Create a Flash Pool local tier (aggregate) using SSD storage pools

ONTAP 9

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Determine whether a Flash Pool local tier (aggregate) is using an SSD storage pool

You can configure a Flash Pool (local tier) aggregate by adding one or more allocation units from an SSD storage pool to an existing HDD local tier.

You manage Flash Pool local tiers differently when they use SSD storage pools to provide their cache than when they use discrete SSDs.

Step

1. Display the aggregate's drives by RAID group:

   `storage aggregate show-status` *`aggr_name`*

   If the aggregate is using one or more SSD storage pools, the value for the `Position` column for the SSD RAID groups is displayed as `Shared`, and the name of the storage pool is displayed next to the RAID group name.

Add cache to a local tier (aggregate) by creating an SSD storage pool

You can provision cache by converting an existing local tier (aggregate) to a Flash Pool local tier (aggregate) by adding solid state drives (SSDs).

You can create solid state drive (SSD) storage pools to provide SSD cache for two to four Flash Pool local tiers (aggregates). Flash Pool aggregates enable you to deploy flash as high performance cache for your working data set while using lower-cost HDDs for less frequently accessed data.

About this task

- You must supply a disk list when creating or adding disks to a storage pool.

  Storage pools do not support a `diskcount` parameter.

- The SSDs used in the storage pool should be the same size.

The procedure that you follow depends on the interface that you use—System Manager or the CLI.

System Manager

Use System Manager to add an SSD cache (ONTAP 9.7 only)

Use the CLI procedure if you are using an ONTAP version other than 9.7

Steps

1. Click **(Return to classic version)**.
2. Click **Storage > Aggregates & Disks > Aggregates**.
3. Select the local tier (aggregate), and then click **Actions > Add Cache**.
4. Select the cache source as "storage pools" or "dedicated SSDs".
5. Click **(Switch to the new experience)**.
6. Click **Storage > Tiers** to verify the size of the new aggregate.

CLI

Use the CLI to create an SSD storage pool

Steps

1. Determine the names of the available spare SSDs:

   ```
   storage aggregate show-spare-disks -disk-type SSD
   ```

   The SSDs used in a storage pool can be owned by either node of an HA pair.

2. Create the storage pool:

   ```
   storage pool create -storage-pool sp_name -disk-list disk1,disk2,…
   ```

3. **Optional:** Verify the newly created storage pool:

   ```
   storage pool show -storage-pool sp_name
   ```

Results

After the SSDs are placed into the storage pool, they no longer appear as spares on the cluster, even though the storage provided by the storage pool has not yet been allocated to any Flash Pool caches. You cannot add SSDs to a RAID group as discrete drives; their storage can be provisioned only by using the allocation units of the storage pool to which they belong.

Create a Flash Pool local tier (aggregate) using SSD storage pool allocation units

You can configure a Flash Pool local tier (aggregate) by adding one or more allocation units from an SSD storage pool to an existing HDD local tier.

What you'll need

- You must have identified a valid local tier composed of HDDs to convert to a Flash Pool local tier.
- You must have determined write-caching eligibility of the volumes associated with the local tier, and completed any required steps to resolve eligibility issues.
- You must have created an SSD storage pool to provide the SSD cache to this Flash Pool local tier.

  Any allocation unit from the storage pool that you want to use must be owned by the same node that owns the Flash Pool local tier.

- You must have determined how much cache you want to add to the local tier.

  You add cache to the local tier by allocation units. You can increase the size of the allocation units later by adding SSDs to the storage pool if there is room.

- You must have determined the RAID type you want to use for the SSD cache.

  After you add a cache to the local tier from SSD storage pools, you cannot change the RAID type of the cache RAID groups.

- You must have determined the maximum cache size for your system and determined that adding SSD cache to your local tier will not cause you to exceed it.

  You can see the amount of cache that will be added to the total cache size by using the `storage pool show` command.

- You must have familiarized yourself with the configuration requirements for Flash Pool local tier.

About this task

If you want the RAID type of the cache to be different from that of the HDD RAID groups, you must specify the cache RAID type when you add the SSD capacity. After you add the SSD capacity to the local tier, you can no longer change the RAID type of the cache.

After you add an SSD cache to a local tier to create a Flash Pool local tier, you cannot remove the SSD cache to convert the local tier back to its original configuration.

Steps

1. Mark the aggregate as eligible to become a Flash Pool aggregate:

   `storage aggregate modify -aggregate` *`aggr_name`* `-hybrid-enabled true`

   If this step does not succeed, determine write-caching eligibility for the target aggregate.

2. Show the available SSD storage pool allocation units:

   `storage pool show-available-capacity`

3. Add the SSD capacity to the aggregate:

   `storage aggregate add` *`aggr_name`* `-storage-pool` *`sp_name`* `-allocation-units` *`number_of_units`*

   If you want the RAID type of the cache to be different from that of the HDD RAID groups, you must change it when you enter this command by using the `raidtype` parameter.

   You do not need to specify a new RAID group; ONTAP automatically puts the SSD cache into separate RAID groups from the HDD RAID groups.

   You cannot set the RAID group size of the cache; it is determined by the number of SSDs in the storage pool.

   The cache is added to the aggregate and the aggregate is now a Flash Pool aggregate. Each allocation unit added to the aggregate becomes its own RAID group.

4. Confirm the presence and size of the SSD cache:

   `storage aggregate show` *`aggregate_name`*

   The size of the cache is listed under `Total Hybrid Cache Size`.

Related information

NetApp Technical Report 4070: Flash Pool Design and Implementation Guide

Determine the impact to cache size of adding SSDs to an SSD storage pool

If adding SSDs to a storage pool causes your platform model's cache limit to be exceeded, ONTAP does not allocate the newly added capacity to any Flash Pool local tiers (aggregates). This can result in some or all of the newly added capacity being unavailable for use.

About this task

When you add SSDs to an SSD storage pool that has allocation units already allocated to Flash Pool local tiers (aggregates), you increase the cache size of each of those local tiers and the total cache on the system. If none of the storage pool's allocation units have been allocated, adding SSDs to that storage pool does not affect the SSD cache size until one or more allocation units are allocated to a cache.

Steps

1. Determine the usable size of the SSDs you are adding to the storage pool:

   `storage disk show` *`disk_name`* `-fields usable-size`

2. Determine how many allocation units remain unallocated for the storage pool:

   `storage pool show-available-capacity` *`sp_name`*

   All unallocated allocation units in the storage pool are displayed.

3. Calculate the amount of cache that will be added by applying the following formula:

   (4 — number of unallocated allocation units) × 25% × usable size × number of SSDs

Add SSDs to an SSD storage pool

When you add solid state drives (SSDs) to an SSD storage pool, you increase the storage pool's physical and usable sizes and allocation unit size. The larger allocation unit size also affects allocation units that have already been allocated to local tiers (aggregates).

What you'll need

You must have determined that this operation will not cause you to exceed the cache limit for your HA pair. ONTAP does not prevent you from exceeding the cache limit when you add SSDs to an SSD storage pool, and doing so can render the newly added storage capacity unavailable for use.

About this task

When you add SSDs to an existing SSD storage pool, the SSDs must be owned by one node or the other of the same HA pair that already owned the existing SSDs in the storage pool. You can add SSDs that are owned by either node of the HA pair.

The SSD you add to the storage pool must be the same size as disk currently used in the storage pool.

Steps

1. **Optional:** View the current allocation unit size and available storage for the storage pool:

   `storage pool show -instance` *`sp_name`*

2. Find available SSDs:

   `storage disk show -container-type spare -type SSD`

3. Add the SSDs to the storage pool:

   `storage pool add -storage-pool sp_name -disk-list` *`disk1,disk2…`*

   The system displays which Flash Pool aggregates will have their size increased by this operation and by how much, and prompts you to confirm the operation.

Commands for managing SSD storage pools

ONTAP provides the `storage pool` command for managing SSD storage pools.

If you want to…	Use this command…
Display how much storage a storage pool is providing to which aggregates	`storage pool show-aggregate`

Display how much cache would be added to the overall cache capacity for both RAID types (allocation unit data size)	`storage pool show -instance`
Display the disks in a storage pool	`storage pool show-disks`
Display the unallocated allocation units for a storage pool	`storage pool show-available-capacity`
Change the ownership of one or more allocation units of a storage pool from one HA partner to the other	`storage pool reassign`

Related information

ONTAP 9 Commands