

iSCSI Performance Tuning

Best Practice Guide

Version 1.0

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Announcement

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Edition 1.0 (JAN. 2020)

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Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products.

All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Preface

About This Guide

This performance tuning guide provides technical guidance for adjusting/increasing the performance when testing QSAN products which provides iSCSI service, and it is intended for use by system administrators, SAN/NAS designers, storage consultants, or anyone who has purchased these products and is familiar with server and computer network, network administration, storage system installation and configuration, network attached storage management, and relevant protocols.



CAUTION:

Do NOT attempt to service, change, disassemble components by yourself. Doing so may violate your warranty and expose you to electric shock. Refer all servicing to authorized service personnel. Please always follow the instructions in this owner's

Technical Support

Do you have any questions or need help troubleshooting a problem? Please contact QSAN Support, we will reply to you as soon as possible.

- Via the Web: http://www.qsan.com/en/contact_support.php
- Via Telephone: +886-2-7720-6355
- (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support
- (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summertime: 09:30 - 01:00)
- Via Email: support@qsan.com

Information, Tip and Caution

This manual uses the following symbols to draw attention to important safety and operational information.



INFORMATION:

INFORMATION provides useful knowledge, definition, or terminology for reference.



TIP:

TIP provides helpful suggestions for performing tasks more effectively.



CAUTION:

CAUTION indicates that failure to take a specified action could result in damage to the system.

1. Overview

1.1 Audience

This document is applicable for those technical members who are familiar with QSAN products, and for those who are good at network trouble shooting, Windows Server and Unix-Like OS operations, and basic hardware installations.

Please read this document carefully before trying to adjust any parameter on server side. Doing an adjustment with wrong understanding may lead you to get a worse performance experience than ever. If you have any questions about the adjustment, please consult QSAN Technical Support for further assistance.

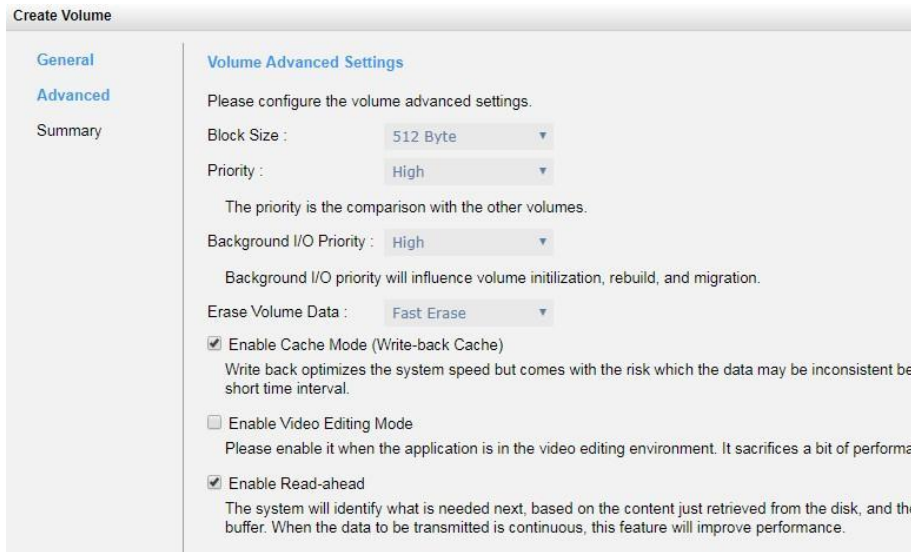
2. Storage Best Configuration

2.1. Network Configuration

Please make sure the followings are configured, don't need to set each setting to the best exactly ones for user:

- Make certain that each network port has been used for I/O transferring, you may check from Performance Monitor page on web UI for reference
-

- Don't change anything when creating a volume Editing Mode if user's environment needs



- The overall performance would be a bit lower if Video Editing Mode or Fast Rebuild is enabled, but it won't be a problem to
- (Optional) This is an optional configuration, but it is important to realize, if overall performance (theory) from disk drives exceeds below thresholds:
- Don't enable / take snapshot on the volume performance, mechanism uses differential copy (on write), write performance will be low when testing write performance on a volume which has taken a snapshot.
- (Optional) This is an optional configuration, but it is important to realize, if overall performance (theory) from disk drives exceeds below thresholds:
 - 6400MB/s for read (Sequential)
 - 2500MB/s for write (Sequential)
 - 600000 IOPS for read (Sequential)
 - 300000 IOPS for write (Sequential)
 - 300000 IOPS for read (Random)
 - 100000 IOPS for write (Random)

Please try to divide disk drives to two parts with the same quantity, and create two RAID pools, then assign to controller1 and controller2 separately.

3. Server Configuration

3.1. Network Configuration

Nowadays, those mainstream OSes contain the driver by default for most popular HBA cards, but it is still recommended to update the driver version to the latest one for the installed HBA on the server side, in case of any incompatibility between the OS and HBA card.

- Make certain that each network port has been used for I/O transferring, you may check from Task Manager from Windows Server.
- You may specify source IP address when logging in iSCSI target from Windows Server iSCSI Initiator, to ensure that each NIC port on server side will be used.
- Unix-Like OS may not support to specify a source IP address when logging in a iSCSI target, so you may need to configure different network segments for each NIC port on server side.
- Make sure a proper network cable with correct link speed is used for each NIC port.



TIP:

If you have a switch connected between server and storage, make sure the Flow Control on the switch side is ON, and be sure the other settings are the same as `server's NIC`.

3.2. Local Drive

If you are going to test the performance by copy and paste operation, please make sure that the local drive installed on your server possesses high performance, as a copy and paste operation relates to read and write performance from local drive as well. E.g., if local drive has only 100MB/s performance for read, while the RAID volume could deliver up to 1000MB/s performance for read and write, the test result by a copy and paste will be around 100MB/s when copying data from the local drive and pasting to the RAID volume, which means the bottleneck is on the local drive instead.

3.3. Windows Server OS

After the above configurations are confirmed, you may or may not encounter slow performance when testing read/write performance with through iSCSI connections, if you were suffering with slow performance, please `try to adjust below para` HBA driver:

- Visit Device Manager, in Network adapters, right-click the NIC port you are using for performance testing, choose Properties, go to Advanced, find RSS Queue (different brands may have different terms), adjust the RSS Queue to 2 from 8.
- In the same location as above, find Receive Buffers, adjust the value to be maximum.

- In the same location as above, find Transmit Buffers, adjust the value to be maximum.
- In the same location as above, find Interrupt Moderation Rate, adjust the value to be Off.

If the above adjustments do not help, please go further for the below option:

- Open a Command Line, type `netsh int tcp`
type `netsh int tcp set global autotuning`



INFORMATION:

It is necessary to re-log in the connected iSCSI session after the above parameters are made, a reboot of server work after a re-login of iSCSI session.



CAUTION:

Please verify the performance right after one of adjustments above is made, to find out which one is suitable for user adjust each item.

3.4. Unix-Like OS

After the above configurations are confirmed, you may or may not encounter slow performance when testing read/write performance with through iSCSI connections, if you were suffering with slow performance, please try to adjust below parameters on server:

- Please firstly finish all the configurations mentioned in this [white paper](#).
- Adjust Read Ahead (RA) buffer for the RAID volume via blockdev command:

```
root@antony-virtual-machine:/home/antony# blockdev --report
RO   RA   SSZ   BSZ   StartSec           Size   Device
rw   256  2048  2048           0     1051721728 /dev/sr0
rw   256   512  4096           0     17179869184 /dev/sda
rw   256   512  4096         2048     16105078784 /dev/sda1
rw   256   512  1024     31459326         1024 /dev/sda2
rw   256   512  4096     31459328     1071644672 /dev/sda5
root@antony-virtual-machine:/home/antony# blockdev --setra 4096 /dev/sda
```

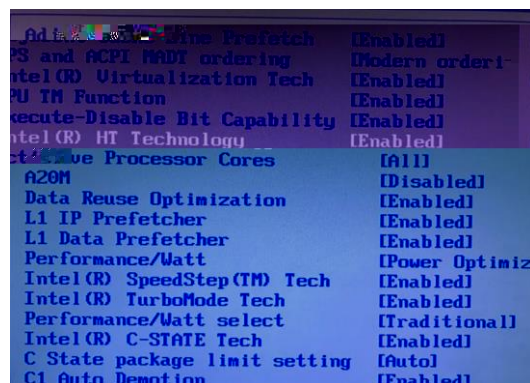
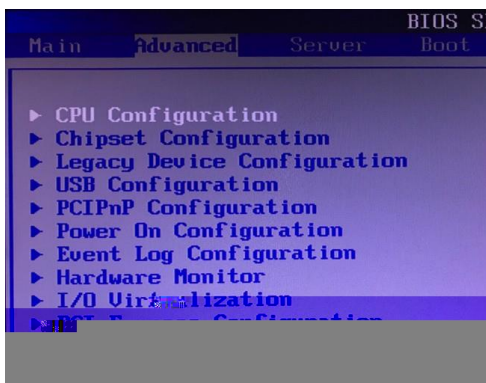
Set the RA value to be higher like 4096 or 8192 for each RAID volume, if the RAID volume is a multipath'ed device, please adjust the dm

- Adjust the Receive Buffer for TCP/IP:

```
root@antony-virtual-machine:/home/antony# sysctl -w net.core.rmem_max=524284
net.core.rmem_max = 524284
root@antony-virtual-machine:/home/antony#
```

Set the receive buffer to be 524284 or higher (twice the value).

- Disable HT (Hyper Threading in BIOS of server):





INFORMATION:

It is necessary to re-log in the connected iSCSI session after the above parameters are made.



CAUTION:

Please verify the performance right after one of adjustments above is made, to find out which one is suitable for user adjust each item.

4. Support and Other Resources

4.1. Getting Technical Support

After installing your device, locate the serial number on the sticker located on the side of the chassis or register your product at partner.qsan.com/ (End-User Registration). We recommend registering your product in QSAN partner website for firmware updates, document download, and latest news in e-blast. To contact QSAN Support, please use the following information.


1. Via the Web: http://www.qsan.com/en/contact_support.php
2. Via Telephone: +886-2-7720-6355
(Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
3. Via Skype Chat, Skype ID: qsan.support
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4. Via Email: support@qsan.com

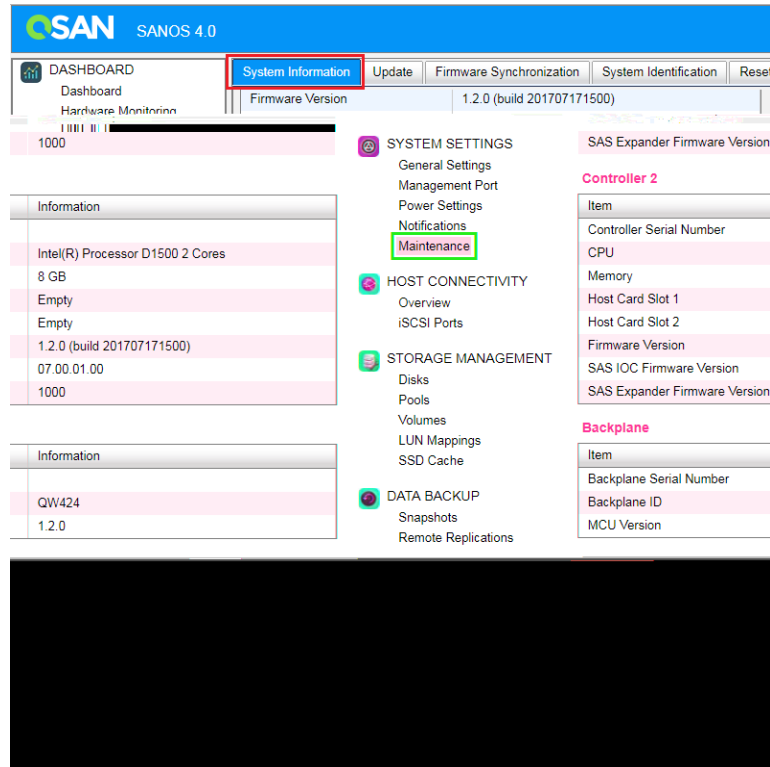
Information to collect

1. Product name, model or version, and serial number
2. Firmware version
3. Error messages or screenshot images
4. Product-specific reports and logs
5. Add-on products or components installed
6. Third-party products or components installed

Information for Technical Support

The following system information is necessary for technical support; please refer to following for what and where to get the information of your XCubeSAN model.

If the technical support requests you to download the service log/debug info, please navigate on the SANOS UI → System Settings → Maintenance → System Information, then click on the  button for download.



4.2. Documentation Feedback

QSAN is committed to providing documentation that meets and exceeds your expectations. To help us improve the documentation, email any errors, suggestions, or comments to docsfeedback@qsan.com.

When submitting your feedback, include the document title, part number, revision, and publication date located on the front cover of the document.

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