



OCI NetApp Storage Service

Workload Factory for NetApp Console

NetApp
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OCI NetApp Storage Service

Learn about OCI NetApp Storage Service in NetApp Workload Factory

Oracle Cloud Infrastructure NetApp Storage Service (OCI NSS) is a fully managed, cloud-based data storage service that provides advanced data management capabilities and highly scalable performance. OCI NSS allows you to create and manage storage pools as the storage backend for all your workloads within NetApp Workload Factory.

OCI NSS provides the same features, performance, and administrative capabilities NetApp customers use on premises today, with the simplicity, agility, security, and scalability of a native Oracle Cloud service.

OCI NSS is the *Storage* component in Workload Factory.

Features

OCI NSS offers the following features:

- **Fully-managed service:** provides a fully-managed service integrated with the Workload Factory console.
- **High availability:** provides high availability for each OCI NSS storage pool, supporting Single and Multiple Availability Zones deployments.
- **Automated snapshots:** protects data with automated, efficient snapshots, which are near instantaneous, space efficient point-in-time read-only copies of the storage pool or volumes.
- **Volume replication:** provides disaster recovery with cross-region replication across Oracle Cloud Infrastructure.
- **Efficient backups:** adds an extra layer of protection with a copy of the data in another region for emergencies.
- **Fast cloning:** accelerates application development with fast cloning.
- **Multi-protocol support:** supports Network File System (NFS), Server Message Block (SMB), and Internet Small Computer Systems Interface (iSCSI) protocols.
- **High throughput:** delivers high throughput performance to ensure low latencies for workloads running on top of OCI NSS file systems.
- **In-memory cache and NVMe cache:** includes a unique in-memory cache and NVMe cache, which boosts the performance of frequently accessed data.
- **Hundreds of thousands of IOPS:** provides hundreds of thousands of IOPS with SSD disks, ensuring that your storage and workloads receive timely results.
- **Thin Provisioning:** allows capacity provisioning in advance, saving costs until more capacity is needed.
- **Data deduplication and compression:** removes duplicate data and compresses data to reduce the amount of physical storage that is required for OCI NSS file systems resulting in cost savings.
- **Data tiering:** allows storage cost reduction by moving less frequently accessed data from the primary, high performance SSD storage tier to the secondary capacity pool storage tier.

Tools to use NetApp Workload Factory

You can use NetApp Workload Factory with the following tools:

- **NetApp Console:** NetApp Console provides a hybrid interface experience so that you can use Workload Factory along with other NetApp data services.
- **Ask Me:** Use the Ask Me AI assistant to ask questions and learn more about Workload Factory without leaving the Workload Factory console. Access Ask Me from the Workload Factory user interface.
- **CloudShell CLI:** Workload Factory includes a CloudShell CLI to manage and operate AWS and NetApp environments across accounts from a single, browser-based CLI. Access CloudShell from the top bar of the Workload Factory console.
- **REST API:** Use the Workload Factory REST APIs to deploy and manage your OCI NSS systems and resources.
- **Oracle Cloud Infrastructure (OCI) Resource Manager:** Use OCI Resource Manager to perform the actions you defined in the Workload Factory console to model, provision, and manage OCI and third-party resources from the Resource Manager stack in your OCI account.
- **NetApp Terraform provider:** Use Terraform to build and manage infrastructure workflows generated in the Workload Factory console.

Getting help

For general questions about Workload Factory or Workload Factory applications and services, refer to [Get help for OCI NSS for Workload Factory](#).

Quick start for Oracle Cloud Infrastructure NetApp Storage Service in NetApp Workload Factory

Get started with Oracle Cloud Infrastructure NetApp Storage Service (OCI NSS) by adding credentials and permissions, creating a link if needed, and creating or discovering a storage system.

Follow these steps to get started.

1

Add credentials and permissions

[Add credentials to an account](#). This includes selecting workload capabilities and creating the IAM policies for the required permissions.

Select the default [view, planning, and analysis](#) permission policy.

2

Create a link

This step is optional. To perform some management tasks from the NetApp Console, you need a NetApp Workload Factory link. A *link* leverages OCI Functions to create a trust relationship and connectivity to your OCI NSS systems.

- [Learn when a Console agent or link is required for OCI NSS management](#)
- [Learn how to create a link](#)

Discover or add an OCI NetApp Storage Service system

You'll discover a storage pool to begin managing your OCI NSS resources in Workload Factory. In the [NetApp Console](#), select **Storage**, then **Management**, and then **Discoverable systems**. [Learn how to discover an OCI NSS storage system](#).

What's next

With a storage pool in your Storage inventory, you can begin managing your OCI NSS resources.

Add Oracle Cloud Infrastructure credentials to NetApp Workload Factory

Add and manage your cloud provider credentials so that NetApp Workload Factory has the permissions that it needs to deploy and manage resources in your cloud provider accounts.

[Permissions for OCI NetApp Storage Service](#)

About this task

You can add credentials to an existing Workload Factory account from the Credentials page. This provides Workload Factory with the permissions needed to manage resources and processes within your cloud environment.

Before you begin

You'll need to have credentials to log in to your Oracle Cloud Infrastructure account.

Steps

1. Log in to the [NetApp console](#).
2. From the menu, select **Workloads > Administration > Credentials**.
3. On the Credentials page, select **Add credentials**.
4. On the Add Oracle Cloud Infrastructure NetApp Storage Service credentials page, do the following:
 - a. Under *Permissions configuration*, select the appropriate permissions for the Oracle Cloud Infrastructure NetApp Storage Service credentials. **View, plan, and analyze** permissions are the default. This permission policy allows you to view OCI NSS storage pools, learn about system health, get the well-architected analysis for your systems, and explore savings.
 - b. Follow the manual steps provided using the Oracle Cloud Console to complete the permissions configuration for the OCI NSS credentials.
 - c. Under *Credentials name*, enter the name that you want to use for these credentials and enter the Tenancy OCID.
5. Select **Add**.

What's next

[Quick start for Oracle Cloud Infrastructure NetApp Storage Service in NetApp Workload Factory](#).

Create or discover Oracle Cloud Infrastructure NetApp Storage Service systems in NetApp Console

Discover Oracle Cloud Infrastructure NetApp Storage Service (OCI NSS) systems and manage volumes and additional data services from the NetApp Console.

Discover an existing cloud storage system

Discover your storage systems from the Discoverable systems page.

Before you begin

Provide your credentials for your OCI NSS environment in Workload Factory.

About this task

You can discover a cloud storage system only once within an account and attach it to one workspace. The storage system can later be removed and re-associated to a different workspace.

Steps

1. From the NetApp Console menu, select **Storage**, then **Management**, and then **Discoverable systems**.
2. The count of discovered cloud storage systems displays. Select **Discover**.
3. Select one or more storage systems and select **Discover** to add them to the Systems page.



- If you select an un-named storage system, you will receive a prompt to enter a name for the system.
- If you select a storage system that doesn't have the credentials required to manage it from the Console, you'll receive a prompt to select credentials with the required permissions.

Result

The Console displays your discovered system on the Systems page. You can manage your storage systems in several ways, such as from Workloads in the NetApp Console and using ONTAP System Manager or using your cloud provider's storage management tools.

Connect to an Oracle Cloud Infrastructure NetApp Storage Service storage system with a link

To perform advanced storage management operations, set up a connection between your NetApp Workload Factory account and an Oracle Cloud Infrastructure NetApp Storage Service (OCI NSS) system. This process involves creating and associating a link with your storage system. Link association lets you monitor and manage certain features directly from the OCI NSS system that are unavailable through OCI APIs.

[Learn more about links.](#)

About this task

A *link* in Workload Factory is an OCI Functions application in your tenancy. Workload Factory uses it to talk to the ONTAP system on an OCI NSS storage pool (HTTPS 443 and SSH 22).

Links use OCI Functions to execute code in response to events and automatically manage the computing resources required by that code. The links that you create are part of your NetApp account and they are associated with an Oracle Cloud Infrastructure account.

You deploy the link, or function, with Terraform, then register the function OCID in Workload Factory.

This stack runs in your tenancy with your OCI user. It is not the cross-tenancy credentials policy. That policy belongs at the tenancy root when you add credentials; you do not create it again to create a link.

What Terraform creates

Resource	Example name
Functions application	netapp-wf-app-<suffix>
Function	netapp-wf-function-<suffix>
Log group + Functions invoke log	netapp-wf-link-logs-<suffix>
Dynamic group + vault-read policy	Only if you enable Local OCI Vault Authentication (netapp-functions-dg, shared in the tenancy)

Create a new link

You can create a link in your account when defining an OCI NSS system. You use the link for that storage system, and you can use it for other OCI NSS systems. You can also associate a link for a storage system later.

Links require authentication. You can authenticate links using credentials stored in the Workload Factory credentials service or with your credentials stored in OCI Vault. Only one authentication method is supported per link. For example, if you select link authentication with OCI Vault, you can't change the authentication method later.



OCI Vault isn't supported when using a Console agent.

Before you begin

- You added Workload Factory credentials for the tenancy.
- You can sign in to the OCI Console for the tenancy and region where the storage pool lives.
- Networking:
 - A **private subnet** in the VCN that can reach the ONTAP management LIF
 - A **service gateway** with a route to All \<Region\> Services in Oracle Services Network (needed to pull the function image)
- Create an IAM policy for the group that will deploy the stack. Learn more about [OCI NSS permissions](#).

Grant the group permission to create the stack and function. Replace <deploy-group> and <compartment-name> with your values. Use a named group, not any-user.

```
Allow group <deploy-group> to manage orm-stacks in compartment
<compartment-name>
Allow group <deploy-group> to manage orm-jobs in compartment
<compartment-name>
```

```
Allow group <deploy-group> to manage functions-family in compartment
<compartment-name>
Allow group <deploy-group> to manage log-groups in compartment
<compartment-name>
Allow group <deploy-group> to use virtual-network-family in compartment
<compartment-name>
```

If you enable **Local OCI Vault Authentication**, add:

```
Allow group <deploy-group> to manage dynamic-groups in tenancy
Allow group <deploy-group> to manage policies in compartment
<compartment-name>
```

The stack then creates (or reuses) dynamic group `netapp-functions-dg` so the function can read the Vault secret. Matching rule:

```
ALL {resource.type = 'fnfunc', resource.compartment.id = '<compartment-
ocid>'}
```

Vault policy in the compartment where the function and secret live:

```
Allow dynamic-group netapp-functions-dg to read secret-bundles in
compartment <compartment-name>
Allow dynamic-group netapp-functions-dg to use keys in compartment
<compartment-name>
```

Steps

Use the OCI CLI or OCI Terraform to create and register the link within Workload Factory.

1. Select the menu , **Administration > Links**.
2. On the Links page, select **Create and associate link > OCI NetApp Storage Service**.
3. In the Add Link dialog under **Details**, provide the following:
 - a. **Link name**: Enter the name that you want to use for this link. The name must be unique within your account.
 - b. **OCI Vault**: Optional. Allows Workload Factory to fetch ONTAP access credentials securely from your OCI Vault.

The link deployment stack adds the following default OCI Vault secret OCID regex to the OCI Functions permission policy: `ocidl.vaultsecret.oc1.iad.<unique_id>.ONTAPSecret*`.

You can either create secrets in alignment with the default regex or update the regex in the Terraform configuration file to match your secret OCID.

- c. **Tags:** Optionally, add up to 50 tags to associate with this link so you can more easily categorize your resources. For example, you could add a tag that identifies this link as being used by OCI NSS storage systems.
- d. **Link registration:** Follow the instructions in the Workload Factory console to register the link. Link registration happens from your OCI Terraform environment. Select OCI Terraform from the Codebox for the instructions.
- e. **Link association:** Select the OCI NSS storage system to associate with this link, and enter the user name and password.
- f. **Link permissions:** Specify the required permissions for the user group to create the link.

Required permissions for the link

```
Allow group to manage orm-stacks in compartment id
Allow group to manage orm-jobs in compartment id
Allow group to manage dynamic-groups in tenancy
Allow group to manage policies in compartment id
Allow group to manage functions-family in compartment id
Allow group to manage log-groups in compartment id
Allow group to use virtual-network-family in compartment id
```

4. In the Add Link dialog under **Location**, provide the following:

- a. **OCI tenancy:** Enter the OCI tenancy.
- b. **Compartment:** Enter the compartment.
- c. **Region:** Select the region.
- d. **Subnet:** Select the subnet.
- e. **Network security group:** Enter the security group.

Workload Factory automatically retrieves the OCI account, location, and security group based on the selected OCI NSS system.

5. Select **Add**.

You can monitor the link creation status on the Events page. This should take no more than five minutes.

6. Return to the Workload Factory interface and you'll see that the link is associated with the OCI NSS storage system.

Deploy the Terraform stack in OCI Resource Manager

Steps

- 1. In the Codebox, select **OCI Terraform**.
- 2. Select **Redirect to OCI Resource Manager**.
- 3. In the dialog, select **Continue**.
- 4. Sign in to the OCI tenancy that contains the storage pool.
- 5. Review compartment, region, and variables (pre-filled from Workload Factory).
- 6. Select **Create**. Wait until the apply job succeeds.

7. Open Job **Output** and copy `function_ocid`.

Register the function in Workload Factory

Steps

1. Return to the **Add link** page.
2. Under **Link registration**, paste the function OCID (`ocid1.fnfunc.oc1...`).
3. Select **Add**.

Other ways to apply the same template

Use these only if you are not using Resource Manager from the Codebox.

Terraform CLI

1. Create a folder.
2. Copy or download **OCI Terraform** from the Codebox (`main.tf`) into that folder.
3. From the folder:

```
terraform init
terraform plan
terraform apply
```

4. Copy `function_ocid` from the apply output and continue with [Register the function](#3-register-the-function-in-workload-factory).

OCI CLI

Use the **OCI CLI** tab in the Codebox to download the zip file, create the Resource Manager stack, then run `plan`, and apply jobs.

Result

The link appears in your **Links** list.

To remove the function, delete the link in Workload Factory, then destroy the Resource Manager stack (or run `terraform destroy`).

Result

The link appears in your **Links** list.

To remove the function, delete the link in Workload Factory, then destroy the Resource Manager stack (or run `terraform destroy`).

Associate an existing link with an OCI NetApp Storage Service system

After you create a link, associate it with one or more OCI NetApp Storage Service systems.

Steps

1. Select the menu , **Workloads > Storage**.
2. Select **OCI NetApp Storage Service > Inventory**.
3. Select the actions menu of the storage pool to associate a link with, and then select **Associate link**.
4. Verify the network identifier (subnet name or OCID and CIDR).
5. Select **Associate an existing link**.
6. Select the link name.
7. Choose the authentication method:
 - **Workload Factory**: enter the ONTAP admin user name and password.
 - **OCI secret management - OCI Vault Key**: use when the link function was deployed with Vault support. Enter the vault secret OCID.
8. Select **Apply**.

Result

Workload Factory associates the link with the OCI NSS system. You can perform advanced ONTAP operations.

Related information

[Learn more about links.](#)

OCI NetApp Storage Service permissions for NetApp Workload Factory

Review the permissions required for managing Oracle Cloud Infrastructure NetApp Storage Service (OCI NSS) resources with NetApp Workload Factory.

How Workload Factory uses OCI NetApp Storage Service permissions

When you create a cross-tenancy policy that admits the Workload Factory identity into your tenancy, Workload Factory calls OCI APIs as that NetApp identity, and OCI checks each request against the permissions you granted.

You do not share user passwords or API keys. Access exists only while your policy is in place.

Cross-tenancy trust

NetApp operates the `workload-factory-OCI-SN` group in a NetApp-owned OCI tenancy. You establish a cross-tenancy policy in the tenancy root compartment that grants this group a narrow, explicit set of permissions in your tenancy. Every OCI API call is evaluated against this contract per request; you can audit and revoke it at any time.

OCI NetApp Storage Service tenancy

The default tenancy for OCI NSS is the tenancy root compartment of your OCI tenancy.

Optionally, when you require least privilege, you can replace in tenancy with in compartment <name> on each line.

IAM policies for OCI NSS

Workload Factory accesses your Oracle Cloud Infrastructure (OCI) tenancy only after you add a cross-tenancy policy that admits the Workload Factory service.

Create that policy in the root compartment of your tenancy. The policy lists the exact permissions Workload Factory is allowed to use. Each API request is checked against it. You can review the policy in the OCI Console and revoke it at any time to stop access.

The following permission policy is available.

- **View, plan, and analyze:** View OCI NetApp Storage Service resources, learn about system health, get the well-architected analysis for your systems, and explore savings.

View the required policies:

▼ Permission policies for OCI NetApp Storage Service

View, plan, and analyze

```
Define tenancy NetAppWF as ocid1.tenancy.oc1..<>
Define group NetAppOpsWF as ocid1.group.oc1..<>
Admit group NetAppOpsWF of tenancy NetAppWF to inspect tenancies in
tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read compartments in
tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read instance-family
in tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read metrics in
tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read log-content in
tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to use virtual-network-
family in tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read file-family in
tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to manage functions-
family in tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read log-groups in
tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read netapp-storage-
pool in tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read netapp-svm in
tenancy
Admit group NetAppOpsWF of tenancy NetAppWF to read netapp-work-
request in tenancy
```

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