Partitioning cache resources with cache logical partitioning (CLPRs)

You can implement logical partitioning of cache as well as performing and troubleshooting CLPR operations in the VSP G1x00, VSP F1500, Do not use - use Gx00 model grouping and Do not use - use Fx00 model grouping.

Before creating CLPRs, check the system requirements in Requirements for using performance functions.

In addition, carefully read the system limitations and usage cautions in About Virtual Partition Manager.

Cache partitioning workflow

1. Calculate the cache capacity required for your needs, taking into account other features and functions that also have cache capacity requirements. For details, see Calculating cache capacity.
2. If needed, install additional cache memory in your storage system.
3. Determine an appropriate time to create CLPRs and migrate resources to the new CLPRs. Creating CLPRs and migrating resources can significantly degrade host performance and should be performed during the initial installation and setup of the storage system or during maintenance.
4. Create the CLPRs and migrate resources to the new CLPRs. For details, see Creating a CLPR and Migrating resources to and from a CLPR.
5. Manage the CLPRs as needed.
   ◦ After a CLPR has been created, you can change the CLPR name, CLPR cache capacity, resident cache size, and number of resident cache extents. For details, see Editing an existing CLPR.
   ◦ (VSP G1x00 and VSP F1500) If Cache Residency Manager operations decrease the cache capacity of a CLPR, you might need to adjust the cache capacity of the CLPR.

Creating a CLPR

Step 1: Calculate the cache capacity

To calculate the cache capacity required for your implementation, see Calculating cache capacity

Step 2: (Optional) Install additional cache

Step 3: Plan a scheduled maintenance
Determine an appropriate time to create CLPRs and migrate resources to the new CLPRs. Creating CLPRs and migrating resources can significantly degrade host performance and should be performed during the initial installation and setup of the storage system or during maintenance.

**Step 4: Create a CLPR and migrate resources**

### Creating a CLPR

**Caution**

Creating CLPRs can significantly degrade host performance and should be performed during the initial installation and setup of the storage system or during maintenance.

Before creating a CLPR, read [Cautions and restrictions for Virtual Partition Manager](https://knowledge.hitachivantara.com/Documents/Management_Software/SVOS/8.1/Performance_Optimization/Partitioning_cache_resources_with_cache_logical_partitioning_(CLPRs)).

If no CLPRs have been created, the entire cache is displayed as CLPR0. When you create the first CLPR, CLPR1 is added. The maximum number of CLPRs that you can create are listed below:

- (VSP G1x00 and VSP F1500) Maximum of 31 CLPRs (CLPR1 to CLPR31).
- (VSP Gx00 models and VSP Fx00 models) Maximum of 9 CLPRs (CLPR1 to CLPR9) for VSP G200, 22 CLPRs (CLPR1 to CLPR22) for VSP G400, and 31 CLPRs (CLPR1 to CLPR31) for VSP G600 and VSP G800.

When you create a CLPR, you assign the necessary capacity from CLPR0 to the new CLPR. The default cache capacity is listed below:

- (VSP G1x00 and VSP F1500) 8 GB
- (VSP Gx00 models and VSP Fx00 models) 4 GB

(VSP G1x00 and VSP F1500) If you use Cache Residency Manager, the remaining cache capacity after subtracting the Cache Residency Manager capacity from the cache capacity of CLPR0 must be at least 8 GB.

**Before you begin**

- Required role: Storage Administrator (System Resource Management)

**Procedure**

1. Open the Cache Partitions window.
   1. On the Administration tree, click Cache Partitions.
   2. Click the Cache Partitions tab.
2. Click Create CLPRs to open the Create CLPRs window. CLPR ID displays the first available CLPR ID or a blank if no CLPR ID is available.
3. In CLPR Name, enter the CLPR name (maximum 16 alphanumeric characters). Each CLPR name must be unique. You cannot use a CLPR name that is already reserved. If no CLPR ID is available, a blank is displayed.
4. (VSP G1x00 and VSP F1500) In Total Cache Size, select the cache capacity. If no CLPR ID is available, a blank is displayed.
   The default size is 8 GB, and you can select 8 GB or higher value in increments of 4 GB. The maximum value is 2,022 GB (subtract 8 GB from the cache capacity of the storage system), but the maximum available capacity (subtract the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the upper limit value.
   The remaining cache capacity (subtract the resident cache size from the total cache size) must be 8 GB or more. Ensure that the remaining capacity in CLPR0 is at least 8 GB when selecting the total cache size or the resident cache size.

5. (VSP Gx00 models and VSP Fx00 models) In Cache Size, select the cache capacity. If no CLPR ID is available, a blank is displayed.
   The default size is 4 GB, and you can select 4 GB or higher value in increments of 2 GB. The maximum available capacity (subtracted the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the upper limit value.

6. (VSP G1x00 and VSP F1500) In Resident Cache Size, select the resident cache capacity. If no CLPR ID is available, a blank is displayed.
   The default is 0 GB, and you can select 0 GB or higher value in increments of 0.5 GB. The maximum value is 2,014 GB (cache residency capacity of the storage system), but the maximum available capacity (subtract the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the upper limit value.

7. (VSP G1x00 and VSP F1500) In Number of Resident Extents, enter the number of resident cache. If no CLPR ID is available, a blank is displayed.
   The default is 0, and you can specify 0 to 16384. The maximum available capacity (subtract the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the upper limit value.

8. Click Add. The created CLPR is added to the Selected CLPRs table.
   To delete a CLPR from the Selected CLPRs table, select the CLPR and click Remove. To change the settings of an existing CLPR, select the CLPR and Change Settings to open the Change Settings window.

9. Click Finish.

10. Check the settings in the Confirm window, enter the task name in Task Name, and click Apply.
    The Tasks window opens if Go to tasks window for status is checked.

Next steps
After creation, a CLPR has no resources (parity groups). To migrate resources to the new CLPR, see Migrating resources to and from a CLPR.

Migrating resources to and from a CLPR
Caution: Migrating resources to and from a CLPR can significantly degrade host performance and should be performed during the initial installation and setup of the storage system or during maintenance.

After creating a CLPR, you can migrate resources (parity groups) from existing CLPRs to the new CLPR.

When migrating resources to and from a CLPR:
Multiple parity groups that configure interleaved parity groups must be in the same CLPR.

(VSP G1x00 and VSP F1500) If a parity group contains one or more LDEVs that have defined Cache Residency Manager cache areas, you cannot migrate that parity group to another CLPR.

Before you begin

- Required role: Storage Administrator (System Resource Management)

Procedure

1. Open the Cache Partitions window.
   1. On the Administration tree, click Cache Partitions.
   2. Click the Cache Partitions tab.

2. On the Cache Partitions tab, click Migrate CLPR Resources to open the Migrate CLPR Resources window.

3. In the Available Parity Groups table or Available Virtual Volumes table, select the resource that you want to migrate.

4. Select the migration destination CLPR in the CLPRs table.

5. Click Set.
   The resource selected in the Available Parity Groups table or the Available Virtual Volumes table is migrated to the CLPR selected in the CLPRs table. To check the information of the CLPR, select the CLPR and click Detail to open the CLPR Properties window.

6. When you are done adding resources to migrate, click Finish.

7. On the Confirm window, check the settings carefully.

8. When you are ready to start the resource migration, enter the task name in the Confirm window, and then click Apply.
   The Tasks window opens if Go to tasks window for status is checked.

Managing CLPRs

Editing an existing CLPR

You can change the following settings after creating a CLPR:

- CLPR name
- CLPR cache capacity
- (VSP G1x00 and VSP F1500) Resident cache size
- (VSP G1x00 and VSP F1500) Number of resident cache extents
When you select "CLPR0" to edit, you can edit only the CLPR name.

Before you begin

- Required role: Storage Administrator (System Resource Management)

Procedure

1. Open the Cache Partitions window.
   1. On the Administration tree, click Cache Partitions.
   2. Click the Cache Partitions tab.

2. Select the CLPR to be edited, and then click Edit CLPR to open the Edit CLPR window on the Cache Partitions tab.
   In CLPR ID, an automatically assigned CLPR ID is displayed.

3. Edit the CLPR settings as follows.
   1. In CLPR Name, edit the CLPR name as needed. You can use up to 16 alphanumeric characters but cannot specify CLPR names that are already reserved. The default is the name set at the time of the CLPR creation.

   2. (VSP G1x00 and VSP F1500) In Total Cache Size, edit the CLPR cache capacity as needed. The minimum cache size is 8 GB, and the size can be changed in increments of 4 GB. The default is the value set at the time of the CLPR creation. The maximum value is 2,022 GB (subtract 8 GB from the cache capacity of the storage system), but the maximum available capacity (subtract the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the upper limit value. The remaining cache capacity (subtract the resident cache size from the total cache size) must be 8 GB or more. Ensure that the remaining capacity in CLPR0 is at least 8 GB when selecting the total cache size or resident cache size.

   When you reduce the value of Total Cache Size, the resident cache size before change may not be applied in some cases. If so, ensure the value of the resident cache size and check the Resident Cache Size check box.

   3. (VSP Gx00 models and VSP Fx00 models) In Cache Size, edit the CLPR cache capacity as needed. You can select 4 GB or a higher value for the cache capacity of the CLPR and the size can be changed in increments of 2 GB. The default is the value set at the time of the CLPR creation. The maximum available capacity (subtract the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the upper limit value.

   4. (VSP G1x00 and VSP F1500) In Resident Cache Size, edit the resident cache capacity as needed. The minimum size is 0 GB, and the size can be changed in increments of 0.5 GB. The default is the value set at the time of the CLPR creation. The maximum value is 2,014 GB (cache residency capacity of the storage system), but the maximum available capacity (subtract the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the upper limit value. If resident cache exists in the selected CLPR and you select a
resident cache size that is smaller than the existing resident cache, an error will occur. Before decreasing the size, check the resident cache capacity set in the selected CLPR.

5. (VSP G1x00 and VSP F1500) In Number of Resident Extents, edit the number of resident cache extents as needed. You can specify from 0 to 16384. The default is the value set at the time of the CLPR creation. The maximum available capacity (subtract the total usage capacity of other CLPRs from the total capacity of the storage system) is displayed as the maximum value. If resident cache exists in the selected CLPR and you select fewer resident cache extents than the existing number of extents, an error will occur. Before decreasing the number, check the number of resident extents set in the selected CLPR.

4. When you are done editing the CLPR settings, click Finish.

5. On the Confirm window, check the settings carefully.

6. When you are ready to change the settings, enter the task name in the Confirm window, and then click Apply. The Tasks window opens if Go to tasks window for status is checked.

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**Deleting a CLPR**

You can only delete CLPRs that you created. CLPR0 cannot be deleted. CLPRs to which parity groups or virtual volumes are allocated cannot be deleted.

Before you begin

- Required role: Storage Administrator (System Resource Management)

Procedure

1. Open the Cache Partitions window.
   
   1. On the Administration tree, click Cache Partitions.
   
   2. Click the Cache Partitions tab.

2. Select the CLPR that you want to delete, and then click Delete CLPRs in the More Actions on the Cache Partitions tab to open the Delete CLPRs window.

3. In the Selected CLPRs table, check the CLPR that you want to delete, and then enter the task name in the Task Name field. To cancel the deletion, click Cancel to go back to the Cache Partitions tab.

4. Click Apply.
   The Tasks window opens if Go to tasks window for status is checked.

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**Optimize your environment**

Review the system option modes for your storage system, and work with your service representative to ensure that the appropriate SOMs for your operational environment are configured on your storage system.
## Troubleshooting Virtual Partition Manager

<table>
<thead>
<tr>
<th>Error</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The CLPR name cannot be changed.</td>
<td>You cannot assign the same name to more than one CLPR. The name you entered is already in use or is a reserved name. Enter another name.</td>
</tr>
<tr>
<td>The parity group in a CLPR cannot be migrated to another CLPR.</td>
<td>If you cannot migrate a parity group in the CLPR to another CLPR, perform the following:</td>
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<tr>
<td></td>
<td>• (VSP G1x00 and VSP F1500) If Cache Residency settings are defined for an LDEV in a parity group, the parity group cannot be migrated. Release the defined Cache Residency, and then migrate the parity group.</td>
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<tr>
<td></td>
<td>• Make sure to click Apply when creating a new CLPR.</td>
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