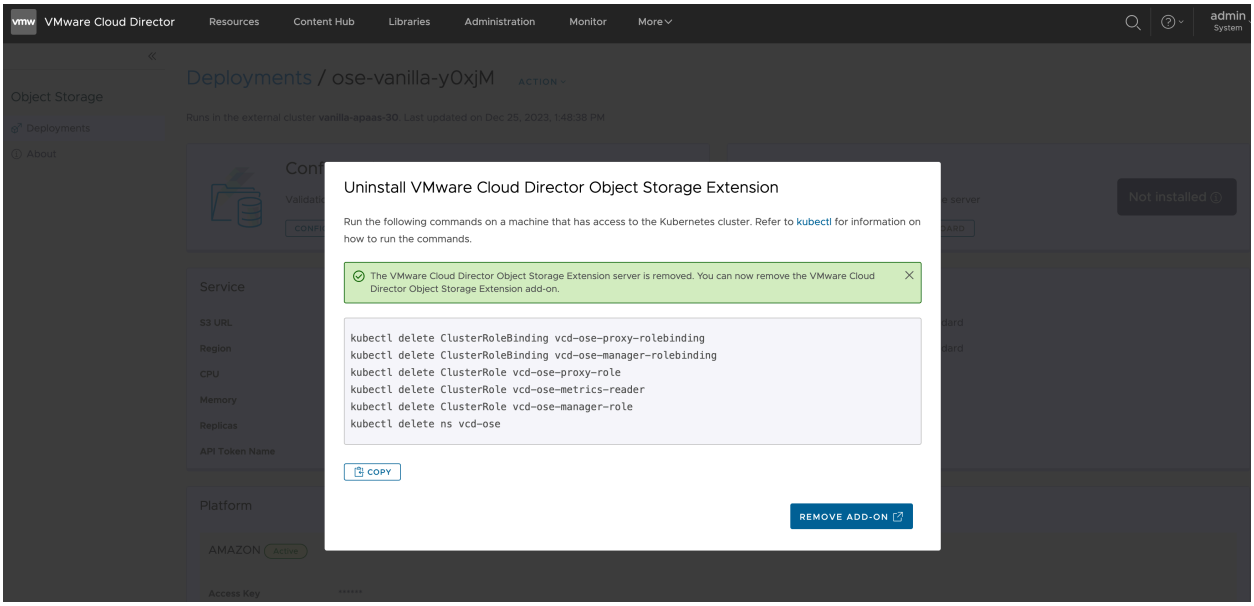
If you have installed Object Storage Extension Kubernetes Operator to Kubernetes cluster location **EXTERNAL**, you are responsible to remove Object Storage Extension from the cluster manually. You can navigate the deployment detail page, click ACTION and then UNINSTALL button.



A popup dialog is promoted to prepare the removal of the server. Typically, you need to wait for 3-5 minutes until UI shows the next step.



Once the removal of the server is completed, UI shows instructions to remove Object Storage Extension Kubernetes Operator in your Kubernetes cluster. Follow it to complete the uninstallation.

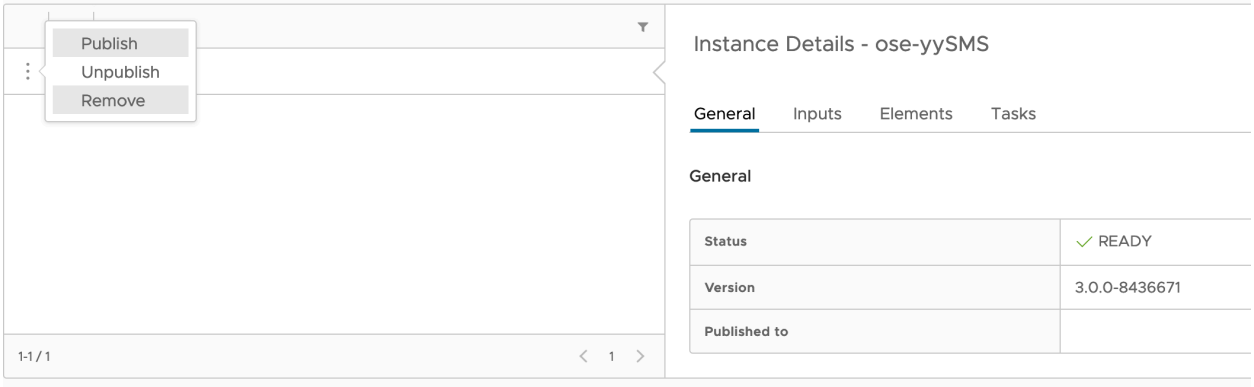


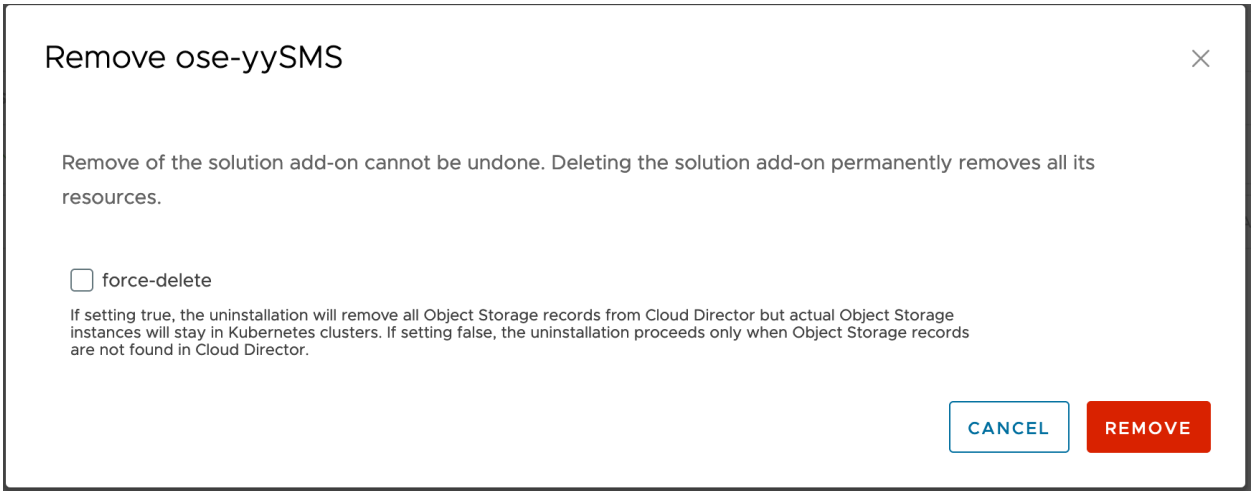
Below are the commands to execute from the command-line.

```
kubectl delete ClusterRoleBinding vcd-ose-proxy-rolebinding
kubectl delete ClusterRoleBinding vcd-ose-manager-rolebinding
kubectl delete ClusterRole vcd-ose-proxy-role
kubectl delete ClusterRole vcd-ose-metrics-reader
kubectl delete ClusterRole vcd-ose-manager-role
kubectl delete ns vcd-ose
```

Uninstall the Add-on Instance by UI

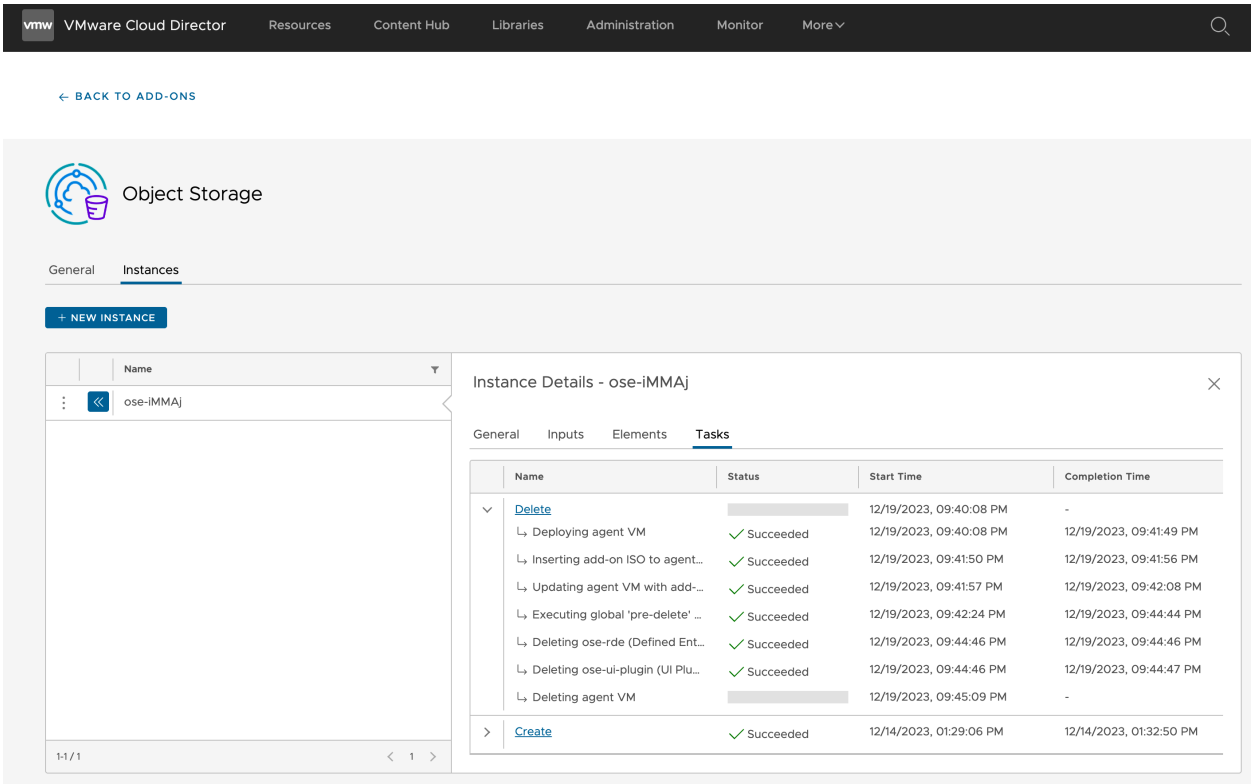
Log in to the provider portal as an administrator, navigate to the Solution Add-ons Management page, enter the detail of Object Storage Extension of the panels, execute the remove action on the menu in front of the instances, deletion will process on background and last a while.



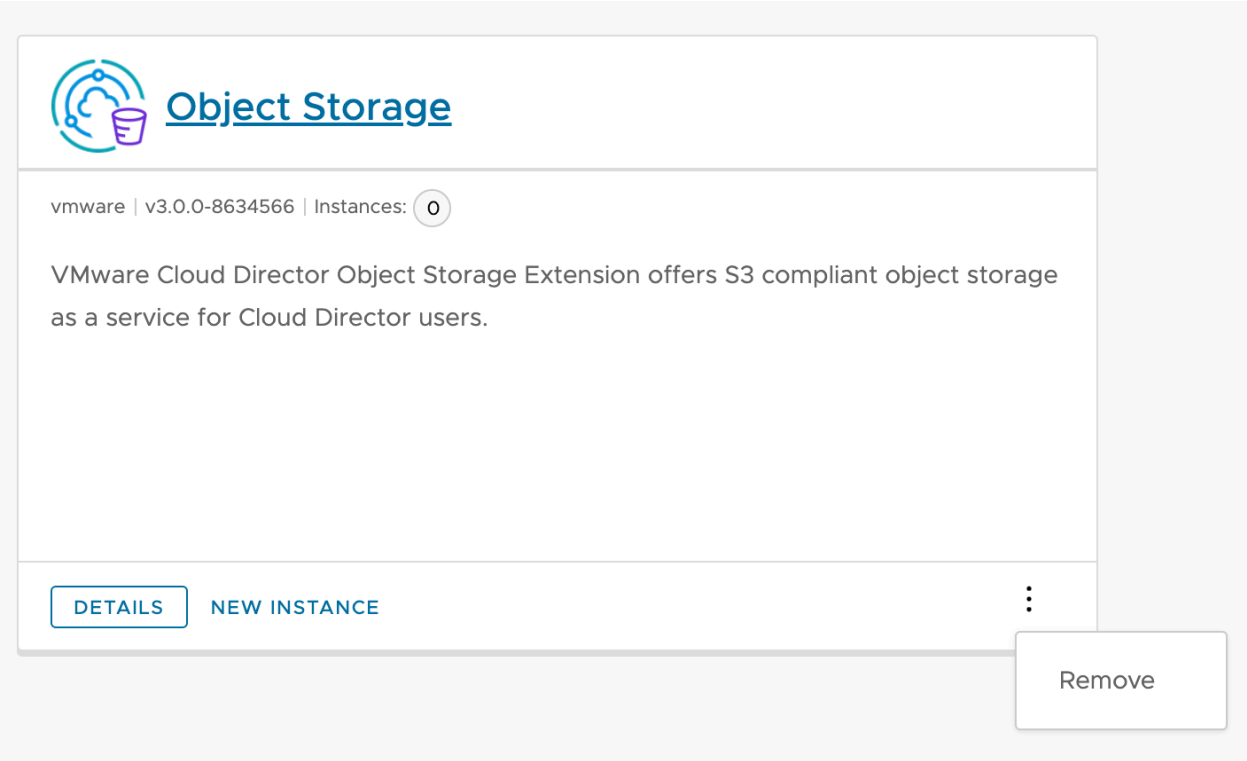


If Object Storage Extension Kubernetes Operator is not up running in a Kubernetes cluster, you must check **force-delete** for the deletion.

You can observe the uninstallation progress by tasks.



If you have no more add-on instances, you can also delete the Object Storage add-on from Solution Add-on Landing Zone by clicking Remove button on Object Storage solution tile.



Uninstall the Add-on Instance by Command-Line

If you have installed the add-on by command-line with parameter --encryption-key, you need to provide the same encryption key for deletion.

You can view help message by command <run> delete instance -h.

```
$ ./linux.run delete instance -h
```

Uninstall

```
./linux.run delete instance --name <name> --host <vcd-hostname> --
username <provider-user> --password <password> --certificate-file <vcd-
cert-file> --accept --iso
```