



## Reference

### Setup and administration

NetApp  
August 25, 2023

This PDF was generated from <https://docs.netapp.com/us-en/bluexp-setup-admin/reference-permissions.html> on August 25, 2023. Always check docs.netapp.com for the latest.

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# Reference

## Permissions

### Permissions summary for BlueXP

To use BlueXP features and services, you'll need to provide permissions so that BlueXP can perform operations in your cloud environment. Use the links on this page to quickly access the permissions that you need based on your goal.

#### AWS permissions

BlueXP requires AWS permissions for the Connector and for individual services.

##### Connectors

Goal	Description	Link
Deploy the Connector from BlueXP	The user who creates a Connector from BlueXP needs specific permissions to deploy the instance in AWS.	<a href="#">Set up AWS permissions</a>
Provide permissions for the Connector	<p>When BlueXP launches the Connector, it attaches a policy to the instance that provides the permissions required to manage resources and processes in your AWS account.</p> <p>You need to set up the policy yourself if you launch a Connector from the AWS Marketplace, if you manually install the Connector, or if you <a href="#">add more AWS credentials to a Connector</a>.</p> <p>You also need to ensure that the policy is up to date as new permissions are added in subsequent releases.</p>	<a href="#">AWS permissions for the Connector</a>

##### Backup and recovery

Goal	Description	Link
Back up on-premises ONTAP clusters to Amazon S3	When activating backups on your ONTAP volumes, BlueXP backup and recovery prompts you to enter an access key and secret for an IAM user that has specific permissions.	<a href="#">Set up S3 permissions for backups</a>

##### Cloud Volumes ONTAP

Goal	Description	Link
Provide permissions for Cloud Volumes ONTAP nodes	An IAM role must be attached to each Cloud Volumes ONTAP node in AWS. The same is true for the HA mediator. The default option is to let BlueXP create the IAM roles for you, but you can use your own when creating the working environment.	<a href="#">Learn how to set up the IAM roles yourself</a>

## Copy and sync

Goal	Description	Link
Deploy the data broker in AWS	The AWS user account that you use to deploy the data broker must have specific permissions.	<a href="#">Permissions required to deploy the data broker in AWS</a>
Provide permissions for the data broker	When BlueXP copy and sync deploys the data broker, it creates an IAM role for the data broker instance. You can deploy the data broker using your own IAM role, if you prefer.	<a href="#">Requirements to use your own IAM role with the AWS data broker</a>
Enable AWS access for a manually installed data broker	If you use the data broker with a sync relationship that includes an S3 bucket, then you should prepare the Linux host for AWS access. When you install the data broker, you'll need to provide AWS keys for an IAM user that has programmatic access and specific permissions.	<a href="#">Enabling access to AWS</a>

## FSx for ONTAP

Goal	Description	Link
Create and manage FSx for ONTAP	To create or manage an Amazon FSx for NetApp ONTAP working environment, you need to add AWS credentials to BlueXP by providing the ARN of an IAM role that gives BlueXP the permissions needed to create the working environment.	<a href="#">Learn how to set up AWS credentials for FSx</a>

## Tiering

Goal	Description	Link
Tier on-premises ONTAP clusters to Amazon S3	When you enable BlueXP tiering to AWS, the wizard prompts you to enter an access key and secret key. These credentials are passed to the ONTAP cluster so that ONTAP can tier data to the S3 bucket.	<a href="#">Set up S3 permissions for tiering</a>

## Azure permissions

BlueXP requires Azure permissions for the Connector and for individual services.

### Connectors

Goal	Description	Link
Deploy the Connector from BlueXP	When you deploy a Connector from BlueXP, you need to use an Azure account or service principal that has permissions to deploy the Connector VM in Azure.	<a href="#">Set up Azure permissions</a>

Goal	Description	Link
Provide permissions for the Connector	<p>When BlueXP deploys the Connector VM in Azure, it creates a custom role that provides the permissions required to manage resources and processes within that Azure subscription.</p> <p>You need to set up the custom role yourself if you launch a Connector from the marketplace, if you manually install the Connector, or if you <a href="#">add more Azure credentials to a Connector</a>.</p> <p>You also need to ensure that the policy is up to date as new permissions are added in subsequent releases.</p>	<a href="#">Azure permissions for the Connector</a>

#### Copy and sync

Goal	Description	Link
Deploy the data broker in Azure	The Azure user account that you use to deploy the data broker must have the required permissions.	<a href="#">Permissions required to deploy the data broker in Azure</a>

#### Google Cloud permissions

BlueXP requires Google Cloud permissions for the Connector and for individual services.

#### Connectors

Goal	Description	Link
Deploy the Connector from BlueXP	The Google Cloud user who deploys a Connector from BlueXP needs specific permissions to deploy the Connector in Google Cloud.	<a href="#">Set up permissions to deploy the Connector</a>
Provide permissions for the Connector	<p>The service account for the Connector VM instance must have specific permissions for day-to-day operations. You need to associate the service account with the Connector during deployment.</p> <p>You also need to ensure that the policy is up to date as new permissions are added in subsequent releases.</p>	<a href="#">Google Cloud permissions for the Connector</a>

#### Backup and recovery

Goal	Description	Link
Back up Cloud Volumes ONTAP to Google Cloud	<p>When using BlueXP backup and recovery to back up Cloud Volumes ONTAP, you need to add permissions to the Connector in the following scenarios:</p> <ul style="list-style-type: none"> <li>You want to use "Search &amp; Restore" functionality</li> <li>You want to use customer-managed encryption keys (CMEK)</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Permissions for Search &amp; Restore functionality</a></li> <li><a href="#">Permissions for CMEKs</a></li> </ul>

Goal	Description	Link
Back up on-premises ONTAP clusters to Google Cloud	When using BlueXP backup and recovery to back up on-prem ONTAP clusters, you need to add permissions to the Connector in order to use the "Search & Restore" functionality.	<a href="#">Permissions for Search &amp; Restore functionality</a>

#### Cloud Volumes Service for Google Cloud

Goal	Description	Link
Discover Cloud Volumes Service for Google Cloud	BlueXP needs access to the Cloud Volumes Service API and the right permissions through a Google Cloud service account.	<a href="#">Set up a service account</a>

#### Copy and sync

Goal	Description	Link
Deploy the data broker in Google Cloud	Ensure that the Google Cloud user who deploys the data broker has the required permissions.	<a href="#">Permissions required to deploy the data broker in Google Cloud</a>
Enable Google Cloud access for a manually installed data broker	If you plan to use the data broker with a sync relationship that includes a Google Cloud Storage bucket, then you should prepare the Linux host for Google Cloud access. When you install the data broker, you'll need to provide a key for a service account that has specific permissions.	<a href="#">Enabling access to Google Cloud</a>

#### StorageGRID permissions

BlueXP requires StorageGRID permissions for two services.

#### Backup and recovery

Goal	Description	Link
Back up on-premises ONTAP clusters to StorageGRID	When you prepare StorageGRID as a backup target for ONTAP clusters, BlueXP backup and recovery prompts you to enter an access key and secret for an IAM user that has specific permissions.	<a href="#">Prepare StorageGRID as your backup target</a>

#### Tiering

Goal	Description	Link
Tier on-premises ONTAP clusters to StorageGRID	When you set up BlueXP tiering to StorageGRID, you need to provide BlueXP tiering with an S3 access key and secret key. BlueXP tiering uses the keys to access your buckets.	<a href="#">Prepare tiering to StorageGRID</a>

#### AWS permissions for the Connector

When BlueXP launches the Connector instance in AWS, it attaches a policy to the

instance that provides the Connector with permissions to manage resources and processes within that AWS account. The Connector uses the permissions to make API calls to several AWS services, including EC2, S3, CloudFormation, IAM, the Key Management Service (KMS), and more.

## **IAM policies**

The IAM policies available below provide the permissions that a Connector needs to manage resources and processes within your public cloud environment based on your AWS region.

Note the following:

- If you create a Connector in a standard AWS region directly from BlueXP, BlueXP automatically applies policies to the Connector. You don't need to do anything in this case.
- You need to set up the policies yourself if you deploy the Connector from the AWS Marketplace, if you manually install the Connector on a Linux host, or if you want to add additional AWS credentials to BlueXP.
- You also need to ensure that the policies are up to date as new permissions are added in subsequent releases.
- If needed, you can restrict the IAM policies by using the IAM `Condition` element. [AWS documentation: Condition element](#)
- To view step-by-step instructions for using these policies, refer to the following pages:
  - [Set up permissions for Connector installation in AWS \(standard mode\)](#)
  - [Set up permissions for Connector installation on premises \(standard mode\)](#)
  - [Set up permissions for restricted mode](#)
  - [Set up permissions for private mode](#)

Select your region to view the required policies:

## Standard regions

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.

The first policy provides permissions for the following services:

- Amazon S3 bucket discovery
- Backup and recovery
- Classification
- Cloud Volumes ONTAP
- FSx for ONTAP
- Tiering

The second policy provides permissions for the following services:

- Edge caching
- Kubernetes
- Remediation



## Policy #1

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": [
        "ec2:DescribeInstances",
        "ec2:DescribeInstanceStatus",
        "ec2:RunInstances",
        "ec2:ModifyInstanceAttribute",
        "ec2:DescribeInstanceAttribute",
        "ec2:DescribeRouteTables",
        "ec2:DescribeImages",
        "ec2:CreateTags",
        "ec2:CreateVolume",
        "ec2:DescribeVolumes",
        "ec2:ModifyVolumeAttribute",
        "ec2:CreateSecurityGroup",
        "ec2:DescribeSecurityGroups",
        "ec2:RevokeSecurityGroupEgress",
        "ec2:AuthorizeSecurityGroupEgress",
        "ec2:AuthorizeSecurityGroupIngress",
        "ec2:RevokeSecurityGroupIngress",
        "ec2:CreateNetworkInterface",
        "ec2:DescribeNetworkInterfaces",
        "ec2:ModifyNetworkInterfaceAttribute",
        "ec2:DescribeSubnets",
        "ec2:DescribeVpcs",
        "ec2:DescribeDhcpOptions",
        "ec2:CreateSnapshot",
        "ec2:DescribeSnapshots",
        "ec2:GetConsoleOutput",
        "ec2:DescribeKeyPairs",
        "ec2:DescribeRegions",
        "ec2:DescribeTags",
        "ec2:AssociateIamInstanceProfile",
        "ec2:DescribeIamInstanceProfileAssociations",
        "ec2:DisassociateIamInstanceProfile",
        "ec2:CreatePlacementGroup",
        "ec2:DescribeReservedInstancesOfferings",
        "ec2:AssignPrivateIpAddresses",
        "ec2:CreateRoute",
        "ec2:DescribeVpcs",
        "ec2:ReplaceRoute",
        "ec2:UnassignPrivateIpAddresses",
```

```
"ec2:DeleteSecurityGroup",
"ec2:DeleteNetworkInterface",
"ec2:DeleteSnapshot",
"ec2:DeleteTags",
"ec2:DeleteRoute",
"ec2:DeletePlacementGroup",
"ec2:DescribePlacementGroups",
"ec2:DescribeVolumesModifications",
"ec2:ModifyVolume",
"cloudformation:CreateStack",
"cloudformation:DescribeStacks",
"cloudformation:DescribeStackEvents",
"cloudformation:ValidateTemplate",
"cloudformation>DeleteStack",
"iam:PassRole",
"iam:CreateRole",
"iam:PutRolePolicy",
"iam:CreateInstanceProfile",
"iam:AddRoleToInstanceProfile",
"iam:RemoveRoleFromInstanceProfile",
"iam:ListInstanceProfiles",
"iam>DeleteRole",
"iam>DeleteRolePolicy",
"iam>DeleteInstanceProfile",
"iam:GetRolePolicy",
"iam:GetRole",
"sts:DecodeAuthorizationMessage",
"sts:AssumeRole",
"s3:GetBucketTagging",
"s3:GetBucketLocation",
"s3:ListBucket",
"s3>CreateBucket",
"s3:GetLifecycleConfiguration",
"s3:ListBucketVersions",
"s3:GetBucketPolicyStatus",
"s3:GetBucketPublicAccessBlock",
"s3:GetBucketPolicy",
"s3:GetBucketAcl",
"s3:PutObjectTagging",
"s3:GetObjectTagging",
"s3>DeleteObject",
"s3>DeleteObjectVersion",
"s3:PutObject",
"s3:ListAllMyBuckets",
"s3:GetObject",
"s3:GetEncryptionConfiguration",
```

```

        "kms:List*",
        "kms:ReEncrypt*",
        "kms:Describe*",
        "kms:CreateGrant",
        "fsx:Describe*",
        "fsx:List*",
        "kms:GenerateDataKeyWithoutPlaintext"
    ],
    "Resource": "*",
    "Effect": "Allow",
    "Sid": "cvoServicePolicy"
},
{
    "Action": [
        "ec2:StartInstances",
        "ec2:StopInstances",
        "ec2:DescribeInstances",
        "ec2:DescribeInstanceStatus",
        "ec2:RunInstances",
        "ec2:TerminateInstances",
        "ec2:DescribeInstanceAttribute",
        "ec2:DescribeImages",
        "ec2:CreateTags",
        "ec2:CreateVolume",
        "ec2:CreateSecurityGroup",
        "ec2:DescribeSubnets",
        "ec2:DescribeVpcs",
        "ec2:DescribeRegions",
        "cloudformation:CreateStack",
        "cloudformation>DeleteStack",
        "cloudformation:DescribeStacks",
        "kms:List*",
        "kms:Describe*",
        "ec2:DescribeVpcEndpoints",
        "kms:ListAliases",
        "athena:StartQueryExecution",
        "athena:GetQueryResults",
        "athena:GetQueryExecution",
        "glue:GetDatabase",
        "glue:GetTable",
        "glue:CreateTable",
        "glue:CreateDatabase",
        "glue:GetPartitions",
        "glue:BatchCreatePartition",
        "glue:BatchDeletePartition"
    ],

```

```

    "Resource": "*",
    "Effect": "Allow",
    "Sid": "backupPolicy"
},
{
    "Action": [
        "s3:GetBucketLocation",
        "s3:ListAllMyBuckets",
        "s3:ListBucket",
        "s3:CreateBucket",
        "s3:GetLifecycleConfiguration",
        "s3:PutLifecycleConfiguration",
        "s3:PutBucketTagging",
        "s3:ListBucketVersions",
        "s3:GetBucketAcl",
        "s3:PutBucketPublicAccessBlock",
        "s3:GetObject",
        "s3:PutEncryptionConfiguration",
        "s3:DeleteObject",
        "s3:DeleteObjectVersion",
        "s3:ListBucketMultipartUploads",
        "s3:PutObject",
        "s3:PutBucketAcl",
        "s3:AbortMultipartUpload",
        "s3:ListMultipartUploadParts",
        "s3:DeleteBucket",
        "s3:GetObjectVersionTagging",
        "s3:GetObjectVersionAcl",
        "s3:GetObjectRetention",
        "s3:GetObjectTagging",
        "s3:GetObjectVersion",
        "s3:PutObjectVersionTagging",
        "s3:PutObjectRetention",
        "s3:DeleteObjectTagging",
        "s3:DeleteObjectVersionTagging",
        "s3:GetBucketObjectLockConfiguration",
        "s3:GetBucketVersioning",
        "s3:PutBucketObjectLockConfiguration",
        "s3:PutBucketVersioning",
        "s3:BypassGovernanceRetention",
        "s3:PutBucketPolicy",
        "s3:PutBucketOwnershipControls"
    ],
    "Resource": [
        "arn:aws:s3:::netapp-backup-*"
    ],

```

```

    "Effect": "Allow",
    "Sid": "backupS3Policy"
  },
  {
    "Action": [
      "s3:CreateBucket",
      "s3:GetLifecycleConfiguration",
      "s3:PutLifecycleConfiguration",
      "s3:PutBucketTagging",
      "s3:ListBucketVersions",
      "s3:GetBucketPolicyStatus",
      "s3:GetBucketPublicAccessBlock",
      "s3:GetBucketAcl",
      "s3:GetBucketPolicy",
      "s3:PutBucketPublicAccessBlock",
      "s3>DeleteBucket"
    ],
    "Resource": [
      "arn:aws:s3:::fabric-pool*"
    ],
    "Effect": "Allow",
    "Sid": "fabricPoolS3Policy"
  },
  {
    "Action": [
      "ec2:DescribeRegions"
    ],
    "Resource": "*",
    "Effect": "Allow",
    "Sid": "fabricPoolPolicy"
  },
  {
    "Condition": {
      "StringLike": {
        "ec2:ResourceTag/netapp-adc-manager": "*"
      }
    },
    "Action": [
      "ec2:StartInstances",
      "ec2:StopInstances",
      "ec2:TerminateInstances"
    ],
    "Resource": [
      "arn:aws:ec2:*:*:instance/*"
    ],
    "Effect": "Allow"
  }
}

```

```

    },
    {
      "Condition": {
        "StringLike": {
          "ec2:ResourceTag/WorkingEnvironment": "*"
        }
      },
      "Action": [
        "ec2:StartInstances",
        "ec2:TerminateInstances",
        "ec2:AttachVolume",
        "ec2:DetachVolume",
        "ec2:StopInstances",
        "ec2>DeleteVolume"
      ],
      "Resource": [
        "arn:aws:ec2:*:*:instance/*"
      ],
      "Effect": "Allow"
    },
    {
      "Action": [
        "ec2:AttachVolume",
        "ec2:DetachVolume"
      ],
      "Resource": [
        "arn:aws:ec2:*:*:volume/*"
      ],
      "Effect": "Allow"
    },
    {
      "Condition": {
        "StringLike": {
          "ec2:ResourceTag/WorkingEnvironment": "*"
        }
      },
      "Action": [
        "ec2>DeleteVolume"
      ],
      "Resource": [
        "arn:aws:ec2:*:*:volume/*"
      ],
      "Effect": "Allow"
    }
  ]
}

```

## Policy #2

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": [
        "ec2:DescribeRegions",
        "eks:ListClusters",
        "eks:DescribeCluster",
        "iam:GetInstanceProfile"
      ],
      "Resource": "*",
      "Effect": "Allow",
      "Sid": "K8sServicePolicy"
    },
    {
      "Action": [
        "cloudformation:DescribeStacks",
        "cloudwatch:GetMetricStatistics",
        "cloudformation:ListStacks"
      ],
      "Resource": "*",
      "Effect": "Allow",
      "Sid": "GFCservicePolicy"
    },
    {
      "Condition": {
        "StringLike": {
          "ec2:ResourceTag/GFCInstance": "*"
        }
      },
      "Action": [
        "ec2:StartInstances",
        "ec2:TerminateInstances",
        "ec2:AttachVolume",
        "ec2:DetachVolume"
      ],
      "Resource": [
        "arn:aws:ec2:*:*:instance/*"
      ],
      "Effect": "Allow"
    },
    {
      "Action": [
        "ec2:CreateTags",
```

```
        "ec2:DeleteTags",
        "ec2:DescribeTags",
        "tag:getResources",
        "tag:getTagKeys",
        "tag:getTagValues",
        "tag:TagResources",
        "tag:UntagResources"
    ],
    "Resource": "*",
    "Effect": "Allow",
    "Sid": "tagServicePolicy"
}
]
```



```

{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "iam:ListInstanceProfiles",
        "iam:CreateRole",
        "iam>DeleteRole",
        "iam:PutRolePolicy",
        "iam:CreateInstanceProfile",
        "iam>DeleteRolePolicy",
        "iam:AddRoleToInstanceProfile",
        "iam:RemoveRoleFromInstanceProfile",
        "iam>DeleteInstanceProfile",
        "ec2:ModifyVolumeAttribute",
        "sts:DecodeAuthorizationMessage",
        "ec2:DescribeImages",
        "ec2:DescribeRouteTables",
        "ec2:DescribeInstances",
        "iam:PassRole",
        "ec2:DescribeInstanceStatus",
        "ec2:RunInstances",
        "ec2:ModifyInstanceAttribute",
        "ec2:CreateTags",
        "ec2:CreateVolume",
        "ec2:DescribeVolumes",
        "ec2>DeleteVolume",
        "ec2:CreateSecurityGroup",
        "ec2>DeleteSecurityGroup",
        "ec2:DescribeSecurityGroups",
        "ec2:RevokeSecurityGroupEgress",
        "ec2:AuthorizeSecurityGroupEgress",
        "ec2:AuthorizeSecurityGroupIngress",
        "ec2:RevokeSecurityGroupIngress",
        "ec2:CreateNetworkInterface",
        "ec2:DescribeNetworkInterfaces",
        "ec2>DeleteNetworkInterface",
        "ec2:ModifyNetworkInterfaceAttribute",
        "ec2:DescribeSubnets",
        "ec2:DescribeVpcs",
        "ec2:DescribeDhcpOptions",
        "ec2:CreateSnapshot",
        "ec2>DeleteSnapshot",

```

```

        "ec2:DescribeSnapshots",
        "ec2:StopInstances",
        "ec2:GetConsoleOutput",
        "ec2:DescribeKeyPairs",
        "ec2:DescribeRegions",
        "ec2>DeleteTags",
        "ec2:DescribeTags",
        "cloudformation:CreateStack",
        "cloudformation>DeleteStack",
        "cloudformation:DescribeStacks",
        "cloudformation:DescribeStackEvents",
        "cloudformation:ValidateTemplate",
        "s3:GetObject",
        "s3:ListBucket",
        "s3:ListAllMyBuckets",
        "s3:GetBucketTagging",
        "s3:GetBucketLocation",
        "s3:CreateBucket",
        "s3:GetBucketPolicyStatus",
        "s3:GetBucketPublicAccessBlock",
        "s3:GetBucketAcl",
        "s3:GetBucketPolicy",
        "kms:List*",
        "kms:ReEncrypt*",
        "kms:Describe*",
        "kms:CreateGrant",
        "ec2:AssociateIamInstanceProfile",
        "ec2:DescribeIamInstanceProfileAssociations",
        "ec2:DisassociateIamInstanceProfile",
        "ec2:DescribeInstanceAttribute",
        "ec2:CreatePlacementGroup",
        "ec2>DeletePlacementGroup"
    ],
    "Resource": "*"
},
{
    "Sid": "fabricPoolPolicy",
    "Effect": "Allow",
    "Action": [
        "s3>DeleteBucket",
        "s3:GetLifecycleConfiguration",
        "s3:PutLifecycleConfiguration",
        "s3:PutBucketTagging",
        "s3:ListBucketVersions",
        "s3:GetBucketPolicyStatus",
        "s3:GetBucketPublicAccessBlock",

```

```

        "s3:GetBucketAcl",
        "s3:GetBucketPolicy",
        "s3:PutBucketPublicAccessBlock"
    ],
    "Resource": [
        "arn:aws-us-gov:s3:::fabric-pool*"
    ]
},
{
    "Sid": "backupPolicy",
    "Effect": "Allow",
    "Action": [
        "s3:DeleteBucket",
        "s3:GetLifecycleConfiguration",
        "s3:PutLifecycleConfiguration",
        "s3:PutBucketTagging",
        "s3:ListBucketVersions",
        "s3:GetObject",
        "s3:ListBucket",
        "s3:ListAllMyBuckets",
        "s3:GetBucketTagging",
        "s3:GetBucketLocation",
        "s3:GetBucketPolicyStatus",
        "s3:GetBucketPublicAccessBlock",
        "s3:GetBucketAcl",
        "s3:GetBucketPolicy",
        "s3:PutBucketPublicAccessBlock"
    ],
    "Resource": [
        "arn:aws-us-gov:s3:::netapp-backup-*"
    ]
},
{
    "Effect": "Allow",
    "Action": [
        "ec2:StartInstances",
        "ec2:TerminateInstances",
        "ec2:AttachVolume",
        "ec2:DetachVolume"
    ],
    "Condition": {
        "StringLike": {
            "ec2:ResourceTag/WorkingEnvironment": "*"
        }
    },
    "Resource": [

```

```
        "arn:aws-us-gov:ec2:*:*:instance/*"
    ],
    {
        "Effect": "Allow",
        "Action": [
            "ec2:AttachVolume",
            "ec2:DetachVolume"
        ],
        "Resource": [
            "arn:aws-us-gov:ec2:*:*:volume/*"
        ]
    }
]
```

```

{
  "Version": "2012-10-17",
  "Statement": [{
    "Effect": "Allow",
    "Action": [
      "ec2:DescribeInstances",
      "ec2:DescribeInstanceStatus",
      "ec2:RunInstances",
      "ec2:ModifyInstanceAttribute",
      "ec2:DescribeRouteTables",
      "ec2:DescribeImages",
      "ec2:CreateTags",
      "ec2:CreateVolume",
      "ec2:DescribeVolumes",
      "ec2:ModifyVolumeAttribute",
      "ec2>DeleteVolume",
      "ec2:CreateSecurityGroup",
      "ec2>DeleteSecurityGroup",
      "ec2:DescribeSecurityGroups",
      "ec2:RevokeSecurityGroupEgress",
      "ec2:RevokeSecurityGroupIngress",
      "ec2:AuthorizeSecurityGroupEgress",
      "ec2:AuthorizeSecurityGroupIngress",
      "ec2:CreateNetworkInterface",
      "ec2:DescribeNetworkInterfaces",
      "ec2>DeleteNetworkInterface",
      "ec2:ModifyNetworkInterfaceAttribute",
      "ec2:DescribeSubnets",
      "ec2:DescribeVpcs",
      "ec2:DescribeDhcpOptions",
      "ec2:CreateSnapshot",
      "ec2>DeleteSnapshot",
      "ec2:DescribeSnapshots",
      "ec2:GetConsoleOutput",
      "ec2:DescribeKeyPairs",
      "ec2:DescribeRegions",
      "ec2>DeleteTags",
      "ec2:DescribeTags",
      "cloudformation:CreateStack",
      "cloudformation>DeleteStack",
      "cloudformation:DescribeStacks",
      "cloudformation:DescribeStackEvents",
      "cloudformation:ValidateTemplate",
      "iam:PassRole",

```

```

        "iam:CreateRole",
        "iam:DeleteRole",
        "iam:PutRolePolicy",
        "iam:CreateInstanceProfile",
        "iam:DeleteRolePolicy",
        "iam:AddRoleToInstanceProfile",
        "iam:RemoveRoleFromInstanceProfile",
        "iam:DeleteInstanceProfile",
        "s3:GetObject",
        "s3:ListBucket",
        "s3:GetBucketTagging",
        "s3:GetBucketLocation",
        "s3:ListAllMyBuckets",
        "kms:List*",
        "kms:Describe*",
        "ec2:AssociateIamInstanceProfile",
        "ec2:DescribeIamInstanceProfileAssociations",
        "ec2:DisassociateIamInstanceProfile",
        "ec2:DescribeInstanceAttribute",
        "ec2:CreatePlacementGroup",
        "ec2:DeletePlacementGroup",
        "iam:ListInstanceProfiles"
    ],
    "Resource": "*"
},
{
    "Sid": "fabricPoolPolicy",
    "Effect": "Allow",
    "Action": [
        "s3:DeleteBucket",
        "s3:GetLifecycleConfiguration",
        "s3:PutLifecycleConfiguration",
        "s3:PutBucketTagging",
        "s3:ListBucketVersions"
    ],
    "Resource": [
        "arn:aws-iso:s3:::fabric-pool*"
    ]
},
{
    "Effect": "Allow",
    "Action": [
        "ec2:StartInstances",
        "ec2:StopInstances",
        "ec2:TerminateInstances",
        "ec2:AttachVolume",

```

```

        "ec2:DetachVolume"
    ],
    "Condition": {
        "StringLike": {
            "ec2:ResourceTag/WorkingEnvironment": "*"
        }
    },
    "Resource": [
        "arn:aws-iso:ec2:*:*:instance/*"
    ]
},
{
    "Effect": "Allow",
    "Action": [
        "ec2:AttachVolume",
        "ec2:DetachVolume"
    ],
    "Resource": [
        "arn:aws-iso:ec2:*:*:volume/*"
    ]
}
]
}

```

## How the AWS permissions are used

The following sections describe how the permissions are used for each BlueXP service. This information can be helpful if your corporate policies dictate that permissions are only provided as needed.

### Amazon FSx for ONTAP

The Connector makes the following API requests to manage Amazon FSx for ONTAP:

- ec2:DescribeInstances
- ec2:DescribeInstanceStatus
- ec2:DescribeInstanceAttribute
- ec2:DescribeRouteTables
- ec2:DescribeImages
- ec2:CreateTags
- ec2:DescribeVolumes
- ec2:DescribeSecurityGroups
- ec2:DescribeNetworkInterfaces
- ec2:DescribeSubnets
- ec2:DescribeVpcs

- ec2:DescribeDhcpOptions
- ec2:DescribeSnapshots
- ec2:DescribeKeyPairs
- ec2:DescribeRegions
- ec2:DescribeTags
- ec2:DescribeIamInstanceProfileAssociations
- ec2:DescribeReservedInstancesOfferings
- ec2:DescribeVpcEndpoints
- ec2:DescribeVpcs
- ec2:DescribeVolumesModifications
- ec2:DescribePlacementGroups
- kms:List\*
- kms:Describe\*
- kms:CreateGrant
- kms:ListAliases
- fsx:Describe\*
- fsx:List\*

#### **Amazon S3 bucket discovery**

The Connector makes the following API request to discover Amazon S3 buckets:

s3:GetEncryptionConfiguration

#### **Backup and recovery**

The Connector makes the following API requests to manage backups in Amazon S3:

- s3:GetBucketLocation
- s3:ListAllMyBuckets
- s3:ListBucket
- s3>CreateBucket
- s3:GetLifecycleConfiguration
- s3:PutLifecycleConfiguration
- s3:PutBucketTagging
- s3:ListBucketVersions
- s3:GetBucketAcl
- s3:PutBucketPublicAccessBlock
- kms:List\*
- kms:Describe\*
- s3:GetObject



- ec2:DescribeVpcEndpoints
- kms:ListAliases
- s3:PutEncryptionConfiguration

The Connector makes the following API requests when you use the Search & Restore method to restore volumes and files:

- s3:CreateBucket
- s3:DeleteObject
- s3:DeleteObjectVersion
- s3:GetBucketAcl
- s3:ListBucket
- s3:ListBucketVersions
- s3:ListBucketMultipartUploads
- s3:PutObject
- s3:PutBucketAcl
- s3:PutLifecycleConfiguration
- s3:PutBucketPublicAccessBlock
- s3:AbortMultipartUpload
- s3:ListMultipartUploadParts
- athena:StartQueryExecution
- athena:GetQueryResults
- athena:GetQueryExecution
- athena:StopQueryExecution
- glue:CreateDatabase
- glue:CreateTable
- glue:BatchDeletePartition

The Connector makes the following API requests when you use DataLock and Ransomware protection for your volume backups:

- s3:GetObjectVersionTagging
- s3:GetBucketObjectLockConfiguration
- s3:GetObjectVersionAcl
- s3:PutObjectTagging
- s3:DeleteObject
- s3:DeleteObjectTagging
- s3:GetObjectRetention
- s3:DeleteObjectVersionTagging
- s3:PutObject

- s3:GetObject
- s3:PutBucketObjectLockConfiguration
- s3:GetLifecycleConfiguration
- s3:ListBucketByTags
- s3:GetBucketTagging
- s3:DeleteObjectVersion
- s3:ListBucketVersions
- s3:ListBucket
- s3:PutBucketTagging
- s3:GetObjectTagging
- s3:PutBucketVersioning
- s3:PutObjectVersionTagging
- s3:GetBucketVersioning
- s3:GetBucketAcl
- s3:BypassGovernanceRetention
- s3:PutObjectRetention
- s3:GetBucketLocation
- s3:GetObjectVersion

The Connector makes the following API requests if you use a different AWS account for your Cloud Volumes ONTAP backups than you're using for the source volumes:

- s3:PutBucketPolicy
- s3:PutBucketOwnershipControls

### **Classification**

The Connector makes the following API requests to deploy the BlueXP classification instance:

- ec2:DescribeInstances
- ec2:DescribeInstanceStatus
- ec2:RunInstances
- ec2:TerminateInstances
- ec2:CreateTags
- ec2:CreateVolume
- ec2:AttachVolume
- ec2:CreateSecurityGroup
- ec2>DeleteSecurityGroup
- ec2:DescribeSecurityGroups
- ec2:CreateNetworkInterface
- ec2:DescribeNetworkInterfaces

- ec2:DeleteNetworkInterface
- ec2:DescribeSubnets
- ec2:DescribeVpcs
- ec2:CreateSnapshot
- ec2:DescribeRegions
- cloudformation:CreateStack
- cloudformation>DeleteStack
- cloudformation:DescribeStacks
- cloudformation:DescribeStackEvents
- iam:AddRoleToInstanceProfile
- ec2:AssociateIamInstanceProfile
- ec2:DescribeIamInstanceProfileAssociations

The Connector makes the following API requests to scan S3 buckets when you use BlueXP classification:

- iam:AddRoleToInstanceProfile
- ec2:AssociateIamInstanceProfile
- ec2:DescribeIamInstanceProfileAssociations
- s3:GetBucketTagging
- s3:GetBucketLocation
- s3:ListAllMyBuckets
- s3:ListBucket
- s3:GetBucketPolicyStatus
- s3:GetBucketPolicy
- s3:GetBucketAcl
- s3:GetObject
- iam:GetRole
- s3>DeleteObject
- s3>DeleteObjectVersion
- s3:PutObject
- sts:AssumeRole

#### **Cloud Volumes ONTAP**

The Connector makes the following API requests to deploy and manage Cloud Volumes ONTAP in AWS.

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create and manage IAM roles and instance profiles for Cloud Volumes ONTAP instances	iam:ListInstanceProfiles	Yes	Yes	No
	iam:CreateRole	Yes	No	No
	iam:DeleteRole	No	Yes	Yes
	iam:PutRolePolicy	Yes	No	No
	iam:CreateInstanceProfile	Yes	No	No
	iam:DeleteRolePolicy	No	Yes	Yes
	iam:AddRoleToInstanceProfile	Yes	No	No
	iam:RemoveRoleFromInstanceProfile	No	Yes	Yes
	iam:DeleteInstanceProfile	No	Yes	Yes
	iam:PassRole	Yes	No	No
	ec2:AssociateIamInstanceProfile	Yes	Yes	No
	ec2:DescribeIamInstanceProfileAssociations	Yes	Yes	No
	ec2:DisassociateIamInstanceProfile	No	Yes	No
Decode authorization status messages	sts:DecodeAuthorizationMessage	Yes	Yes	No
Describe the specified images (AMIs) available to the account	ec2:DescribeImages	Yes	Yes	No
Describe the route tables in a VPC (required for HA pairs only)	ec2:DescribeRouteTables	Yes	No	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Stop, start, and monitor instances	ec2:StartInstances	Yes	Yes	No
	ec2:StopInstances	Yes	Yes	No
	ec2:DescribeInstances	Yes	Yes	No
	ec2:DescribeInstanceStatus	Yes	Yes	No
	ec2:RunInstances	Yes	No	No
	ec2:TerminateInstances	No	No	Yes
	ec2:ModifyInstanceAttribute	No	Yes	No
Verify that enhanced networking is enabled for supported instance types	ec2:DescribeInstanceAttribute	No	Yes	No
Tag resources with the "WorkingEnvironment" and "WorkingEnvironmentId" tags which are used for maintenance and cost allocation	ec2:CreateTags	Yes	Yes	No
Manage EBS volumes that Cloud Volumes ONTAP uses as back-end storage	ec2:CreateVolume	Yes	Yes	No
	ec2:DescribeVolumes	Yes	Yes	Yes
	ec2:ModifyVolumeAttribute	No	Yes	Yes
	ec2:AttachVolume	Yes	Yes	No
	ec2>DeleteVolume	No	Yes	Yes
	ec2:DetachVolume	No	Yes	Yes

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create and manage security groups for Cloud Volumes ONTAP	ec2:CreateSecurityGroup	Yes	No	No
	ec2:DeleteSecurityGroup	No	Yes	Yes
	ec2:DescribeSecurityGroups	Yes	Yes	Yes
	ec2:RevokeSecurityGroupEgress	Yes	No	No
	ec2:AuthorizeSecurityGroupEgress	Yes	No	No
	ec2:AuthorizeSecurityGroupIngress	Yes	No	No
	ec2:RevokeSecurityGroupIngress	Yes	Yes	No
Create and manage network interfaces for Cloud Volumes ONTAP in the target subnet	ec2:CreateNetworkInterface	Yes	No	No
	ec2:DescribeNetworkInterfaces	Yes	Yes	No
	ec2>DeleteNetworkInterface	No	Yes	Yes
	ec2:ModifyNetworkInterfaceAttribute	No	Yes	No
Get the list of destination subnets and security groups	ec2:DescribeSubnets	Yes	Yes	No
	ec2:DescribeVpcs	Yes	Yes	No
Get DNS servers and the default domain name for Cloud Volumes ONTAP instances	ec2:DescribeDhcpOptions	Yes	No	No
Take snapshots of EBS volumes for Cloud Volumes ONTAP	ec2:CreateSnapshot	Yes	Yes	No
	ec2>DeleteSnapshot	No	Yes	Yes
	ec2:DescribeSnapshots	No	Yes	No
Capture the Cloud Volumes ONTAP console, which is attached to AutoSupport messages	ec2:GetConsoleOutput	Yes	Yes	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Get the list of available key pairs	ec2:DescribeKeyPairs	Yes	No	No
Get the list of available AWS regions	ec2:DescribeRegions	Yes	Yes	No
Manage tags for resources associated with Cloud Volumes ONTAP instances	ec2:DeleteTags	No	Yes	Yes
	ec2:DescribeTags	No	Yes	No
Create and manage stacks for AWS CloudFormation templates	cloudformation:CreateStack	Yes	No	No
	cloudformation:DeleteStack	Yes	No	No
	cloudformation:DescribeStacks	Yes	Yes	No
	cloudformation:DescribeStackEvents	Yes	No	No
	cloudformation:ValidateTemplate	Yes	No	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create and manage an S3 bucket that a Cloud Volumes ONTAP system uses as a capacity tier for data tiering	s3:CreateBucket	Yes	Yes	No
	s3>DeleteBucket	No	Yes	Yes
	s3:GetLifecycleConfiguration	No	Yes	No
	s3:PutLifecycleConfiguration	No	Yes	No
	s3:PutBucketTagging	No	Yes	No
	s3:ListBucketVersions	No	Yes	No
	s3:GetBucketPolicyStatus	No	Yes	No
	s3:GetBucketPublicAccessBlock	No	Yes	No
	s3:GetBucketAcl	No	Yes	No
	s3:GetBucketPolicy	No	Yes	No
	s3:PutBucketPublicAccessBlock	No	Yes	No
	s3:GetBucketTagging	No	Yes	No
	s3:GetBucketLocation	No	Yes	No
	s3:ListAllMyBuckets	No	No	No
	s3:ListBucket	No	Yes	No
Enable data encryption of Cloud Volumes ONTAP using the AWS Key Management Service (KMS)	kms:List*	Yes	Yes	No
	kms:ReEncrypt*	Yes	No	No
	kms:Describe*	Yes	Yes	No
	kms:CreateGrant	Yes	Yes	No
	kms:GenerateDataKeyWithoutPlaintext	Yes	Yes	No
Create and manage an AWS spread placement group for two HA nodes and the mediator in a single AWS Availability Zone	ec2:CreatePlacementGroup	Yes	No	No
	ec2:DeletePlacementGroup	No	Yes	Yes



Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create reports	fsx:Describe*	No	Yes	No
	fsx:List*	No	Yes	No
Create and manage aggregates that support the Amazon EBS Elastic Volumes feature	ec2:DescribeVolume sModifications	No	Yes	No
	ec2:ModifyVolume	No	Yes	No

### Edge caching

The Connector makes the following API requests to deploy BlueXP edge caching instances during deployment:

- cloudformation:DescribeStacks
- cloudwatch:GetMetricStatistics
- cloudformation:ListStacks

### Kubernetes

The Connector makes the following API requests to discover and manage Amazon EKS clusters:

- ec2:DescribeRegions
- eks:ListClusters
- eks:DescribeCluster
- iam:GetInstanceProfile

### Remediation

The Connector makes the following API requests to manage tags on AWS resources when you use BlueXP remediation:

- ec2:CreateTags
- ec2>DeleteTags
- ec2:DescribeTags
- tag:getResources
- tag:getTagKeys
- tag:getTagValues
- tag:TagResources
- tag:UntagResources

### Change log

As permissions are added and removed, we'll note them in the sections below.

6 June, 2023

The following permission is now required for Cloud Volumes ONTAP:

kms:GenerateDataKeyWithoutPlaintext

14 February, 2023

The following permission is now required for BlueXP tiering:

ec2:DescribeVpcEndpoints

## Azure permissions for the Connector

When BlueXP launches the Connector VM in Azure, it attaches a custom role to the VM that provides the Connector with permissions to manage resources and processes within that Azure subscription. The Connector uses the permissions to make API calls to several Azure services.

### Custom role permissions

The custom role shown below provides the permissions that a Connector needs to manage resources and processes within your Azure network.

When you create a Connector directly from BlueXP, BlueXP automatically applies this custom role to the Connector.

If you deploy the Connector from the Azure Marketplace or if you manually install the Connector on a Linux host, then you'll need to set up the custom role yourself.

- [Set up permissions for Connector installation in Azure \(standard mode\)](#)
- [Set up permissions for Connector installation on premises \(standard mode\)](#)
- [Set up permissions for restricted mode](#)
- [Set up permissions for private mode](#)

You also need to ensure that the role is up to date as new permissions are added in subsequent releases.

```
{
  "Name": "BlueXP Operator",
  "Actions": [
    "Microsoft.Compute/disks/delete",
    "Microsoft.Compute/disks/read",
    "Microsoft.Compute/disks/write",
    "Microsoft.Compute/locations/operations/read",
    "Microsoft.Compute/locations/vmSizes/read",
    "Microsoft.Resources/subscriptions/locations/read",
    "Microsoft.Compute/operations/read",
    "Microsoft.Compute/virtualMachines/instanceView/read",
    "Microsoft.Compute/virtualMachines/powerOff/action",
    "Microsoft.Compute/virtualMachines/read",
```

```
"Microsoft.Compute/virtualMachines/restart/action",
"Microsoft.Compute/virtualMachines/deallocate/action",
"Microsoft.Compute/virtualMachines/start/action",
"Microsoft.Compute/virtualMachines/vmSizes/read",
"Microsoft.Compute/virtualMachines/write",
"Microsoft.Compute/images/read",
"Microsoft.Network/locations/operationResults/read",
"Microsoft.Network/locations/operations/read",
"Microsoft.Network/networkInterfaces/read",
"Microsoft.Network/networkInterfaces/write",
"Microsoft.Network/networkInterfaces/join/action",
"Microsoft.Network/networkSecurityGroups/read",
"Microsoft.Network/networkSecurityGroups/write",
"Microsoft.Network/networkSecurityGroups/join/action",
"Microsoft.Network/virtualNetworks/read",

"Microsoft.Network/virtualNetworks/checkIpAddressAvailability/read",
    "Microsoft.Network/virtualNetworks/subnets/read",
    "Microsoft.Network/virtualNetworks/subnets/write",

"Microsoft.Network/virtualNetworks/subnets/virtualMachines/read",

"Microsoft.Network/virtualNetworks/virtualMachines/read",

"Microsoft.Network/virtualNetworks/subnets/join/action",
    "Microsoft.Resources/deployments/operations/read",
    "Microsoft.Resources/deployments/read",
    "Microsoft.Resources/deployments/write",
    "Microsoft.Resources/resources/read",

"Microsoft.Resources/subscriptions/operationresults/read",

"Microsoft.Resources/subscriptions/resourceGroups/delete",

"Microsoft.Resources/subscriptions/resourceGroups/read",

"Microsoft.Resources/subscriptions/resourcegroups/resources/read",

"Microsoft.Resources/subscriptions/resourceGroups/write",
    "Microsoft.Storage/checknameavailability/read",
    "Microsoft.Storage/operations/read",
    "Microsoft.Storage/storageAccounts/listkeys/action",
    "Microsoft.Storage/storageAccounts/read",
    "Microsoft.Storage/storageAccounts/delete",
    "Microsoft.Storage/storageAccounts/write",
```

```

"Microsoft.Storage/storageAccounts/blobServices/containers/read",

"Microsoft.Storage/storageAccounts/listAccountSas/action",
    "Microsoft.Storage/usages/read",
    "Microsoft.Compute/snapshots/write",
    "Microsoft.Compute/snapshots/read",
    "Microsoft.Compute/availabilitySets/write",
    "Microsoft.Compute/availabilitySets/read",
    "Microsoft.Compute/disks/beginGetAccess/action",

"Microsoft.MarketplaceOrdering/offertypes/publishers/offers/plans/agreements/read",

"Microsoft.MarketplaceOrdering/offertypes/publishers/offers/plans/agreements/write",
    "Microsoft.Network/loadBalancers/read",
    "Microsoft.Network/loadBalancers/write",
    "Microsoft.Network/loadBalancers/delete",

"Microsoft.Network/loadBalancers/backendAddressPools/read",

"Microsoft.Network/loadBalancers/backendAddressPools/join/action",

"Microsoft.Network/loadBalancers/loadBalancingRules/read",
    "Microsoft.Network/loadBalancers/probes/read",
    "Microsoft.Network/loadBalancers/probes/join/action",
    "Microsoft.Authorization/locks/*",
    "Microsoft.Network/routeTables/join/action",
    "Microsoft.NetApp/netAppAccounts/read",
    "Microsoft.NetApp/netAppAccounts/capacityPools/read",

"Microsoft.NetApp/netAppAccounts/capacityPools/volumes/write",

"Microsoft.NetApp/netAppAccounts/capacityPools/volumes/read",

"Microsoft.NetApp/netAppAccounts/capacityPools/volumes/delete",
    "Microsoft.Network/privateEndpoints/write",

"Microsoft.Storage/storageAccounts/PrivateEndpointConnectionsApproval/action",

"Microsoft.Storage/storageAccounts/privateEndpointConnections/read",

"Microsoft.Storage/storageAccounts/managementPolicies/read",

"Microsoft.Storage/storageAccounts/managementPolicies/write",

```

```

        "Microsoft.Network/privateEndpoints/read",
        "Microsoft.Network/privateDnsZones/write",

"Microsoft.Network/privateDnsZones/virtualNetworkLinks/write",
        "Microsoft.Network/virtualNetworks/join/action",
        "Microsoft.Network/privateDnsZones/A/write",
        "Microsoft.Network/privateDnsZones/read",

"Microsoft.Network/privateDnsZones/virtualNetworkLinks/read",

"Microsoft.Resources/deployments/operationStatuses/read",
        "Microsoft.Insights/Metrics/Read",
        "Microsoft.Compute/virtualMachines/extensions/write",
        "Microsoft.Compute/virtualMachines/extensions/delete",
        "Microsoft.Compute/virtualMachines/extensions/read",
        "Microsoft.Compute/virtualMachines/delete",
        "Microsoft.Network/networkInterfaces/delete",
        "Microsoft.Network/networkSecurityGroups/delete",
        "Microsoft.Resources/deployments/delete",
        "Microsoft.Compute/diskEncryptionSets/read",
        "Microsoft.Compute/snapshots/delete",
        "Microsoft.Network/privateEndpoints/delete",
        "Microsoft.Compute/availabilitySets/delete",
        "Microsoft.KeyVault/vaults/read",
        "Microsoft.KeyVault/vaults/accessPolicies/write",
        "Microsoft.Compute/diskEncryptionSets/write",
        "Microsoft.KeyVault/vaults/deploy/action",
        "Microsoft.Compute/diskEncryptionSets/delete",
        "Microsoft.Resources/tags/read",
        "Microsoft.Resources/tags/write",
        "Microsoft.Resources/tags/delete",
        "Microsoft.Network/applicationSecurityGroups/write",
        "Microsoft.Network/applicationSecurityGroups/read",

"Microsoft.Network/applicationSecurityGroups/joinIpConfiguration/action",

"Microsoft.Network/networkSecurityGroups/securityRules/write",
        "Microsoft.Network/applicationSecurityGroups/delete",

"Microsoft.Network/networkSecurityGroups/securityRules/delete",

"Microsoft.ContainerService/managedClusters/listClusterUserCredential/action",
        "Microsoft.ContainerService/managedClusters/read",
        "Microsoft.Synapse/workspaces/write",
        "Microsoft.Synapse/workspaces/read",

```

```

        "Microsoft.Synapse/workspaces/delete",
        "Microsoft.Synapse/register/action",
        "Microsoft.Synapse/checkNameAvailability/action",
        "Microsoft.Synapse/workspaces/operationStatuses/read",
        "Microsoft.Synapse/workspaces/firewallRules/read",

        "Microsoft.Synapse/workspaces/replaceAllIpFirewallRules/action",
        "Microsoft.Synapse/workspaces/operationResults/read",

        "Microsoft.Synapse/workspaces/privateEndpointConnectionsApproval/action",

        "Microsoft.ManagedIdentity/userAssignedIdentities/assign/action",
        "Microsoft.Compute/images/write",

        "Microsoft.Network/loadBalancers/frontendIPConfigurations/read"
    ],
    "NotActions": [],
    "AssignableScopes": [],
    "Description": "BlueXP Permissions",
    "IsCustom": "true"
}

```

## How Azure permissions are used

The following sections describe how the permissions are used for each BlueXP service. This information can be helpful if your corporate policies dictate that permissions are only provided as needed.

### Azure NetApp Files

The Connector makes the following API requests when you use BlueXP classification to scan Azure NetApp Files data:

- Microsoft.NetApp/netAppAccounts/read
- Microsoft.NetApp/netAppAccounts/capacityPools/read
- Microsoft.NetApp/netAppAccounts/capacityPools/volumes/write
- Microsoft.NetApp/netAppAccounts/capacityPools/volumes/read
- Microsoft.NetApp/netAppAccounts/capacityPools/volumes/delete

### Backup and recovery

The Connector makes the following API requests for BlueXP backup and recovery:

- Microsoft.Compute/virtualMachines/read
- Microsoft.Compute/virtualMachines/start/action
- Microsoft.Compute/virtualMachines/deallocate/action
- Microsoft.Storage/storageAccounts/listkeys/action

- Microsoft.Storage/storageAccounts/read
- Microsoft.Storage/storageAccounts/write
- Microsoft.Storage/storageAccounts/blobServices/containers/read
- Microsoft.Storage/storageAccounts/listAccountSas/action
- Microsoft.KeyVault/vaults/read
- Microsoft.KeyVault/vaults/accessPolicies/write
- Microsoft.Network/networkInterfaces/read
- Microsoft.Resources/subscriptions/locations/read
- Microsoft.Network/virtualNetworks/read
- Microsoft.Network/virtualNetworks/subnets/read
- Microsoft.Resources/subscriptions/resourceGroups/read
- Microsoft.Resources/subscriptions/resourcegroups/resources/read
- Microsoft.Resources/subscriptions/resourceGroups/write
- Microsoft.Authorization/locks/\*
- Microsoft.Network/privateEndpoints/write
- Microsoft.Network/privateEndpoints/read
- Microsoft.Network/privateDnsZones/virtualNetworkLinks/write
- Microsoft.Network/virtualNetworks/join/action
- Microsoft.Network/privateDnsZones/A/write
- Microsoft.Network/privateDnsZones/read
- Microsoft.Network/privateDnsZones/virtualNetworkLinks/read
- Microsoft.Compute/virtualMachines/extensions/delete
- Microsoft.Compute/virtualMachines/delete
- Microsoft.Network/networkInterfaces/delete
- Microsoft.Network/networkSecurityGroups/delete
- Microsoft.Resources/deployments/delete
- Microsoft.ManagedIdentity/userAssignedIdentities/assign/action

The Connector makes the following API requests when you use the Search & Restore functionality:

- Microsoft.Synapse/workspaces/write
- Microsoft.Synapse/workspaces/read
- Microsoft.Synapse/workspaces/delete
- Microsoft.Synapse/register/action
- Microsoft.Synapse/checkNameAvailability/action
- Microsoft.Synapse/workspaces/operationStatuses/read
- Microsoft.Synapse/workspaces/firewallRules/read
- Microsoft.Synapse/workspaces/replaceAllIpFirewallRules/action

- Microsoft.Synapse/workspaces/operationResults/read
- Microsoft.Synapse/workspaces/privateEndpointConnectionsApproval/action

### Classification

The Connector makes the following API requests when you use BlueXP classification.

Action	Used for set up?	Used for daily operations?
Microsoft.Compute/locations/operations/read	Yes	Yes
Microsoft.Compute/locations/vmSizes/read	Yes	Yes
Microsoft.Compute/operations/read	Yes	Yes
Microsoft.Compute/virtualMachines/instanceView/read	Yes	Yes
Microsoft.Compute/virtualMachines/powerOff/action	Yes	No
Microsoft.Compute/virtualMachines/read	Yes	Yes
Microsoft.Compute/virtualMachines/restart/action	Yes	No
Microsoft.Compute/virtualMachines/start/action	Yes	No
Microsoft.Compute/virtualMachines/vmSizes/read	No	Yes
Microsoft.Compute/virtualMachines/write	Yes	No
Microsoft.Compute/images/read	Yes	Yes
Microsoft.Compute/disks/delete	Yes	No
Microsoft.Compute/disks/read	Yes	Yes
Microsoft.Compute/disks/write	Yes	No
Microsoft.Storage/checknameavailability/read	Yes	Yes
Microsoft.Storage/operations/read	Yes	Yes
Microsoft.Storage/storageAccounts/listkeys/action	Yes	No
Microsoft.Storage/storageAccounts/read	Yes	Yes
Microsoft.Storage/storageAccounts/write	Yes	No
Microsoft.Storage/storageAccounts/blobServices/containers/read	Yes	Yes



Action	Used for set up?	Used for daily operations?
Microsoft.Network/networkInterfaces/read	Yes	Yes
Microsoft.Network/networkInterfaces/write	Yes	No
Microsoft.Network/networkInterfaces/join/action	Yes	No
Microsoft.Network/networkSecurityGroups/read	Yes	Yes
Microsoft.Network/networkSecurityGroups/write	Yes	No
Microsoft.Resources/subscriptions/locations/read	Yes	Yes
Microsoft.Network/locations/operationResults/read	Yes	Yes
Microsoft.Network/locations/operations/read	Yes	Yes
Microsoft.Network/virtualNetworks/read	Yes	Yes
Microsoft.Network/virtualNetworks/checkIpAddressAvailability/read	Yes	Yes
Microsoft.Network/virtualNetworks/subnets/read	Yes	Yes
Microsoft.Network/virtualNetworks/subnets/virtualMachines/read	Yes	Yes
Microsoft.Network/virtualNetworks/virtualMachines/read	Yes	Yes
Microsoft.Network/virtualNetworks/subnets/join/action	Yes	No
Microsoft.Network/virtualNetworks/subnets/write	Yes	No
Microsoft.Network/routeTables/join/action	Yes	No
Microsoft.Resources/deployments/operations/read	Yes	Yes
Microsoft.Resources/deployments/read	Yes	Yes
Microsoft.Resources/deployments/write	Yes	No
Microsoft.Resources/resources/read	Yes	Yes

Action	Used for set up?	Used for daily operations?
Microsoft.Resources/subscriptions/operationresults/read	Yes	Yes
Microsoft.Resources/subscriptions/resourceGroups/delete	Yes	No
Microsoft.Resources/subscriptions/resourceGroups/read	Yes	Yes
Microsoft.Resources/subscriptions/resourcegroups/resources/read	Yes	Yes
Microsoft.Resources/subscriptions/resourceGroups/write	Yes	No

#### Cloud Volumes ONTAP

The Connector makes the following API requests to deploy and manage Cloud Volumes ONTAP in Azure.

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create and manage VMs	Microsoft.Compute/locations/operations/read	Yes	Yes	No
	Microsoft.Compute/locations/vmSizes/read	Yes	Yes	No
	Microsoft.Resources/subscriptions/locations/read	Yes	No	No
	Microsoft.Compute/operations/read	Yes	Yes	No
	Microsoft.Compute/virtualMachines/instanceView/read	Yes	Yes	No
	Microsoft.Compute/virtualMachines/powerOff/action	Yes	Yes	No
	Microsoft.Compute/virtualMachines/read	Yes	Yes	No
	Microsoft.Compute/virtualMachines/restart/action	Yes	Yes	No
	Microsoft.Compute/virtualMachines/start/action	Yes	Yes	No
	Microsoft.Compute/virtualMachines/deallocate/action	No	Yes	Yes
	Microsoft.Compute/virtualMachines/vmSizes/read	No	Yes	No
	Microsoft.Compute/virtualMachines/write	Yes	Yes	No
	Microsoft.Compute/virtualMachines/delete	Yes	Yes	Yes
	Microsoft.Resources/deployments/delete	Yes	No	No
Enable deployment from a VHD	Microsoft.Compute/images/read	Yes	No	No
	Microsoft.Compute/images/write	Yes	No	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create and manage network interfaces in the target subnet	Microsoft.Network/networkInterfaces/read	Yes	Yes	No
	Microsoft.Network/networkInterfaces/write	Yes	Yes	No
	Microsoft.Network/networkInterfaces/join/action	Yes	Yes	No
	Microsoft.Network/networkInterfaces/delete	Yes	Yes	No
Create and manage network security groups	Microsoft.Network/networkSecurityGroups/read	Yes	Yes	No
	Microsoft.Network/networkSecurityGroups/write	Yes	Yes	No
	Microsoft.Network/networkSecurityGroups/join/action	Yes	No	No
	Microsoft.Network/networkSecurityGroups/delete	No	Yes	Yes

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Get network information about regions, the target VNet and subnet, and add the VMs to VNets	Microsoft.Network/locations/operationResults/read	Yes	Yes	No
	Microsoft.Network/locations/operations/read	Yes	Yes	No
	Microsoft.Network/virtualNetworks/read	Yes	No	No
	Microsoft.Network/virtualNetworks/checkIpAddressAvailability/read	Yes	No	No
	Microsoft.Network/virtualNetworks/subnets/read	Yes	Yes	No
	Microsoft.Network/virtualNetworks/subnets/virtualMachines/read	Yes	Yes	No
	Microsoft.Network/virtualNetworks/virtualMachines/read	Yes	Yes	No
	Microsoft.Network/virtualNetworks/subnets/join/action	Yes	Yes	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create and manage resource groups	Microsoft.Resources/deployments/operations/read	Yes	Yes	No
	Microsoft.Resources/deployments/read	Yes	Yes	No
	Microsoft.Resources/deployments/write	Yes	Yes	No
	Microsoft.Resources/resources/read	Yes	Yes	No
	Microsoft.Resources/subscriptions/operationresults/read	Yes	Yes	No
	Microsoft.Resources/subscriptions/resourceGroups/delete	Yes	Yes	Yes
	Microsoft.Resources/subscriptions/resourceGroups/read	No	Yes	No
	Microsoft.Resources/subscriptions/resourcegroups/resources/read	Yes	Yes	No
	Microsoft.Resources/subscriptions/resourceGroups/write	Yes	Yes	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Manage Azure storage accounts and disks	Microsoft.Compute/disks/read	Yes	Yes	Yes
	Microsoft.Compute/disks/write	Yes	Yes	No
	Microsoft.Compute/disks/delete	Yes	Yes	Yes
	Microsoft.Storage/checknameavailability/read	Yes	Yes	No
	Microsoft.Storage/operations/read	Yes	Yes	No
	Microsoft.Storage/storageAccounts/listkeys/action	Yes	Yes	No
	Microsoft.Storage/storageAccounts/read	Yes	Yes	No
	Microsoft.Storage/storageAccounts/delete	No	Yes	Yes
	Microsoft.Storage/storageAccounts/write	Yes	Yes	No
	Microsoft.Storage/usage/read	No	Yes	No
Enable backups to Blob storage and encryption of storage accounts	Microsoft.Storage/storageAccounts/blobServices/containers/read	Yes	Yes	No
	Microsoft.KeyVault/vaults/read	Yes	Yes	No
	Microsoft.KeyVault/vaults/accessPolicies/write	Yes	Yes	No
Enable VNet service endpoints for data tiering	Microsoft.Network/virtualNetworks/subnets/write	Yes	Yes	No
	Microsoft.Network/routeTables/join/action	Yes	Yes	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Create and manage Azure managed snapshots	Microsoft.Compute/snapshots/write	Yes	Yes	No
	Microsoft.Compute/snapshots/read	Yes	Yes	No
	Microsoft.Compute/snapshots/delete	No	Yes	Yes
	Microsoft.Compute/disks/beginGetAccess/action	No	Yes	No
Create and manage availability sets	Microsoft.Compute/availabilitySets/write	Yes	No	No
	Microsoft.Compute/availabilitySets/read	Yes	No	No
Enable programmatic deployments from the marketplace	Microsoft.MarketplaceOrdering/offertypes/publishers/offers/plans/agreements/read	Yes	No	No
	Microsoft.MarketplaceOrdering/offertypes/publishers/offers/plans/agreements/write	Yes	Yes	No



Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Manage a load balancer for HA pairs	Microsoft.Network/loadBalancers/read	Yes	Yes	No
	Microsoft.Network/loadBalancers/write	Yes	No	No
	Microsoft.Network/loadBalancers/delete	No	Yes	Yes
	Microsoft.Network/loadBalancers/backendAddressPools/read	Yes	No	No
	Microsoft.Network/loadBalancers/backendAddressPools/join/action	Yes	No	No
	Microsoft.Network/loadBalancers/frontendIPConfigurations/read	Yes	Yes	No
	Microsoft.Network/loadBalancers/loadBalancingRules/read	Yes	No	No
	Microsoft.Network/loadBalancers/probes/read	Yes	No	No
	Microsoft.Network/loadBalancers/probes/join/action	Yes	No	No
	Microsoft.Network/loadBalancers/probes/join/action	Yes	No	No
Enable management of locks on Azure disks	Microsoft.Authorization/locks/*	Yes	Yes	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Enable private endpoints for HA pairs when there's no connectivity outside the subnet	Microsoft.Network/privateEndpoints/write	Yes	Yes	No
	Microsoft.Storage/storageAccounts/PrivateEndpointConnectionsApproval/action	Yes	No	No
	Microsoft.Storage/storageAccounts/privateEndpointConnections/read	Yes	Yes	Yes
	Microsoft.Network/privateEndpoints/read	Yes	Yes	Yes
	Microsoft.Network/privateDnsZones/write	Yes	Yes	No
	Microsoft.Network/privateDnsZones/virtualNetworkLinks/write	Yes	Yes	No
	Microsoft.Network/virtualNetworks/join/action	Yes	Yes	No
	Microsoft.Network/privateDnsZones/A/write	Yes	Yes	No
	Microsoft.Network/privateDnsZones/read	Yes	Yes	No
	Microsoft.Network/privateDnsZones/virtualNetworkLinks/read	Yes	Yes	No
Required for some VM deployments, depending on the underlying physical hardware	Microsoft.Resources/deployments/operationStatuses/read	Yes	Yes	No
Remove resources from a resource group in case of deployment failure or deletion	Microsoft.Network/privateEndpoints/delete	Yes	Yes	No
	Microsoft.Compute/availabilitySets/delete	Yes	Yes	No

Purpose	Action	Used for deployment?	Used for daily operations?	Used for deletion?
Enable the use of customer-managed encryption keys when using the API	Microsoft.Compute/diskEncryptionSets/read	Yes	Yes	Yes
	Microsoft.Compute/diskEncryptionSets/write	Yes	Yes	No
	Microsoft.KeyVault/vaults/deploy/action	Yes	No	No
	Microsoft.Compute/diskEncryptionSets/delete	Yes	Yes	Yes
Configure an application security group for an HA pair to isolate the HA interconnect and cluster network NICs	Microsoft.Network/applicationSecurityGroups/write	No	Yes	No
	Microsoft.Network/applicationSecurityGroups/read	No	Yes	No
	Microsoft.Network/applicationSecurityGroups/joinIpConfiguration/action	No	Yes	No
	Microsoft.Network/networkSecurityGroups/securityRules/write	Yes	Yes	No
	Microsoft.Network/applicationSecurityGroups/delete	No	Yes	Yes
	Microsoft.Network/networkSecurityGroups/securityRules/delete	No	Yes	Yes
Read, write, and delete tags associated with Cloud Volumes ONTAP resources	Microsoft.Resources/tags/read	No	Yes	No
	Microsoft.Resources/tags/write	Yes	Yes	No
	Microsoft.Resources/tags/delete	Yes	No	No
Encrypt storage accounts during creation	Microsoft.ManagedIdentity/userAssignedIdentities/assign/action	Yes	Yes	No

## Edge caching

The Connector makes the following API requests when you use BlueXP edge caching:

- Microsoft.Insights/Metrics/Read
- Microsoft.Compute/virtualMachines/extensions/write
- Microsoft.Compute/virtualMachines/extensions/read
- Microsoft.Compute/virtualMachines/extensions/delete
- Microsoft.Compute/virtualMachines/delete
- Microsoft.Network/networkInterfaces/delete
- Microsoft.Network/networkSecurityGroups/delete
- Microsoft.Resources/deployments/delete

## Kubernetes

The Connector makes the following API requests to discover and manage clusters running in Azure Kubernetes Service (AKS):

- Microsoft.Compute/virtualMachines/read
- Microsoft.Resources/subscriptions/locations/read
- Microsoft.Resources/subscriptions/operationresults/read
- Microsoft.Resources/subscriptions/resourceGroups/read
- Microsoft.Resources/subscriptions/resourcegroups/resources/read
- Microsoft.ContainerService/managedClusters/read
- Microsoft.ContainerService/managedClusters/listClusterUserCredential/action

## Remediation

The Connector makes the following API requests to manage tags on Azure resources when you use BlueXP remediation:

- Microsoft.Resources/resources/read
- Microsoft.Resources/subscriptions/operationresults/read
- Microsoft.Resources/subscriptions/resourceGroups/read
- Microsoft.Resources/subscriptions/resourcegroups/resources/read
- Microsoft.Resources/tags/read
- Microsoft.Resources/tags/write

## Tiering

The Connector makes the following API requests when you set up BlueXP tiering.

- Microsoft.Storage/storageAccounts/listkeys/action
- Microsoft.Resources/subscriptions/resourceGroups/read
- Microsoft.Resources/subscriptions/locations/read

The Connector makes the following API requests for daily operations.

- Microsoft.Storage/storageAccounts/blobServices/containers/read
- Microsoft.Storage/storageAccounts/managementPolicies/read
- Microsoft.Storage/storageAccounts/managementPolicies/write
- Microsoft.Storage/storageAccounts/read

## Change log

As permissions are added and removed, we'll note them in the sections below.

### 12 May, 2023

The following permissions were added to the JSON policy because they are required for Cloud Volumes ONTAP management:

- Microsoft.Compute/images/write
- Microsoft.Network/loadBalancers/frontendIPConfigurations/read

The following permissions were removed from the JSON policy because they are no longer required:

- Microsoft.Storage/storageAccounts/blobServices/containers/write
- Microsoft.Network/publicIPAddresses/delete

### 23 March, 2023

The "Microsoft.Storage/storageAccounts/delete" permission is no longer needed for BlueXP classification.

This permission is still required for Cloud Volumes ONTAP.

### 5 January, 2023

The following permissions were added to the JSON policy:

- Microsoft.Storage/storageAccounts/listAccountSas/action
- Microsoft.Synapse/workspaces/privateEndpointConnectionsApproval/action

These permissions are required for BlueXP backup and recovery.

- Microsoft.Network/loadBalancers/backendAddressPools/join/action

This permission is required for Cloud Volumes ONTAP deployment.

## Google Cloud permissions for the Connector

BlueXP requires permissions to perform actions in Google Cloud. These permissions are included in a custom role provided by NetApp. You might want to understand what BlueXP does with these permissions.

## Service account permissions

The custom role shown below provides the permissions that a Connector needs to manage resources and processes within your Google Cloud network.

You'll need to apply this custom role to a service account that gets attached to the Connector VM.

- [Set up permissions for standard mode](#)
- [Set up permissions for restricted mode](#)
- [Set up permissions for private mode](#)

You also need to ensure that the role is up to date as new permissions are added in subsequent releases.

```
title: NetApp BlueXP
description: Permissions for the service account associated with the
Connector instance.
stage: GA
includedPermissions:
- iam.serviceAccounts.actAs
- compute.regionBackendServices.create
- compute.regionBackendServices.get
- compute.regionBackendServices.list
- compute.networks.updatePolicy
- compute.backendServices.create
- compute.addresses.list
- compute.disks.create
- compute.disks.createSnapshot
- compute.disks.delete
- compute.disks.get
- compute.disks.list
- compute.disks.setLabels
- compute.disks.use
- compute.firewalls.create
- compute.firewalls.delete
- compute.firewalls.get
- compute.firewalls.list
- compute.globalOperations.get
- compute.images.get
- compute.images.getFromFamily
- compute.images.list
- compute.images.useReadOnly
- compute.instances.addAccessConfig
- compute.instances.attachDisk
- compute.instances.create
- compute.instances.delete
- compute.instances.detachDisk
- compute.instances.get
```

- `compute.instances.getSerialPortOutput`
- `compute.instances.list`
- `compute.instances.setDeletionProtection`
- `compute.instances.setLabels`
- `compute.instances.setMachineType`
- `compute.instances.setMetadata`
- `compute.instances.setTags`
- `compute.instances.start`
- `compute.instances.stop`
- `compute.instances.updateDisplayDevice`
- `compute.instanceGroups.get`
- `compute.addresses.get`
- `compute.instances.updateNetworkInterface`
- `compute.machineTypes.get`
- `compute.networks.get`
- `compute.networks.list`
- `compute.projects.get`
- `compute.regions.get`
- `compute.regions.list`
- `compute.snapshots.create`
- `compute.snapshots.delete`
- `compute.snapshots.get`
- `compute.snapshots.list`
- `compute.snapshots.setLabels`
- `compute.subnetworks.get`
- `compute.subnetworks.list`
- `compute.subnetworks.use`
- `compute.subnetworks.useExternalIp`
- `compute.zoneOperations.get`
- `compute.zones.get`
- `compute.zones.list`
- `compute.instances.setServiceAccount`
- `deploymentmanager.compositeTypes.get`
- `deploymentmanager.compositeTypes.list`
- `deploymentmanager.deployments.create`
- `deploymentmanager.deployments.delete`
- `deploymentmanager.deployments.get`
- `deploymentmanager.deployments.list`
- `deploymentmanager.manifests.get`
- `deploymentmanager.manifests.list`
- `deploymentmanager.operations.get`
- `deploymentmanager.operations.list`
- `deploymentmanager.resources.get`
- `deploymentmanager.resources.list`
- `deploymentmanager.typeProviders.get`
- `deploymentmanager.typeProviders.list`

- deploymentmanager.types.get
- deploymentmanager.types.list
- logging.logEntries.list
- logging.privateLogEntries.list
- resourcemanager.projects.get
- storage.buckets.create
- storage.buckets.delete
- storage.buckets.get
- storage.buckets.list
- cloudkms.cryptoKeyVersions.useToEncrypt
- cloudkms.cryptoKeys.get
- cloudkms.cryptoKeys.list
- cloudkms.keyRings.list
- storage.buckets.update
- iam.serviceAccounts.getIamPolicy
- iam.serviceAccounts.list
- storage.objects.get
- storage.objects.list
- monitoring.timeSeries.list
- storage.buckets.getIamPolicy
- cloudkms.cryptoKeys.getIamPolicy
- cloudkms.cryptoKeys.setIamPolicy
- cloudkms.keyRings.get
- cloudkms.keyRings.getIamPolicy
- cloudkms.keyRings.setIamPolicy

## How Google Cloud permissions are used

Actions	Purpose
<ul style="list-style-type: none"> <li>- compute.disks.create</li> <li>- compute.disks.createSnapshot</li> <li>- compute.disks.delete</li> <li>- compute.disks.get</li> <li>- compute.disks.list</li> <li>- compute.disks.setLabels</li> <li>- compute.disks.use</li> </ul>	To create and manage disks for Cloud Volumes ONTAP.
<ul style="list-style-type: none"> <li>- compute.firewalls.create</li> <li>- compute.firewalls.delete</li> <li>- compute.firewalls.get</li> <li>- compute.firewalls.list</li> </ul>	To create firewall rules for Cloud Volumes ONTAP.
<ul style="list-style-type: none"> <li>- compute.globalOperations.get</li> </ul>	To get the status of operations.
<ul style="list-style-type: none"> <li>- compute.images.get</li> <li>- compute.images.getFromFamily</li> <li>- compute.images.list</li> <li>- compute.images.useReadOnly</li> </ul>	To get images for VM instances.



Actions	Purpose
<ul style="list-style-type: none"> <li>- compute.instances.attachDisk</li> <li>- compute.instances.detachDisk</li> </ul>	To attach and detach disks to Cloud Volumes ONTAP.
<ul style="list-style-type: none"> <li>- compute.instances.create</li> <li>- compute.instances.delete</li> </ul>	To create and delete Cloud Volumes ONTAP VM instances.
<ul style="list-style-type: none"> <li>- compute.instances.get</li> </ul>	To list VM instances.
<ul style="list-style-type: none"> <li>- compute.instances.getSerialPortOutput</li> </ul>	To get console logs.
<ul style="list-style-type: none"> <li>- compute.instances.list</li> </ul>	To retrieve the list of instances in a zone.
<ul style="list-style-type: none"> <li>- compute.instances.setDeletionProtection</li> </ul>	To set deletion protection on the instance.
<ul style="list-style-type: none"> <li>- compute.instances.setLabels</li> </ul>	To add labels.
<ul style="list-style-type: none"> <li>- compute.instances.setMachineType</li> <li>- compute.instances.setMinCpuPlatform</li> </ul>	To change the machine type for Cloud Volumes ONTAP.
<ul style="list-style-type: none"> <li>- compute.instances.setMetadata</li> </ul>	To add metadata.
<ul style="list-style-type: none"> <li>- compute.instances.setTags</li> </ul>	To add tags for firewall rules.
<ul style="list-style-type: none"> <li>- compute.instances.start</li> <li>- compute.instances.stop</li> <li>- compute.instances.updateDisplayDevice</li> </ul>	To start and stop Cloud Volumes ONTAP.
<ul style="list-style-type: none"> <li>- compute.machineTypes.get</li> </ul>	To get the numbers of cores to check quotas.
<ul style="list-style-type: none"> <li>- compute.projects.get</li> </ul>	To support multi-projects.
<ul style="list-style-type: none"> <li>- compute.snapshots.create</li> <li>- compute.snapshots.delete</li> <li>- compute.snapshots.get</li> <li>- compute.snapshots.list</li> <li>- compute.snapshots.setLabels</li> </ul>	To create and manage persistent disk snapshots.
<ul style="list-style-type: none"> <li>- compute.networks.get</li> <li>- compute.networks.list</li> <li>- compute.regions.get</li> <li>- compute.regions.list</li> <li>- compute.subnetworks.get</li> <li>- compute.subnetworks.list</li> <li>- compute.zoneOperations.get</li> <li>- compute.zones.get</li> <li>- compute.zones.list</li> </ul>	To get the networking information needed to create a new Cloud Volumes ONTAP virtual machine instance.

Actions	Purpose
<ul style="list-style-type: none"> <li>- deploymentmanager.compositeTypes.get</li> <li>- deploymentmanager.compositeTypes.list</li> <li>- deploymentmanager.deployments.create</li> <li>- deploymentmanager.deployments.delete</li> <li>- deploymentmanager.deployments.get</li> <li>- deploymentmanager.deployments.list</li> <li>- deploymentmanager.manifests.get</li> <li>- deploymentmanager.manifests.list</li> <li>- deploymentmanager.operations.get</li> <li>- deploymentmanager.operations.list</li> <li>- deploymentmanager.resources.get</li> <li>- deploymentmanager.resources.list</li> <li>- deploymentmanager.typeProviders.get</li> <li>- deploymentmanager.typeProviders.list</li> <li>- deploymentmanager.types.get</li> <li>- deploymentmanager.types.list</li> </ul>	To deploy the Cloud Volumes ONTAP virtual machine instance using Google Cloud Deployment Manager.
<ul style="list-style-type: none"> <li>- logging.logEntries.list</li> <li>- logging.privateLogEntries.list</li> </ul>	To get stack log drives.
<ul style="list-style-type: none"> <li>- resourcemanager.projects.get</li> </ul>	To support multi-projects.
<ul style="list-style-type: none"> <li>- storage.buckets.create</li> <li>- storage.buckets.delete</li> <li>- storage.buckets.get</li> <li>- storage.buckets.list</li> <li>- storage.buckets.update</li> </ul>	To create and manage a Google Cloud Storage bucket for data tiering.
<ul style="list-style-type: none"> <li>- cloudkms.cryptoKeyVersions.useToEncrypt</li> <li>- cloudkms.cryptoKeys.get</li> <li>- cloudkms.cryptoKeys.list</li> <li>- cloudkms.keyRings.list</li> </ul>	To use customer-managed encryption keys from the Cloud Key Management Service with Cloud Volumes ONTAP.
<ul style="list-style-type: none"> <li>- compute.instances.setServiceAccount</li> <li>- iam.serviceAccounts.actAs</li> <li>- iam.serviceAccounts.getIamPolicy</li> <li>- iam.serviceAccounts.list</li> <li>- storage.objects.get</li> <li>- storage.objects.list</li> </ul>	To set a service account on the Cloud Volumes ONTAP instance. This service account provides permissions for data tiering to a Google Cloud Storage bucket.
<ul style="list-style-type: none"> <li>- compute.addresses.list</li> </ul>	To retrieve the addresses in a region when deploying an HA pair.
<ul style="list-style-type: none"> <li>- compute.backendServices.create</li> <li>- compute.regionBackendServices.create</li> <li>- compute.regionBackendServices.get</li> <li>- compute.regionBackendServices.list</li> </ul>	To configure a backend service for distributing traffic in an HA pair.
<ul style="list-style-type: none"> <li>- compute.networks.updatePolicy</li> </ul>	To apply firewall rules on the VPCs and subnets for an HA pair.
<ul style="list-style-type: none"> <li>- compute.subnetworks.use</li> <li>- compute.subnetworks.useExternallp</li> <li>- compute.instances.addAccessConfig</li> </ul>	To enable BlueXP classification.

Actions	Purpose
<ul style="list-style-type: none"> <li>- container.clusters.get</li> <li>- container.clusters.list</li> </ul>	To discover Kubernetes clusters running in Google Kubernetes Engine.
<ul style="list-style-type: none"> <li>- compute.instanceGroups.get</li> <li>- compute.addresses.get</li> <li>- compute.instances.updateNetworkInterface</li> </ul>	To create and manage storage VMs on Cloud Volumes ONTAP HA pairs.
<ul style="list-style-type: none"> <li>- monitoring.timeSeries.list</li> <li>- storage.buckets.getIamPolicy</li> </ul>	To discover information about Google Cloud Storage buckets.
<ul style="list-style-type: none"> <li>- cloudkms.cryptoKeys.get</li> <li>- cloudkms.cryptoKeys.getIamPolicy</li> <li>- cloudkms.cryptoKeys.list</li> <li>- cloudkms.cryptoKeys.setIamPolicy</li> <li>- cloudkms.keyRings.get</li> <li>- cloudkms.keyRings.getIamPolicy</li> <li>- cloudkms.keyRings.list</li> <li>- cloudkms.keyRings.setIamPolicy</li> </ul>	To select your own customer-managed keys in the BlueXP backup and recovery activation wizard instead of using the default Google-managed encryption keys.

## Change log

As permissions are added and removed, we'll note them in the sections below.

### 6 February, 2023

The following permission was added to this policy:

- compute.instances.updateNetworkInterface

This permission is required for Cloud Volumes ONTAP.

### 27 January, 2023

The following permissions were added to the policy:

- cloudkms.cryptoKeys.getIamPolicy
- cloudkms.cryptoKeys.setIamPolicy
- cloudkms.keyRings.get
- cloudkms.keyRings.getIamPolicy
- cloudkms.keyRings.setIamPolicy

These permissions are required for BlueXP backup and recovery.

## Ports

### Security group rules in AWS

The AWS security group for the Connector requires both inbound and outbound rules. BlueXP automatically creates this security group when you create a Connector from BlueXP. You need to set up this security group for all other installation options.

## Inbound rules

Protocol	Port	Purpose
SSH	22	Provides SSH access to the Connector host
HTTP	80	Provides HTTP access from client web browsers to the local user interface
HTTPS	443	Provides HTTPS access from client web browsers to the local user interface, and connections from the BlueXP classification instance
TCP	3128	Provides Cloud Volumes ONTAP with internet access to send AutoSupport messages to NetApp Support. You must manually open this port after deployment. <a href="#">Learn how the Connector is used as a proxy for AutoSupport messages</a>
TCP	9060, 9061	Provides the ability to enable and use BlueXP classification and BlueXP backup and recovery in Government regions.

## Outbound rules

The predefined security group for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

### Basic outbound rules

The predefined security group for the Connector includes the following outbound rules.

Protocol	Port	Purpose
All TCP	All	All outbound traffic
All UDP	All	All outbound traffic

### Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

Service	Protocol	Port	Destination	Purpose
API calls and AutoSupport	HTTPS	443	Outbound internet and ONTAP cluster management LIF	API calls to AWS, to ONTAP, to BlueXP classification, to BlueXP ransomware protection, and sending AutoSupport messages to NetApp
API calls	TCP	3000	ONTAP HA mediator	Communication with the ONTAP HA mediator
	TCP	8080	BlueXP classification	Probe to BlueXP classification instance during deployment
DNS	UDP	53	DNS	Used for DNS resolve by BlueXP

## Security group rules in Azure

The Azure security group for the Connector requires both inbound and outbound rules. BlueXP automatically creates this security group when you create a Connector from BlueXP. You need to set up this security group for all other installation options.

### Inbound rules

Protocol	Port	Purpose
SSH	22	Provides SSH access to the Connector host
HTTP	80	Provides HTTP access from client web browsers to the local user interface
HTTPS	443	Provides HTTPS access from client web browsers to the local user interface, and connections from the BlueXP classification instance
TCP	3128	Provides Cloud Volumes ONTAP with internet access to send AutoSupport messages to NetApp Support. You must manually open this port after deployment. <a href="#">Learn how the Connector is used as a proxy for AutoSupport messages</a>
TCP	9060, 9061	Provides the ability to enable and use BlueXP classification and BlueXP backup and recovery in Government regions.

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#### Basic outbound rules

The predefined security group for the Connector includes the following outbound rules.

Protocol	Port	Purpose
All TCP	All	All outbound traffic
All UDP	All	All outbound traffic

#### Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

Service	Protocol	Port	Destination	Purpose
API calls and AutoSupport	HTTPS	443	Outbound internet and ONTAP cluster management LIF	API calls to Azure, to ONTAP, to BlueXP classification, to BlueXP ransomware protection, and sending AutoSupport messages to NetApp

Service	Protocol	Port	Destination	Purpose
API calls	TCP	8080	BlueXP classification	Probe to BlueXP classification instance during deployment
DNS	UDP	53	DNS	Used for DNS resolve by BlueXP

## Firewall rules in Google Cloud

The Google Cloud firewall rules for the Connector requires both inbound and outbound rules. BlueXP automatically creates this security group when you create a Connector from BlueXP. You need to set up this security group for all other installation options.

### Inbound rules

Protocol	Port	Purpose
SSH	22	Provides SSH access to the Connector host
HTTP	80	Provides HTTP access from client web browsers to the local user interface
HTTPS	443	Provides HTTPS access from client web browsers to the local user interface
TCP	3128	Provides Cloud Volumes ONTAP with internet access to send AutoSupport messages to NetApp Support. You must manually open this port after deployment. <a href="#">Learn how the Connector is used as a proxy for AutoSupport messages</a>

### Outbound rules

The predefined firewall rules for the Connector opens all outbound traffic. If that is acceptable, follow the basic outbound rules. If you need more rigid rules, use the advanced outbound rules.

#### Basic outbound rules

The predefined firewall rules for the Connector includes the following outbound rules.

Protocol	Port	Purpose
All TCP	All	All outbound traffic
All UDP	All	All outbound traffic

#### Advanced outbound rules

If you need rigid rules for outbound traffic, you can use the following information to open only those ports that are required for outbound communication by the Connector.



The source IP address is the Connector host.

Service	Protocol	Port	Destination	Purpose
API calls and AutoSupport	HTTPS	443	Outbound internet and ONTAP cluster management LIF	API calls to Google Cloud, to ONTAP, to BlueXP classification, to BlueXP ransomware protection, and sending AutoSupport messages to NetApp
API calls	TCP	8080	BlueXP classification	Probe to BlueXP classification instance during deployment
DNS	UDP	53	DNS	Used for DNS resolve by BlueXP

## Ports for the on-prem Connector

The Connector uses *inbound* ports when installed manually on an on-premises Linux host. You might need to refer to these ports for planning purposes.

These inbound rules apply to all BlueXP deployment models.

Protocol	Port	Purpose
HTTP	80	Provides HTTP access from client web browsers to the local user interface
HTTPS	443	Provides HTTPS access from client web browsers to the local user interface

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