ONTAP® 9

Using All Flash FAS with ONTAP® Software

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Deciding whether to use the Using All Flash FAS with ONTAP Software guide

This guide describes how to use All Flash FAS platforms with ONTAP software, including storage layout and configuration options to optimize performance, differences between AFF and FAS platforms from the ONTAP perspective, and additional resources for AFF platforms.

You should use this guide under the following circumstances:

• You want to understand the capabilities of AFF clusters.
• You want to use the command-line interface (CLI) or OnCommand System Manager.

If you want to quickly set up an FC SAN optimized AFF system, you should see the following documentation:

*FC SAN optimized AFF setup*

If you require additional configuration or conceptual information, you should choose among the following documentation:

• Disks and aggregate management
  *Disk and aggregate management*

• System administration
  *System administration*

• Cluster management using OnCommand System Manager
  *Cluster management using System Manager*

• Networking and LIF management
  *Network and LIF management*

• Command reference
  *ONTAP 9 commands*

• ONTAP concepts
  *ONTAP concepts*
What All Flash FAS is

All Flash FAS (AFF) systems optimize I/O and maximize application throughput while running flash-optimizing functions to accelerate a broad range of SAN and NAS workloads. In general, All Flash FAS systems use the same ONTAP commands and features as the FAS platforms, although there are a few differences.

All Flash FAS systems can be ordered with a factory-configured FC SAN optimized configuration. The *FC SAN Optimized AFF Setup Guide* has more information about FC SAN optimized AFF system setup.

*FC SAN optimized AFF setup*
How the AFF platform differs from the FAS platform

AFF platforms differ from FAS platforms in a few significant ways. You should understand these differences before using your AFF cluster.

The following table describes the differences between AFF and FAS systems:

<table>
<thead>
<tr>
<th>Difference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSD drives</td>
<td>Only SSD drives are supported on AFF platforms. If non-SSD drives are attached to an AFF platform, the disks do not go online. If the root aggregate is HDD-based, the nodes do not boot. HDDs and FlexArray are not supported.</td>
</tr>
<tr>
<td>Performance</td>
<td>All Flash FAS systems provide maximum I/O performance. For example, AFF systems running Data ONTAP 8.3.1 have experienced 200 to 300 microsecond reductions in FCP latency for read-intensive workloads already at or around 1 microsecond in overall response times.</td>
</tr>
<tr>
<td>Volumes</td>
<td>All volumes created in aggregates owned by an AFF node have inline compression and inline deduplication enabled by default.</td>
</tr>
<tr>
<td>SVMs</td>
<td>The storage efficiency polices for SVMs differ from those on a FAS system.</td>
</tr>
<tr>
<td>Root-data partitioning</td>
<td>The root-data partitioning capability is enabled by default on an AFF node.</td>
</tr>
<tr>
<td>Mixed platform support</td>
<td>You cannot pair an AFF node with a regular FAS node in an HA pair. You can mix AFF HA pairs with FAS HA pairs in a cluster.</td>
</tr>
<tr>
<td>Zero block elimination</td>
<td>Instead of writing incoming 4 KB blocks that contain all zeroes to storage media, All Flash FAS systems indicate the block’s inode as all zeroes. With deduplication enabled, zero block elimination is enabled by volume by default with no user configuration required.</td>
</tr>
<tr>
<td>FC SAN optimization</td>
<td>An FC SAN optimized AFF configuration is available. The FC SAN optimized cluster enables you to quickly complete a configuration that is ready for demonstration and testing.</td>
</tr>
</tbody>
</table>
Setup checklist for AFF

After you have cabled your system and performed the initial setup of your All Flash FAS system, you can perform some of the AFF-specific configuration tasks.

• Verify that the hardware setup is complete and Config Advisor runs without errors.
• Prepare hosts that you want to connect to the cluster.
• Use the Cluster Setup wizard to perform initial configuration and to set up your cluster.
• Zone switches (if applicable).
Optimizing performance on AFF clusters

While most configuration is the same for AFF clusters, you must configure the storage layout differently from FAS clusters to optimize performance.

Assigning disk ownership on AFF systems

Before using your All Flash FAS (AFF) system, you should assign disk ownership to maximize performance.

About this task

All Flash FAS systems use root-data partitioning to partition aggregates.

Twelve SSDs from each shelf are assigned to a node. One data aggregate is provisioned on each node.

Steps

1. Assign disks in bays 0 through 11 to the first node in the HA pair.
2. Assign disks in bays 12 through 23 to the second node in the HA pair.
3. If required, repeat the procedure for additional disk shelves.

You can partition up to 48 SSDs on an HA pair depending on your configuration.

Creating a Storage Virtual Machine (SVM) on an All Flash FAS system

The process for creating SVMs is the same for either an AFF or a FAS system, but the SVM on an AFF system uses different options.

Step

1. Create an SVM using the default IPspace, root volume security style of UNIX, and no Snapshot policy:

<table>
<thead>
<tr>
<th>If you want to use...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster Setup Wizard</td>
<td>The Cluster Setup Wizard creates your SVM when you first create the cluster.</td>
</tr>
<tr>
<td>System Manager</td>
<td>Create the SVM by using the SVM Create Wizard.</td>
</tr>
<tr>
<td>CLI</td>
<td>Enter the following command:</td>
</tr>
<tr>
<td></td>
<td><code>vserver create -vserver &lt;vserver&gt; [-ipspace &lt;IPspace&gt;] -rootvolume &lt;volume name&gt; -aggregate &lt;aggregate name&gt; -rootvolume-security-style &lt;security style&gt; [-snapshot-policy &lt;snapshot policy&gt;]</code></td>
</tr>
</tbody>
</table>
Example

The following example creates an SVM named vs0.example.com in the default IPspace. The SVM's root volume is named as root_vs0, is located on aggregate aggr0, and has the UNIX security style. The Snapshot policy is specified as None.

```
vserver create -vserver vs0.example.com -ipspace default -rootvolume root_vs0 -aggregate aggr0 -rootvolume-security-style unix -snapshot-policy none
```

Creating aggregates on All Flash FAS systems

The process for creating aggregates on All Flash FAS systems is the same as on a FAS system, but you should specify certain options that are specific to AFF.

Steps

1. Create one data aggregate on each node using 23 partitions and one hot spare partition per node:

<table>
<thead>
<tr>
<th>If you want to use...</th>
<th>Then...</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Manager</td>
<td>Create the aggregates by using the Aggregate Create Wizard.</td>
</tr>
<tr>
<td>CLI</td>
<td>Enter the following command:</td>
</tr>
<tr>
<td></td>
<td><code>storage aggregate create -aggregate &lt;aggr_name&gt; -diskcount &lt;number_of_partitions&gt; [-node &lt;node_name&gt;]</code></td>
</tr>
</tbody>
</table>

Example

The following example creates aggregate named aggr0 on a node named node0. The aggregate contains 23 disks.

```
storage aggregate create -aggregate aggr0 -node node0 -diskcount 23
```

2. Create additional aggregates if your system has more than 48 disks.

Creating volumes on an All Flash FAS system

You should create volumes that are of the same size as the aggregate on which they are located and check that they are thinly provisioned. Volumes on AFF systems also have different efficiency policies than volumes on FAS systems.

About this task

Volumes created in aggregates owned by an AFF node have inline compression and inline deduplication enabled by default.

Steps

1. Create a volume that is of the same size as the aggregate on which they are located:

<table>
<thead>
<tr>
<th>If you want to use...</th>
<th>Then do this...</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Manager</td>
<td>Create volumes by using the UI.</td>
</tr>
<tr>
<td>If you want to use...</td>
<td>Then do this...</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>CLI</strong></td>
<td>Enter the following command:</td>
</tr>
<tr>
<td></td>
<td>`volume create -vserver vserver_name -volume volume_name -aggregate aggregate_name [-size volume_size] [-autosize-mode {off</td>
</tr>
</tbody>
</table>

**Example**

The following example displays a volume being created with autosize mode off, no Snapshot policy, no space guarantee, and a fractional reserve equaling zero:

```
volume create -vserver vs0.example.com -volume user_jdoe -aggregate aggr0 -size volume_size -autosize-mode off -space-guarantee none -snapshot-policy none -fractional-reserve 0
```

2. Create the volume efficiency policy by using the default policy, daily schedule, and best-effort QoS policy:

<table>
<thead>
<tr>
<th>If you want to use...</th>
<th>Then do this...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Manager</strong></td>
<td>Create the efficiency policy by using the UI.</td>
</tr>
<tr>
<td><strong>CLI</strong></td>
<td>Enter the following command:</td>
</tr>
<tr>
<td></td>
<td><code>volume efficiency policy create -vserver vserver_name -policy text [-type Efficiency policy type] [-schedule texttext] [-qos-policy Efficiency QoS policy]</code></td>
</tr>
</tbody>
</table>

**Example**

The following example displays a volume efficiency policy being created with the default policy, daily schedule, and best-effort QoS policy:

```
volume efficiency policy create -vserver vserver_name -policy default -type scheduled -schedule daily -qos-policy best effort
```

**Number of SSDs required for All Flash FAS systems root partitioning**

A certain minimum number of disks are required to use SSD partitioning on All Flash FAS systems.

- A minimum of 12 SSDs are required for root-data or root-data-data partitioning. This requirement assures that spare root partitions are provisioned.
- A maximum of 48 SSDs per HA pair (24 per node) are partitioned when root aggregates are provisioned.

The *Disks and Aggregates Power Guide* has more information about root-data partitioning.
Readying the cluster for production

Before you put your cluster into production, you should complete some additional configuration steps.

**Steps**

1. Assign passwords for cluster interconnect switches (if applicable).
2. Configure EMS.
3. Configure the DNS network.
4. Protect the root volumes.
5. Create production volumes and LUNs.
6. Optionally join additional AFF or FAS nodes to the cluster.
   
   You can add FAS nodes to an existing AFF cluster, but you cannot merge clusters.
Where to find additional resources for AFF

After performing AFF-specific configuration tasks, you can continue configuring the cluster using additional resources.

Additional AFF resources

FC SAN optimized AFF setup

Additional clustered Data ONTAP resources

- *NetApp Documentation*
  Links to product documentation, including the Data ONTAP product library.

- *NetApp Documentation: Clustered Data ONTAP Express Guides*
  Specific express guides describe how to configure protocols and to verify setup.

- *Network and LIF management*
  Describes how to configure and manage physical and virtual network ports (VLANs and interface groups), LIFs using IPv4 and IPv6, routing, and host-resolution services in clusters; optimize network traffic by load balancing; and monitor the cluster by using SNMP.

- *Disk and aggregate management*
  Describes how to manage physical storage resources for FlexVol volumes and Infinite Volumes in clusters, including disks, RAID groups, and aggregates.

- *System administration*
  Describes general system administration of a cluster, including the CLI interface, cluster access, node management, SVM setup, user account management, event monitoring, and performance evaluation.

- *Cluster management using System Manager*
  A printable version of System Manager online Help that describes how to configure, manage, and monitor storage objects and storage systems running clustered Data ONTAP.

- *ONTAP concepts*
  Describes conceptual information about the administration of a cluster, including the CLI interface, cluster access, node management, SVM setup, user account management, event monitoring, and performance evaluation.
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