



NetApp FlexVol and FlexClone Raise the Rate of Return on Storage Resources

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Management Summary

If one bank promised a 5% annual return on your money and another promised 10%, where would you deposit your hard-earned cash? All other things being equal, the bank offering the higher rate of return is the better choice – because it is smart to maximize your money. This is true for any scarce resource, *including storage*.

NetApp introduced two new major capabilities in its Data ONTAP 7G storage operating system: *FlexVol* and *FlexClone*. FlexVol virtualizes volumes by allocating capacity in a dynamic (vs. fixed) manner. FlexClone creates readable and writable point-in-time copies without the overhead of a full copy. Think of it as a *SnapShot* without read-only limitations.

Most interestingly, both new capabilities raise the rate of return on storage resources. That is, they increase the utility of a given amount of storage capacity. Disk drives are disk drives, but the real value is what an enterprise can do with them.

Read on for details about what enterprises can do with FlexVol and FlexClone.

FlexVol

FlexVol virtualizes volumes in NetApp storage systems by abstracting them from the underlying physical media. This is like the difference between a wireless phone and a landline. While each is associated with a unique phone number, the wireless phone can be practically anywhere in the country (or world) but the landline phone must be in a fixed location.

FlexVol volumes are similarly flexible, as the name implies. They are created from a common pool of disk capacity called an *aggregate*, which consists of multiple RAID groups of typically the same type of disk. Capacity allocations are soft, not fixed as in traditional volumes. Therefore, FlexVol volumes consume capacity only when data is written, and free resources do not sit idle, inaccessible, and reserved for only a single volume. Resizing up or down is non-disruptive to the application. In addition, all volumes stripe data across all disks in their associated aggregate. This means the cumulative performance of all spindles is available to all volumes. Several benefits accrue from these technical improvements:

- **Higher resource utilization** – Soft allocations from a common pool of capacity are more efficient in using disk resources.

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Higher utilization means lower storage costs.

- **Better availability** – FlexVol makes volume provisioning and re-sizing non-disruptive to applications. This is important because storage environments continuously grow and change, and periodic reconfigurations are necessary. When it comes to downtime, less is more.
- **Better performance** – FlexVol makes broader and more consistent use of available performance by striping data across all drives taken together. Performance is a function of the number of spindles or drives in a volume, among other things.
- **Simpler management** – FlexVol simplifies the human aspect of volume management, which helps reduce operating costs.

FlexClone

FlexClone creates virtual (PIT) copies without the capacity overhead of a traditional full copy. FlexClone copies are readable, writable, independently-addressable copies of a source volume. However, they employ the same copy-on-write technique as SnapShots. They only consume capacity as blocks change in the source volume or FlexClone copy, except for a relatively small amount of metadata. This allows enterprises to create multiple, instant PIT copies with minimal overhead, instead of consuming the full capacity of the source for each one.

FlexClone lowers the cost threshold for enterprises to use full PIT copies. An analogy might be a family household asking the question, “Should we buy a second car?” They would normally weigh the cost versus the additional conveniences that it would bring. However, what if the cost of a second vehicle were a small fraction of the first? That would completely change the analysis, and many more households would go for the second vehicle.

While read-only SnapShots open up broader use of copies for data protection, backup, and restore, FlexClone enables more activities like testing, development,

bug fixing, upgrades, and multiple, simultaneous simulations against a data set.

Data ONTAP 7G

FlexVol and FlexClone are enhancements to Data ONTAP, NetApp’s specialized storage operating system. This is the software foundation of its products, including the *FAS*¹ (fabric-attached storage), *NearStore*², and *gFiler*³ platforms. Therefore, Data ONTAP and its recent FlexVol and FlexClone enhancements are applicable only to NetApp storage, except in the case of the gFiler gateway, which can incorporate third-party disk arrays.

Conclusion

FlexVol and FlexClone stretch storage capacity further and open up additional productive activities for enterprise data. They raise the rate of return on storage resources.

If your enterprise already owns a NetApp storage platform, it would be worth upgrading to Data ONTAP 7g to take advantage of FlexVol for improving storage costs, performance, and availability. If FlexClone copies would open up additional, productive activities for your data, that would be another reason.

If you are looking at NetApp storage platforms vis-à-vis competitive alternatives, be sure to factor these interesting new capabilities into your analysis.



¹ See *NetApp Unified SAN and NAS – Simpler is Better* in **The Clipper Group Navigator** dated October 21, 2002, at <http://www.clipper.com/research/TCG2003041.pdf>.

² See *Network Appliance Breaks New Ground For Business Continuance with the NearStore R100* in **The Clipper Group Navigator** dated March 18, 2002, at <http://www.clipper.com/research/TCG2002009.pdf>.

³ See *NetApp Pushes the Envelope of Unified Storage* in **The Clipper Group Navigator** dated January 16, 2004, at <http://www.clipper.com/research/TCG2003002.pdf>.

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