StarWind VSAN for vSphere: changing Linux I/O scheduler to optimize storage performance

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Description

Storage performance on Linux systems depends on many parameters and settings. One of them is Linux I/O scheduler which defines a way how to work and optimize disk access requests. There are several I/O scheduler options available that can be used depending on the storage type and environment. This article describes how to change Linux I/O scheduler in Linux-based VM with StarWind VSAN.

Solution

Before changing the I/O scheduler option, it is good to clarify them by reading the file */sys/block/<disk device>/queue/scheduler.* For example, the command below shows that I/O scheduler for disk ***sda*** is set to ***deadline***.

```
# cat /sys/block/sda/queue/scheduler noop [deadline] cfq
```

NOTE: Depending on the kernel version, the output can also looks like: *[bfq] mq-deadline none* Different schedulers can be used depending on environment requirements and disk types and must be chosen based on the tests, performed in a specific environment. However, it was defined that for SSD or NVME drives the ***none*** or ***noop*** I/O scheduler reduces CPU overhead, while for HDD storage the ***deadline*** or the default I/O scheduler shows better results with synthetic tests. In order to change the I/O scheduler, the corresponding information has to be changed in */sys/block/<disk device>/queue/scheduler* file. Please find below one of the possible ways how it can be done. In the example below I/O scheduler for disk ***sdb*** is set to ***noop***:

```
# echo noop > /sys/block/sdb/queue/scheduler
```

After changing the file, please double-check that I/O scheduler has been changed:

```
# cat /sys/block/sdb/queue/scheduler [noop] deadline cfq
```

NOTE: It is important to remember that I/O scheduler in Linux is defined on each disk device separately, thus it makes sense to check it for each disk device, like ***sda***, ***sdb*,** etc. In order to apply the scheduler rules permanently, for example after Linux restart, the scheduler file */etc/udev/rules.d/89-disk-scheduler.rules* have to be edited and one more rule should be added. For example, the following line will change I/O scheduler to ***noop*** for ***sdb*** device, and set ***no read ahead*** policy for it. `ACTION=="add|change", SUBSYSTEM=="block", KERNEL=="sdb", ATTR{queue/scheduler}="noop", ATTR{queue/read_ahead_kb}="0"` For the cases, when storage is used by StarWind VSAN service and HA device, in order to avoid performance issues, it's highly recommended to set the same I/O scheduler settings for the storage on all nodes, where

HA devices are located. **NOTE**: In the latest StarWind VSAN for vSphere builds it is configured to identify storage type automatically and change I/O scheduler for SSD storage to ***noop***. More information about I/O schedulers in Linux: IOSchedulers: https://wiki.ubuntu.com/Kernel/Reference/IOSchedulers What is the suggested I/O scheduler to improve disk performance when using Red Hat Enterprise Linux with virtualization?: https://access.redhat.com/solutions/5427

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