Flash Pool caching policies and SSD partitioning

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Caching policies for the volumes in a Flash Pool aggregate let you deploy flash as high performance cache for your working data set while using lower-cost HDDs for less frequently accessed data. If you are providing cache to two or more Flash Pool aggregates, you should use Flash Pool SSD partitioning to share SSDs across the aggregates in the Flash Pool.

Caching policies are applied to volumes that reside in Flash Pool aggregates. You should understand how caching policies work before changing them.

In most cases, the default caching policy of `auto` is the best caching policy to use. The caching policy should be changed only if a different policy provides better performance for your workload. Configuring the wrong caching policy can severely degrade volume performance; the performance degradation could increase gradually over time.

Caching policies combine a read caching policy and a write caching policy. The policy name concatenates the names of the read caching policy and the write caching policy, separated by a hyphen. If there is no hyphen in the policy name, the write caching policy is “none”, except for the `auto` policy.

Read caching policies optimize for future read performance by placing a copy of the data in the cache in addition to the stored data on HDDs. For read caching policies that insert data into the cache for write operations, the cache operates as a *write-through* cache.

Data inserted into the cache by using the write caching policy exists only in cache; there is no copy in HDDs. Flash Pool cache is RAID protected. Enabling write caching makes data from write operations available for reads from cache immediately, while deferring writing the data to HDDs until it ages out of the cache.

You can change the caching policy for a volume that resides on a Flash Pool aggregate by using the `-caching-policy` parameter with the `volume create` command. When you create a volume on a Flash Pool aggregate, by default, the `auto` caching policy is assigned to the volume.

If you move a volume from a Flash Pool aggregate to a single-tier aggregate, it loses its caching policy; if you later move it back to a Flash Pool aggregate, it is assigned the default caching policy of `auto`. If you move a volume between two Flash Pool aggregates, the caching policy is preserved.

How Flash Pool SSD partitioning works for Flash Pool aggregates using storage pools

If you are providing cache to two or more Flash Pool aggregates, you should use Flash Pool Solid-State Drive (SSD) partitioning. Flash Pool SSD partitioning allows SSDs to be shared by all the aggregates using the Flash Pool. This spreads the cost of parity over multiple aggregates, increases SSD cache allocation flexibility, and maximizes SSD performance.

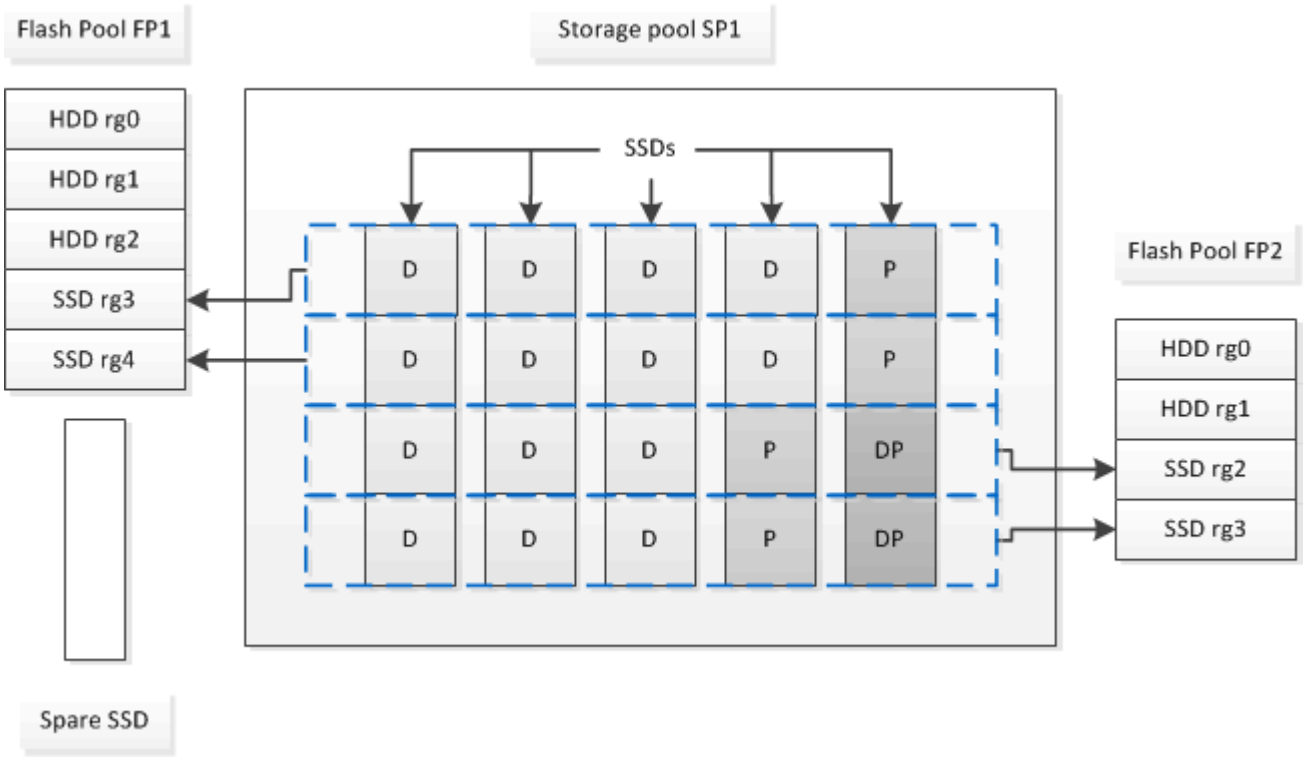
For an SSD to be used in a Flash Pool aggregate, the SSD must be placed in a storage pool. You cannot use SSDs that have been partitioned for root-data partitioning in a storage pool. After the SSD is placed in the storage pool, the SSD can no longer be managed as a stand-alone disk and cannot be removed from the

storage pool unless you destroy the aggregates associated with the Flash Pool and you destroy the storage pool.

SSD storage pools are divided into four equal allocation units. SSDs added to the storage pool are divided into four partitions and one partition is assigned to each of the four allocation units. The SSDs in the storage pool must be owned by the same HA pair. By default, two allocation units are assigned to each node in the HA pair. Allocation units must be owned by the node that owns the aggregate it is serving. If more Flash cache is required for aggregates on one of the nodes, the default number of allocation units can be shifted to decrease the number on one node and increase the number on the partner node.

You can use only one spare SSD for a storage pool. If the storage pool provides allocation units to Flash Pool aggregates owned by both nodes in the HA pair, then the spare SSD can be owned by either node. However, if the storage pool provides allocation units only to Flash Pool aggregates owned by one of the nodes in the HA pair, then the SSD spare must be owned by that same node.

The following illustration is an example of Flash Pool SSD partitioning. The SSD storage pool provides cache to two Flash Pool aggregates:



Storage pool SP1 is composed of five SSDs and a hot spare SSD. Two of the storage pool's allocation units are allocated to Flash Pool FP1, and two are allocated to Flash Pool FP2. FP1 has a cache RAID type of RAID4. Therefore, the allocation units provided to FP1 contain only one partition designated for parity. FP2 has a cache RAID type of RAID-DP. Therefore, the allocation units provided to FP2 include a parity partition and a double-parity partition.

In this example, two allocation units are allocated to each Flash Pool aggregate. However, if one Flash Pool aggregate required a larger cache, you could allocate three of the allocation units to that Flash Pool aggregate, and only one to the other.