CHAPTER 1

Introduction to this guide

This section contains the following topics:

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- Isilon scale-out NAS overview ............................................. 4
- Where to go for support ...................................................... 4
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About this guide

This guide provides planning information for upgrading to a later version of OneFS and includes instructions for assessing an EMC Isilon cluster to ensure it is ready for an upgrade. This guide also provides upgrade installation instructions and describes post-upgrade restoration and change management procedures.

We value your feedback. Please let us know how we can improve this document.

- Take the survey at https://www.research.net/s/isi-docfeedback.
- Send your comments or suggestions to docfeedback@isilon.com.

Isilon scale-out NAS overview

The EMC Isilon scale-out NAS storage platform combines modular hardware with unified software to harness unstructured data. Powered by the OneFS operating system, an EMC Isilon cluster delivers a scalable pool of storage with a global namespace.

The platform’s unified software provides centralized web-based and command-line administration to manage the following features:

- A cluster that runs a distributed file system
- Scale-out nodes that add capacity and performance
- Storage options that manage files, block data, and tiering
- Flexible data protection and high availability
- Software modules that control costs and optimize resources

Where to go for support

You can contact EMC Isilon Technical Support for any questions about EMC Isilon products.

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<tr>
<th>Online Support</th>
<th>Live Chat Create a Service Request</th>
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<tr>
<td>Help with online support</td>
<td>For questions specific to EMC Online Support registration or access, email <a href="mailto:support@emc.com">support@emc.com</a>.</td>
</tr>
</tbody>
</table>

Documentation resources

There are several documents that supplement the information in this guide. Make sure that the document versions that you reference are applicable to the OneFS upgrade version. Some documents are applicable to multiple versions.

Gather the following documents to begin planning your upgrade:
• OneFS Upgrades - Isilon Info Hub
• OneFS Release Notes
• Isilon Supportability and Compatibility Guide
• Isilon Third-Party Software and Hardware Compatibility Guide (only available in 7.0 and later.)
• OneFS Web Administration Guide (previously known as the Isilon OneFS User Guide)
• OneFS CLI Administration Guide (previously known as the Isilon OneFS Command Reference)
• OneFS Event Reference
• OneFS ETAs
• OneFS 7.1.1 and Later Best Practices for Upgrading Clusters Configured with Access Zones

You can search for Isilon OneFS documentation and knowledge base articles on the EMC Online Support page.
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CHAPTER 2
Upgrade readiness checklist

Complete the following tasks during each stage of the upgrade process.

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Upgrade planning overview

An upgrade plan is helpful in determining what tasks you need to complete before and after installing a new OneFS image.

Your upgrade plan helps you estimate the time it will take to complete tasks and determine who needs to complete them.

Create an upgrade plan by evaluating how the upgrade will affect users and workflow, assessing the impact of the new version of OneFS on your EMC Isilon cluster, and analyzing upgrade risks.

The EMC Remote Proactive team is available to perform OneFS pre-upgrade health checks and will complete the OneFS upgrade remotely for Premium support customers. To contact the EMC Remote Proactive team, see Article 193448, Remote Proactive (RCM). Upgrade shadowing is not available at this time.

Clusters running a version of OneFS that has reached the End of Service Life will also need a Time & Materials engagement for upgrade. Contact your Account Team to discuss available options and an upgrade strategy.

Types of OneFS upgrades

There are two options available for upgrading the OneFS operating system: a simultaneous upgrade or a rolling upgrade.

Rolling upgrades are not available between all OneFS versions. See the OneFS Release Notes for more information.

Simultaneous upgrades

A simultaneous upgrade installs the new operating system and restarts all nodes in the EMC Isilon cluster at the same time.

Simultaneous upgrades are faster than rolling upgrades but require a temporary interruption of service during the upgrade process. All client connections to the cluster must be terminated prior to completing the upgrade and data is inaccessible until the installation of the new OneFS operating system is complete and the cluster is back online.

Rolling upgrades

A rolling upgrade individually upgrades and restarts each node in the EMC Isilon cluster so that only one node is offline at a time.

A rolling upgrade takes longer to complete than a simultaneous upgrade. Whichever node the upgrade is started from is the last node to be upgraded. From the starting node, node are upgraded and restarted in sequential order. The upgrade process can be monitored from the starting node.

During a rolling upgrade, nodes that are not actively being upgraded remain online and can continue serving clients; however, clients connected to a restarting node will be disconnected and reconnected. How the client connection behaves when a node is restarted depends on several factors including client type, client configuration (mount type, timeout settings), IP allocation method, and how the client connected to the cluster.
Verify the upgrade path

Verify that the current version of OneFS on your EMC Isilon cluster can be upgraded to the target version.

You may be able to upgrade directly to the target version or you may be required to upgrade to an intermediate version before you can upgrade to the target version. For example, if your cluster is currently running OneFS 6.5, you must first upgrade to OneFS 7.0 or OneFS 7.1 before you can upgrade to OneFS 7.2. See the Isilon Supportability and Compatibility Guide for a list of OneFS upgrade paths and then see the OneFS Release Notes for each version in the path to confirm that the path is supported.

To view which version of OneFS is running on a node, run the following command:

```
uname -r
```
### Assess upgrade impact

Assessing upgrade impact is a critical exercise to help ensure that upgrading does not disrupt your EMC Isilon cluster, workflow, or users.

Consider all the areas of your environment that might be affected by upgrading to a new version and plan a strategy to handle tasks and issues that might occur.

### Consider upgrade limitations

The process for upgrading OneFS on an EMC Isilon cluster has certain limitations that you should understand.

If the upgrade process cannot be completed for any reason, such as insufficient space in key directories or a stalled drive, the system will revert to the existing version and the upgrade will be cancelled. The OneFS upgrade process does not allow you to pause or halt so that you can attend to the blocking issue. Preparing your cluster as recommended in "Completing pre-upgrade tasks" will help avoid situations that result in a cancelled upgrade.

You should be aware that after you upgrade to a new major version of OneFS, you cannot restore the previous version. A OneFS version upgrade consists of re-imaging the kernel and file system and copying user changes from the old file system to the new one. Once the OneFS kernel is re-imaged, there is no mechanism for rolling back to the previous major version. For example, if you upgrade from OneFS 6.5 to OneFS 7.0.2, you cannot revert back to OneFS 6.5.

### Review feature changes and known issues

You should review feature changes and known issues introduced in the upgrade version of OneFS.

Familiarize yourself with new, modified, and deprecated features in the upgrade version and evaluate whether the new version is right for your environment. Because of the inherent differences between major versions of OneFS, some of your requirements might not be supported in exactly the same way, the upgrade version might impact the performance, configuration, or functionality of your cluster after upgrading, or the new version might override some of your custom settings with default settings.

Also familiarize yourself with known issues and limitations in the upgrade version to make sure that the issues do not affect your requirements, workflow, or users. If the new version contains an issue that affects your environment, you should consider waiting to upgrade until after EMC Isilon resolves the issue in a later version of OneFS.

See the [OneFS Release Notes](#) for a summary of new features, feature changes, and known issues in the upgrade version of OneFS. Refer to the [OneFS Web Administration Guide](#) or the [OneFS CLI Administration Guide](#) to learn detailed information about new and changed features.
Plan an upgrade schedule

Consider all the factors that will go into preparing and executing your upgrade and create an upgrade schedule.

An upgrade schedule can help your upgrade go smoothly. Your schedule should estimate time for each stage of the upgrade process.

The upgrade process begins with ensuring your EMC Isilon cluster is ready to be upgraded. Cluster preparation is important to minimize upgrade errors or failure. It is recommended that you set aside two weeks to check cluster health and resolve issues before performing the upgrade itself. The two-week period allows time for shipping and replacing degraded hardware.

The main factors you should take into consideration when estimating a schedule include:

**Data back-up and information collection**
Estimate the time it will take to back up our data. Consider cluster size, number of files, types of files, and file size. Also include time to collect information about the cluster such as status, logs, and settings.

**Cluster preparation and readiness**
Schedule time for node and drive health checks and replacement of bad hardware. Include time to update configurations and settings that are not supported in the new version.

**Upgrade maintenance window**
Estimate the time it will take to run the upgrade. Consider cluster size and upgrade type (rolling or simultaneous). If performing rolling upgrade, consider whether you will configure client connection drain times, which will extend the required maintenance window, but lower the impact on client connections. Build in time to let the upgrade jobs run and to re-establish permissions and connections. A best practice is to upgrade the cluster during an off-hours maintenance window. Schedule time to inform users when the upgrade will take place and how they might be affected; client connections may be slow, file access may be affected, or clients may be disconnected altogether.

If you have already upgraded the cluster, use the last upgrade to estimate how long the next upgrade will take. You can view the amount of time that last upgrade required by viewing the update_handler file on the node that started the last upgrade. The file is located under /var/log, and is named according to the following format:

/var/log/update_handler_<date_upgrade_started>.txt

**Troubleshooting**
Schedule time or extend the maintenance window for post-upgrade tasks such as reconfiguring custom settings or scripts, and troubleshooting.

Upgrade a test cluster

If available, upgrade a test cluster that has the same version of OneFS and the same software configurations as your production EMC Isilon cluster.

Upgrading a test cluster before a production cluster exposes issues that slow down the upgrade of your production system.
After upgrading a test cluster, verify that the cluster is operational and validate key workflows on the test cluster by simulating how administrators, users and applications interact with the system.
CHAPTER 4

Completing pre-upgrade tasks

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About pre-upgrade tasks

Ensure that the EMC Isilon cluster is ready to upgraded to a later version of OneFS.

One purpose of the pre-upgrade tasks is to ensure that the cluster hardware, OneFS features and modules, and file system do not have issues that might interrupt the upgrade process. Another purpose of the pre-upgrade tasks is to collect cluster data, record configuration settings, and reduce the potential for lost data.

Check cluster readiness

Ensure that the EMC Isilon cluster hardware and file system do not have issues that might interrupt the OneFS upgrade.

Completing pre-upgrade tasks such as checking the health of the hardware components on the cluster, ensuring that storage space requirements are met, and managing outstanding cluster events and errors are recommended for a successful upgrade.

Restart the cluster

It is recommended that you restart the EMC Isilon cluster before you upgrade the OneFS software. Restarting the cluster can expose problems that might interfere with the upgrade process.

Restarting the cluster flushes the caches, frees up memory, clears unused connections, and exposes problems in hardware or firmware that must be fixed before upgrading. For example, restarting a node might expose degraded drives that must be smartfailed and replaced, or stalled drives that must be resolved.

Restarting the cluster is especially important if the cluster has been operational for a long period of time (one year or more) without a reboot.

It is recommended that you begin the process of restarting the cluster by rebooting the nodes two weeks before you upgrade in order to leave enough time to resolve any issues and, if necessary, order and replace hardware. Unresolved issues will likely reoccur during the upgrade process and might interrupt or block the upgrade.

Procedure

1. Identify how long each node in the cluster has been up by running the following command:

   ```
   isi_for_array -s "uptime"
   ```

2. Restart the cluster.
   a. Enter the `isi config` prompt by run the following command:

   ```
   isi config
   ```

   b. Restart each node by running the `reboot` command.

   The following command reboots a node with an LNN of 3:

   ```
   reboot 3
   ```
Check hardware health

You can manually check the health of your hardware components to confirm that the EMC Isilon cluster can support an upgrade.

You can run perform the following checks to evaluate node and cluster health and determine if the cluster is ready for an upgrade.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run the following command: <code>isi status -D</code></td>
<td>Displays detailed information about protection operations running on the cluster, failed protection operations, and operation errors. Check jobs or devices that report a status of ATTENTION, SMARTFAIL, or DOWN. For more information, see EMC Isilon knowledge base article 16497, <em>How to determine why a node is in an attention state</em>.</td>
</tr>
<tr>
<td>Run the following command: `isi_for_array -s 'isi devices</td>
<td>\ grep -v HEALTHY'`</td>
</tr>
<tr>
<td>Run the following command: <code>isi_for_array -s 'gmirror status'</code></td>
<td>Displays the mirror status of the boot drives on each node. If a drive is degraded, do not proceed with the upgrade. For more information, see EMC Isilon knowledge base article 88746, <em>Cannot perform upgrade with degraded boot drive</em>.</td>
</tr>
</tbody>
</table>

Perform the following procedure for each node in the cluster:
1. In the OneFS web administration interface, click Dashboard > Cluster Overview > Cluster Status.
2. In the Status area, click the ID of a node.
3. In the Chassis and drive status area, click Platform

Checks the data management interface (DMI) log for a record of errors reported by individual memory modules (DIMM/RAM) on the cluster. Do not proceed with the upgrade if any errors are reported as correctable or fatal in the Totals section of the Hardware Logs area. First, see the following EMC Isilon knowledge base articles, assess whether the articles are related to the errors, and follow the instructions in the articles:
- Article 89662, *ECC error policy violation alert does not clear after replacement*
- Article 89205, *Physical memory low*
- Article 90941, *Temperature sensitivity in the DIMM module used in the Isilon IQ 10000X-SSD, IQ 5000S-SSD, and IQ*
- Article 89614, *DIMM replacement policy for EMC Isilon nodes*

If the errors cannot be resolved, contact EMC Isilon Technical Support to determine whether the DIMM must be replaced. DIMM replacement must be performed by an EMC Isilon technician.
Completing pre-upgrade tasks

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run the following command:</td>
<td>and requires that the node be powered down during the service.</td>
</tr>
<tr>
<td>`egrep -B1 &quot;MA&quot; /var/log/opensm-*.topo</td>
<td>egrep -o &quot;Isilon.*&quot;</td>
</tr>
</tbody>
</table>

It is recommended that you enable the Virtual Hot Spare (VHS) feature. VHS ensures the cluster has enough free space available in order to smartfail the drive and re-protect its data. See EMC Isilon knowledge base article 88964, How to enable and configure Virtual Hot Spare (VHS) for instructions.

Check for free node space

Ensure minimum available-space requirements for nodes and overall capacity of the EMC Isilon cluster are met before you upgrade OneFS.

The total amount of available space on the entire cluster must be at least 10 percent, and the total free space for each node must be at least 8 percent. Do not proceed with the OneFS upgrade if the minimum available-space requirement for the cluster is not met.

The directories in the following table must meet a minimum available-space requirement. If any of these directories exceed the minimum available-space requirement, you must make more space available before upgrading. Otherwise, the upgrade process will fail, but it will not return an error indicating space issues as the cause.

For more information, see the Best Practices Guide for Maintaining Enough Free Space on Isilon Clusters and Pools.

<table>
<thead>
<tr>
<th>Directory</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>root partition</td>
<td>Cannot be more than 97 percent full.</td>
</tr>
<tr>
<td>(/)</td>
<td>See the following resources for resolution instructions if this directory is at or near the minimum available-space requirement:</td>
</tr>
</tbody>
</table>

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**Directory** | **Requirement**
---|---
| | • EMC Isilon knowledge base article 89552, *Node reached 95% used capacity on the root filesystem.*  
| | • Event ID 100010003, "The / (root) partition is near capacity," in the OneFS Event Reference.

/iifs | Cannot be more than 95 percent full.  
See the following resources for resolution instructions if this directory is at or near the minimum available-space requirement:  
| | • EMC Isilon knowledge base article 167267, *There is at least one smartpool at or over capacity or the SmartPool is near or over capacity.*  
| | • Event ID 100010004, "The cluster's /ifs partition is near capacity," in the OneFS Event Reference.

/var | Cannot be more than 90 percent full.  
See the following resources for resolution instructions if this directory is at or near the minimum available-space requirement:  
| | • EMC Isilon knowledge base article 89848, *The /var partition is near capacity (95% used).*  
| | • Event ID 100010001, "The /var partition is near capacity," in the OneFS Event Reference.

/var/crash | Cannot be more than 90 percent full.  
See the following resources for resolution instructions if this directory is at or near the minimum available-space requirement:  
| | • EMC Isilon knowledge base article 89823, *The crash partition of a node in the cluster has reached 90% capacity alert.*  
| | • Event ID 100010002, "The /var/crash partition is near capacity," in the OneFS Event Reference.

Run the following command to check the available space capacity of each instance of these directories on the cluster:

```bash
isi_for_array -s 'df -h'
```

The system returns output similar to the following example:

```
virtual-demo-3: Filesystem   Size  Used  Avail  Capacity  Mounted on
--------------------------------------------------------------------
virtual-demo-3: /dev/imdd0a  495M  418M  38M    92%       /
virtual-demo-3: devfs        1.0K  1.0K   0B     100%      /dev
virtual-demo-3: /dev/imdd1a  495M  6.7M  449M   1%        /var
virtual-demo-3: /dev/imdd2a  496M  5.9M  451M   1%        /var/crash
virtual-demo-3: OneFS        40G   283M  20G    1%        /ifs

virtual-demo-2: Filesystem   Size  Used  Avail  Capacity  Mounted on
--------------------------------------------------------------------
virtual-demo-2: /dev/imdd0a  495M  417M  38M    92%       /
virtual-demo-2: devfs        1.0K  1.0K   0B     100%      /dev
virtual-demo-2: /dev/imdd1a  495M  6.1M  449M   1%        /var
virtual-demo-2: /dev/imdd2a  496M  5.9M  451M   1%        /var/crash
virtual-demo-2: OneFS        40G   283M  20G    1%        /ifs
```
Resolve outstanding events and errors

Before you upgrade, resolve outstanding critical events, errors, and failures. Unresolved events and errors can disrupt the OneFS upgrade process.

Run the following command to view all events on the cluster:

```bash
isi events list
```

Run the following command to view critical events on the cluster:

```bash
isi events list --severity=critical | grep "-\-"
```

If these commands return any critical errors, you may find more details in the log files of the following directories:

- /var/log
- /var/log/messages
- /var/crash

**Note**

If the logs contain a dynamic sector recovery (DSR) failure or an Isilon Data Integrity (IDI) failure (most likely in /var/log/idi.log), contact Isilon Technical Support before you upgrade.

Cancel non-critical events before upgrading OneFS to prevent recurrence of notifications that are being addressed by the upgrade or that you know to be harmless. See the following knowledge base articles for more information:

- Article 16597, *How to quiet or cancel an event (alert) and article*
- Article 16586, *How to reset the celog database and clear all historical alerts*

See the OneFS Event Reference for information about specific event details. See the following EMC Isilon knowledge base articles that address specific errors, and if the logs contain any of these errors, complete the resolution instructions provided by the article:

- Article 167267, *There is at least one smartpool at or over capacity*
- Article 89373, *Detected IDI failure, attempting DSR*
- Article 89479, *DSR - Dynamic Sector Recovery Failure*
- Article 89475, *IDI error. Shallow verification failure in block*
- Article 89464, *Detected IDI network checksum error on path*
- Article 88683, *Cluster needs to be restriped but FlexProtect is not running*

Verify configurations and settings

OneFS configurations and settings on the EMC Isilon cluster must be supported by the version of OneFS that you want to upgrade to.
Consider access zone changes

If you upgrade to OneFS 7.1.1 or later, any existing access zones will be modified by the upgrade. You can evaluate changes and create a plan for making post-upgrade modifications to access zones.

In OneFS 7.1.1, the structure of access zones changed to enforce data isolation by requiring each zone to specify a base directory that does not overlap with another base directory. The base directory of the default System access zone is /ifs; it cannot be modified. Base directories in other access zones should not be a sub-directory of or identical to any other base directory with the exception of /ifs. More than one access zone can specify /ifs as the base directory although this configuration is not recommended.

If you upgrade to OneFS 7.1.1 or later, each access zones in the current version is migrated and /ifs is assigned as the base directory. Connections to access zones and data will continue to work as normal. However, the migrated configuration in which /ifs is the base directory for all of the access zones is not recommended, and you will not be able to create new access zones until you reconfigure unique base directories for each zone.

The following features will also be affected by the enforcement of base directories in access zone after upgrading to OneFS 7.1.1 or later:

<table>
<thead>
<tr>
<th>Feature</th>
<th>After upgrading to OneFS 7.1.1 or later</th>
</tr>
</thead>
</table>
| SMB shares           | • Shares are not stored in a global list; shares are stored in access zones.  
                      | • A share path must match or fall under the base directory path of the access zone.  
                      | • Share names must be unique only within an access zone, not on the EMC Isilon cluster.  
                      | • If an SMB share was listed in multiple access zones, the upgrade process makes duplicate copies of the shares and places them in their respective zones. Each duplicate share references the same directory.  
                      | • If an SMB share previously had a display name in an access zone, the upgrade process replaces the share name with the display name. |
| Home directory templates | • The path of the home directory template in each access zone that is configured with the local authentication provider must match or fall under the base directory path of the access zone. |
| HDFS                 | • Settings for the HDFS root directory and authentication are allowed in each access zone.  
                      | • The root directory of each migrated access zone defaults to the base directory.  
                      | • A root directory path must match or fall under the base directory path of the access zone. |

Although these features will continue to work as normal after the upgrade, the resulting configurations are not recommended. Resolve the configuration after the upgrade to
better support data isolation. This might involve creating and migrating data to new directories and reconfiguring SMB shares. The scope of changes required to achieve full data isolation through access zones depends on your cluster.

**Note**

If you delete an access zone before you upgrade OneFS, all SMB shares, NFS exports, and HDFS data paths in the access zone are also deleted; however, the directories and data still exist, and you can map new shares, exports, or paths in another access zone. IP addresses associated with the deleted access zone are not automatically reassigned to another access zone. Authentication providers in the deleted access zone are not deleted from the system and will remain available to other access zones. You cannot delete the default System zone.

### Reconfigure unsupported SMB settings

Ensure that SMB settings on the EMC Isilon cluster are supported by the later version of OneFS.

If the SMB settings on the EMC Isilon cluster are not supported by the later OneFS version that you are upgrading to, the upgrade will fail. You can check for unsupported settings by running the upgrade compatibility check utility.

Remove or modify unsupported SMB settings before you upgrade by editing the `/etc/mcp/override/smbd.xml` file or the `/etc/mcp/override/smbd_shares.xml` file. After you modify SMB settings, test the workflow.

See the following EMC Isilon knowledge base articles for more information:
- Article 88910, *Unsupported SMB parameters in OneFS 6.5.x*
- Article 90167, *Upgrading to 6.5 can fail due to a pre-upgrade SMB configuration check*

### Verify global namespace requirements

Verify that your EMC Isilon cluster meets the minimum requirements for Global Namespace Acceleration (GNA).

If you are upgrading to OneFS 7.0 or later and GNA is enabled, the EMC Isilon cluster must meet the following requirements before you upgrade:

- 20% or more of the nodes in the cluster must contain at least one SSD
- SSDs must make up at least 1.5% of the total storage capacity on the cluster; 2% storage is recommended

If the cluster does not meet these system requirements before you upgrade the cluster to OneFS 7.0 or later, the upgrade process will fail and GNA is disabled.

Run the following command to view size and capacity of SSDs on the cluster:

```
isistatus -q
```

See EMC Isilon knowledge base article 90371, *Upgrade to OneFS 7.0.1.2 and later is halted if Global Namespace Acceleration is enabled and SSD storage is less than the enforced minimum of 1.5 percent of total storage*, for more information.
Check disk pool configurations

If you are upgrading to OneFS 7.0 or later, you must resolve any small disk pool configurations on your EMC Isilon cluster.

OneFS 7.0 and later versions do not support certain disk pool configurations that were allowed but not recommended in earlier versions of OneFS. If you are upgrading to OneFS 7.0 or later, any small disk pools (disk pools of two or fewer nodes) of the same node type must be merged into a single, larger disk pool consisting of nodes of the same type or equivalence class. You do not need to run a SmartPools job after merging pools.

If you do not resolve any small disk pools prior to upgrading to OneFS 7.0 or later, the nodes in the small disk pools cannot communicate with the rest of the nodes in the cluster after the upgrade.

See the Isilon Supportability and Compatibility Guide for additional details about node pools, node equivalence classes, and autoprovisioning.

Procedure

1. Run the following command to display information that includes any disk pool configurations:

   ```
   isi status -d
   ```

Verify the disk pool policy

If you are upgrading from OneFS 6.5 or earlier, confirm that the disk pool policy on the EMC Isilon cluster is supported by the version of OneFS that you are upgrading to.

If any of the following conditions apply to your cluster, you must set the `/ifs/.ifsvar` directory to use the `system:any` disk pool policy.

- The first version of OneFS installed on the cluster was earlier than 6.0 and the global protection policy was set to Advanced.
- The SmartPools module is not licensed.
- Every node contains one or more SSDs.

If you upgrade OneFS without setting the directory to `system:any`, the upgrade fails without an error message, the `ifs` directory becomes read-only, and services such as authentication, SMB file sharing, and the web administration interface cannot be started.

See EMC Isilon knowledge base article 90487, Upgrade to OneFS 7.0.x fails or is halted if the `/ifs/.ifsvar` directory does not use the `system:any` disk pool policy, for additional information.

Procedure

1. Run the following command to determine the disk pool policy of the `/ifs/.ifsvar/` directory:

   ```
   isi get -Dd /ifs/.ifsvar
   ```

   If the disk pool policy is `system:any`, the first disk pools entry appears similar to the following:

   ```
   * Disk pools: policy system : any -> target <disk_pool_name>({disk_pool_id})
   ```
Completing pre-upgrade tasks

2. If the disk pool policy is not system:any, run the following command to set the directory policy to system:any:

    isi set -FR --diskpool system:any /ifs/.ifsvar

Configure the LDAP service

Ensure the Lightweight Directory Access Protocol (LDAP) service configured on the EMC Isilon cluster is supported by the OneFS version you are upgrading to.

The OneFS operating system was updated with a newer version of the LDAP provider in version 6.5. Any existing LDAP settings were reclassified as "legacy LDAP." You can determine which LDAP service is configured on the cluster through the OneFS web administration interface.

The following table displays the OneFS versions that support legacy and standard LDAP.

<table>
<thead>
<tr>
<th>Version</th>
<th>LDAP service supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 and earlier</td>
<td>Legacy LDAP only</td>
</tr>
<tr>
<td>6.5.x.x</td>
<td>Both legacy LDAP and standard LDAP</td>
</tr>
<tr>
<td>7.0 and later</td>
<td>Standard LDAP only</td>
</tr>
</tbody>
</table>

If you are upgrading to OneFS version 7.0 or 7.1 and the legacy LDAP service is enabled on the cluster, disable the legacy LDAP service, and then enable and configure the standard LDAP service as described in the OneFS User Guide for OneFS version 6.5.4.

Check SmartLock mode

OneFS can operate in either SmartLock enterprise or SmartLock compliance mode. SmartLock compliance mode is only supported in OneFS 7.0 and later, and it enables you to protect your data in compliance with the regulations defined by U.S. Securities and Exchange Commission rule 17a-4.

Before you upgrade, verify that the SmartLock mode that is configured on the EMC Isilon cluster is supported by the OneFS version you are upgrading to.

- If you are upgrading to OneFS 7.0 or later from either OneFS 6.0 or OneFS 6.5, enterprise mode is supported.
- Clusters running OneFS 6.0 or OneFS 6.5 can be upgraded to enterprise mode, but cannot be upgraded to compliance mode or converted to compliance mode from enterprise mode.

Preserve the Kerberos keytab file

Configure Kerberos settings to ensure that the keytab file is preserved through the OneFS upgrade.

If Kerberos authentication is configured on the EMC Isilon cluster, upgrading OneFS might delete the local /etc/<name>.keytab file that is located on each node. Choose one of the following methods to preserve the keytab file during the upgrade:

- Add the following text to the /etc/mcp/override/
  user_preserve_files.xml file of each node on the cluster:

  ```xml
  <?xml version="1.0" encoding="UTF-8"?>
  <user_preserve>
  ```
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- Copy the keytab file to the /ifs directory where it can be accessed by all nodes on the cluster instead of saved locally on each node.

See EMC Isilon knowledge base article 16584, *How to configure the Isilon cluster to use Kerberos with NFS in a non-Active Directory environment*, for more configuration information.

### Install supported version of InsightIQ

Ensure the installed version of InsightIQ is supported by the later version of OneFS before you upgrade.

OneFS 6.5 supports InsightIQ 1.0 and later and OneFS 7.0 or later supports InsightIQ 2.5 or later.

If you are upgrading to OneFS 7.0 or later, you must upgrade your InsightIQ installation to version 2.5 or 3.0 before you proceed. See the following documents for more information about InsightIQ:

- InsightIQ 2.5 Installation and Setup Guide
- InsightIQ 3.0 Installation and Setup Guide

Run the following command to determine whether InsightIQ is licensed on the cluster:

```bash
isi license | grep -i insightiq
```

### Install supported version of Isilon for vCenter

Ensure the installed version of Isilon for vCenter is supported by the later version of OneFS before you upgrade.

OneFS 6.5 requires Isilon for vCenter 1.0 and later. OneFS 7.0 or later requires Isilon for vCenter 1.3.

If you are upgrading to OneFS 7.0 or later, you must upgrade your installation of vCenter to version 1.3 before you proceed. See the Isilon for vCenter 1.3 Installation Guide for more information.

Run the following command to determine whether Isilon for vCenter is licensed on the cluster:

```bash
isi license | grep -i vcenter
```

### Upgrade compatibility check utility

The upgrade compatibility check utility performs a number of checks to verify whether the EMC Isilon cluster is compatible with the new version of OneFS and ready for an upgrade.

The utility examines cluster settings, activities, or statuses that might interrupt the upgrade process or cause the upgrade to fail. If the upgrade compatibility check utility finds any issues, investigate and resolve the issues, and then run the utility again for verification. It is important that you do not rely only on the checks run by the utility to
ensure that your cluster is ready for an upgrade. You should review cluster readiness and configuration verification tasks described in this guide as well.

The upgrade compatibility check utility is included in the OneFS installation package and can be run without starting the actual upgrade process.

Download the OneFS installation image

Before running the upgrade compatibility check utility or upgrading the OneFS software, you must download the installation image of the OneFS upgrade version. OneFS installation images are available from the EMC online support site.

Procedure

1. From the EMC Online Support site, click the download link for the version of the OneFS image that you want to install.

   https://support.emc.com/downloads/15209_Isilon-OneFS

2. Save the installation files to the /ifs/data directory on the EMC Isilon cluster.

3. From the EMC Online Support site, next to the download link, click Checksum and record the MD5 checksum value.

4. Open a secure shell (SSH) connection to any node in the cluster and log in using the root account.

5. In the OneFS command-line interface, run the following command, specifying the installation image file name:

   md5 <OneFS-install-file-name>

   The command returns an MD5 checksum value.

6. Compare the MD5 checksum value recorded from the EMC Online Support site against the MD5 checksum generated from the command-line interface.

Run the upgrade compatibility check utility

Run the upgrade compatibility check utility to confirm that the EMC Isilon cluster is compatible with the OneFS version that you are upgrading to.

Before you begin

You must download the installation files for the OneFS version that you are upgrading to.

Procedure

1. Open a secure shell (SSH) connection to any node in the cluster and log in to the cluster with the root account.

2. Run the isi version osrelease command and, in the output, view the OneFS version that is running on the cluster.

3. (Optional) If the cluster is currently running OneFS 6.5.5.9 or earlier, you must install a patch before running the upgrade compatibility checks.

   The specific patch that you install depends on the version of OneFS that you are upgrading from.

   The patch adds the --check-only option to the isi update command so that you can run the compatibility check utility without starting the upgrade process. See EMC Isilon knowledge base article 88766, Patches to provide pre-upgrade configuration checks... for more information.
<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
</table>
| OneFS 6.5.5.0–6.5.5.9         | a. Download patch 96454 from the EMC Isilon FTP site at ftp://ftp.isilon.com/outgoing/patches/patch-96454.tgz.  
                                | b. Install the patch by completing the steps in the README file that is included with the patch.                                           |
                                | b. Install the patch by completing the steps in the README file that is included with the patch.                                           |
| OneFS versions earlier than   | Contact Isilon Technical Support for information about running the upgrade compatibility checks.                                             |
| 6.5.4                         |                                                                                                                                            |

4. Start the upgrade compatibility check utility by running the following command:

   
   `isi update --check-only`

   The following prompt appears:

   Please specify the image to update:

   **Note**

   Although the prompt indicates that the image will be updated, because the `--check-only` option was specified, the command only runs the upgrade compatibility check utility.

5. At the prompt, type the absolute path or URL to the location of the installation image, which contains the utility, and then press **ENTER**.

   The installation image should be in the `/ifs/data` directory on the cluster. For example, `/ifs/data/OneFS_v7_Install.tar.gz`.

   The utility may take several minutes to run.

   **After you finish**

   If the utility returns errors, you must resolve the errors before proceeding with the upgrade. Warnings are informational and do not prevent an upgrade.

**Upgrade compatibility checks**

The upgrade compatibility check utility examines the following areas of the EMC Isilon cluster and returns warnings or errors if an area is not compatible with the version that you want to upgrade to.

<table>
<thead>
<tr>
<th>Check</th>
<th>Description and recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk load</td>
<td>Checks the cluster usage level and returns a warning if the disk load is greater than 50 percent. We recommend that you disconnect all client connections and stop all system jobs before upgrading. A disk load that is greater than 50 percent is not compatible with the upgrade.</td>
</tr>
<tr>
<td>Check</td>
<td>Description and recommendation</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Check</td>
<td>percent might indicate that multiple clients are connected to the cluster or that system jobs are running. We also recommend that you reboot the cluster, if you have not already done so.</td>
</tr>
<tr>
<td>Free space</td>
<td>Checks the free space and returns a warning or an error if certain capacity thresholds are exceeded for the following cluster partitions or node pools:</td>
</tr>
<tr>
<td></td>
<td>/ Returns a warning if the root partition exceeds 97 percent of its capacity. The utility returns an error if the partition reaches 100 percent capacity.</td>
</tr>
<tr>
<td></td>
<td>/var Returns a warning if the /var partition is more than 90 percent full. The utility returns an error if the partition reaches 100 percent full.</td>
</tr>
<tr>
<td></td>
<td>/ifs Returns a warning if the /ifs partition exceeds 95 percent of its capacity. The utility returns an error if the partition reaches 100 percent capacity.</td>
</tr>
<tr>
<td></td>
<td>Node pools Returns a warning if one or more node pools exceeds 90 percent of its capacity. The utility returns an error if all the node pools reach 90 percent capacity.</td>
</tr>
<tr>
<td></td>
<td>If the utility reports an error, do not proceed with the upgrade until you reduce the size of the partition or node pool so that the free space for that partition is below the threshold.</td>
</tr>
<tr>
<td></td>
<td>See &quot;Check for free node space&quot; in this guide for more information.</td>
</tr>
<tr>
<td>Drive stalls</td>
<td>Checks the health of the drives in the cluster and returns a warning if the cluster contains stalled drives. If the utility reports a stalled drive, do not proceed with the upgrade until you smartfail and replace the stalled drive or resolve the stall.</td>
</tr>
<tr>
<td></td>
<td>See EMC Isilon knowledge base article 89477, Introduction to drive stalls, for information about resolving drive stalls.</td>
</tr>
<tr>
<td>Smartfail operation status</td>
<td>Determines whether a smartfail operation is running on any drives or nodes in the cluster.</td>
</tr>
<tr>
<td>Check</td>
<td>Description and recommendation</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Check</td>
<td>If a smartfail operation is running, the utility returns an error. Wait for the smartfail operation to complete before proceeding with the upgrade.</td>
</tr>
<tr>
<td>Integrity scan job status</td>
<td>Determines whether the integrity scan job is running. If the integrity scan job is running, wait for the job to complete before proceeding with the upgrade.</td>
</tr>
<tr>
<td>Outstanding critical events</td>
<td>Checks for critical events on the cluster. If the utility returns any critical events, do not proceed with the upgrade until you resolve the issues. See the OneFS Event Reference for more information.</td>
</tr>
<tr>
<td>Unsupported chmod_mask_nfs_only ACL policy</td>
<td>Checks whether the chmod_mask_nfs_only ACL policy is set. This policy is not available in OneFS 7.2 and later. If the utility returns an error, the ACL policy is set. Upgrades will succeed regardless of whether the policy is set; however, the policy will not be available after the upgrade completes.</td>
</tr>
<tr>
<td>Unsupported SMB configuration</td>
<td>Checks for deprecated SMB settings. If the utility reports that the SMB configuration is not supported, do not proceed with the upgrade until you remove the unsupported settings and reconfigure SMB. See &quot;Reconfigure unsupported SMB settings&quot; in this guide for more information.</td>
</tr>
<tr>
<td>SMB-access zone association</td>
<td>Checks if one or more SMB shares are associated with multiple Access Zones where the share paths are equal or nested. If the utility reports an error, the upgrade will succeed. However, you cannot create new Access Zones until the path overlap is fixed.</td>
</tr>
<tr>
<td>Kerberos keytab check</td>
<td>Checks whether Kerberos settings have been configured to preserve the keytab file. If the utility reports an error, you must configure Kerberos settings before upgrading OneFS. See &quot;Preserve the Kerberos keytab file&quot; in this guide for more information. The keytab file will be used to migrate Kerberos settings into the OneFS web administration interface and command-line interface.</td>
</tr>
</tbody>
</table>
## Completing pre-upgrade tasks

<table>
<thead>
<tr>
<th>Check</th>
<th>Description and recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note</strong></td>
<td>This check was first added for upgrades to OneFS 7.2. If you are upgrading to an earlier version of OneFS, you must manually make sure that Kerberos settings have been configured correctly.</td>
</tr>
<tr>
<td><strong>HDFS Kerberos keytab check</strong></td>
<td>Checks whether HDFS Kerberos settings have been configured to preserve the keytab file. If the utility reports an error, you must configure Kerberos settings before upgrading OneFS. See &quot;Preserve the Kerberos keytab file&quot; in this guide for more information. The keytab file will be used to migrate Kerberos settings into the OneFS web administration interface and command-line interface.</td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>This check was first added for upgrades to OneFS 7.2. If you are upgrading to an earlier version of OneFS, you must manually make sure that Kerberos settings have been configured correctly.</td>
</tr>
<tr>
<td><strong>Legacy LDAP support enabled</strong></td>
<td>Checks the compatibility of the LDAP service. If the utility reports that the cluster is configured with an LDAP service deprecated in the version you are upgrading to, do not proceed with the upgrade until you reconfigure the cluster with a supported LDAP service. See &quot;Configure the LDAP service&quot; in this guide for more information.</td>
</tr>
<tr>
<td><strong>Unsupported SmartPools configuration</strong></td>
<td>Checks the compatibility of the SmartPools configuration. If the utility reports that the cluster contains a SmartPools configuration deprecated in the version you are upgrading to, do not proceed with the upgrade until you reconfigure SmartPools to a supported configuration. See &quot;Check disk pool configurations&quot; and &quot;Verify the disk pool policy&quot; in this guide for more information.</td>
</tr>
</tbody>
</table>
OneFS hardened upgrade compatibility check

The following checks are performed by the upgrade compatibility check utility only if you are upgrading from OneFS 7.0.1.H.7 to OneFS 7.2.1.

Note

If you upgrade from OneFS 7.0.1.H.7 to OneFS 7.2.1, the Security Technology Implementation Guides (STIG) hardening profile will automatically be applied to the cluster.

If any of the following failure messages appear during the compatibility check, you must fix the issue by following the instructions included in the resolution column.

<table>
<thead>
<tr>
<th>Failure message</th>
<th>Description</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>In file /etc/mcp/templates/sshd_config, Text matching the following regular expression not found: ^PermitRootLogin[[:space:]]+[Nn][Oo]</td>
<td>The root user is able to access the cluster through SSH.</td>
<td>On each node that the error occurred on, perform the following procedure: 1. Open the /etc/mcp/templates/sshd_config file in a text editor. 2. Edit the file so that the PermitRootLogin option is set to No. The file must contain the following line: PermitRootLogin No</td>
</tr>
<tr>
<td>In file /etc/ttys, Text matching the following regular expression not found: ^console[[:space:]]+.+ [[:space:]]+.+ [[:space:]]+.+ [[:space:]]+ insecure</td>
<td>The console security is not set to insecure.</td>
<td>On each node that the error occurred on, perform the following procedure: 1. Open the /etc/ttys file in a text editor. 2. Edit the file so that the console option is set to insecure. The file must contain the following line: console none unknown off insecure</td>
</tr>
<tr>
<td>In file /var/cron/allow, Text matching the</td>
<td>The root user is not currently able to run the crontab command.</td>
<td>On each node that the error occurred on, perform the following procedure:</td>
</tr>
<tr>
<td>Failure message</td>
<td>Description</td>
<td>Resolution</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>following regular expression not found: root</td>
<td></td>
<td>1. Open the <code>/var/cron/allow</code> file in a text editor. 2. Add the following line to the file: root</td>
</tr>
<tr>
<td>In file <code>/var/cron/allow</code>, user other than root is present</td>
<td>Users other than root are currently able to run the <code>crontab</code> command.</td>
<td>On each node that the error occurred on, perform the following procedure: 1. Open the <code>/var/cron/allow</code> file in a text editor. 2. Remove all text from the file except the following line: root</td>
</tr>
<tr>
<td>File <code>/var/cron/deny</code> contains at least one user</td>
<td>The root user might be blocked from running the <code>crontab</code> command.</td>
<td>On each node that the error occurred on, perform the following procedure: 1. Open the <code>/var/cron/deny</code> file in a text editor. 2. Remove all text from the file except comments.</td>
</tr>
<tr>
<td>In file <code>/var/at/at.allow</code>, Text matching the following regular expression not found: root</td>
<td>The root user is not currently able to run the <code>at</code> command.</td>
<td>On each node that the error occurred on, perform the following procedure: 1. Open the <code>/var/at/at.allow</code> file in a text editor. 2. Add the following line to the file: root</td>
</tr>
<tr>
<td>In file <code>/var/at/at.allow</code>, user other than root is present</td>
<td>Users other than root are currently able to run the <code>at</code> command.</td>
<td>On each node that the error occurred on, perform the following procedure: 1. Open the <code>/var/at/at.allow</code> file in a text editor.</td>
</tr>
</tbody>
</table>

Completing pre-upgrade tasks
<table>
<thead>
<tr>
<th>Failure message</th>
<th>Description</th>
<th>Resolution</th>
</tr>
</thead>
</table>
| In file `/etc/master.passwd`, Text matching the following regular expression not found: `^www:.*:.*:.*:.*:.*:.*:.*:/var/empty:.*` | The www user's home directory is not currently set to `/var/empty`. | 2. On any node in the cluster, run the following command: 
`isi auth users modify www --home-directory /var/empty` |
| In file `/etc/master.passwd`, Text matching the following regular expression not found: `^ganglia:.*:.*:.*:.*:.*:.*:.*:/var/empty:.*` | The ganglia user's home directory is not currently set to `/var/empty`. | On any node in the cluster, run the following command: 
`isi auth users modify ganglia --home-directory /var/empty` |
| In file `/etc/master.passwd`, Text matching the following regular expression not found: `^toor:.*:90:.*` | The UID of the toor user is not currently set to 90. | 1. On any node in the cluster, run the following command: 
`pw user mod toor -u 90`
2. On any node in the cluster, run the following command: 
`isi_for_array /usr/likewise/bin/lwsm restart lsass` |
| In file `/root/.cshrc`, Text matching the following regular expression not found: `^umask[[:space:]]\+77` | The umask of the root user for C-shell is not set to 77. | On each node that the error occurred on, perform the following procedure: 
1. Open the `/root/.cshrc` file in a text editor.
2. Add the following line to the file: 
`umask 77` |
Completing pre-upgrade tasks

<table>
<thead>
<tr>
<th>Failure message</th>
<th>Description</th>
</tr>
</thead>
</table>
| In file /root/.profile, Text matching the following regular expression not found: ^umask[:space:]
]\+077 | The umask of the root user in the root user's profile is not set to 077.     |
| Resolution                                                                    | On each node that the error occurred on, perform the following procedure:    |
|                                                                              | 1. Open the /root/.profile file in a text editor.                           |
|                                                                              | 2. Add the following line to the file:                                      |
|                                                                              | umask 077                                                                  |

Back up data

It is recommended that you back up all files and data on your EMC Isilon cluster immediately before you upgrade.

Allow sufficient time for a full and an incremental backup, if needed. Depending on the size of your cluster and the file types stored, a back up can take one or more days.

It is recommended that you back up the following directories:

- Back up modified files from:
  - /usr/
  - /usr/local/
  - /usr/libexec/
  - /var/
  - /var/crash/
- Back up all files from /etc/mcp/override/. Some files in this directory may need to be reconfigured after upgrading.

You should validate that you can restore the data from your backup system before you upgrade.

SyncIQ backup

You can back up the data on an EMC Isilon cluster by replicating the data from one cluster to another with SyncIQ.

SyncIQ enables you to retain a consistent backup copy of your data on another Isilon cluster. You must configure a SyncIQ license on both Isilon clusters before you can replicate data between them.

You can replicate data at the directory level while optionally excluding specific files and sub-directories from being replicated. SyncIQ creates and references snapshots to replicate a consistent point-in-time image of a root directory. Metadata such as access control lists (ACLs) and alternate data streams (ADS) are replicated along with data.

See the OneFS Web Administration Guide or the OneFS CLI Administration Guide for information on replicating data with SyncIQ.
NDMP backup

You can back up the data on your EMC Isilon cluster through the Network Data Management Protocol (NDMP).

From a backup server, you can direct backup and recovery processes between a cluster and backup devices such as tape devices, media servers, and virtual tape libraries (VTLs).

You can perform both NDMP three-way backup and NDMP two-way backup. NDMP two-way backup is the most efficient method in terms of cluster resource consumption.

However, NDMP two-way backup requires that you attach one or more backup accelerator nodes to the cluster.

During an NDMP three-way backup operation, a data management application (DMA) on a backup server instructs the cluster to start backing up data to a tape media server that is either attached to the LAN or directly attached to the DMA. During a two-way NDMP backup, a DMA on a backup server instructs a backup accelerator node on the cluster to start backing up data to a tape media server that is attached to the backup accelerator node. In both backup models, file history data is transferred from the cluster to a backup server over the network, even if the NDMP stream is backed up directly to tape over fiber-channel interfaces.

See the OneFS Web Administration Guide or the OneFS CLI Administration Guide for information on backing up data with NDMP.

Back up custom settings

Document and back up any custom settings you have on your EMC Isilon cluster.

Most settings are transferred over to the new version of OneFS during the upgrade. Backing up custom settings enables you to reapply any settings that were not transferred during the upgrade process.

Back up the following custom settings:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMB audit logging</td>
<td>If you have an audit log directory in /ifs—for example, /ifs/auditlog—you might have custom SMB logging settings. After upgrading, you must reconfigure SMB audit logging. See the following documents for more information about SMB audit logging:</td>
</tr>
<tr>
<td></td>
<td>- Article 16545, How to enable SMB or SMB2 logging and auditing in OneFS 6.5</td>
</tr>
<tr>
<td></td>
<td>- File System Auditing with EMC Isilon and EMC Common Event Enabler</td>
</tr>
<tr>
<td>Passwords for local user accounts</td>
<td>Make a list of your local accounts and their passwords before you upgrade. After you upgrade, you might have to reset the passwords of the local user accounts that you configured on the cluster.</td>
</tr>
</tbody>
</table>
### Completing pre-upgrade tasks

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Other users should be prepared to reset the passwords of their local accounts after the upgrade.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Changes to system control (sysctl) values</strong></td>
<td>If you overrode a default sysctl value either for the cluster in <code>/etc/mcp/override/sysctl.conf</code> or for a local node in <code>/etc/local/sysctl.conf</code>, you might need to reset the sysctl value after upgrading. A sysctl value that was modified in another file, such as <code>/etc/sysctl.conf</code>, will not be copied over when you upgrade. It is recommended that you do not modify sysctl values unless you are instructed to do so by Isilon Technical Support. However, if you must change a sysctl value, set it in the override file to preserve it when you upgrade a node or a cluster. Document your sysctl values and back up the override files before you proceed. See EMC Isilon knowledge base article 89232, <em>Configuring sysctls and making sysctl changes persist through node and cluster reboots and upgrades</em> for more information.</td>
</tr>
<tr>
<td><strong>Certificates</strong></td>
<td>If you configured a certificate for your cluster, you must configure a certificate again after you upgrade. Make sure you have the certificate information on hand so that you can set up the certificate after the upgrade.</td>
</tr>
<tr>
<td><strong>Static routes</strong></td>
<td>If you are upgrading a cluster running a version of OneFS earlier than 6.5, you must reconfigure the static routes that were set in <code>rc.conf</code>. Back up the <code>rc.conf</code> file so that you can reconfigure the routes after you upgrade. If you are upgrading a cluster running OneFS 6.5 or later, static routes that you set in <code>rc.conf</code> or through the <code>isi networks</code> <code>modify pool &lt;subnet&gt;:&lt;pool&gt; --add-static-routes</code> command should transfer over when you upgrade. If you are upgrading a cluster running OneFS 6.5 or later, static routes that you set in <code>rc.conf</code> should be reconfigured before you upgrade. See the following EMC Isilon knowledge base articles for more information about static routes:</td>
</tr>
</tbody>
</table>

---

38 OneFS Upgrade Planning and Process Guide
Collect cluster data

You should collect information about your EMC Isilon cluster before you upgrade. Collecting information helps both you and Isilon Technical Support troubleshoot if a problem occurs.

Collect cluster information

Before you upgrade, record key information about your EMC Isilon cluster. Refer to the recorded information to verify that your settings have been preserved after you upgrade. If there is an issue with your upgrade, share the information with Isilon Technical Support.

It is recommended that you collect and record the following information:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspera for Isilon</td>
<td>Before you upgrade, back up your Aspera configuration files. If your Aspera settings are not transferred over after the upgrade, you must reinstall Aspera. Back up configuration files in the following directories:</td>
</tr>
<tr>
<td></td>
<td>• /ifs/.ifsvar/aspera/etc/</td>
</tr>
<tr>
<td></td>
<td>• /ifs/.ifsvar/aspera/www/</td>
</tr>
<tr>
<td></td>
<td>• /usr/local/aspera/var/aspera-prepost</td>
</tr>
<tr>
<td></td>
<td>You should also back up your custom Aspera scripts. For more information, see the Aspera Enterprise Server for Isilon guide at the Asperasoft web site.</td>
</tr>
<tr>
<td>Cron jobs</td>
<td>Cron jobs settings that were not configured through /etc/mcp/ override/ crontab.smbtime are lost after an upgrade. Document and back up these cron jobs or reconfigure them through /etc/mcp/ override/crontab.smbtime before you upgrade. Check for syntax changes of OneFS commands that may affect your cron job. You might have to modify a cron job that contains changed OneFS commands so that the job works after the upgrade.</td>
</tr>
</tbody>
</table>
• Upgrade date
• Cluster name
• Current OneFS version
• Upgrade OneFS version
• Physical installation location
• List of all nodes types and quantity of each
• Software licenses:
  ▪ SmartConnect Advanced
  ▪ SmartQuotas
  ▪ SmartPools
  ▪ SmartLock
  ▪ SyncIQ
  ▪ SnapShotIQ
  ▪ InsightIQ
  ▪ SmartDedupe
  ▪ iSCSI
  ▪ Isilon for vCenter
  ▪ HDFS
• SyncIQ usage (destination or source)
• Cluster usage (production, test, development, evaluation)
• Data protection level of the cluster (+1n, +2d:1n, +2n, +3d:1n, +3d:1n1d, +3n, +4d:1n, +4d:2n, +4n, 2x, 3x, 4x, 5x, 6x, 7x, 8x)
  If multiple diskpools or nodepools exist, note the protection level of each.
• Custom protection levels for directories, files or pools
• IB switch type (dual or single)
• MTU (9,000 or 1,500)
• File sharing protocols enabled on the cluster, such as:
  ▪ SMB
  ▪ NFS
  ▪ HTTP
  ▪ FTP
  ▪ SSH
  ▪ HDFS
  ▪ iSCSI
• Cluster access method for administration (serial console, SSH, web interface)
• Is SupportIQ or ESRS Gateway support enabled?
• List of customizations:
  ▪ Local accounts and passwords
  ▪ SMB audit logging
  ▪ Custom scripts
Collect cluster status

Before you upgrade, get the status of your EMC Isilon cluster.

Run the `isi status` command with the following options to get the status of your cluster, events, and jobs:

```
isi status -D -w
```

These options display non-truncated, detailed information on running protection operations, including a list of worker processes. These options also display more information on failed protection operations, including a list of errors.

Save the results to help Isilon Technical Support troubleshoot if a problem occurs during or after the upgrade.

For more information, see the OneFS CLI Administration Guide.

Gather cluster logs through the command-line interface

You can gather and send cluster logs from each node in the cluster to EMC Isilon Technical Support.

Logs generated by this command are stored by default in the `/ifs/data/Isilon_Support/pkg` directory.

Procedure

1. Run the following command.

```
isi_gather_info
```

You must have root access to run `isi_gather_info`. For more information about the `isi_gather_info` command, see the OneFS CLI Administration Guide.

Complete or stop jobs in progress

You should ensure that there are no jobs running on your EMC Isilon cluster before beginning the OneFS upgrade.

Wait for jobs to fully complete or stop jobs before upgrading.

Complete NDMP backup

Before you upgrade, you must wait for Network Data Management Protocol (NDMP) backups to finish so you have saved copies of your data.

If you cannot wait for the backups to finish, stop the active NDMP backups 30–60 minutes before the upgrade. The NDMP backup process requires this additional time to come to a halt.
For instructions on how to stop backup jobs, see the documentation for your backup application.

**Complete system jobs**

You must complete or cancel all system jobs running on your EMC Isilon cluster before you upgrade the OneFS operating system.

OneFS performs system jobs through a service that runs in the background. Ensure that no system jobs are running during the upgrade or the upgrade process might fail. You can allow system jobs to finish before you begin the upgrade process or you can cancel them. The following system jobs provide information that is useful in determining cluster readiness; it is recommended that you allow these jobs to run to completion before the upgrade instead of canceling them:

**FlexProtect**

Following a node failure, performs a pass on the file system to ensure that all files remain protected. FlexProtect is most efficient in clusters that contain only HDDs.

**FlexProtectLin**

Following a node failure, performs a pass on the file system to ensure that all files remain protected. FlexProtectLin is most efficient if file system metadata is stored on SSDs.

**IntegrityScan**

Verifies file system integrity.

---

**Note**

If a FlexProtect, FlexProtectLin, or IntegrityScan system job takes longer than expected, contact Isilon Technical Support. Do not stop one of these system jobs unless instructed to do so by Support. You cannot proceed with the upgrade if any of these three system jobs are running.

**Procedure**

1. Run the following command to check for running system jobs:

   ```shell
   isi job status
   ```

2. Run the following command for each running job, where `<job>` is a job name or a job instance ID:

   ```shell
   isi job cancel <job>
   ```

   **Note**

   Do not cancel FlexProtect, FlexProtectLin, or IntegrityScan jobs.

3. Run the following command 20 to 30 minutes before the upgrade to stop the system job service:

   ```shell
   isi services -a isi_job_d disable
   ```
4. Run the following command to re-enable the system job service before the upgrade; upgrading relies on the system job service:

```
isil services -a isi_job_d enable
```

## Pause or cancel SyncIQ jobs

Pause or cancel any SyncIQ jobs that are running on your EMC Isilon cluster before upgrading the OneFS operating system.

Pause or cancel SyncIQ jobs 30 to 60 minutes before upgrading to reduce the likelihood of failed backups or incomplete SyncIQ jobs during the upgrade.

- Pausing a replication job temporarily stops data from being replicated, but does not free the cluster resources replicating the data. You can pause a running SyncIQ job and then resume the job later.
- Cancelling a SyncIQ job stops data from being replicated and frees the cluster resources that were replicating data. You cannot resume a cancelled SyncIQ job; to restart replication, you must start the policy again.

It is recommended that you set SyncIQ jobs to run only when manually started in order to ensure that a job cannot run again. You might need to reproduce the original schedules after the upgrade. You can set the policy to run manually in the individual policy settings from the web administration interface.

### Procedure

1. Run the following command to determine if a license for SyncIQ is activated on the cluster:

```
isil license |grep -l synciq
```

2. Run the following command to view a list of SyncIQ policies on the cluster:

```
isil sync policy list -v
```

3. Run the following command to view any running jobs:

```
isil sync jobs list
```

4. Pause or cancel running SyncIQ jobs.

    - Pause a SyncIQ job by running the following command, where `<policy-name>` is the policy that you want to pause:
      
      ```
isil sync jobs pause <policy-name>
      ```
    
    - Cancel a SyncIQ job by running the following command, where `<policy-name>` is the policy that you want to cancel:
      
      ```
isil sync jobs cancel <policy-name>
      ```

"
**Update drive firmware**

You must make sure that the cluster is running Drive Firmware Package (DFP) 1.8 or later before upgrading the cluster.

After a cluster upgrade, OneFS might upgrade the file system, which causes nodes to experience higher levels of drive I/O than usual. If a node is running drive firmware package 1.7 or earlier, the increased I/O might trigger an issue that causes Mars-K+ drives to appear to have failed, which could result in the cluster becoming underprotected. For more information, see ETA 193819.

**Procedure**

1. For information about installing drive firmware, see the Drive Firmware Package Release Notes.

**Disconnect client connections**

Disconnect client connections to the EMC Isilon cluster before you upgrade OneFS.

Client disconnection is required for simultaneous upgrades and highly recommended for rolling upgrades to deliver the best upgrade experience. You can terminate connections immediately or specify an amount of time to wait for connections to terminate after you start the upgrade process through the drain time option available when you start a rolling upgrade.

Disconnect the following connection protocols at least 5 to 10 minutes before you upgrade to avoid leaving clients with stalled mounts:

- NFS
- SMB
- HTTP
- Hadoop/HDFS
- iSCSI

**Note**

If there are any iSCSI connections to the cluster, you can only perform a simultaneous upgrade. After all the initiator connections are stopped, set the iSCSI LUN to offline until the upgrade is complete.

**Disconnect IPMI ports**

If you have enabled IPMI ports, it is recommended that you change the IPMI port IP configuration to static in the BIOS settings for each affected node.

**Note**

Use of IPMI ports is not supported and we do not recommend connecting IPMI ports to a network.

**Procedure**

1. This procedure is documented in EMC Isilon knowledge base article 89532, *Unsupported IPMI port is active and uses DHCP on X200, S200, X400, and NL400 nodes.*
If you change the IPMI port configuration during the upgrade process, and your workflow requires the IPMI ports to be enabled, you must manually re-enable the ports after the upgrade process is complete.

Activate SupportIQ or ESRS

You can enable SupportIQ or EMC Secure Remote Services (ESRS), both of which are features that can help Isilon Technical Support troubleshoot if a problem occurs.

When SupportIQ or ESRS is enabled, Isilon Technical Support personnel can request logs through scripts that gather EMC Isilon cluster data and then upload the data to a secure location. Both features can also enable remote access, which allows Isilon Technical Support personnel to troubleshoot your cluster remotely and run additional data-gathering scripts.

You must enable and configure either SupportIQ or ESRS support before Isilon Technical Support can gather data or access clusters remotely.

ESRS support is only available on clusters running OneFS 7.1 or later.

See the OneFS Web Administration Guide or the OneFS CLI Administration Guide for more information on SupportIQ and ESRS.
Completing pre-upgrade tasks
CHAPTER 5
Performing the OneFS upgrade

This section contains the following topics:

- Upgrade process overview ................................................................. 48
- Completing a simultaneous upgrade of OneFS ....................................... 48
- Completing a rolling upgrade of OneFS .................................................. 49
- Verify the OneFS installation ................................................................. 54
Upgrade process overview

The OneFS upgrade process consists of installing the upgrade image, starting the upgrade, and verifying that the upgrade completed.

You must first download the installation image from the EMC Support website. See "Download the OneFS image" for more information.

You can upgrade OneFS from the command-line interface or the web administration interface.

Before upgrading OneFS, be sure that you have completed all pre-upgrade tasks.

Completing a simultaneous upgrade of OneFS

A simultaneous upgrade upgrades OneFS and restarts all of the nodes in the EMC Isilon cluster at the same time. While the nodes are restarting, the cluster is unavailable for client connections.

You can perform a simultaneous upgrade through the web administration interface or the command line interface.

Perform a simultaneous upgrade through the web interface

You can upgrade the OneFS version that is running on an EMC Isilon cluster through the web administration interface.

Before you begin

You must download the OneFS installation image from the EMC Support website. The OneFS installation image is used to run compatibility checks. If you have not downloaded the image and run the checks, you must do so before upgrading OneFS. You must resolve any compatibility issues found by the checks before installing the new version of OneFS. See the Upgrade compatibility check utility section for more information.

Procedure

1. Log in to the lowest-numbered node in the cluster through the OneFS web administration interface with the root account.
2. Navigate to the Upgrade OneFS page.
   - For OneFS 6.5 or earlier, click Cluster > Cluster Management > Upgrade Summary.
   - For OneFS 7.0 or later, click Help > About This Cluster, and then click Upgrade.
3. Browse to the location of the installation image that you want to install, and then click Submit.
4. In the Upgrade Mode area, select Simultaneous upgrade, and then click Continue.
   The cluster displays status updates and a prompt to continue the upgrade process.
5. Click yes to begin the upgrade process.
   The cluster might display several confirmation messages. You must confirm each message to continue the upgrade process.

Results

After the OneFS image is updated, the cluster restarts, and then the web administration interface login page appears. If the login page does not appear, clear your web browser cache and reload the page. A number of upgrade-related jobs may continue to run on the
Perform a simultaneous upgrade through the CLI

You can upgrade the OneFS version that is running on an EMC Isilon cluster through the command-line interface.

Before you begin

You must download the OneFS installation image from the EMC Support website. The OneFS installation image is used to run compatibility checks. If you have not downloaded the image and run the checks, you must do so before upgrading OneFS. You must resolve any compatibility issues found by the checks before installing the new version of OneFS. See the Upgrade compatibility check utility section for more information.

Procedure

1. Open a secure shell (SSH) connection on the lowest-numbered node in the cluster and log in with the root account.
2. Run the following command to perform a simultaneous upgrade:

   `isi update`

3. At the prompt, specify the location of the OneFS installation image that you downloaded and press Enter.

Results

After the upgrade, a number of upgrade-related jobs may continue to run on the cluster for some time. During this time, the cluster is accessible, but you might experience a decrease in cluster performance. After the jobs complete, performance will return to normal.

Completing a rolling upgrade of OneFS

A rolling upgrade upgrades OneFS and restarts each node in the EMC Isilon cluster sequentially.

You can perform a rolling upgrade through the web administration interface or the command line interface.

Rolling upgrades are not available for some OneFS versions. Review the relevant OneFS Release Notes for a list of versions that support rolling upgrades.

Perform a rolling upgrade through the web interface

You can upgrade the OneFS version that is running on an EMC Isilon cluster through the web administration interface.

Before you begin

You must download the OneFS installation image from the EMC Support website. The OneFS installation image is used to run compatibility checks. If you have not downloaded the image and run the checks, you must do so before installing the new version of OneFS. You must resolve any compatibility issues found by the checks before installing the new version of OneFS. See the Upgrade compatibility check utility section for more information.
Procedure

1. Log in to the lowest-numbered node in the cluster through the OneFS web administration interface with the root account.

2. Navigate to the Upgrade OneFS page.
   - For OneFS 6.5 or earlier, click Cluster > Cluster Management > Upgrade Summary.
   - For OneFS 7.0 or later, click Help > About This Cluster, and then click Upgrade.

3. Browse to the location of the installation image that you want to install, and then click Submit.

4. In the Upgrade Mode area, select Rolling upgrade, and then click Continue.
   The cluster displays status updates and a prompt to continue the upgrade process.

5. (Optional) Specify how to terminate client connections before upgrading the node.

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>To immediately terminate client connections</td>
<td>Click Immediately terminate TCP connections.</td>
</tr>
</tbody>
</table>
| To allow client connections to terminate after a wait period | a. Click Wait for TCP connections to terminate.  
|                                                             | b. In the Wait time field, type an integer that represents how long to wait in seconds, minutes, hours, days, weeks, or months. |

**Note**
If any client connections are not terminated within the specified drain time, the upgrade will halt or fail. You must manually disconnect client connections and restart the upgrade. You must restart the upgrade from the node that the upgrade failed on, view the update_handler file. The file is located under /var/log, and is named according to the following format:

/var/log/update_handler_<date_upgrade_started>.txt

The node that the upgrade failed on is the last node mentioned in the file.

6. (Optional) Specify whether you want to confirm restarting each node during the upgrade process.

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>To display a notification and a prompt before each upgraded node is restarted</td>
<td>Click Confirm before rebooting nodes.</td>
</tr>
</tbody>
</table>
Options | Description
--- | ---
| **Note** | This option requires that you stay connected to the session to confirm each reboot. If you disconnect, the upgrade will halt until you can physically connect to the node through the serial port to confirm the reboot by typing yes, even if no prompt is displayed on the screen.
| To automatically restart each upgraded node without a prompt | Click Reboot nodes without confirmation.

7. Click yes to begin the upgrade process.

The cluster might display several confirmation messages. You must confirm each message to continue the upgrade process.

Results
After the OneFS image is updated on the final node and the node restarts, the web administration interface login page appears. If the login page does not appear, clear your web browser cache and reload the page. A number of upgrade-related jobs may continue to run on the cluster for some time. During this time, the cluster is accessible, but you might experience a decrease in cluster performance. After the jobs complete, performance will return to normal.

Perform a rolling upgrade through the CLI
You can upgrade the OneFS version that is running on an EMC Isilon cluster through the command-line interface.

Before you begin
You must download the OneFS installation image from the EMC Support website. The OneFS installation image is used to run compatibility checks. If you have not downloaded the image and run the checks, you must do so before installing the new version of OneFS. You must resolve any compatibility issues found by the checks before installing the new version of OneFS. See the Upgrade compatibility check utility section for more information.

Procedure
1. Open a secure shell (SSH) connection on the lowest-numbered node in the cluster and log in with the root account.
2. Run the following command to perform a rolling upgrade:
   
   ```
   isi update --rolling
   ```
3. (Optional) You can specify the following rolling upgrade options:

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection drain time</td>
<td>Specify a timeout period for clients to disconnect with the --drain-time option.</td>
</tr>
</tbody>
</table>
### Options

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>This option</strong></td>
<td>Specifies the number of seconds during which clients can disconnect from the cluster before the upgrade process restarts the node. The default timeout is zero seconds.</td>
</tr>
</tbody>
</table>

**Note**

If any client connections are not terminated within the specified drain time, the upgrade will halt or fail. You must manually disconnect client connections and restart the upgrade. You must restart the upgrade from the node that the upgrade failed on. To identify which node the upgrade failed on, view the `update_handler` file. The file is located under `/var/log`, and is named according to the following format:

`/var/log/update_handler_<date_upgrade_started>.txt`  

The node that the upgrade failed on is the last node mentioned in the file.

| Manual restart | Display a confirmation prompt before each node restarts by including the `--manual` option. If you do not include this option, each upgraded node is automatically restarted without a prompt. |

**Note**

This option requires that you stay connected to the session to confirm each reboot. If you disconnect, the upgrade will halt until you can physically connect to the node through the serial port to confirm the reboot by typing `yes`, even if no prompt is displayed on the screen.

The following example command starts a rolling upgrade, sets a drain time of ten minutes and specifies manual restart for each node:

```bash
isi update --rolling --drain-time=600 --manual
```

4. At the prompt, specify the location of the OneFS installation image that you downloaded and press `Enter`.

### Results

After the OneFS image is updated on the final node and the node restarts, a number of upgrade-related jobs may continue to run on the cluster for some time. During this time, the cluster is accessible, but you might experience a decrease in cluster performance. After the jobs complete, performance will return to normal.

### Configuration changes during a rolling upgrade

During a rolling upgrade, nodes on the EMC Isilon cluster are upgraded and restarted one at a time and can affect which configuration changes are allowed on the cluster.

You can continue to manage data and perform cluster configurations during a rolling upgrade such as modifying and adding SMB shares or NFS exports. However, you can only make configuration changes from nodes that have not yet been upgraded. Configuration changes will fail on nodes that have been upgraded while the rolling upgrade is still in progress.
Features that are new in the OneFS version that you are upgrading to are not functional until all nodes in the cluster have been updated. Attempts to enable or configure settings for new features on an upgraded node will fail until the entire upgrade is complete. You cannot activate software module licenses on a cluster while a rolling upgrade is in progress.

The last node that is upgraded and restarted is the node on which the upgrade script is run. It is recommended that you make configuration changes from this node to adhere to the requirement that configuration changes be made from a non-upgraded node and to avoid client reconnection due to restarting nodes.

Client connections during rolling upgrades

During a rolling upgrade, nodes on the EMC Isilon cluster are upgraded and restarted one at a time and can affect client connections and access to data.

Rolling upgrades allow you and your users to access data before, during, and after the upgrade; however, as nodes are upgraded and restarted, users may experience brief pauses in the time it takes to complete a read or write operation.

Client connections to restarted nodes are automatically reconnected if the cluster is configured for dynamic IP allocation through the licensed SmartConnect Advanced module. When a node is restarted, the IP addresses assigned to the node are automatically moved to another available node, and the clients connected to the restarted node are automatically moved to the available node through the same IP addresses.

Clients may be required to re-establish connections more than once if a client reconnects to a node that has not been upgraded and restarted yet.

How the client connection behaves when a node is restarted depends on several factors including client type, and client configuration (mount type, timeout settings). The following table describes expected client behavior if connected to a node that is restarted on a cluster configured for dynamic IP allocation:

<table>
<thead>
<tr>
<th>Client</th>
<th>Expected client behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMB 1.0, 2.0</td>
<td>Client quickly re-establishes a connection to a new node after the connection to the restarting node is disrupted. This might occur several times throughout the upgrade process</td>
</tr>
<tr>
<td>NFS v2 and NFS v3 with hard mounts</td>
<td>Client transitions from the restarting node to a new node without disruption.</td>
</tr>
<tr>
<td>NFS v2 and NFS v3 with soft mounts</td>
<td>Client transitions from the restarting node to a new node without disruption. If the transition times out, the client continues to transition the connection until successful. The client may display a timeout notification; no action is required.</td>
</tr>
</tbody>
</table>

**Note**

Refer to EMC Isilon knowledge base article 90041, *Best practices for NFS client settings*, for more information.
Verify the OneFS installation

After you install OneFS, verify that the installation was successful.

Procedure

1. Confirm that the health of all the nodes in the EMC Isilon cluster is OK by running the following command:
   
   isi stat

2. Remove the installation files from the /ifs/data directory by running the following command:
   
   rm /ifs/data/OneFS_v<onefs-version>_Install.tar.gz
   
   Replace <onefs-version> with the four-digit OneFS version number.

3. Collect information about the cluster by running the following command:
   
   isi_gather_info
CHAPTER 6
Completing post-upgrade tasks

This section contains the following topics:

- About post-upgrade tasks ................................................................. 56
- Allow upgrade-related jobs to run ...................................................... 56
- Verify operational status .................................................................... 56
- Re-establish user privileges ............................................................... 58
- Restore client connections and test your workflow .............................. 58
- Restore custom settings ................................................................. 58
- Configuring base directories for access zones ................................. 59
- Reconfiguring SMB shares within access zones ............................... 60
- Reconfiguring home directory templates within access zones .......... 62
- Reconfiguring HDFS settings within access zones .......................... 63
- Verify Kerberos migration ............................................................... 63
- Migration to L3 cache ....................................................................... 64
- Update SMB auditing ........................................................................ 64
- Re-install Aspera ............................................................................... 65
- Modify custom scripts ...................................................................... 65
- Install recommended patches .......................................................... 65
- Implement the Platform API .............................................................. 66
About post-upgrade tasks

After an upgrade, you should perform a number of restoration and change management tasks to ensure your EMC Isilon cluster performs and behaves as expected.

Once the cluster has been upgraded to the new version of OneFS, the system will run a series of upgrade jobs that must be allowed to finish, and then you should verify that your cluster is operational.

It is important that you build time into your upgrade plan to re-establish custom settings and privileges, and re-enable connections and features. You should also make time to modify settings for new and changed features.

Allow upgrade-related jobs to run

You must allow upgrade-related jobs to run to completion.

After the upgrade, a number of upgrade-related jobs will continue to run for a while. This might include an important Upgrade job that redistributes, or re-stripes, data more efficiently.

The Upgrade job is normally run when upgrading to a OneFS version that has significant changes to on-disk structures—node pools or disk pools—than the previous OneFS version. The Upgrade job has three phases. First, the Upgrade job scans all LINs and restripes the files as needed, and then repeats the process on all SINs. Finally, the Upgrade job scans all blocks on all drives on the cluster. The following table indicates which upgrades cause the Upgrade job to run:

<table>
<thead>
<tr>
<th>Upgrading from</th>
<th>7.0.0</th>
<th>7.1.0</th>
<th>7.1.1</th>
<th>7.2.0</th>
<th>7.2.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.5.5</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.0.0</td>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>7.1.0</td>
<td></td>
<td>No</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.1.1</td>
<td></td>
<td></td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>7.2.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No</td>
</tr>
</tbody>
</table>

Although the EMC Isilon cluster remains accessible while the upgrade jobs are running, the jobs might temporarily decrease the cluster’s performance.

Verify operational status

You can run a series of commands as root to help verify that the EMC Isilon cluster is working correctly after an upgrade.

If you find an unresolvable issue, contact Isilon Technical Support.

Procedure

1. Check the new version number of the cluster:

   ```
   isi_for_array -s uname -a
   ```
2. View the status of the cluster and make sure all your nodes are operational:

   `isi status -D -w`

3. Ping all of the cluster’s internal and external interfaces to verify network connectivity and to help verify that SmartConnect works correctly.

   

4. Review the list of events and address any critical events:

   `isi events list -w`

5. Check the status of jobs and resume the jobs that you paused for the upgrade:

   `isi job status`

6. Verify your network interfaces:

   `isi networks list interfaces`

7. Verify your subnets:

   `isi networks list subnets --verbose`

8. Verify your pools:

   `isi networks list pools --verbose`

9. Review the cluster's other log files to check for stray problems:

   `cat /var/log/messages`

10. Review the list of SyncIQ jobs:

    `isi sync jobs list`

11. Check the SyncIQ job reports:

    `isi sync reports list`

12. Review the list of your scheduled snapshots:

    `isi snapshot schedules list`

13. Check the cluster's input and output; type Ctrl-C when you are done:

    `isi statistics system --nodes --top`

14. Check the devices in the nodes to validate the status of your drives:

    `isi_for_array -s "isi devices | grep -iv healthy"`
15. Check your global SMB settings:

`isi smb settings global view`

16. Check the status of the firmware to ensure that the firmware is consistent across nodes:

`isi firmware status`

17. Make sure that all your licenses carried over and remain up to date:

`isi license`

18. Check the status of your authentication providers to make sure they remain active:

`isi auth status --verbose`

Re-establish user privileges

After you upgrade, you should re-establish user privileges and roles.

OneFS 7.0 and later includes role-based access control (RBAC) for administration. In place of a root or administrator account, RBAC lets you manage administrative access by role. A role limits privileges to an area of administration. For example, you can create separate administrator roles for security, auditing, storage, and backup. Administrative RBAC helps improve security and compliance.

If your system administered roles through RBAC before your upgrade, custom roles are still in place. However, if the privileges assigned to built-in roles have changed in the new version, your users assigned to those built-in roles will now have those new privileges.

After upgrading, you can log in to the EMC Isilon cluster through SSH as root or though an administrator account if that role has been assigned to any users.

See the OneFS Web Administration Guide or the OneFS CLI Administration Guide for more information.

Restore client connections and test your workflow

After an upgrade, ensure that your EMC Isilon cluster works correctly, and then restore client connections and confirm that all your users, clients, and applications can access the cluster.

If you disconnected iSCSI initiators before you upgraded, you should reconnect them and set the cluster's iSCSI LUN to online in the web administration interface.

Test your workflows to ensure that they function correctly.

Restore custom settings

You should restore the custom settings that you backed up from your EMC Isilon cluster.

Certain custom settings might not have been transferred during the upgrade. Reapply the custom settings that you recorded and backed up before the upgrade. The custom settings include:
• SMB audit logging
• Passwords for local user accounts
• Changes to system controls
• Certificates
• Static routes
• Aspera for Isilon
• Cron jobs

Configuring base directories for access zones

If you have upgraded to OneFS 7.1.1 or later, you cannot create new access zones until you reconfigure any zones that were migrated during the OneFS upgrade.

In OneFS 7.1.1 and later, access zone functionality changed in the following ways:

• A base directory must be specified for each access zone.
• Each base directory cannot overlap with another base directory.
• The base directory of the default System access zone is /ifs and cannot be modified.

If you have upgraded to OneFS 7.1.1 or later, each migrated access zones now specifies /ifs as the base directory. Connections to access zones and data will continue to work as normal. However, this configuration is not recommended, and you will not be able to create new access zones until you reconfigure the base directories. However, the migrated configuration in which /ifs is the base directory for all of the access zones is not recommended, and you will not be able to create new access zones until you reconfigure each zone with a unique base directory.

Access zones upgrade example

The following example illustrates access zones before and after upgrading to OneFS 7.1.1 or later.

<table>
<thead>
<tr>
<th>Before upgrading</th>
<th>After upgrading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global List of Shares:</td>
<td>ZoneA:</td>
</tr>
<tr>
<td>• Finance = /ifs/data/Finance</td>
<td>• Base directory = /ifs</td>
</tr>
<tr>
<td>• Engineering = /ifs/data/Engineering</td>
<td>• Shares:</td>
</tr>
<tr>
<td>• Human Resources = /ifs/data/Human Resources</td>
<td>• Finance = /ifs/data/Finance</td>
</tr>
<tr>
<td>ZoneA:</td>
<td>• Home directory template:</td>
</tr>
<tr>
<td>• Shares:</td>
<td>• local-provider:ZoneA = /ifs/home/%U</td>
</tr>
<tr>
<td>• Finance</td>
<td>ZoneB:</td>
</tr>
<tr>
<td>• Home directory template:</td>
<td>• Base directory = /ifs</td>
</tr>
<tr>
<td>• local-provider:ZoneA = /ifs/home/%U</td>
<td>• Shares:</td>
</tr>
<tr>
<td>ZoneB:</td>
<td>• Human Resources = /ifs/data/Human Resources</td>
</tr>
<tr>
<td>• Shares:</td>
<td>• Engineering = /ifs/data/Engineering</td>
</tr>
<tr>
<td>• Human Resources</td>
<td>• Home directory template:</td>
</tr>
</tbody>
</table>
Before upgrading | After upgrading
--- | ---
- Engineering | - local-provider:ZoneB = /ifs/home/%U
- Home directory template: | - local-provider:ZoneB = /ifs/home/%U
- /ifs/home/%U |/

After the upgrade, both ZoneA and ZoneB point to /ifs as the base directory and the home directory template in each zone points to the same directory.

**Configure base directories in access zones**

You can configure the base directory for each access zone that was migrated upon upgrading to OneFS 7.1.1 or later.

**Before you begin**

Before modifying base directories, you should complete the following actions:

- Create new directories, if needed.
- Move data to the new directories. It is recommended that you move directories, rather than files, through the `mv` command.
- Modify home directory template path of the local provider for each access zone.
- Modify SMB share paths in each access zone to point to the directories data was moved to.

**Procedure**

1. Run the `isi zone zones modify` command.
   
   The following example command changes the base directory for ZoneA to /ifs/ZoneA:

   ```bash
   isi zone zones modify ZoneA --path=/ifs/ZoneA
   ```

   **Reconfiguring SMB shares within access zones**

   OneFS 7.1.1 introduced changes to access zones that affect SMB shares.

   In OneFS 7.1.1 and later, SMB share functionality changed in the following ways:

   - Shares are not stored in a global list; shares are stored in access zones.
   - A share path must match or fall under the base directory path of the access zone.
   - Share names must be unique only within an access zone, not on the EMC Isilon cluster.

   The following configuration changes occur upon upgrade to OneFS 7.1.1 or later:

   - If an SMB share was listed in multiple access zones, the upgrade process makes duplicate copies of the shares and places them in their respective zones. Each share references the same directory. This is not a recommended configuration and should be reconfigured.
   - If an SMB share had a display name in an access zone, the upgrade process replaces the share name with the display name.
SMB shares upgrade example

The following example illustrates SMB shares before and after upgrading to OneFS 7.1.1 or later.

<table>
<thead>
<tr>
<th>Before upgrading</th>
<th>After upgrading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global List of Shares:</strong></td>
<td><strong>ZoneA:</strong></td>
</tr>
<tr>
<td>• Finance = /ifs/data/Finance</td>
<td>• Base directory = /ifs</td>
</tr>
<tr>
<td>• Engineering = /ifs/data/Engineering</td>
<td>• Shares:</td>
</tr>
<tr>
<td>• Human Resources = /ifs/data/Human Resources</td>
<td>• Human Resources = /ifs/data/Human Resources</td>
</tr>
<tr>
<td><strong>ZoneA:</strong></td>
<td>• Finance = /ifs/data/Finance</td>
</tr>
<tr>
<td>• Shares:</td>
<td><strong>ZoneB:</strong></td>
</tr>
<tr>
<td>• Human Resources</td>
<td>• Base directory = /ifs</td>
</tr>
<tr>
<td>• Finance</td>
<td>• Shares:</td>
</tr>
<tr>
<td><strong>ZoneB:</strong></td>
<td>• Human Resources = /ifs/data/Human Resources</td>
</tr>
<tr>
<td>• Shares:</td>
<td>• Engineering = /ifs/data/Engineering</td>
</tr>
</tbody>
</table>
|   • Human Resources |   |}

Reconfigure SMB shares

If you have upgraded to OneFS 7.1.1 or later, SMB shares are assigned to access zones. An SMB share path must match or fall under the base directory path of the access zone. You can modify SMB shares to adhere to zone requirements. Modify SMB share paths prior to reconfiguring home directory template paths and access zone base directories.

**Procedure**

1. If it does not exist, create the directory the SMB share will reference.

2. Move SMB share data from the current directory to the new directory by running the `mv` command.

   It is recommended that you move entire directories rather than directory contents. Moving entire directories results in a single node update and is very fast; moving contents only might affect permission inheritance and takes a very long period of time.

   The following example command moves data from the `/ifs/data/Finance` directory to a new `/ifs/ZoneA/Finance` directory:

   ```
   mv /ifs/data/Finance /ifs/ZoneA/Finance
   ```

3. Run the `isi smb shares modify <share name>` command.
The following example command changes the directory of the Finance share in ZoneA to `/ifs/ZoneA/Finance`:

```bash
isi smb shares modify Finance --path=/ifs/ZoneA/Finance --zone=ZoneA
```

## Reconfiguring home directory templates within access zones

OneFS 7.1.1 introduced changes to access zones that affect home directory templates. Each access zone that is configured with the local authentication provider contains a home directory template. In OneFS 7.1.1 and later, the path of the home directory template must match or fall under the base directory path of the access zone.

### Home directory template upgrade example

The following example illustrates the home directory template before and after upgrading to OneFS 7.1.1 or later.

<table>
<thead>
<tr>
<th>Before upgrading</th>
<th>After upgrading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global List of Shares:</strong></td>
<td><strong>ZoneA:</strong></td>
</tr>
<tr>
<td>• HOMEDIR = /ifs/home/%U</td>
<td>• Base directory = /ifs</td>
</tr>
<tr>
<td>ZoneA:</td>
<td>• Shares: HOMEDIR = /ifs/home/%U</td>
</tr>
<tr>
<td>• Shares: HOMEDIR</td>
<td>• local-provider:ZoneA = /ifs/home/%U</td>
</tr>
<tr>
<td>• local-provider:ZoneA = /ifs/home/%U</td>
<td>ZoneB:</td>
</tr>
<tr>
<td>ZoneB:</td>
<td>• Base directory: /ifs</td>
</tr>
<tr>
<td>• Shares: HOMEDIR</td>
<td>• Shares: HOMEDIR = /ifs/home/%U</td>
</tr>
<tr>
<td>• local-provider:ZoneB = /ifs/home/%U</td>
<td>• local-provider:ZoneB = /ifs/home/%U</td>
</tr>
</tbody>
</table>

### Reconfigure home directory templates

If you have upgraded to OneFS 7.1.1 or later, home directory templates are assigned to local provider access zones. This procedure is available only through the command-line interface (CLI).

A home directory template path must match or fall under the base directory path of the access zone. You can modify the template path to adhere to zone requirements. Modify home directory template paths prior to reconfiguring SMB share paths and access zone base directories.

**Procedure**

1. If it does not exist, create the directory the home directory template will reference.
2. Run the `isi auth local modify <zone name>` command to change the template path.

   The following example command changes the template directory in ZoneA to `/ifs/ZoneA/home/%U`:

   ```bash
   isi auth local modify ZoneA -home-directory-template=/ifs/ZoneA/home/%U
   ```

3. Run the `isi smb shares modify HOMEDIR` command to change the HOMEDIR path to the template path.
The following example command changes the HOMEDIR directory in ZoneA to /ifs/
ZoneA/home/%U:

```
isisthshares modify HOMEDIR --path=/ifs/ZoneA/home/%U --zone=ZoneA
```

4. Move all home directories for users in the specified zone to the new HOMEDIR path.

Reconfiguring HDFS settings within access zones

OneFS 7.1.1 introduced changes to access zones that affect HDFS.

In OneFS 7.1.1 and later, HDFS functionality changed to allow you to configure the
following settings within each access zone instead of globally on the EMC Isilon cluster:

- HDFS root directory
- Authentication
- WebHDFS

The following configuration changes occur upon upgrade to OneFS 7.1.1 or later:

- By default, the HDFS root directory of each migrated access zone is set to the base
directory of the zone. This is not a recommended configuration and should be
reconfigured.
- Settings for authentication and keytab files are copied and applied to each migrated
access zone.
- WebHDFS is enabled by default in each access zone.

Reconfigure HDFS settings

If you have upgraded to OneFS 7.1.1 or later, HDFS settings are no longer global; they are
configured in each access zone. This procedure is available only through the command-
line interface (CLI).

You can specify values for the following HDFS attributes within each access zone:

- HDFS root directory
- Authentication method
- WebHDFS support

Procedure

1. Run the `isi zone zones modify <zone name>` command.

The following example command sets the root directory to /ifs/ZoneA/Hadoop,
sets the authentication method to simple only, and disables WebHDFS in ZoneA:

```
isisthzones modify ZoneA \  
   --hdfs-root-directory=/ifs/ZoneA/Hadoop \  
   --hdfs-authentication=simple_only --webhdfs-enabled=no
```

Verify Kerberos migration

If you have upgraded to OneFS 7.2 or later, Kerberos authentication can be configured
through the OneFS web administration interface and OneFS command-line interface. You
must verify that Kerberos providers and settings have been migrated to the web administration interface and command-line interface successfully.

Procedure

1. Verify that Kerberos authentication settings and providers are correctly represented.
   • To verify through the web administration interface, perform the following procedure:
     a. Click Access > Authentication Providers > Kerberos Provider.
     b. In the Kerberos Realms, Kerberos Domains, and Kerberos Providers tables, view Kerberos providers.
     c. Click Access > Authentication Providers > Kerberos Provider.
     d. In the Kerberos Settings area, view Kerberos settings.
   • To verify through the command-line interface, run the following commands:
     - isi auth krb5 realm list
     - isi auth krb5 domain list
     - isi auth krb5 spn list
     - isi auth settings krb5 view

Migration to L3 cache

L3 cache is enabled by default on new nodes. If you are upgrading your cluster from an older release (pre-OneFS 7.1.1), you must enable L3 cache manually on node pools that have SSDs. When you enable L3 cache, OneFS activates a process that migrates SSDs from storage disks to cache. File data currently on SSDs is moved elsewhere in the cluster.

You can enable L3 cache as the default for all new node pools or manually for a specific node pool, either through the command line or from the web administration interface. You can enable L3 cache only on node pools whose nodes have SSDs.

Depending on the amount of data stored in your SSDs, the migration process can take some time. OneFS displays a message informing you that the migration is about to begin:

WARNING: Changes to L3 cache configuration can have a long completion time. If this is a concern, please contact EMC Isilon Support for more information.

You must confirm whether OneFS should proceed with the migration. After you do, OneFS handles the migration intelligently as a background process. You can continue to administer your cluster during the migration.

If you choose to disable L3 cache on a node pool, the migration process is very fast.

Update SMB auditing

SMB auditing changed in OneFS 7.1. If you are upgrading from a version earlier than OneFS 7.1 and your environment is configured for SMB auditing, you will need to reconfigure the cluster to use the new auditing tool.

For more information, see the “Auditing” section in the OneFS Web Administration Guide or the OneFS CLI Administration Guide.
Re-install Aspera

If you were running Aspera for Isilon before you upgraded your EMC Isilon cluster, you must reinstall Aspera after you upgrade to restore the Aspera service.

Before you begin

See EMC Isilon knowledge base article 91221, Aspera Enterprise Server application is stopped after upgrading to OneFS 6.5 or later, for information about restarting the Aspera server after upgrading. Also, see the Aspera Enterprise Server for Isilon guide at http://asperasoft.com/.

Procedure

1. Connect to a node by SSH and log in as root.
2. To install Aspera on the node, run the following command:

   `/usr/local/aspera/var/install.sh`

3. To install Aspera on all the nodes in the cluster, run the following command:

   `isi_for_array /usr/local/aspera/var/install.sh`

4. Verify that the installation script enabled the Aspera Central service and the Aspera node daemon by running the following command:

   `isi services`

Modify custom scripts

Modify any custom scripts affected by any OneFS command syntax changes.

Check to see if the upgrade version contains any syntax changes to OneFS commands. If the syntax in the command-line interface is different, custom scripts might not work. For more information about changes to command syntax, see the OneFS CLI Mappings guide.

If your workflow depends on custom scripts, you should determine whether they will work with the new version without modifications and be prepared to rewrite them if they do not work.

Install recommended patches

Install all recommended patches for this version of OneFS and any other patches that might affect your workflow.

Procedure

1. See Current Isilon OneFS Patches to view a list of patches that are available for this version of OneFS.
2. Install all recommended patches.
Implement the Platform API

You can implement the latest version of the Platform API.

OneFS 7.0 and later includes a RESTful application programming interface (API) to automate access, configuration, and monitoring. For example, you can retrieve performance statistics, provision users, and create SMB shares in an access zone. In addition, the Platform API, which requires no license, integrates with OneFS role-based access control to improve security.

The API available in versions previous to OneFS 7.0 is not supported in OneFS 7.0 and later.

See the OneFS Platform API Reference for more information.
CHAPTER 7

Troubleshooting your upgrade

This section contains the following topics:

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- Review the upgrade logs ................................................................. 68
- Common issues .................................................................................. 68
Troubleshooting overview

You can check upgrade logs and review common upgrade issues if you experience problems with your OneFS upgrade.

You can search for Isilon OneFS documentation and knowledge base articles on the EMC Online Support page. Go to EMC Online Support to begin a search.

If you need help troubleshooting, contact Isilon Technical Support.

Review the upgrade logs

You can inspect logs from the upgrade to check for issues that occurred during the upgrade process.

An upgrade generates several logs and places them in the `/var/crash` directory.

**update_engine**
Generates two logs. One log contains general information about the upgrade and one contains information about the after-upgrade reboot. The logs names are similar to the following:

- `update_engine_2011-06-26_08_56_48.txt`
- `update_engine_2011-06-26_09_00_50.txt`

**update_handler**
Generates a log that provides an overall view of the upgrade on the EMC Isilon cluster. You will usually find more specific information about errors in this log. The log name is similar to the following:

- `update_handler_2011-11-20_05_54_59.txt`

**update_proxy**
Generates a log that provides a view of the new OneFS image running on the nodes. The log name is similar to the following:

- `update_proxy_2011-11-20_05_54_59.txt`

Common issues

Check to see if problems with your upgrade are due to common issues.

Check for a dropped node

OneFS might stay in an upgrade state if a node does not come back after performing a simultaneous upgrade reboot. You cannot make changes to certain features such as SMB shares and NFS exports while OneFS is in an upgrade state.

**Procedure**

1. Smartfail the node that did not come back after rebooting.
2. Check to ensure that the name of the smartfailed node is removed from the cluster node list.
   This operation might take some time depending on the amount of data that is migrated off of the node.

3. Reboot any node in the cluster.

**Adjust the SMB client-credit minimum**

SMB2 client connections might stop responding because of an increase in the client-credit minimum.

Adjust the SMB client-credit minimum if the following errors occur:

- The SMB clients show system "error 51" or "error 0x80070033."
- The Microsoft Windows event log contains the following entry:

```
Operating system error 64 (The specified network name is no longer available.)
```

- An error similar to the following appears in the packet captures on the servers:

```
```

See EMC Isilon knowledge base article 88645, *SMB2 connections stop responding because client credit minimum value is too high*, for more information.

**Adjust NFS performance**

Fix the system controls for Network File System (NFS) server threads.

NFS performance might be lower than expected because of a configuration change. The default number of NFS server threads was changed from 64 to 16 in OneFS 7.0 to address a potential issue in which the NFS server monopolizes node resources.

It is recommended that you set threads_min and threads_max to the same value. Increasing the number of threads can improve performance at the expense of stability.

Before you change the number of threads, contact Isilon Technical Support to determine the values that work best for your EMC Isilon cluster; the values vary by CPUs, memory, the number of nodes, and other factors.

After you determine the number of threads for your cluster by consulting with Isilon Technical Support, you can adjust the number of NFS threads by running the following commands, where \( x \) is an integer. These commands require you to log in as a root user.

**Procedure**

1. To modify the minimum number of threads, run the following command:

   ```
   isi_sysctl_cluster vfs.nfsrv.rpc.threads_min=x
   ```

2. To modify the maximum number of threads, run the following command:

   ```
   isi_sysctl_cluster vfs.nfsrv.rpc.threads_max=x
   ```
Check for 64-bit requirement to run custom applications

The upgrade version of OneFS may require a 64-bit U.S. system, which requires any custom applications and tools run in the user space to be compiled for a 64-bit system.

Note

Running your own applications on the EMC Isilon cluster is neither recommended nor supported.