



Workload Factory for VMware documentation

VMware workloads

NetApp
November 04, 2024

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Workload Factory for VMware documentation

Release notes

What's new

Learn what's new with the VMware Cloud migration advisor component of Workload Factory.

3 November 2024

VMware migration advisor data reduction ratio help

This release of Workload Factory for VMware features a data reduction ratio assistant. The data reduction ratio assistant helps you decide which ratio is best for your VMware inventory and storage estate when preparing for AWS cloud onboarding.

[Create a deployment plan for Amazon EC2 using the migration advisor](#)

19 September 2024

VMware migration advisor enhancements

This release of Workload Factory for VMware features functionality and stability enhancements as well as the ability to import and export migration plans when using the VMware migration advisor.

[Create a deployment plan for Amazon EC2 using the migration advisor](#)

1 September 2024

Migrate to Amazon EC2

Workload Factory for VMware now supports migration to Amazon EC2 using the VMware migration advisor.

7 July 2024

Initial release of Workload Factory for VMware

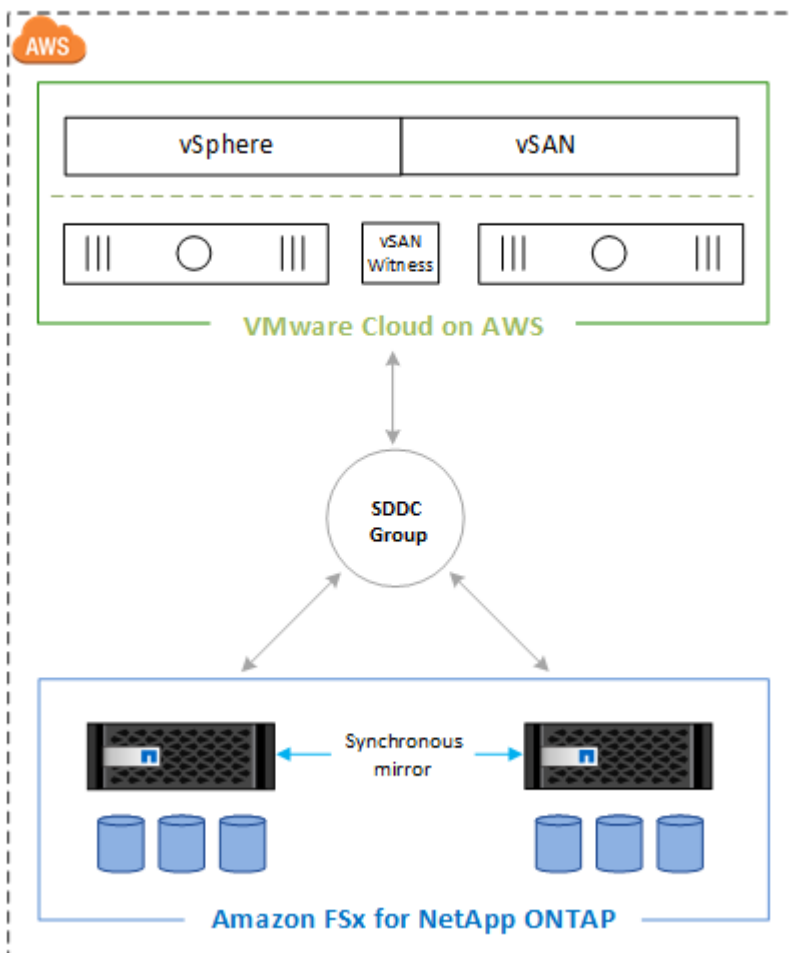
The initial release includes the capability to use the VMware migration advisor to analyze your current virtual machine configurations in on-premises vSphere environments and generate a plan to deploy recommended VM layouts to VMware Cloud on AWS and use customized Amazon FSx for NetApp ONTAP file systems as external datastores.

Get started

Learn about Workload Factory for VMware

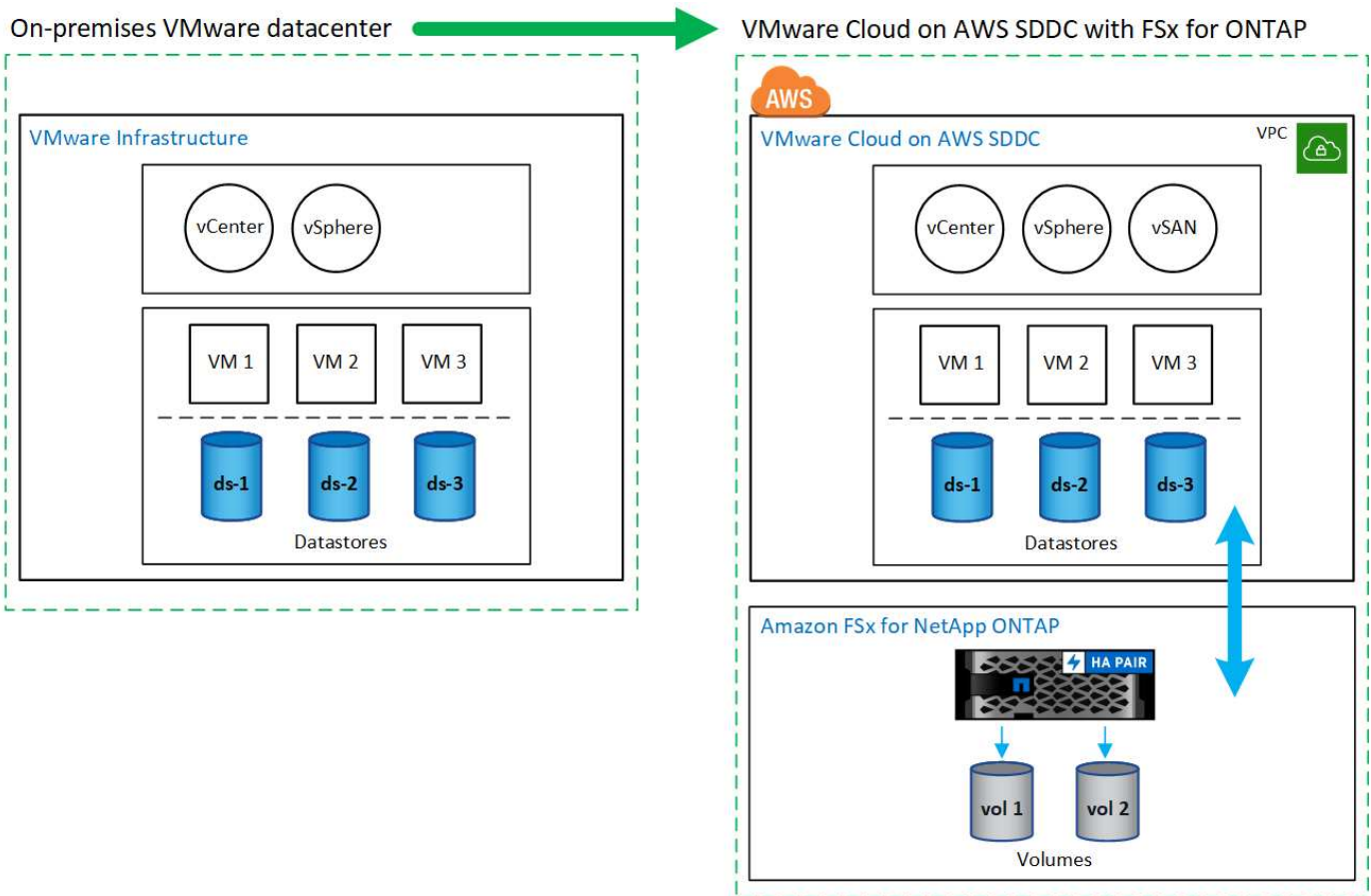
Workload Factory for VMware provides tools to move your data from on-premises systems to either VMware Cloud on AWS (VMC) or Amazon EC2. The VMware migration advisor enables you to analyze your current virtual machine configurations in on-premises vSphere environments and generate a plan to deploy recommended VM layouts to Amazon EC2 or VMware Cloud on AWS vSphere clusters and use customized Amazon FSx for NetApp ONTAP file systems as external datastores.

Amazon FSx for NetApp ONTAP is an external NFS datastore built on NetApp's ONTAP file system that can be attached to Amazon EC2 instances or VMware Cloud on AWS vSphere clusters. There is no need to add more hosts to increase available storage; instead, just use FSx for ONTAP volumes as external datastores to complement vSAN datastores. This provides you with a flexible, high-performance, virtualized storage infrastructure that scales independently of compute resources.



How the VMware migration advisor works

The migration advisor can help you move on-premises virtual machines (VMs) and their data, running on any VMware supported datastores, to either Amazon EC2 or VMware Cloud datastores, which includes supplemental NFS datastores on an FSx for ONTAP file system.



Note that you can attach up to four (4) FSx for ONTAP volumes to a single vSphere cluster on VMware Cloud on AWS.

What you can do with the migration advisor

The migration advisor provides the following functionality:

- Analyze current on-premises VM configurations
- Determine which VMs to migrate to Amazon EC2 or VMware Cloud on AWS
- Identify the space required on FSx for ONTAP volumes to be used as VM external datastores
- Review resulting report to understand the deployment steps
- Perform the actual deployment

The migration advisor supports configuration planning for a single Amazon EC2 instance or VMware Cloud on AWS cluster connected to a single FSx for ONTAP file system.

Benefits of using the migration advisor

Transitioning parts of your current infrastructure to Amazon EC2 or VMware Cloud on AWS using Amazon FSx for ONTAP as external NFS datastores provides the following benefits:

- Cost optimization due to host and storage decoupling and advanced data efficiency
- Ability to grow the storage capacity as needed without the need to purchase additional host instances
- NetApp ONTAP data management capabilities in the cloud, such as space efficient snapshots, cloning,

compression, deduplication, compaction, and replication

- Reduction in management of hardware refreshes
- Ability to change data throughput, IOPS, and the size of the file system in addition to increase or decrease the size of volumes
- High availability supporting multiple Availability Zone (AZ) deployments
- Cost and latency reduction from single-AZ configurations that use VPC peering without requiring a Transit Gateway

Cost

There is no cost for using the VMware migration advisor.

You'll need to pay for AWS resources that you deploy based on the recommendations from the migration advisor.

Licensing

No special licenses are needed from NetApp to use the migration advisor.

Quick start for migrating to VMware Cloud on AWS using the VMware migration advisor

Get started with the VMware migration advisor to move your current infrastructure to VMware Cloud on AWS using Amazon FSx for ONTAP as external NFS datastores.

Before you get started, you should have an understanding of [operational modes](#)

1

Sign up and create an account for Workload Factory

Go to the [Workload Factory console](#) and sign up. [Learn more about creating accounts.](#)

2

Add AWS credentials and permissions to your account

You can use Workload Factory in *Basic* mode without adding credentials to access your AWS account. Adding AWS credentials to Workload Factory in either *Read* or *Automate* mode gives your Workload Factory account the permissions needed to create and manage FSx for ONTAP file systems, and to deploy and manage workloads within VMware Cloud.

[Learn how to add credentials and permissions](#)

3

Capture your current VM configurations in your vSphere environment

You can use the Migration advisor VM collector script or RVTtools to capture your current VM configurations in order to create a deployment plan. You can also import an existing deployment plan as a template and then modify any required attributes.

[Learn how to capture your current VM configurations.](#)

4**Create a deployment plan using the VMware migration advisor**

Launch the VMware migration advisor and select the VMs that you want to migrate to the new VMware Cloud on AWS infrastructure using an Amazon FSx for ONTAP file system as external NFS datastores. You can make some modifications before you save the plan.

[Learn how to use the VMware migration advisor to create a deployment plan.](#)

5**Deploy the recommended FSx for ONTAP file system**

Deploy the new FSx for ONTAP file system that will provide the datastores for your VMs in your VMware Cloud on AWS infrastructure.

[Learn how to deploy your new FSx for ONTAP file system.](#)

6**Connect your FSx for ONTAP file systems to VMware Cloud on AWS**

Your Software-Defined Data Center (SDDC) offers network options for connecting to the FSx for ONTAP file system by using the VPC Peering capability to extend network connectivity to the external NFS storage volumes.

[Learn more about migrating your data.](#)

7**Migrate data from your old systems to your new FSx for ONTAP file systems**

Use an external tool such as VMware HCX (Hybrid Cloud Extension) to move your data from your old virtual machine storage to the FSx for NetApp ONTAP volumes connected to your new virtual machines.

[Learn more about migrating your data.](#)

Quick start for migrating to Amazon EC2 using the VMware migration advisor

Get started with the VMware migration advisor to move your current infrastructure to Amazon EC2 using Amazon FSx for ONTAP as external NFS datastores.

Before you get started, you should have an understanding of [operational modes](#)

1**Sign up and create an account for Workload Factory**

Go to the [Workload Factory console](#) and sign up. [Learn more about creating accounts.](#)

2**Add AWS credentials and permissions to your account**

You can use Workload Factory in *Basic* mode without adding credentials to access your AWS account. Adding AWS credentials to Workload Factory in either *Read* or *Automate* mode gives your Workload Factory account the permissions needed to create and manage FSx for ONTAP file systems, and to deploy and manage workloads within Amazon EC2.

[Learn how to add credentials and permissions](#)

3

Capture your current VM configurations in your vSphere environment

You can use the Migration advisor VM collector script or RVTools to capture your current VM configurations in order to create a deployment plan. You can also import an existing deployment plan as a template and then modify any required attributes.

[Learn how to capture your current VM configurations.](#)

4

Create a deployment plan using the VMware migration advisor

Launch the VMware migration advisor and select the VMs that you want to migrate to Amazon EC2 infrastructure using an Amazon FSx for ONTAP file system as external NFS datastores. You can make some modifications before you save the plan.

[Learn how to use the VMware migration advisor to create a deployment plan.](#)

5

Deploy the recommended FSx for ONTAP file system

Deploy the new FSx for ONTAP file system that will provide the datastores for your VMs in your Amazon EC2 infrastructure.

[Learn how to deploy your new FSx for ONTAP file system.](#)

6

Connect your FSx for ONTAP file systems to VMware Cloud on AWS

Your Software-Defined Data Center (SDDC) offers network options for connecting to the FSx for ONTAP file system by using the VPC Peering capability to extend network connectivity to the external NFS storage volumes.

[Learn more about migrating your data.](#)

7

Migrate data from your old systems to your new FSx for ONTAP file systems

Use an external tool such as VMware HCX (Hybrid Cloud Extension) to move your data from your old virtual machine storage to the FSx for NetApp ONTAP volumes connected to your new virtual machines.

[Learn more about migrating your data.](#)

Use the VMware migration advisor

Migrate to Amazon EC2

Capture your current VM configurations before migrating to Amazon EC2

You can use the Migration advisor VM collector script or RVTools to capture your current VM configurations. We recommend that you use the Migration advisor VM collector script because it gathers both VM configuration and performance data for the most accurate plan.

Use the Migration advisor VM collector script

The NetApp Migration advisor VM collector script gathers VM configuration information from your vCenter similar to what RVTools collects, however, it captures current VM performance data to provide actual read and write IOPS and throughput statistics.

You need to start the Migration advisor to copy the Migration advisor VM collector script from the Codebox window.

Before you begin

The system where you'll be running the collector script must meet the following requirements:



- Microsoft PowerShell 7.0 or greater must be installed. See the [Microsoft PowerShell documentation](#) if you need to install PowerShell.
- VMware PowerCLI must be installed. See the [VMware PowerCLI documentation](#) if you need to install PowerCLI.
- SSL certificate checking must be disabled.
- PowerShell must allow running unsigned scripts.

Note that if you plan to capture long-term statistics from your VMs (daily statistics), you must have activated statistics level 3 or above in the vSphere management console (VMware management environment).

Steps

1. Log in to Workload Factory.
2. In the VMware tile, select **Access and plan**.
3. Select **Create a new deployment plan**, select the option for **Use the migration advisor VMware data collector**, and select **Next**.

The **Prepare for VMware Cloud on AWS migration** page is displayed.

4. In the Codebox window, select either  to save the Migration advisor VM collector script (named "list-vms.ps1") to the target system, or select  to copy the script so you can paste it on the appropriate system.
5. Follow these steps to capture the configurations of your current VMs:
 - a. Log in to the system where you downloaded the data collector, on which PowerShell and PowerCLI are installed.
 - b. Connect to your VMware vCenter server by running the following command:

```
Connect-VIServer -server <server_IP>
```

Replace <server_IP> with the IP address or hostname of your VMware server.

- c. Run the data collector script you downloaded and specify the data collection option for "daily" or "hourly" VM statistics.

```
.list-vms.ps1 -isLongTermDataCollectionEnabled <true | false>
```

where:

- **true** collects IOPS and throughput data for the past 24 hours with 5-minute intervals
- **false** collects IOPS and throughput data for the past 1 hour with 20-second intervals.

Result

The script outputs a compressed file with a timestamp in the name in the current working directory. The .zip file contains a list of all VMs and their properties, along with their IOPS and throughput data.

Use RVTools software

RVTools is a Windows application that interacts with VCenter and ESX server (5.x to 8.0) to capture information about your VMware virtual environments. It gathers information about VMs, CPU, memory, disks, clusters, ESX hosts, datastores, and more. You can export this information to an xlsx file to use with the migration advisor.

[Learn more about RVTools](#)

Steps

1. Download and install RVTools 4.4.2 or greater from [RVTools website](#)
2. Launch RVTools and log in to the target VCenter Server.

This will capture information about that VCenter Server.

3. Export your VMware information to an xlsx or xls file.

See the chapter on "commandline parameters" in the [RVTools documentation](#) for details.

Result

The xlsx or xls file that contains your results is saved to your working directory.

What's next?

[Create an Amazon EC2 deployment plan using the migration advisor.](#)

Create a deployment plan for Amazon EC2 using the migration advisor

Log in to the NetApp Workload Factory to access the VMware migration advisor. You'll follow the steps in the wizard to create a deployment plan or migration plan that is customized for your needs.

Note that you must have a user name and password to access Workload Factory. If you don't have access, create an account now. See the instructions [here](#).

Create a deployment plan based on an on-premises vSphere environment

You can migrate your current virtual machine configurations in on-premises vSphere environments to virtual machines in Amazon EC2 and use customized Amazon FSx for NetApp ONTAP file systems as external datastores.

Requirements

- You must have created the inventory file from your existing systems by using the migration advisor VM

collector (.zip file) or by using RVTools (.xlsx file).

- You must have access to the inventory file from the system on which you are logging in to Workload Factory.


Steps

1. From the VMware workloads tile, select **Access and plan** and then select **Migration to AWS native compute**. The VMware migration advisor splash screen is displayed.

Review the information to learn about the benefits of the migration advisor.

2. When ready, select **Let's start**.
3. Select **Create a new deployment plan**.
4. Select the type of inventory file you'll be using to populate Workload Factory with your current VM configuration and select **Next**.
 - Select **Use the migration advisor VMware data collector** to use the file that you created using the VMware data collector.
 - Select **Use RVTools** to use the .xlsx file that you created using RVTools.

The "Prepare for AWS Cloud onboarding" page is displayed.

5. In the *Upload VM configuration* section, select  and select the inventory file that you want to use.
 - Select the .zip file when using the Migration advisor VM collector.
 - Select the .xlsx file when using RVTools.

The **VMs summary** section is populated from the inventory file to reflect the number of VMs and the total storage capacity.

6. In the *VM inventory considerations* section, select the options to filter the list of VMs that you want to migrate.
 - a. **Consider VMs:** Indicate which VMs will be extracted from the inventory file based on their operating power state. You can bring in all VMs, or only those that are on, off, or suspended.
 - b. **VM Storage to consider:** Select whether the datastores created for each onboarded VM are sized based on their currently utilized size (recommended) or their provisioned size.

The external datastores will be implemented using Amazon FSx for NetApp ONTAP file system volumes.

7. In the *Cloud deployment configuration* section, enter details about the required Amazon EC2 configuration.
 - a. **Region:** Select the region where Amazon FSx for NetApp ONTAP file systems will be deployed.

For optimal performance and cost efficiency, this is typically the same region as where your existing Amazon EC2 SDDC is deployed.

- b. **VM estimated performance requirements:** This option is available only when using RVTools. The Migration advisor VM collector captures this information from your environment. Provide the following per virtual machine average performance parameters that you want to be applied to your new VMs that will be deployed:

- **Average IOPS per VM:**

Enter the number of IOPS required for your file systems. If you are unsure, you can use the default of 3 IOPS per GiB of SSD storage for Amazon FSx for ONTAP file systems. For example, if you

deploy 2,000 GiB of capacity, this will be translated to 6,000 IOPS.

We recommend that you begin with a smaller IOPS setting. You can increase your provisioned SSD IOPS after the file system is created as workloads are migrated or deployed.

▪ **Average I/O block size:**

The size of each block containing read or write operations. The default size is 4 KB.

A larger block size might be better for large sequential read and write workloads. A smaller block size might offer better performance for workloads that perform small random writes to sparse files or to large files.

▪ **Average write ratio:**

The percentage of operations that are write operations for your workloads. The default ratio is 30% writes and 70% reads.

8. In the *Target capacity and protection considerations* section, select from a few storage options.

a. **Average data reduction ratio:** Choose from among the three common data reduction ratios. Select "1:1 - No reduction", "1:1.25 - 20% reduction", or "1:1.5 - 33% reduction".

Select **Help me decide** if you're unsure which ratio to choose. The *Data reduction ratio assistant* dialog appears. Select any statements that apply to your VM inventory and storage estate. The assistant will recommend an appropriate data reduction rate. Select **Apply** to use the recommended ratio.

b. **Headroom percentage:** Enter the percentage of capacity growth that is added to the capacity for your FSx for ONTAP file systems.

Note that if you select an amount less than 20% you won't be able to create volume snapshots for protection and long-term backups.

c. **VM snapshot protection:** Enable this option to protect the VMs with snapshots.

9. Select **Next**.

10. On the **Review EC2 volume assignment** page, review the VM information, volume classification rules, volume assignments, and list of volumes that will be migrated as part of deployment.

11. Select **Next**.

12. On the **Review instance storage assignment** page, review the EC2 instances and the volumes assigned to different FSx for ONTAP clusters.

13. On the **Review your migration plan** page, review the estimated monthly cost for all the VMs that you plan to migrate.

The top of the page estimates the monthly savings for FSx for ONTAP file systems and EBS volumes. You can expand each section to view details for the suggested filesystem configuration, estimated savings breakdown, assumptions, and technical disclaimers.

14. When you are satisfied with the migration plan, you have a few options:

- Select **Download plan > Instance storage deployment** to download the external datastore deployment plan in a .csv format so you can use it to create your new cloud-based intelligent data infrastructure.
- Select **Download plan > Plan report** to download the deployment plan in a .pdf format so you can distribute the plan for review.
- Select **Export plan** to save the migration plan as a template in a .json format. You can import the plan at a later time to use as a template when deploying systems with similar requirements.


Create a deployment plan based on an existing plan

If you are planning a new deployment that is similar to an existing deployment plan that you've used in the past, you can import that plan, make changes, and then save it as a new deployment plan.

Requirements

You must have access to the .json file for the existing deployment plan from the system on which you are logging in to Workload Factory.

Steps

1. Log in to Workload Factory.
2. From the VMware workloads tile, select **Access and plan** and then select **Migration to AWS native compute**.
3. Select **Import an existing deployment plan**.
4. Select  and select the existing .json plan file that you want to import in the migration advisor.
5. Select **Next**.

The Review plan page is displayed.

6. You can select **Previous** to access previous pages and modify the settings for the plan as described in the previous section.
7. After you have customized the plan to your requirements, you can save the plan or download the plan report as a PDF file.

Deploy the recommended FSx for ONTAP file system

After you verify that the recommended FSx for ONTAP file system (or multiple file systems in some cases) meets your exact requirements, you can use Workload Factory to deploy the system in your AWS environment.

Depending on the policy and permissions that you added to your Workload Factory account, you can deploy the FSx for ONTAP file system completely using Workload Factory (using Automate mode). If you have fewer permissions (Read mode), or no permissions (Basic mode), you'll need to use the CloudFormation information from the Codebox and deploy the FSx for ONTAP file system yourself in AWS.

Requirements for deployments to VMware Cloud on AWS

- You must be using VMware Cloud on AWS Software-Defined Data Center (SDDC) version 1.20 or greater to deploy FSx for ONTAP file systems.
- You must not deploy the FSx for ONTAP file system in the same VPC used during the SDDC deployment. Instead, you must deploy it in a new Amazon VPC that you own to enable VMware Cloud on AWS integration with Amazon FSx for NetApp ONTAP.
- You must deploy the FSx for ONTAP file system within the same AWS region as your SDDC.

Requirements for deployments to Amazon EC2

- The root volume of the FSx for ONTAP file system must be created as an EBS volume.

Steps

1. At the bottom of the **Review plan** page, select **Deploy** and the Create an FSx for ONTAP file system page is displayed.

Most of the fields that define your FSx for ONTAP file system are completed based on the information you provided, but there are a few fields that you need to complete in this page.

You can use the Quick create or Advanced create option. Advanced create offers a few additional storage parameters that you can customize. [See what these two options offer.](#)

2. **AWS credentials:** Select or add credentials that will give Workload Factory the permissions necessary to create your FSx for ONTAP file system directly. You can also select the CloudFormation code from Codebox and deploy the FSx for ONTAP file system yourself in AWS.
3. **File system name:** Enter the name that you want to use for this FSx for ONTAP file system.
4. **Tags:** Optionally you can add tags to categorize this FSx for ONTAP file system.
5. In the "Network & security" section, enter the following information:
 - a. **Region & VPC:** Select the Region and the VPC where the FSx for ONTAP file system will be deployed.

If you are deploying to VMware Cloud on AWS, ensure you deploy it in a VPC that is different than the VPC where the VMware Cloud on AWS is deployed.

- b. **Security group:** When using the **Advanced create** option, you can select the default security group for the FSx for ONTAP VPC so that all traffic can access the FSx for ONTAP file system.

You can add an inbound rule that restricts what other AWS services can access the FSx for ONTAP file system. This will block the amount of services that are open. These are the minimum ports and protocols:

Protocols	Ports	Purpose
TCP, UDP	111	Portmapper (used to negotiate which ports are used in NFS requests)
TCP, UDP	635	NFS mountd (receives NFS mount requests)
TCP, UDP	2049	NFS network traffic
TCP, UDP	4045	Network Lock Manager (NLM, lockd) - Handles lock requests.
TCP, UDP	4046	Network Status Monitor (NSM, statd) - Notifies NFS clients about reboots of the server for lock management.

- c. **Availability zone:** Select the Availability Zone and the Subnet.

You should select the same availability zone as where your VMware SDDC is deployed if you want to avoid charges for cross-AZ traffic.

- d. **Encryption:** When using the **Advanced create** option, you can select the AWS encryption key name from the dropdown.
 - e. **Datastore access control:** When using the **Advanced create** option, you can select whether all hosts can access the datastores or whether only certain vSphere cluster nodes on a specific subnet can access the datastores.

6. In the "File system details" section, enter the following information:

- a. **ONTAP credentials:** Enter and confirm the ONTAP password.
 - b. **Storage VM credentials** (Advanced create only): Enter and confirm the storage VM password. The

password can be specific to this file system, or you can use the same password entered for ONTAP credentials.

7. In the **Summary** section, you can view the FSx for ONTAP file system and datastore configuration that the VMware migration advisor has designed based on your information.
8. Select **Create** to deploy the FSx for ONTAP file system. This process can take up to 2 hours.

Optionally, in the Codebox window you can select **Redirect to CloudFormation** to create the file system using a CloudFormation stack.

In either case, you can you can monitor the creation progress in CloudFormation.

Result

The FSx for ONTAP file system is deployed.

Migrate your data to the new infrastructure

Use a tool such as AWS Application Migration Service (MGN) to move your data from your old virtual machine storage to the FSx for NetApp ONTAP volumes connected to your new virtual machines.

AWS MGN enables you to migrate your applications to the FSx for NetApp ONTAP volumes in Amazon EC2.

[Review the AWS Application Migration Service documentation](#) for details.

What's next?

Now that you've migrated your data to AWS and Amazon FSx for NetApp ONTAP external datastores, you can back up and protect the important data on your FSx for ONTAP file system to make sure your data is always available.

For information about managing your FSx for ONTAP file system, go to the [Amazon FSx for NetApp ONTAP documentation](#) to view the the backup and protection capabilities you can use.

Migrate to VMware Cloud on AWS

Capture your current VM configurations before migrating to VMware Cloud

You can use the Migration advisor VM collector script or RVTools to capture your current VM configurations. We recommend that you use the Migration advisor VM collector script because it gathers both VM configuration and performance data for the most accurate plan.

If you plan to deploy a new system based on an existing deployment plan that you previously saved locally, you can skip this step and select the existing deployment plan. [Learn how to use an existing plan to build a new plan.](#)

Use the Migration advisor VM collector script

The NetApp Migration advisor VM collector script gathers VM configuration information from your vCenter similar to what RVTools collects, however, it captures current VM performance data to provide actual read and write IOPS and throughput statistics.

You need to start the Migration advisor to copy the Migration advisor VM collector script from the Codebox window.

Before you begin

The system where you'll be running the collector script must meet the following requirements:

- Microsoft PowerShell 7.0 or greater must be installed. See the [Microsoft PowerShell documentation](#) if you need to install PowerShell.
- VMware PowerCLI must be installed. See the [VMware PowerCLI documentation](#) if you need to install PowerCLI.
- SSL certificate checking must be disabled.
- PowerShell must allow running unsigned scripts.

Note that if you plan to capture long-term statistics from your VMs (daily statistics), you must have activated statistics level 3 or above in the vSphere management console (VMware management environment).



Steps

1. Log in to Workload Factory.
2. From the VMware workloads tile, select **Access and plan** and then select **Migration to VMware Cloud on AWS**.

The VMware migration advisor main page is displayed.

3. Select **Create a new deployment plan**, select the option for **Use the migration advisor VMware data collector**, and select **Next**.

The **Prepare for VMware Cloud on AWS migration** page is displayed.

4. In the Codebox window, select either  to save the Migration advisor VM collector script (named "list-vms.ps1") to the target system, or select  to copy the script so you can paste it on the appropriate system.
5. Follow these steps to capture the configurations of your current VMs:
 - a. Log in to the system where you downloaded the data collector, on which PowerShell and PowerCLI are installed.
 - b. Connect to your VMware vCenter server by running the following command:

```
Connect-VIServer -server <server_IP>
```

Replace <server_IP> with the IP address or hostname of your VMware server.

- c. Run the data collector script you downloaded and specify the data collection option for "daily" or "hourly" VM statistics.

```
.list-vms.ps1 -isLongTermDataCollectionEnabled <true | false>
```

where:

- **true** collects IOPS and throughput data for the past 24 hours with 5-minute intervals
- **false** collects IOPS and throughput data for the past 1 hour with 20-second intervals.

Result

The script outputs a CSV file named `list-vms-yyyy-MM-dd-HH-mm-ss.csv` in the current working directory. The CSV file contains a list of all VMs and their properties, along with their IOPS and throughput data.

Use RVTools software

RVTools is a Windows application that interacts with VCenter and ESX server (5.x to 8.0) to capture information about your VMware virtual environments. It gathers information about VMs, CPU, memory, disks, clusters, ESX hosts, datastores, and more. You can export this information to an xlsx file to use with the migration advisor.

[Learn more about RVTools](#)

Steps

1. Download and install RVTools 4.4.2 or greater from [RVTools website](#)
2. Launch RVTools and log in to the target VCenter Server.

This will capture information about that VCenter Server.

3. Export your VMware information to an xlsx or xls file.

See the chapter on "commandline parameters" in the [RVTools documentation](#) for details.

Result

The xlsx or xls file that contains your results is saved to your working directory.

What's next?

[Create a VMware Cloud on AWS deployment plan using the migration advisor.](#)

Create a deployment plan for VMware Cloud on AWS using the migration advisor

Log in to the NetApp Workload Factory to access the VMware migration advisor. You'll follow the steps in the wizard to create a deployment plan or migration plan that is customized for your needs.

When migrating to VMware Cloud, you can use the migration advisor to create a deployment plan for the following scenarios:

- [To migrate your current on-premises vSphere environment to VMWare cloud.](#)
- [To deploy a system in the cloud based on an existing deployment plan that has similar requirements.](#)

Note that you must have a user name and password to access Workload Factory. If you don't have access, create an account now. See the instructions [here](#).

Create a deployment plan based on an on-premises vSphere environment

You can migrate your current virtual machine configurations in on-premises vSphere environments to virtual machines in VMware Cloud on AWS and use customized Amazon FSx for NetApp ONTAP file systems as external datastores.

Requirements

- You must have created the inventory file from your existing systems by using the migration advisor VM collector (.csv file) or by using RVTools (.xlsx file).
- You must have access to the inventory file from the system on which you are logging in to Workload Factory.

Steps

1. From the VMware workloads tile, select **Access and plan** and then select **Migration to VMware Cloud on AWS**.

The VMware migration advisor main page is displayed.

2. Select **Create a new deployment plan**.

3. Select the type of inventory file you'll be using to populate Workload Factory with your current VM configuration and select **Next**.

- Select **Use the migration advisor VMware data collector** to use the .csv file that you created using the VMware data collector.
- Select **Use RVTools** to use the .xlsx file that you created using RVTools.

The "Prepare for VMware Cloud onboarding" page is displayed.

4. In the *Upload VM configuration* section, select  and select the file that you want to use.

- Select the .csv file when using the Migration advisor VM collector.
- Select the .xlsx file when using RVTools.

The VMs summary section is populated from the inventory file to reflect the number of VMs and the total storage capacity.

5. In the *VM inventory considerations* section, select the options to filter the list of VMs that you want to migrate.

- a. **Consider VMs:** Indicate which VMs will be extracted from the .csv file based on their operating power state. You can bring in all VMs, or only those that are On, Off, or Suspended.
- b. **VM Storage to consider:** Select whether the datastores created for each onboarded VM are sized based on their currently utilized size (recommended) or their provisioned size.

The external datastores will be implemented using Amazon FSx for NetApp ONTAP file system volumes.

- c. **VM Memory to consider:** Select whether the memory allocated for each onboarded VM is sized based on their currently utilized size (recommended) or their provisioned size.

6. In the *VMware Cloud on AWS deployment configuration* section, enter details about the required VMware Cloud on AWS configuration.

- a. **Region:** Select the region where the VMs and Amazon FSx for NetApp ONTAP file systems will be deployed.

For optimal performance and cost efficiency, this is typically the same region as where your existing VMware Cloud on AWS SDDC is deployed.

- b. **VM estimated performance requirements:** This option is available only when using RVTools. The Migration advisor VM collector captures this information from your environment. Provide the following per virtual machine average performance parameters that you want to be applied to your new VMs that will be deployed:

- **Average IOPS per VM:**

Enter the number of IOPS required for your file systems. If you are unsure, you can use the default of 3 IOPS per GiB of SSD storage for Amazon FSx for ONTAP file systems. For example, if you deploy 2,000 GiB of capacity, this will be translated to 6,000 IOPS.

We recommend that you begin with a smaller IOPS setting. You can increase your provisioned SSD IOPS after the file system is created as workloads are migrated or deployed.

- **Average I/O block size:**

The size of each block containing read or write operations. The default size is 4 KB.

A larger block size may be better for large sequential read and write workloads. A smaller block size may offer better performance for workloads that perform small random writes to sparse files or to large files.

- **Average write ratio:**

The percentage of operations that are write operations for your workloads. The default ratio is 30% writes and 70% reads.

7. In the *VM storage capacity considerations* section, select from a few storage options.

- a. **Average data reduction ratio:** Choose from among the three common data reduction selection values. Select "1:1 - No reduction", "1:1.25 - 20% reduction", or "1:1.5 - 33% reduction".

- b. **Headroom percentage:** Enter the percentage of capacity growth that is added to the capacity for your FSx for ONTAP file systems.

Note that if you select an amount less than 20% that you won't be able to create volume snapshots for protection and long-term backups.

8. Select **Next** and the "VMware cloud on AWS node configuration" page is displayed.

This page enables you to define the VMware cloud on AWS cluster configuration using an estimated savings analysis and the recommended node type. You can configure the following:

- a. **vSAN architecture:** Select whether you want to use vSAN Express Storage Architecture (ESA) or vSAN Original Storage Architecture (OSA) architecture.

- b. **vSAN Fault Tolerance:** Select the level of fault tolerance that is required for the VMs. You can choose "Auto", which is recommended, or from among a variety of RAID levels.

- RAID-1 (FTT 1): consists of an exact copy (or mirror) of a set of data on 2 or more disks.

- RAID-5 (FTT 1): consists of block-level striping with distributed parity - parity information is distributed among 3 or more drives, and it can survive a single disk failures.

- RAID-5 (FTT 2): consists of block-level striping with distributed parity - parity information is distributed among 4 or more drives, and it can survive any two concurrent disk failures.

- RAID-6 (FTT 2): extends RAID 5 by adding another parity block; thus, it uses block-level striping with two parity blocks distributed across all member disks. It requires 4 or more drives, and it can

survive any two concurrent disk failures.

c. **Nodes configuration selection list:** Select an EC2 instance type for the nodes.

9. Select **Next** and the "Select virtual machines" page displays the VMs that match the criteria you provided in the previous page.

a. In the *Selection criteria* section, select the criteria for the VMs that you plan to deploy:

- Based on cost and performance optimization
- Based on the ability to easily restore your data with local snapshots for recovery scenarios
- Based on both sets of criteria: the lowest cost while still providing good recovery options

b. In the *Virtual machines* section, the VMs that matched the criteria you provided in the previous page are selected (checked). Select or deselect VMs if you want to onboard/migrate fewer or more VMs on this page.

The **Recommended deployment** section will be updated if you make any changes. Note that by selecting the checkbox in the heading row you can select all VMs on this page.

c. Select **Next**.

10. On the **Datastore deployment plan** page, review the total number of VMs and datastores that have been recommended for the migration.

a. Select each Datastore listed across the top of the page to see how the datastores and VMs will be provisioned.

The bottom of the page shows the source VM (or multiple VMs) for which this new VM and datastore will be provisioned.

b. Once you understand how your datastores will be deployed, select **Next**.

11. On the **Review deployment plan** page, review the estimated monthly cost for all the VMs that you plan to migrate.

The top of the page describes the monthly cost for all deployed VMs and FSx for ONTAP file systems. You can expand each section to view details for "Recommended Amazon FSx for ONTAP file system configuration", "Estimated cost breakdown", "Volume configuration", "Sizing assumptions", and technical "Disclaimers".

12. When you are satisfied with the migration plan, you have a few options:

- Select **Deploy** to deploy the FSx for ONTAP file systems to support your VMs. [Learn how to deploy an FSx for ONTAP file system.](#)
- Select **Download plan > VM deployment** to download the migration plan in a .csv format so you can use it to create your new cloud-based intelligent data infrastructure.
- Select **Download plan > Plan report** to download the migration plan in a .pdf format so you can distribute the plan for review.
- Select **Export plan** to save the migration plan as a template in a .json format. You can import the plan at a later time to use as a template when deploying systems with similar requirements.


Create a deployment plan based on an existing plan

If you are planning a new deployment that is similar to an existing deployment plan that you've used in the past, you can import that plan, make edits, and then save it as a new deployment plan.

Requirements

You must have access to the .json file for the existing deployment plan from the system on which you are logging in to Workload Factory.

Steps

1. Log in to Workload Factory.
2. From the VMware workloads tile, select **Access and plan** and then select **Migration to VMware Cloud on AWS**. The VMware migration advisor main page is displayed.
3. Select **Import an existing deployment plan**.
4. Select  and select the existing plan file that you want to import in the migration advisor.
5. Select **Next** and the Review plan page is displayed.
6. You can select **Previous** to access the *Prepare for VMware Cloud onboarding* page and the *Select VMs* page to modify the settings for the plan as described in the previous section.
7. After you have customized the plan to your requirements, you can save the plan or begin the deployment process for your datastores on FSx for ONTAP file systems.

Deploy the recommended FSx for ONTAP file system

After you verify that the recommended FSx for ONTAP file system (or multiple file systems in some cases) meets your exact requirements, you can use Workload Factory to deploy the system in your AWS environment.

Depending on the policy and permissions that you added to your Workload Factory account, you can deploy the FSx for ONTAP file system completely using Workload Factory (using Automate mode). If you have fewer permissions (Read mode), or no permissions (Basic mode), you'll need to use the CloudFormation information from the Codebox and deploy the FSx for ONTAP file system yourself in AWS.

Requirements for deployments to VMware Cloud on AWS

- You must be using VMware Cloud on AWS Software-Defined Data Center (SDDC) version 1.20 or greater to deploy FSx for ONTAP file systems.
- You must not deploy the FSx for ONTAP file system in the same VPC used during the SDDC deployment. Instead, you must deploy it in a new Amazon VPC that you own to enable VMware Cloud on AWS integration with Amazon FSx for NetApp ONTAP.
- You must deploy the FSx for ONTAP file system within the same AWS region as your SDDC.

Requirements for deployments to Amazon EC2

- The root volume of the FSx for ONTAP file system must be created as an EBS volume.

Steps

1. At the bottom of the **Review plan** page, select **Deploy** and the Create an FSx for ONTAP file system page is displayed.

Most of the fields that define your FSx for ONTAP file system are completed based on the information you provided, but there are a few fields that you need to complete in this page.

You can use the Quick create or Advanced create option. Advanced create offers a few additional storage parameters that you can customize. [See what these two options offer.](#)

2. **AWS credentials:** Select or add credentials that will give Workload Factory the permissions necessary to create your FSx for ONTAP file system directly. You can also select the CloudFormation code from

Codebox and deploy the FSx for ONTAP file system yourself in AWS.

3. **File system name:** Enter the name that you want to use for this FSx for ONTAP file system.
4. **Tags:** Optionally you can add tags to categorize this FSx for ONTAP file system.
5. In the "Network & security" section, enter the following information:
 - a. **Region & VPC:** Select the Region and the VPC where the FSx for ONTAP file system will be deployed.

If you are deploying to VMware Cloud on AWS, ensure you deploy it in a VPC that is different than the VPC where the VMware Cloud on AWS is deployed.
 - b. **Security group:** When using the **Advanced create** option, you can select the default security group for the FSx for ONTAP VPC so that all traffic can access the FSx for ONTAP file system.

You can add an inbound rule that restricts what other AWS services can access the FSx for ONTAP file system. This will block the amount of services that are open. These are the minimum ports and protocols:

Protocols	Ports	Purpose
TCP, UDP	111	Portmapper (used to negotiate which ports are used in NFS requests)
TCP, UDP	635	NFS mountd (receives NFS mount requests)
TCP, UDP	2049	NFS network traffic
TCP, UDP	4045	Network Lock Manager (NLM, lockd) - Handles lock requests.
TCP, UDP	4046	Network Status Monitor (NSM, statd) - Notifies NFS clients about reboots of the server for lock management.

- c. **Availability zone:** Select the Availability Zone and the Subnet.

You should select the same availability zone as where your VMware SDDC is deployed if you want to avoid charges for cross-AZ traffic.
 - d. **Encryption:** When using the **Advanced create** option, you can select the AWS encryption key name from the dropdown.
 - e. **Datastore access control:** When using the **Advanced create** option, you can select whether all hosts can access the datastores or whether only certain vSphere cluster nodes on a specific subnet can access the datastores.
6. In the "File system details" section, enter the following information:
 - a. **ONTAP credentials:** Enter and confirm the ONTAP password.
 - b. **Storage VM credentials** (Advanced create only): Enter and confirm the storage VM password. The password can be specific to this file system, or you can use the same password entered for ONTAP credentials.
7. In the **Summary** section, you can view the FSx for ONTAP file system and datastore configuration that the VMware migration advisor has designed based on your information.
8. Select **Create** to deploy the FSx for ONTAP file system. This process can take up to 2 hours.

Optionally, in the Codebox window you can select **Redirect to CloudFormation** to create the file system

using a CloudFormation stack.

In either case, you can monitor the creation progress in CloudFormation.

Result

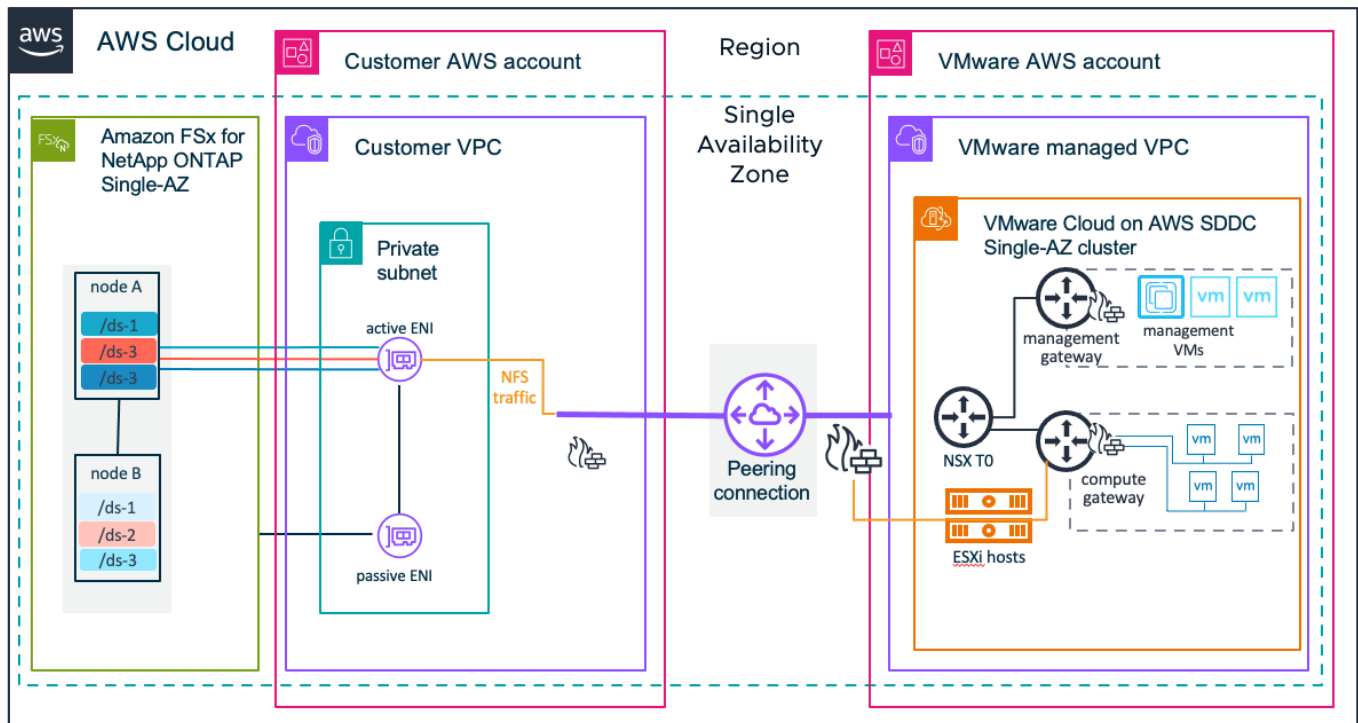
The FSx for ONTAP file system is deployed.

Connect your FSx for ONTAP file systems to VMware Cloud on AWS

After you deploy FSx for ONTAP file systems, you need to connect that system to your VMware Cloud on AWS infrastructure. Your Software-Defined Data Center (SDDC) offers network options for connecting to the FSx for ONTAP file system by using the VPC peering capability to extend network connectivity to the external NFS storage volumes.

[Review the Amazon VPC peering documentation for details](#)

The following diagram shows how to use VPC peering to connect single Availability Zone (AZ) SDDC clusters to FSx for ONTAP single-AZ deployments.



Migrate your data to the new infrastructure

Use a tool such as VMware Hybrid Cloud Extension (HCX) to move your data from your old virtual machine storage to the FSx for NetApp ONTAP volumes connected to your new virtual machines. VMware HCX core functionality enables you to migrate workloads from your on-premises data center to your Software-Defined Data Center (SDDC) transparently.

[Review the VMware HCX documentation for details.](#)

What's next?

Now that you've migrated your data to VMware Cloud on AWS and Amazon FSx for NetApp ONTAP external datastores, you can back up and protect the important data on your FSx for ONTAP file system to make sure your data is always available.

For information about managing your FSx for ONTAP file system, go to the [Amazon FSx for NetApp ONTAP documentation](#) to view the the backup and protection capabilities you can use.

Knowledge and support

Register for support

Support registration is required to receive technical support specific to Workload Factory and its storage solutions and services. You must register for support from the BlueXP console, which is a separate web-based console from Workload Factory.

Registering for support does not enable NetApp support for a cloud provider file service. For technical support related to a cloud provider file service, its infrastructure, or any solution using the service, refer to "Getting help" in the Workload Factory documentation for that product.

[Amazon FSx for ONTAP](#)

Support registration overview

Registering your account ID support subscription (your 20 digit 960xxxxxxx serial number located on the Support Resources page in BlueXP) serves as your single support subscription ID. Each BlueXP account-level support subscription must be registered.

Registering enables capabilities like opening support tickets and automatic case generation. Registration is completed by adding NetApp Support Site (NSS) accounts to BlueXP as described below.

Register your account for NetApp support

To register for support and activate support entitlement, one user in your account must associate a NetApp Support Site account with their BlueXP login. How you register for NetApp support depends on whether you already have a NetApp Support Site (NSS) account.

Existing customer with an NSS account

If you're a NetApp customer with an NSS account, you simply need to register for support through BlueXP.

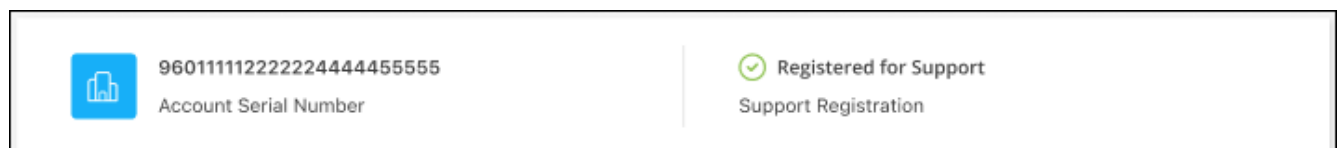
Steps

1. In the upper right of the Workload Factory console, select **Help > Support**.

Selecting this option opens the BlueXP console a new browser tab and loads the Support dashboard.

2. In the upper right of the BlueXP console, select the Settings icon, and select **Credentials**.
3. Select **User Credentials**.
4. Select **Add NSS credentials** and follow the NetApp Support Site (NSS) Authentication prompt.
5. To confirm that the registration process was successful, select the Help icon, and select **Support**.

The **Resources** page should show that your account is registered for support.



Note that other BlueXP users will not see this same support registration status if they have not associated a NetApp Support Site account with their BlueXP login. However, that doesn't mean that your BlueXP account is not registered for support. As long as one user in the account has followed these steps, then your account has been registered.

Existing customer but no NSS account

If you're an existing NetApp customer with existing licenses and serial numbers but *no* NSS account, you need to create an NSS account and associate it with your BlueXP login.

Steps

1. Create a NetApp Support Site account by completing the [NetApp Support Site User Registration form](#)
 - a. Be sure to select the appropriate User Level, which is typically **NetApp Customer/End User**.
 - b. Be sure to copy the BlueXP account serial number (960xxxx) used above for the serial number field. This will speed up the account processing.
2. Associate your new NSS account with your BlueXP login by completing the steps under [Existing customer with an NSS account](#).

Brand new to NetApp

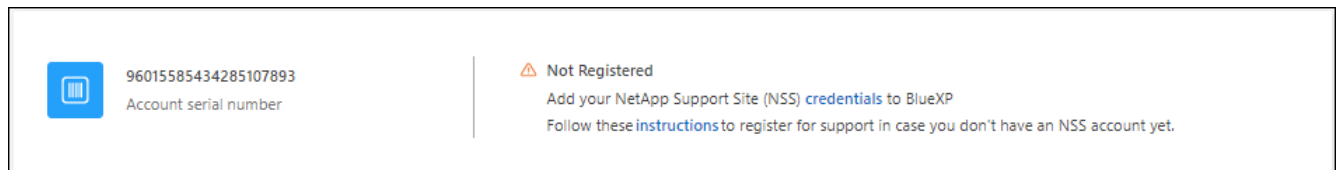
If you are brand new to NetApp and you don't have an NSS account, follow each step below.

Steps

1. In the upper right of the Workload Factory console, select **Help > Support**.

Selecting this option opens the BlueXP console a new browser tab and loads the Support dashboard.

2. Locate your account ID serial number from the Support Resources page.



3. Navigate to [NetApp's support registration site](#) and select **I am not a registered NetApp Customer**.
4. Fill out the mandatory fields (those with red asterisks).
5. In the **Product Line** field, select **Cloud Manager** and then select your applicable billing provider.
6. Copy your account serial number from step 2 above, complete the security check, and then confirm that you read NetApp's Global Data Privacy Policy.

An email is immediately sent to the mailbox provided to finalize this secure transaction. Be sure to check your spam folders if the validation email doesn't arrive in few minutes.

7. Confirm the action from within the email.

Confirming submits your request to NetApp and recommends that you create a NetApp Support Site account.

8. Create a NetApp Support Site account by completing the [NetApp Support Site User Registration form](#)
 - a. Be sure to select the appropriate User Level, which is typically **NetApp Customer/End User**.

- b. Be sure to copy the account serial number (960xxxx) used above for the serial number field. This will speed up the account processing.

After you finish

NetApp should reach out to you during this process. This is a one-time onboarding exercise for new users.

Once you have your NetApp Support Site account, associate the account with your BlueXP login by completing the steps under [Existing customer with an NSS account](#).

Get help

NetApp provides support for Workload Factory and its cloud services in a variety of ways. Extensive free self-support options are available 24x7, such as knowledgebase (KB) articles and a community forum. Your support registration includes remote technical support via web ticketing.

Get support for FSx for ONTAP

For technical support related to FSx for ONTAP, its infrastructure, or any solution using the service, refer to "Getting help" in the Workload Factory documentation for that product.

[Amazon FSx for ONTAP](#)

To receive technical support specific to Workload Factory and its storage solutions and services, use the support options described below.

Use self-support options

These options are available for free, 24 hours a day, 7 days a week:

- Documentation

The Workload Factory documentation that you're currently viewing.

- [Knowledge base](#)

Search through the Workload Factory knowledge base to find helpful articles to troubleshoot issues.

- [Communities](#)

Join the Workload Factory community to follow ongoing discussions or create new ones.

Create a case with NetApp support

In addition to the self-support options above, you can work with a NetApp Support specialist to resolve any issues after you activate support.

Before you get started

To use the **Create a Case** capability, you must first register for support. associate your NetApp Support Site credentials with your Workload Factory login. [Learn how to register for support](#).

Steps

1. In the upper right of the Workload Factory console, select **Help > Support**.

Selecting this option opens the BlueXP console a new browser tab and loads the Support dashboard.

2. On the **Resources** page, choose one of the available options under Technical Support:

a. Select **Call Us** if you'd like to speak with someone on the phone. You'll be directed to a page on netapp.com that lists the phone numbers that you can call.

b. Select **Create a Case** to open a ticket with a NetApp Support specialist:

- **Service:** Select **Workload Factory**.

- **Case Priority:** Choose the priority for the case, which can be Low, Medium, High, or Critical.


To learn more details about these priorities, hover your mouse over the information icon next to the field name.

- **Issue Description:** Provide a detailed description of your problem, including any applicable error messages or troubleshooting steps that you performed.

- **Additional Email Addresses:** Enter additional email addresses if you'd like to make someone else aware of this issue.


- **Attachment (Optional):** Upload up to five attachments, one at a time.

Attachments are limited to 25 MB per file. The following file extensions are supported: txt, log, pdf, jpg/jpeg, rtf, doc/docx, xls/xlsx, and csv.

ntapitdemo 
NetApp Support Site Account

Service Working Environment


Select Select

Case Priority 


Low - General guidance



Issue Description

Provide detailed description of problem, applicable error messages and troubleshooting steps taken.

Additional Email Addresses (Optional) 

Type here

Attachment (Optional) Upload 

No files selected  

After you finish

A pop-up will appear with your support case number. A NetApp Support specialist will review your case and get back to you soon.

For a history of your support cases, you can select **Settings > Timeline** and look for actions named "create support case." A button to the far right lets you expand the action to see details.

It's possible that you might encounter the following error message when trying to create a case:

"You are not authorized to Create a Case against the selected service"

This error could mean that the NSS account and the company of record it's associated with is not the same company of record for the BlueXP account serial number (ie. 960xxxx) or the working environment serial number. You can seek assistance using one of the following options:

- Use the in-product chat
- Submit a non-technical case at <https://mysupport.netapp.com/site/help>

Manage your support cases (Preview)

You can view and manage active and resolved support cases directly from BlueXP. You can manage the cases associated with your NSS account and with your company.

Case management is available as a Preview. We plan to refine this experience and add enhancements in upcoming releases. Please send us feedback by using the in-product chat.

Note the following:

- The case management dashboard at the top of the page offers two views:
 - The view on the left shows the total cases opened in the past 3 months by the user NSS account you provided.
 - The view on the right shows the total cases opened in the past 3 months at your company level based on your user NSS account.

The results in the table reflect the cases related to the view that you selected.

- You can add or remove columns of interest and you can filter the contents of columns like Priority and Status. Other columns provide just sorting capabilities.

View the steps below for more details.

- At a per-case level, we offer the ability to update case notes or close a case that is not already in Closed or Pending Closed status.

Steps

1. In the upper right of the Workload Factory console, select **Help > Support**.

Selecting this option opens the BlueXP console a new browser tab and loads the Support dashboard.

2. Select **Case Management** and if you're prompted, add your NSS account to BlueXP.

The **Case management** page shows open cases related to the NSS account that is associated with your BlueXP user account. This is the same NSS account that appears at the top of the **NSS management** page.

3. Optionally modify the information that displays in the table:
 - Under **Organization's cases**, select **View** to view all cases associated with your company.
 - Modify the date range by choosing an exact date range or by choosing a different time frame.


Search: Cases opened on the last 3 months Create a case

Date created	Last updated	Priority	Status (5)
December 22, 2022	December 29, 2022	Medium (P3)	Assigned
December 21, 2022	December 28, 2022	Medium (P3)	Active
December 15, 2022	December 27, 2022	Medium (P3)	Pending customer
December 14, 2022	December 26, 2022	Low (P4)	Solution proposed

- Filter the contents of the columns.

Search: Cases opened on the last 3 months Create a case

Last updated	Priority	Status (5)
December 29, 2022	Critical (P1)	<input checked="" type="checkbox"/> Active <input checked="" type="checkbox"/> Pending customer
December 28, 2022	High (P2)	<input checked="" type="checkbox"/> Solution proposed <input checked="" type="checkbox"/> Pending closed
December 27, 2022	Medium (P3)	<input type="checkbox"/> Closed
December 26, 2022	Low (P4)	<input type="checkbox"/> Closed

- Change the columns that appear in the table by selecting  and then choosing the columns that you'd like to display.

Search: Cases opened on the last 3 months Create a case

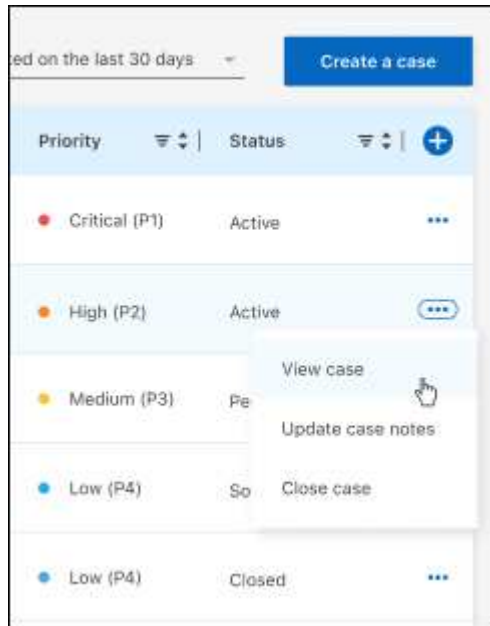
Last updated	Priority	Status (5)
December 29, 2022	Critical (P1)	<input checked="" type="checkbox"/> Last updated <input checked="" type="checkbox"/> Priority
December 28, 2022	High (P2)	<input checked="" type="checkbox"/> Cluster name
December 27, 2022	Medium (P3)	<input type="checkbox"/> Case owner <input type="checkbox"/> Opened by
December 26, 2022	Low (P4)	<input type="checkbox"/> Opened by

4. Manage an existing case by selecting **...** and selecting one of the available options:

- **View case:** View full details about a specific case.
- **Update case notes:** Provide additional details about your problem or select **Upload files** to attach up to a maximum of five files.

Attachments are limited to 25 MB per file. The following file extensions are supported: txt, log, pdf, jpg/jpeg, rtf, doc/docx, xls/xlsx, and csv.

- **Close case:** Provide details about why you're closing the case and select **Close case**.



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- [Workload Factory for Databases](#)
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