



## **On premises**

### **Set up and administration**

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# On premises

## Quick start to create a Connector on premises

Create a Connector on your premises by setting up networking, preparing a host, preparing cloud permissions, and more.

1

### Set up networking

Prepare the following for the Connector:

- A network location where you plan to install the Connector
- A network connection to the networks where you're planning to create and manage working environments
- Outbound internet access to specific endpoints for day-to-day operations
- The IP address, credentials, and HTTPS certificate of a proxy server, if a proxy server is required for outbound internet

[Learn more about networking requirements.](#)

2

### Review host requirements

The Connector software must run on a host that meets specific requirements. The key requirements are as follows:

- A dedicated host running CentOS or Red Hat Enterprise Linux
- 4 CPUs
- 14 GB of RAM
- Docker Engine

[Learn more about these host requirements.](#)

3

### Set up cloud permissions

Set up permissions for your cloud provider so that you can use BlueXP to manage storage in the cloud:

- **AWS:** Create an IAM policy and attach the policy to an IAM user. After installation, you need to provide BlueXP with access keys for that IAM user.
- **Azure:** Set up a service principal in Azure Active Directory that includes the required permissions. After installation, you need to provide BlueXP with the credentials for the service principal.

When the Connector is installed on your premises, it can't manage storage or data in Google Cloud. The Connector must be installed in Google Cloud to manage any storage or data that resides there.

[Follow step-by-step instructions for each of these options.](#)

## 4

### Install the Connector software

Download the Connector software from the [NetApp Support Site](#) and run the installation script.

[Follow step-by-step instructions.](#)

## 5

### Provide BlueXP with permissions

After you install and set up the Connector, you need to add your cloud credentials so that BlueXP has the required permissions to perform actions in AWS or Azure.

[Follow step-by-step instructions.](#)

## Set up on-prem networking

Set up your networking so the Connector can manage resources and processes within your hybrid cloud environment.

### Connections to target networks

A Connector requires a network connection to the type of working environment that you're creating and the services that you're planning to enable.

For example, if you want to launch Cloud Volumes ONTAP in the cloud, then you must set up a VPN connection from your corporate network to the virtual network where you plan to launch Cloud Volumes ONTAP.

### Outbound internet access

The network location where you deploy the Connector must have an outbound internet connection.

### Endpoints contacted during manual installation


When you manually install the Connector on your own Linux host, the installer for the Connector requires access to the following URLs during the installation process:

- <https://support.netapp.com>
- <https://mysupport.netapp.com>
- <https://cloudmanager.cloud.netapp.com/tenancy>
- <https://stream.cloudmanager.cloud.netapp.com>
- <https://cloudmanagerinfraproduct.azurecr.io>
- <https://production-artifacts.cloudmanager.cloud.netapp.com>
- [https://\\*.blob.core.windows.net](https://*.blob.core.windows.net)

The host might try to update operating system packages during installation. The host can contact different mirroring sites for these OS packages.

## Endpoints contacted for day-to-day operations

The Connector requires outbound internet access to contact the following endpoints in order to manage resources and processes within your public cloud environment.

Endpoints	Purpose
AWS services (amazonaws.com): <ul style="list-style-type: none"><li>• CloudFormation</li><li>• Elastic Compute Cloud (EC2)</li><li>• Identity and Access Management (IAM)</li><li>• Key Management Service (KMS)</li><li>• Security Token Service (STS)</li><li>• Simple Storage Service (S3)</li></ul>	To manage resources in AWS. The exact endpoint depends on the region in which you deploy the Connector. <a href="#">Refer to AWS documentation for details</a>
<a href="https://management.azure.com">https://management.azure.com</a> <a href="https://login.microsoftonline.com">https://login.microsoftonline.com</a>	To manage resources in Azure public regions.
<a href="https://management.chinacloudapi.cn">https://management.chinacloudapi.cn</a> <a href="https://login.chinacloudapi.cn">https://login.chinacloudapi.cn</a>	To manage resources in Azure China regions.
<a href="https://www.googleapis.com/compute/v1/">https://www.googleapis.com/compute/v1/</a> <a href="https://cloudresourcemanager.googleapis.com/v1/projects">https://cloudresourcemanager.googleapis.com/v1/projects</a> <a href="https://www.googleapis.com/compute/beta">https://www.googleapis.com/compute/beta</a> <a href="https://storage.googleapis.com/storage/v1">https://storage.googleapis.com/storage/v1</a> <a href="https://www.googleapis.com/storage/v1">https://www.googleapis.com/storage/v1</a> <a href="https://iam.googleapis.com/v1">https://iam.googleapis.com/v1</a> <a href="https://cloudkms.googleapis.com/v1">https://cloudkms.googleapis.com/v1</a> <a href="https://www.googleapis.com/deploymentmanager/v2/projects">https://www.googleapis.com/deploymentmanager/v2/projects</a>	To manage resources in Google Cloud.
<a href="https://support.netapp.com">https://support.netapp.com</a>	To obtain licensing information and to send AutoSupport messages to NetApp support.
<a href="https://*.api.blueexp.netapp.com">https://*.api.blueexp.netapp.com</a> <a href="https://api.blueexp.netapp.com">https://api.blueexp.netapp.com</a> <a href="https://*.cloudmanager.cloud.netapp.com">https://*.cloudmanager.cloud.netapp.com</a> <a href="https://cloudmanager.cloud.netapp.com">https://cloudmanager.cloud.netapp.com</a>	<div>The Connector is currently contacting "cloudmanager.cloud.netapp.com" but it will start contacting "api.blueexp.netapp.com" in an upcoming release.</div>
<a href="https://cloudmanagerinfraprod.azurecr.io">https://cloudmanagerinfraprod.azurecr.io</a> <a href="https://*.blob.core.windows.net">https://*.blob.core.windows.net</a>	To upgrade the Connector and its Docker components.

### Related link

[Prepare networking for user access to the BlueXP console](#)

## Proxy server

If your organization requires deployment of a proxy server for all outgoing internet traffic, obtain the following information about your HTTP or HTTPS proxy:

- IP address
- Credentials
- HTTPS certificate

## Ports

There's no incoming traffic to the Connector, unless you initiate it or if the Connector is used as a proxy for AutoSupport messages.

- HTTP (80) and HTTPS (443) provide access to the local UI, which you'll use in rare circumstances.
- SSH (22) is only needed if you need to connect to the host for troubleshooting.
- Inbound connections over port 3128 are required if you deploy Cloud Volumes ONTAP systems in a subnet where an outbound internet connection isn't available. If Cloud Volumes ONTAP systems don't have an outbound internet connection to send AutoSupport messages, BlueXP automatically configures those Cloud Volumes ONTAP systems to use a proxy server that's included with the Connector. The only requirement is to ensure that the Connector's security group allows inbound connections over port 3128. You'll need to open this port after you deploy the Connector.

## IP address limitation

There's a possible conflict with IP addresses in the 172 range. [Learn more about this limitation.](#)

# Review Connector host requirements for on-prem installs

The Connector software must run on a host that meets specific operating system requirements, RAM requirements, port requirements, and so on.

### Dedicated host

The Connector is not supported on a host that is shared with other applications. The host must be a dedicated host.

### Supported operating systems

- CentOS 7.6, 7.7, 7.8, and 7.9
- Red Hat Enterprise Linux 7.6, 7.7, 7.8, 7.9, 8.6, and 8.7

The host must be registered with Red Hat Subscription Management. If it's not registered, the host can't access repositories to update required 3rd-party software during Connector installation.

The Connector is supported on English-language versions of these operating systems.

### Hypervisor

A bare metal or hosted hypervisor that is certified to run CentOS or Red Hat Enterprise Linux is required. [Red Hat Solution: Which hypervisors are certified to run Red Hat Enterprise Linux?](#)

**CPU**

4 cores or 4 vCPUs

**RAM**

14 GB

**Disk space in /opt**

100 GiB of space must be available

**Disk space in /var**

20 GiB of space must be available

**Docker Engine**

Docker Engine version 19.3.1 or later is required on the host before you install the Connector. [View installation instructions](#)

## Set up cloud permissions for on-prem deployments

If you want to use BlueXP services in AWS or Azure with an on-prem Connector, then you need to set up permissions in your cloud provider so that you can add the credentials to the Connector after you install it.



Why not Google Cloud? When the Connector is installed on your premises, it can't manage your resources in Google Cloud. The Connector must be installed in Google Cloud to manage any resources that resides there.

## AWS

When the Connector is installed on premises, you need to provide BlueXP with AWS permissions by adding access keys for an IAM user who has the required permissions.

You must use this authentication method if the Connector is installed on premises. You can't use an IAM role.

### Steps

1. From the IAM console, create a policy:
  - a. Click **Policies > Create policy**.
  - b. Select **JSON** and copy and paste the contents of the [IAM policy for the Connector](#).
  - c. Finish the remaining steps to create the policy.

Depending on the BlueXP services that you're planning to use, you might need to create a second policy.

For standard regions, the permissions are spread across two policies. Two policies are required due to a maximum character size limit for managed policies in AWS. [Learn more about IAM policies for the Connector](#).

2. Attach the policies to an IAM user.
  - [AWS Documentation: Creating IAM Roles](#)
  - [AWS Documentation: Adding and Removing IAM Policies](#)
3. Ensure that the user has access keys that you can add to BlueXP after you install the Connector.

### Result

You should now have access keys for an IAM user who has the required permissions. After you install the Connector, you'll need to associate these credentials with the Connector from BlueXP.

[Learn how to provide these permissions to BlueXP](#).

## Azure

When the Connector is installed on premises, you need to provide BlueXP with Azure permissions by setting up a service principal in Azure Active Directory and obtaining the Azure credentials that BlueXP needs.

### Create an Azure Active Directory application for role-based access control

1. Ensure that you have permissions in Azure to create an Active Directory application and to assign the application to a role.

For details, refer to [Microsoft Azure Documentation: Required permissions](#).

2. From the Azure portal, open the **Azure Active Directory** service.





3. In the menu, click **App registrations**.
4. Click **New registration**.
5. Specify details about the application:
  - **Name**: Enter a name for the application.
  - **Account type**: Select an account type (any will work with BlueXP).
  - **Redirect URI**: You can leave this field blank.
6. Click **Register**.

You've created the AD application and service principal.

#### Assign the application to a role

1. Create a custom role:
  - a. Copy the contents of the [custom role permissions for the Connector](#) and save them in a JSON file.
  - b. Modify the JSON file by adding Azure subscription IDs to the assignable scope.

You should add the ID for each Azure subscription from which users will create Cloud Volumes ONTAP systems.

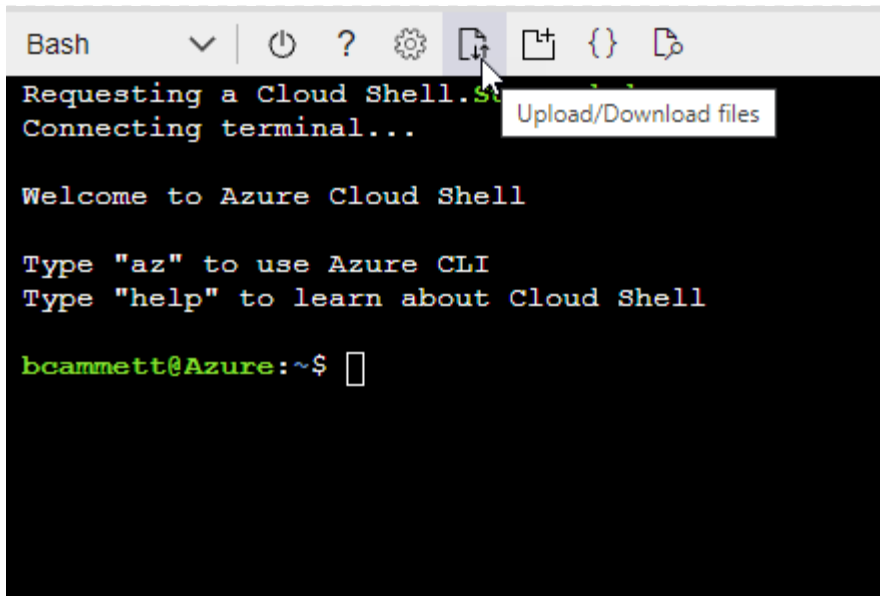
#### Example

```
"AssignableScopes": [  
  "/subscriptions/d333af45-0d07-4154-943d-c25fbzzzzzzz",  
  "/subscriptions/54b91999-b3e6-4599-908e-416e0zzzzzzz",  
  "/subscriptions/398e471c-3b42-4ae7-9b59-ce5bbzzzzzzz"
```

- c. Use the JSON file to create a custom role in Azure.

The following steps describe how to create the role by using Bash in Azure Cloud Shell.

- Start [Azure Cloud Shell](#) and choose the Bash environment.
- Upload the JSON file.



- Use the Azure CLI to create the custom role:

```
az role definition create --role-definition  
Connector_Policy.json
```

You should now have a custom role called BlueXP Operator that you can assign to the Connector virtual machine.

2. Assign the application to the role:
  - a. From the Azure portal, open the **Subscriptions** service.
  - b. Select the subscription.
  - c. Click **Access control (IAM) > Add > Add role assignment**.
  - d. In the **Role** tab, select the **BlueXP Operator** role and click **Next**.
  - e. In the **Members** tab, complete the following steps:
    - Keep **User, group, or service principal** selected.
    - Click **Select members**.

**Add role assignment** ...

[Got feedback?](#)

**Role**   **Members**   [Review + assign](#)

**Selected role**   Cloud Manager Operator 3.9.12\_B

**Assign access to**   ☒ User, group, or service principal  
☐ Managed identity

**Members**   [+ Select members](#)

- Search for the name of the application.

Here's an example:

**Select members** ✕

Select ⓘ

test-service-principal

test-service-principal

- Select the application and click **Select**.
  - Click **Next**.
- f. Click **Review + assign**.

The service principal now has the required Azure permissions to deploy the Connector.

If you want to deploy Cloud Volumes ONTAP from multiple Azure subscriptions, then you must bind the service principal to each of those subscriptions. BlueXP enables you to select the subscription that you want to use when deploying Cloud Volumes ONTAP.

#### Add Windows Azure Service Management API permissions

1. In the **Azure Active Directory** service, click **App registrations** and select the application.
2. Click **API permissions > Add a permission**.
3. Under **Microsoft APIs**, select **Azure Service Management**.

## Request API permissions

Select an API

Microsoft APIs APIs my organization uses My APIs

### Commonly used Microsoft APIs

#### Microsoft Graph

Take advantage of the tremendous amount of data in Office 365, Enterprise Mobility + Security, and Windows 10. Access Azure AD, Excel, Intune, Outlook/Exchange, OneDrive, OneNote, SharePoint, Planner, and more through a single endpoint.



#### Azure Batch

Schedule large-scale parallel and HPC applications in the cloud

#### Azure Data Catalog

Programmatic access to Data Catalog resources to register, annotate and search data assets

#### Azure Data Explorer

Perform ad-hoc queries on terabytes of data to build near real-time and complex analytics solutions

#### Azure Data Lake

Access to storage and compute for big data analytic scenarios

#### Azure DevOps

Integrate with Azure DevOps and Azure DevOps server

#### Azure Import/Export

Programmatic control of import/export jobs

#### Azure Key Vault

Manage your key vaults as well as the keys, secrets, and certificates within your Key Vaults

#### Azure Rights Management Services

Allow validated users to read and write protected content

#### Azure Service Management

Programmatic access to much of the functionality available through the Azure portal

#### Azure Storage

Secure, massively scalable object and data lake storage for unstructured and semi-structured data

#### Customer Insights

Create profile and interaction models for your products

#### Data Export Service for Microsoft Dynamics 365

Export data from Microsoft Dynamics CRM organization to an external destination

- Click **Access Azure Service Management as organization users** and then click **Add permissions**.

## Request API permissions

[← All APIs](#)



Azure Service Management

<https://management.azure.com/> [Docs](#) [↗](#)

What type of permissions does your application require?

### Delegated permissions

Your application needs to access the API as the signed-in user.

### Application permissions

Your application runs as a background service or daemon without a signed-in user.

Select permissions

[expand all](#)

Type to search

PERMISSION

ADMIN CONSENT REQUIRED



user\_impersonation

Access Azure Service Management as organization users (preview) ⓘ

## Get the application ID and directory ID for the application

1. In the **Azure Active Directory** service, click **App registrations** and select the application.
2. Copy the **Application (client) ID** and the **Directory (tenant) ID**.



When you add the Azure account to BlueXP, you need to provide the application (client) ID and the directory (tenant) ID for the application. BlueXP uses the IDs to programmatically sign in.

## Create a client secret

1. Open the **Azure Active Directory** service.
2. Click **App registrations** and select your application.
3. Click **Certificates & secrets > New client secret**.
4. Provide a description of the secret and a duration.
5. Click **Add**.
6. Copy the value of the client secret.

## Client secrets

A secret string that the application uses to prove its identity when requesting a token. Also can be referred to as application password.

[+ New client secret](#)

DESCRIPTION	EXPIRES	VALUE	Copy to clipboard
test secret	8/16/2020	*sZ1jSe2By:D*-ZRoV4NLfdAcY7:+0vA	

You now have a client secret that BlueXP can use it to authenticate with Azure AD.

### Result

Your service principal is now setup and you should have copied the application (client) ID, the directory (tenant) ID, and the value of the client secret. After you install the Connector, you'll need to associate these credentials with the Connector from BlueXP.

[Learn how to provide these permissions to BlueXP.](#)

## Install and set up the Connector on premises

Install the Connector on premises and then log in and set it up to work with your BlueXP account.

### Install the Connector

Download and install the Connector software on an existing Linux host on premises.

#### What you'll need

- Root privileges to install the Connector.
- Details about a proxy server, if a proxy is required for internet access from the Connector.

You have the option to configure a proxy server after installation but doing so requires restarting the Connector.

- A CA-signed certificate, if the proxy server uses HTTPS or if the proxy is an intercepting proxy.

#### About this task

- The installation installs the AWS command line tools (awscli) to enable recovery procedures from NetApp support.

If you receive a message that installing the awscli failed, you can safely ignore the message. The Connector can operate successfully without the tools.

- The installer that is available on the NetApp Support Site might be an earlier version. After installation, the Connector automatically updates itself if a new version is available.

#### Steps

1. Verify that docker is enabled and running.

```
sudo systemctl enable docker && sudo systemctl start docker
```

2. If the `http_proxy` or `https_proxy` system variables are set on the host, remove them:

```
unset http_proxy
unset https_proxy
```

If you don't remove these system variables, the installation will fail.

3. Download the Connector software from the [NetApp Support Site](#), and then copy it to the Linux host.

You should download the "online" Connector installer that's meant for use in your network or in the cloud. A separate "offline" installer is available for the Connector, but it's only supported with private mode deployments.

4. Assign permissions to run the script.

```
chmod +x OnCommandCloudManager-<version>
```

Where `<version>` is the version of the Connector that you downloaded.

5. Run the installation script.

```
./OnCommandCloudManager-<version> --proxy <HTTP or HTTPS proxy server>
--cacert <path and file name of a CA-signed certificate>
```

The `--proxy` and `--cacert` parameters are optional. If you have a proxy server, you will need to enter the parameter(s) as shown. The installer doesn't prompt you to provide information about a proxy.

Here's an example of the command using both optional parameters:

```
./OnCommandCloudManager-V3.9.26 --proxy
https://user:password@10.0.0.30:8080/ --cacert
/tmp/cacert/certificate.cer
```

`--proxy` configures the Connector to use an HTTP or HTTPS proxy server using one of the following formats:

- `http://address:port`
- `http://username:password@address:port`
- `https://address:port`
- `https://username:password@address:port`

`--cacert` specifies a CA-signed certificate to use for HTTPS access between the Connector and the proxy

server. This parameter is required only if you specify an HTTPS proxy server or if the proxy is an intercepting proxy.

## Result

The Connector is now installed. At the end of the installation, the Connector service (occm) restarts twice if you specified a proxy server.

## Set up the Connector

Sign up or log in and then set up the Connector to work with your account.

### Steps

1. Open a web browser and enter the following URL:

`https://ipaddress`

*ipaddress* can be localhost, a private IP address, or a public IP address, depending on the configuration of the host. For example, if the Connector is in the public cloud without a public IP address, you must enter a private IP address from a host that has a connection to the Connector host.

2. Sign up or log in.
3. After you log in, set up BlueXP:
  - a. Specify the BlueXP account to associate with the Connector.
  - b. Enter a name for the system.
  - c. Under **Are you running in a secured environment?** keep restricted mode disabled.

You should keep restricted mode disabled because these steps describe how to use BlueXP in standard mode. (In addition, restricted mode isn't supported when the Connector is installed on premises.)

- d. Click **Let's start**.

## Result

BlueXP is now set up with the Connector that you just installed.

### What's next?

[Provide BlueXP with the permissions that you previously setup.](#)

## Provide permissions to BlueXP for on-prem installs

After you install and set up the Connector, you need to add your cloud credentials so that BlueXP has the required permissions to perform actions in AWS or Azure.



Why not Google Cloud? When the Connector is installed on your premises, it can't manage your resources in Google Cloud. The Connector must be installed in Google Cloud to manage any resources that resides there.



## AWS

### Before you get started

If you just created these credentials in AWS, it might take a few minutes until they are available for use. Wait a few minutes before you add the credentials to BlueXP.

### Steps

1. In the upper right of the BlueXP console, click the Settings icon, and select **Credentials**.



2. Click **Add Credentials** and follow the steps in the wizard.
  - a. **Credentials Location:** Select **Amazon Web Services > Connector**.
  - b. **Define Credentials:** Enter an AWS access key and secret key.
  - c. **Marketplace Subscription:** Associate a Marketplace subscription with these credentials by subscribing now or by selecting an existing subscription.
  - d. **Review:** Confirm the details about the new credentials and click **Add**.

### Result

BlueXP now has the permissions that it needs to perform actions in AWS on your behalf. You can now go to the [BlueXP console](#) to start using the Connector with BlueXP.

## Azure

### Before you get started

If you just created these credentials in Azure, it might take a few minutes until they are available for use. Wait a few minutes before you add the credentials to BlueXP.

### Steps

1. In the upper right of the BlueXP console, click the Settings icon, and select **Credentials**.



2. Click **Add Credentials** and follow the steps in the wizard.
  - a. **Credentials Location:** Select **Microsoft Azure > Connector**.
  - b. **Define Credentials:** Enter information about the Azure Active Directory service principal that grants the required permissions:
    - Application (client) ID
    - Directory (tenant) ID
    - Client Secret
  - c. **Marketplace Subscription:** Associate a Marketplace subscription with these credentials by subscribing now or by selecting an existing subscription.
  - d. **Review:** Confirm the details about the new credentials and click **Add**.

**Result**

BlueXP now has the permissions that it needs to perform actions in Azure on your behalf. You can now go to the [BlueXP console](#) to start using the Connector with BlueXP.

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