

Snapshot Manual

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Introduction

QSAN provides snapshot function as a quick, easy and reliable way to backup and restore data inside controller. In this document, it describes how to create a data-consistent or data-completed snapshot against to the original data stored in disk. The difference of snapshot operation between LVM2 and LVM3 will also be interpreted in this article.

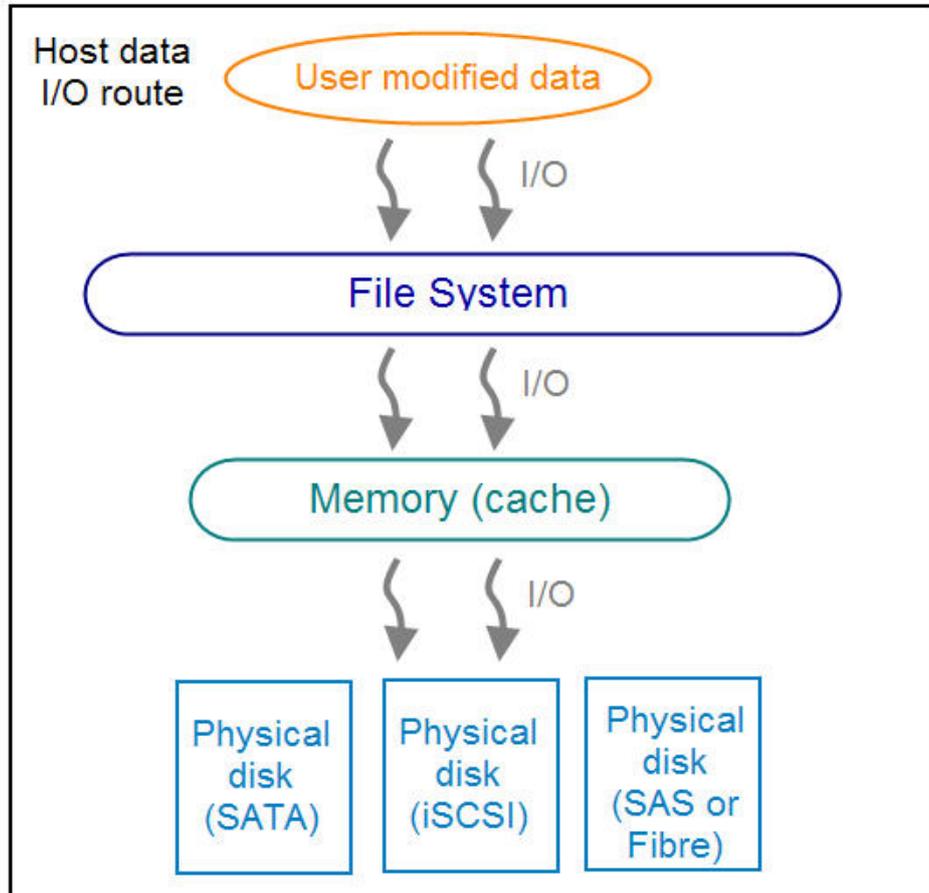
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How snapshot works?

QSAN snapshot function applies Copy-on-Write technique on UDV/VD and provides a quick and efficient backup methodology. When taking a snapshot, it does not copy any data at first time until a request of data modification comes in. The snapshot copies the original data to snapshot space and then overwrites the original data with new changes. With this technique, snapshot only copies the changed data instead of copying whole data. It will save a lot of disk space.

Create a data-consistent snapshot

Before using snapshot, user have to know why sometimes the data corrupts after rollback of snapshot. Please refer to the following diagram.



When user modifies the data from host, the data will pass through file system and memory of the host (write caching). Then the host will flush the data from memory to physical disks, no matter the disk is local disk (IDE or SATA), DAS (SCSI or SAS), or SAN (fibre or iSCSI). From the viewpoint of storage device, it can not control the behavior of host side. This case maybe happens. If user takes a snapshot, some data is still in memory and not flush to disk. Then the snapshot may have an incomplete image of original data. The problem does not belong to the storage device. To avoid this data inconsistent issue between snapshot and original data, user has to make the operating system flush the data from memory of host (write caching) into disk before taking snapshot.

On Linux and UNIX platform, a command named **sync** can be used to make the operating system flush data from write caching into disk. For Windows platform, Microsoft also provides a tool – **sync**, which can do exactly the same thing as the **sync** command in Linux/UNIX. It will tell the OS to flush the data on demand. For more detail about **sync** tool, please refer to: <http://technet.microsoft.com/en-us/sysinternals/bb897438.aspx>

Besides the **sync** tool, Microsoft develops **VSS** (volume shadow copy service) to prevent this issue. VSS is a mechanism for creating consistent point-in-time copies of data known as shadow copies. It is a coordinator between backup software, application (SQL or Exchange...) and storages to make sure the snapshot without the problem of data-inconsistent. For more detail about the VSS, please refer to <http://technet.microsoft.com/en-us/library/cc785914.aspx>. **QSAN P210C** can support Microsoft VSS.

What if the snapshot space is over?

Before using snapshot, a snapshot space is needed from VG / RG capacity. After a period of working snapshot, what if the snapshot size over the snapshot space of user defined? There are two different situations:

1. If there are two or more snapshots existed, the system will try to remove the oldest snapshots (to release more space for the latest snapshot) until enough space is released.
2. If there is only one snapshot existed, the snapshot will fail. Because the snapshot space is run out.

For example, there are two or more snapshots existed on a UDV / VD and the latest snapshot keeps growing. When it comes to the moment that the snapshot space is run out, the system will try to remove the oldest snapshot to release more space for the latest snapshot usage. As the latest snapshot is growing, the system keeps removing the old snapshots. When it comes that the latest snapshot is the only one in system, there is no more snapshot space which can be released for incoming changes, then snapshot will fail.

How many snapshots can be created on a UDV / VD

There are up to 32 snapshots can be created on a UDV / VD. What if the 33rd snapshot has been taken? There are two different situations:

1. If the snapshot is configured as **auto snapshot**, the latest one (the 33rd snapshot) will replace the oldest one (the first snapshot) and so on.
2. If the snapshot is taken manually, when taking the 33rd snapshot will fail and a warning message will be showed on Web UI.

Rollback/Delete snapshot on LVM2 / LVM3

On LVM2 models (i.e. **P150C**, **P200C**, **S120C**, and **S500C**), when a snapshot has been rollbacked, the other snapshots will be removed and the snapshot space will be reset to zero. So the best practice of rollback is to mount the snapshot and check it in advance. If a snapshot has been deleted, the other snapshots which are earlier than it will also be deleted. The space occupied by these snapshots will be released after deleting.

On LVM3 models (i.e. **P160C**, **P210C**, **S510C**, and **F200C**), when a snapshot has been rollbacked, the other snapshots which are earlier than it will also be removed. But the rest snapshots will be kept after rollback. The behavior of deleting a snapshot is the same as LVM2.

Summary

QSAN snapshot-on-the-box is a quick, easy, and reliable way to help users to backup data on UDV/VD. It is necessary for an operator to understand all its manipulation thoroughly before applying it as a routine backup. Any unfamiliar operation may cause the data corrupt. Please read this document carefully. Hope that snapshot function would become a good assistant of backup jobs.

Applies to

- All **QSAN** controllers with snapshot feature enabled.

References

- Microsoft file and disk utility -- Sync v2.0
<http://technet.microsoft.com/en-us/sysinternals/bb897438.aspx>
- How Volume Shadow Copy Service Works
<http://technet.microsoft.com/en-us/library/cc785914.aspx>