Managing RAID groups

ONTAP 9

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Convert from RAID-DP to RAID-TEC

If you want the added protection of triple-parity, you can convert from RAID-DP to RAID-TEC. RAID-TEC is recommended if the size of the disks used in your aggregate is greater than 4 TiB.

What you'll need

The aggregate that is to be converted must have a minimum of six disks.

About this task

Hard disk drive (HDD) aggregates can be converted from RAID-DP to RAID-TEC. This includes HDD tiers in Flash Pool aggregates.

Steps

1. Verify that the aggregate is online and has a minimum of six disks:

   ```
   storage aggregate show-status -aggregate aggregate_name
   ```

2. Convert the aggregate from RAID-DP to RAID-TEC:

   ```
   storage aggregate modify -aggregate aggregate_name -raidtype raid_tec
   ```

3. Verify that the aggregate RAID policy is RAID-TEC:

   ```
   storage aggregate show aggregate_name
   ```

Convert RAID-TEC to RAID-DP

If you reduce the size of your aggregate and no longer need triple parity, you can convert your RAID policy from RAID-TEC to RAID-DP and reduce the number of disks you need for RAID parity.

What you'll need

The maximum RAID group size for RAID-TEC is larger than the maximum RAID group size for RAID-DP. If the largest RAID-TEC group size is not within the RAID-DP limits, you cannot convert to RAID-DP.

Steps

1. Verify that the aggregate is online and has a minimum of six disks:

   ```
   storage aggregate show-status -aggregate aggregate_name
   ```

2. Convert the aggregate from RAID-TEC to RAID-DP:

   ```
   storage aggregate modify -aggregate aggregate_name -raidtype raid_dp
   ```

3. Verify that the aggregate RAID policy is RAID-DP:

```
storage aggregate show aggregate_name
```

Considerations for sizing RAID groups

Configuring an optimum RAID group size requires a trade-off of factors. You must decide which factors—speed of RAID rebuild, assurance against risk of data loss due to drive failure, optimizing I/O performance, and maximizing data storage space—are most important for the aggregate that you are configuring.

When you create larger RAID groups, you maximize the space available for data storage for the same amount of storage used for parity (also known as the “parity tax”). On the other hand, when a disk fails in a larger RAID group, reconstruction time is increased, impacting performance for a longer period of time. In addition, having more disks in a RAID group increases the probability of a multiple disk failure within the same RAID group.

HDD or array LUN RAID groups

You should follow these guidelines when sizing your RAID groups composed of HDDs or array LUNs:

- All RAID groups in an aggregate should have the same number of disks.

  While you can have up to 50% less or more than the number of disks in different raid groups on one aggregate, this might lead to performance bottlenecks in some cases, so is best avoided.

- The recommended range of RAID group disk numbers is between 12 and 20.

  The reliability of performance disks can support a RAID group size of up to 28, if needed.

- If you can satisfy the first two guidelines with multiple RAID group disk numbers, you should choose the larger number of disks.

SSD RAID groups in Flash Pool aggregates

The SSD RAID group size can be different from the RAID group size for the HDD RAID groups in a Flash Pool aggregate. Usually, you should ensure that you have only one SSD RAID group for a Flash Pool aggregate, to minimize the number of SSDs required for parity.

SSD RAID groups in SSD aggregates

You should follow these guidelines when sizing your RAID groups composed of SSDs:

- All RAID groups in an aggregate should have a similar number of drives.

  The RAID groups do not have to be exactly the same size, but you should avoid having any RAID group that is less than one half the size of other RAID groups in the same aggregate when possible.

- For RAID-DP, the recommended range of RAID group size is between 20 and 28.

Customize the size of your RAID groups

You can customize the size of your RAID groups to ensure that your RAID group sizes are appropriate for the amount of storage you plan to include for an aggregate.

About this task

For standard aggregates, you change the size of RAID groups on a per-aggregate basis. For Flash Pool aggregates, you can change the RAID group size for the SSD RAID groups and the HDD RAID groups independently.

The following list outlines some facts about changing the RAID group size:

- By default, if the number of disks or array LUNs in the most recently created RAID group is less than the new RAID group size, disks or array LUNs will be added to the most recently created RAID group until it reaches the new size.
- All other existing RAID groups in that aggregate remain the same size, unless you explicitly add disks to them.
- You can never cause a RAID group to become larger than the current maximum RAID group size for the aggregate.
- You cannot decrease the size of already created RAID groups.
- The new size applies to all RAID groups in that aggregate (or, in the case of a Flash Pool aggregate, all RAID groups for the affected RAID group type—SSD or HDD).

Steps

1. Use the applicable command:

If you want to…	Enter the following command…
Change the maximum RAID group size for the SSD RAID groups of a Flash Pool aggregate	`storage aggregate modify -aggregate aggr_name -cache-raid-group-size size`
Change the maximum size of any other RAID groups	`storage aggregate modify -aggregate aggr_name -maxraidsize size`

Examples

The following command changes the maximum RAID group size of the aggregate n1_a4 to 20 disks or array LUNs:

```
storage aggregate modify -aggregate n1_a4 -maxraidsize 20
```

The following command changes the maximum RAID group size of the SSD cache RAID groups of the Flash Pool aggregate n1_cache_a2 to 24:

```
storage aggregate modify -aggregate n1_cache_a2 -cache-raid-group-size 24
```