

# Inside MegaRAID



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# Agenda

- **Anwendungsgebiete & -beispiele**
- **Performance Betrachtungen**
- **Managementoberflächen**
- **Fragen & Antworten**

# Anwendungsbeispiele

# Wann welcher Controller?



## LSI MR SAS 9240, 9341

- 6 & 12Gb/s SAS
- über 700K IOPS
- PCI Express 2.0 & 3.0
- Bis zu 8 Ports
- RAID 0/1/5/6/10

*Low Entry*

## LSI MR SAS 9250, 9260, 9280

- 6Gb/s SAS
- über 340k IOPS
- Bis zu 2.9GB/s Schreiben
- Bis zu 2.9GB/s Lesen
- 512MB DDR-III
- PCI Express 2.0
- Bis zu 24 Ports
- BBU

*Value*

## LSI MR SAS 9266, 9271, 9286

- 6Gb/s SAS
- Über 670k IOPS
- Bis zu 3.0GB/s Schreiben
- Bis zu 4.2GB/s Lesen
- 1GB DDR-III
- PCI Express 3.0
- bis zu 8 Ports
- CacheVault und BBU

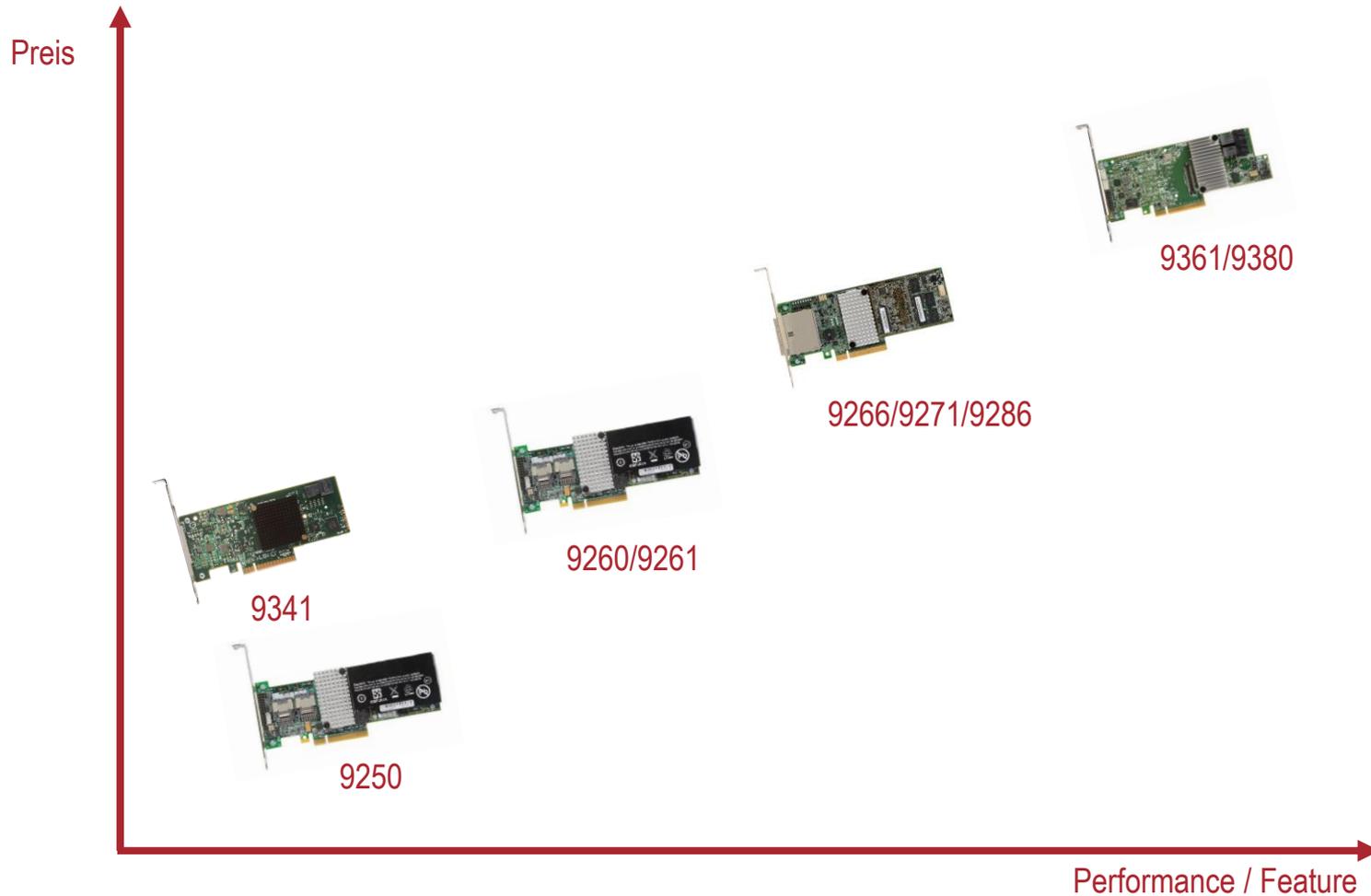
*Performance*

## LSI MR SAS 9361, 9380

- 12Gb/s SAS
- über 700k IOPS
- Bis zu 6.5GB/s Schreiben
- Bis zu 6.0Gb/s Lesen
- 1GB DDR-III
- PCI Express 3.0
- Bis zu 16 Ports (NEU!!!)
- Nur CacheVault

*Leadership*

# Preis-/Leistung



# Einstiegssystem

## Microserver MI106 [Ver.1.0]



- \_ Intel Celeron (max. 4 cores, up to 2GHz)
- \_ Upgradeable to 16GB RAM, (2 DIMMs)
- \_ 4x 3.5" HDD(s), configurable up to 32 TB (Gross)
- \_ Additional HDDs: 2 x 2,5" HDD(s) (fest installiert)
- \_ Expandable with 1 additional card(s), 1x PCI-E 2.0 (x1)
- \_ Compact, silent microserver for the office
- \_ Energy-efficient power supply 80plus Gold (> 87%)

12G SW RAID  
offloaded  
\$\$



9341

6G HW RAID 0,1,10  
Cache + BBU  
\$



9250

6G HW RAID  
Cache + BBU  
\$\$\$



9260

# Mittelklasse

## 2U Intel Dual-CPU SC825 Server [Ver.4.3]



- \_ Up to 2x Intel Xeon processor E5-2600v2 (4 - 12 cores, up to 3.5GHz)
- \_ Upgradeable to 512GB RAM, (16 DIMMs)
- \_ 8x 3.5" HDD(s) or 2.5" HDD(s), configurable up to 64 TB (Gross)
- \_ Expandable with 6 LP/ HL/ FL additional card(s), 3x PCI-E 3.0 (x16) 3x PCI-E 3.0 (x8)
- \_ Expandable to 4 on-board LAN ports (optional)
- \_ Energy-efficient power supply 80plus Platinum (> 94%)
- \_ Integrated IPMI (dedicated NIC)

Anwendung: mittlere Unternehmen; Web-, File-, Mail-, DB-Server; ggf. virtualisiert

6G HW RAID  
Cache + BBU

\$



9260

2. Gen 6G HW RAID  
Cache + BBU/CV

\$\$



9266/9271

12G HW RAID  
Cache + CV

\$\$\$



9361/9380

**AVAGO**  
TECHNOLOGIES

STORAGE  
BY LSI™

# Enterprise

## 2U Intel Dual-CPU RI8224M Server [Ver.1.0]



- \_ incl. CPU and RAM (optional variable) included in delivery
- \_ Up to 2x Intel Xeon E5-2600 (v2) Ivy Bridge CPUs (per node)
- \_ Upgradeable to 128GB DDR3 ECC Registered RAM, (8 DIMMs) (per node)
- \_ 6x 2.5" HDD(s), up to 5.4 TB configurable (per node)
- \_ Expandable with 1 LP additional card(s), 1x PCI-E 3.0 (x16) (per node)
- \_ Integrated IPMI (dedicated NIC) (per node)
- \_ Energy-efficient power supply 80plus Platinum (> 94%) red. NT

Anwendung: mittlere Unternehmen; virtualisiert, storageintensive Workloads, Datenbanken

2. Gen 6G HW RAID  
Cache + BBU/CV  
\$\$



9266/9271

12G HW RAID  
Cache + CV  
\$\$\$



9361/9380

# Advanced Software Optionen

## SafeStore Key Management für SED Medien

- **Instant Secure Erase**

Sofortiges löschen:

- Bevor Laufwerke retourniert werden
- Neue Verwendung für HDDs innerhalb eines Rechenzentrums

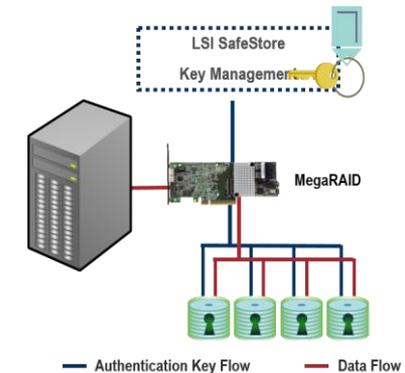
- **Auto-Locked Volumes**

Simpel - Transparent

- Automatisch gesichert, wenn Server heruntergefahren wird

Sichert Daten, wenn ein Laufwerk

- Ausfällt
- gestohlen wird
- wenn ein Server gestohlen wird



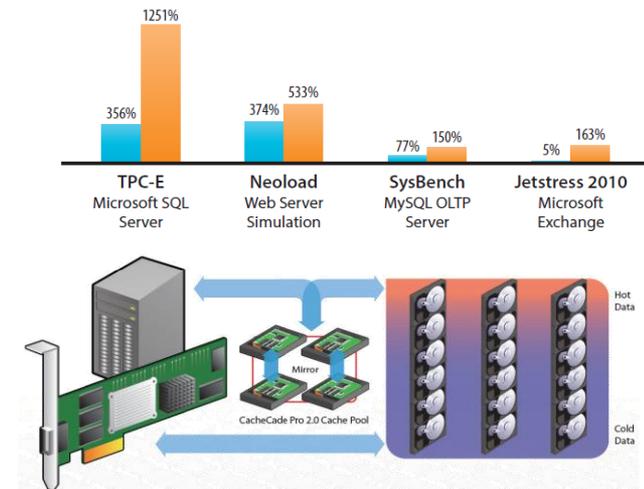
## Einsatzgebiete

- HDD Austausch
- HDD Recycling
- Diebstahlschutz

# Advanced Software Optionen

## Cache Cade - SSD Hot Data Caching

- Beschleunigt was beschleunigt werden muss
  - Algorithmus zur Erkennung von HotData
  - HotData werden auf einen Cache Pool aus SSDs verschoben
  - Beschleunigt Lese- & Schreibvorgänge



## Einsatzgebiete

- Webserver
- Datenbanken
- Random-Workloads

# Performancebetrachtungen

# Housekeeping



Max. Bandbreite	3 Gb/s	6 Gb/s	12 Gb/s
Max. Bandbreite (4 Ports)	12 Gb/s	24 Gb/s	48 Gb/s
Max. Transferrate	300 MB/s	600 MB/s	1.200 MB/s
Max. Transferrate (4 Ports)	1.200 MB/s	2.400 MB/s	4.800 MB/s
Max. Transferrate (8 Ports)	2.400 MB/s	4.800 MB/s	9.600 MB/s

# Housekeeping

	PCIe 1.0/1.1	PCIe 2.0/2.1	PCIe 3.0	PCIe 4.0
Erschienen	2003	2007	2012	~2016
<u>Transfers/s</u> (je Lane und Richtung)	2,5 GT/s	5,0 GT/s	8,0 GT/s	16,0 GT/s
Lanes (Breite)				
x1	250 MB/s	500 MB/s	985 MB/s	1969 MB/s
x2	500 MB/s	1000 MB/s	1969 MB/s	3938 MB/s
x4	1000 MB/s	2000 MB/s	3938 MB/s	7877 MB/s
x8	2000 MB/s	4000 MB/s	7877 MB/s	15754 MB/s
x16	4000 MB/s	8000 MB/s	15754 MB/s	31508 MB/s
(x32)	8000 MB/s	16000 MB/s	31508 MB/s	63015 MB/s

# Medienlimitationen

Generation	Drive Type	Disk K IOPs	Sustained MB/s
Generation 2 (6 Gb/s)	SAS 2.5"	40 bis 250	80 bis 210
	SAS 3.5"	40 bis 250	90 bis 220
	SATA 2.5"	10 bis 70	40 bis 120
	SATA 3.5"	10 bis 70	80 bis 150
Generation 3 (12 Gb/s)	SAS HDD	40 bis 250	100 bis 220
	SATA HDD	10 bis 80	50 bis 150
	SAS SSD	10 bis 120	550
	SATA SSD	10 bis 100	550

# Read Policies

- **Always Read Ahead** – Mit dieser Option nutzt der Controller Read-Ahead wenn die letzten beiden Disk zugriffen in sequenziellen Sektoren stattfanden. Wenn alle Reads in einem Random Muster stattfinden verwendet der Algorithmus kein Read Ahead, aber alle Anfragen werden dauerhaft auf mögliche sequenziellen Operationen überprüft.
- **No Read Ahead** – Nur die angeforderten Daten werden gelesen und der Controller tätigt kein Read Ahead von Daten

# Write Policies

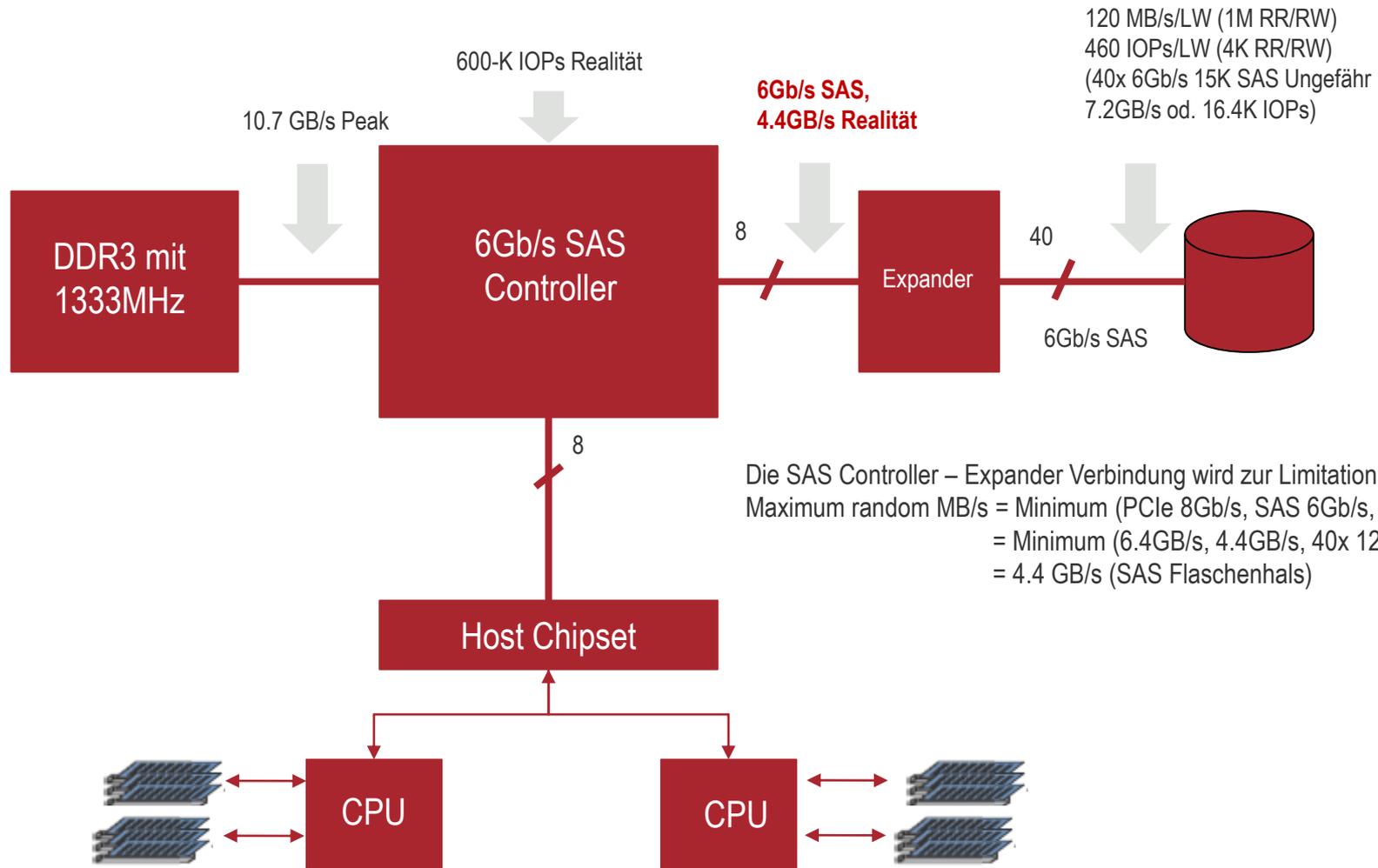
- **Write-Through** – mit dieser Caching Strategie werden Daten auf die Disks geschrieben bevor ein Abschluss Status ans Host OS gegeben wird – wir als sicherer gesehen, da bei einem Strom-Ausfall ungeschriebene Daten verloren gehen, wenn keine Cache-Absicherung vorhanden ist. Die Daten fließen direkt vom Host zu den Disks ohne die Daten vorher in den Cache kopiert zu haben was die Gesamt-Performance von Streaming Workloads mit Direct IO Mode erhöhen kann.
- **Write-Back** – mit dieser Caching Strategie wird bei Schreiboperationen ein Abschluss Status ans Host OS gegeben, sobald die Daten im RAID Cache geschrieben wurden. Die Daten werden auf die Disk geschrieben sobald dies vom Controller vorgegeben wird. Write-Back ist effizienter wenn temporäre und/oder die Größe der Anfragen niedriger sind als die Größe des Controller Caches. Write-Back ist sehr effizient in schreiblastigen Umgebungen. Cache Absicherung gegen Stromausfall wird empfohlen.

# Data Placement Policies

- **Direct IO** – Alle Lese Daten umgehen den RAID Controller Cache und werden direkt in den Host Speicher transferiert. Alle Read Ahead Daten werden gecached – Alle Schreibvorgänge werden direkt vom Host Speicher unter Umgehung des RAID Controller Caches auf die Disks geschrieben, wenn Write-Through eingestellt ist. Empfehlung für alle Konfiguration.
- **Cached IO** – Alle Lese- und Schreibvorgänge gehen durch den Controller Cache auf dem Weg von oder zu dem Host (inklusive Schreibvorgänge in Write-Through Modus) – Nur für CacheCade 1.1 (Read Caching) ansonsten nicht zu empfehlen.

# Limitations-Beispiele

# 6Gb/s SAS Controller Limitation

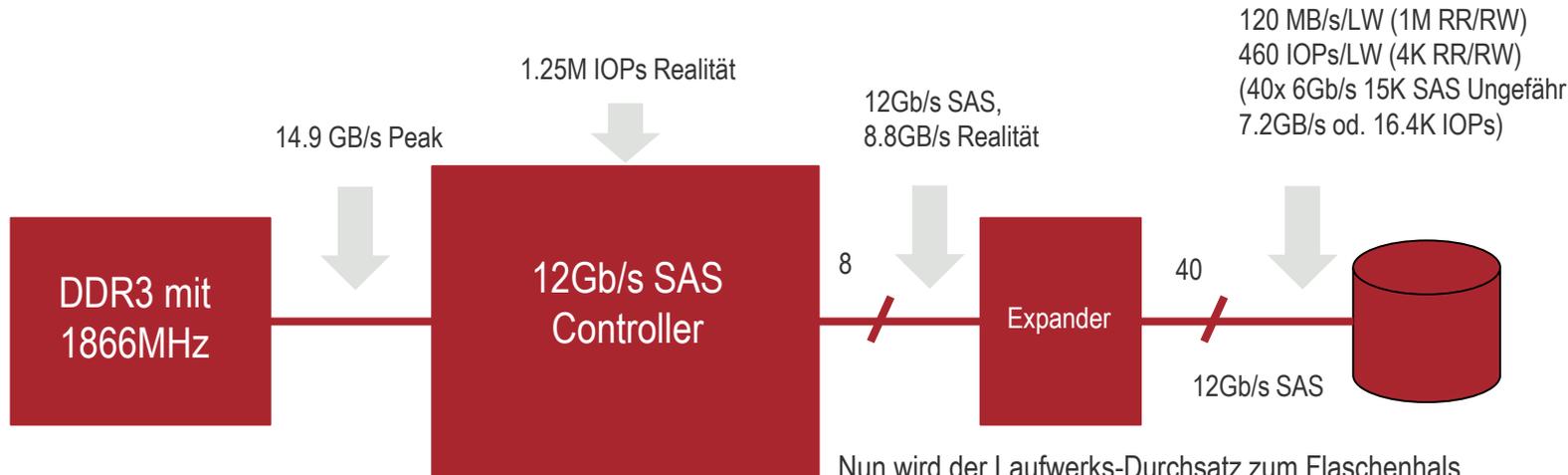


Die SAS Controller – Expander Verbindung wird zur Limitation:  
 Maximum random MB/s = Minimum (PCIe 8Gb/s, SAS 6Gb/s, 40x LW)  
 = Minimum (6.4GB/s, 4.4GB/s, 40x 120 MB/s)  
 = 4.4 GB/s (SAS Flaschenhals)

10.66 GB/s (DDR3-1333 SDRAMs 8-byte primary data bus)

10.66 GB/s (DDR3-1333 SDRAMs 8-byte primary data bus)

# 12Gb/s SAS Controller PCIe Limitation

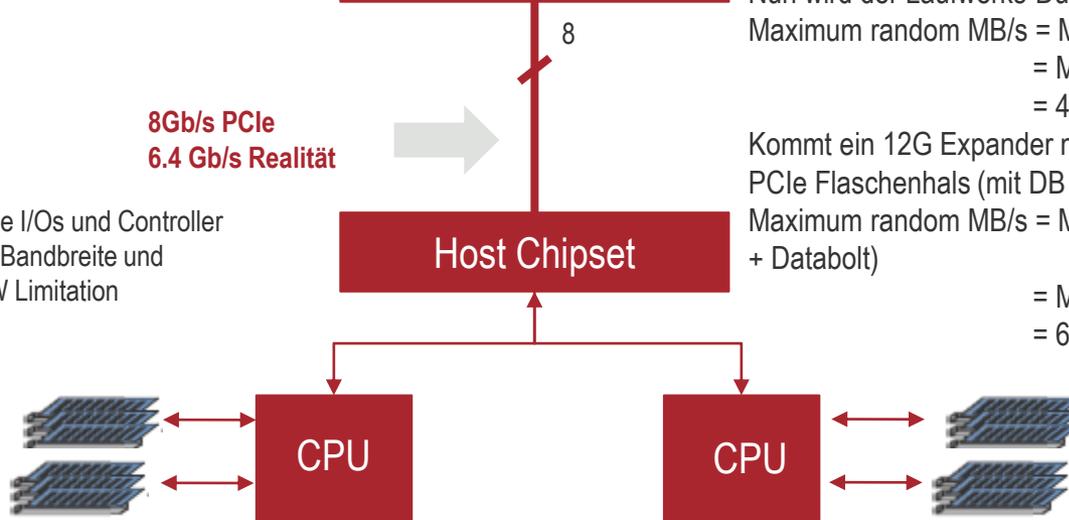


Nun wird der Laufwerks-Durchsatz zum Flaschenhals  
 Maximum random MB/s = Minimum (PCIe 8Gb/s, SAS 12Gb/s, 40x LW)  
 = Minimum (6.4GB/s, 8.8GB/s, 4.8 GB/s)  
 = 4.8 GB/s (LW Flaschenhals)

Kommt ein 12G Expander mit Databolt zum Einsatz ändert sich das zum PCIe Flaschenhals (mit DB ~ 9.6GB/s max.)  
 Maximum random MB/s = Minimum (PCIe 8Gb/s, SAS 12Gb/s, 40x LW + Databolt)  
 = Minimum (6.4GB/s, 8.8GB/s, 7.2 GB/s)  
 = 6.4 GB/s (PCIe Flaschenhals)

8Gb/s PCIe  
6.4 Gb/s Realität

PCIe Flaschenhals. Große I/Os und Controller Interface laufen mit max. Bandbreite und Geschwindigkeit ohne LW Limitation



10.66 GB/s (DDR3-1333 SDRAMs 8-byte primary data bus)

10.66 GB/s (DDR3-1333 SDRAMs 8-byte primary data bus)

# Wer viel misst, misst Mist...

- **Traue keinem Benchmark, den Du nicht selbst getunet hast**
- **Beachte die gegebenen Limitationen**
- **Formuliere, was gebenchmarked werden soll**
- **Stelle die Erwartungen korrekt auf**
- **Verwende ein empfohlenes, aussagekräftiges Benchmark-Tool**

# Managementoberflächen

# Configuration Utility (Pre-Boot)

# Configuration Utility

```

LSI MegaRAID SAS-MFI BIOS
Version 6.12.00 (Build March 25, 2013)
Copyright(c) 2013 LSI Corporation
F/W Initializing Devices 100%
HA -0 (Bus 2 Dev 0) LSI MegaRAID 9361-8i
Battery Status: Not present
PCI Slot Number: 4

ID LUN VENDOR      PRODUCT                REVISION              CAPACITY
-- --  -
      LSI          LSI MegaRAID 9361-8i  4.200.20-2742         1024MB
8  0  ATA           ST33000650NS          0004                  2861588MB
9  0  ATA           ST33000650NS          0004                  2861588MB
10 0  ATA          ST33000650NS          0004                  2861588MB
11 0  ATA          ST33000650NS          0004                  2861588MB
   0  LSI          Virtual Drive         RAID5                  5722044MB

1 Virtual Drive(s) found on the host adapter.

1 Virtual Drive(s) handled by BIOS
Press <Ctrl><R> to Run MegaRAID Configuration Utility
Initializing HA -0 (Bus 2 Dev 0) Please Wait...
-

```

## LSI MegaRAID 9361-8i BIOS Configuration Utility 5.00-0007

UD Mgmt PD Mgmt Ctrl Mgmt Properties

## Virtual Drive Management

[-] LSI MegaRAID 9361-8i (Bus 0x02, Dev 0x00)

[-] Drive Group: 0, RAID 5

[-] Virtual Drives

ID: 0, VD\_0, 5.45 TB

[+] Drives

[+] Available size: 0.00 KB

Hot spare drives

[-] Unconfigured Drives

--:--:03: Ready: 2.72 TB

Virtual Drive 0:

State: Optimal

RAID Level: 5

Drive Group 0:

Virtual Drives: 1

Drives: 3

Free Cap.: 0.00 KB

Free Areas: 0

F1-Help F2-Operations F5-Refresh Ctrl-N-Next Page Ctrl-P-Prev Page F12-Ctrl

## LSI MegaRAID 9361-8i BIOS Configuration Utility 5.00-0007

UD Mgmt PD Mgmt Ctrl Mgmt Properties

## Drive Management

## BackPlane

DeviceID	Type	Capacity	State	DG	Vendor
10	SATA	2.72 TB	UG	-	ATA
8	SATA	2.72 TB	Online	00	ATA
9	SATA	2.72 TB	Online	00	ATA
11	SATA	2.72 TB	Online	00	ATA

## PAGE-1

## Enclosure Info

Vendor:  
LSI  
Enclosure ID:  
252  
Enclosure Location:  
Unknown  
Enclosure Model:  
SGPIO

F1-Help F2-Operations F5-Refresh Ctrl-N-Next Page Ctrl-P-Prev Page F12-Ctrlr

LSI MegaRAID 9361-8i BIOS Configuration Utility 5.00-0007

UD Mgmt PD Mgmt Ctrl Mgmt Properties

Controller Settings

Coercion Mode: 1GB Boot device: UD 0 5.45 TB

Alarm Control

Enable Silence

Rebuild Rate: 30 Patrol Rate : 30

BGI Rate : 30 Cache flush Interval: 4

CC Rate : 30 Spinup delay : 12

Recon. Rate : 30 Spinup drive : 2

[X] Maintain PD Fail History

[X] Enable controller BIOS

[ ] Enable BIOS Stop on Error

[ ] Enable Stop CC on Error

[ ] Auto Enhanced Import

Set Factory Defaults APPLY CANCEL < Next >

F1-Help F5-Refresh Ctrl-N-Next Page Ctrl-P-Prev Page F12-Ctrl

# HII – Human Interface Infrastructure (EFI)

```

Dashboard View

Main Menu
Help

PROPERTIES
Status          <Optimal>
Backplane       [0]
BBU             <No>
Enclosure       [0]
Drives          [2]
Drive Groups    [0]
Virtual Drives  [0]
View Server Profile

ACTIONS
View Foreign Configuration
Configure
Set Factory Defaults
Update Firmware
Silence Alarm

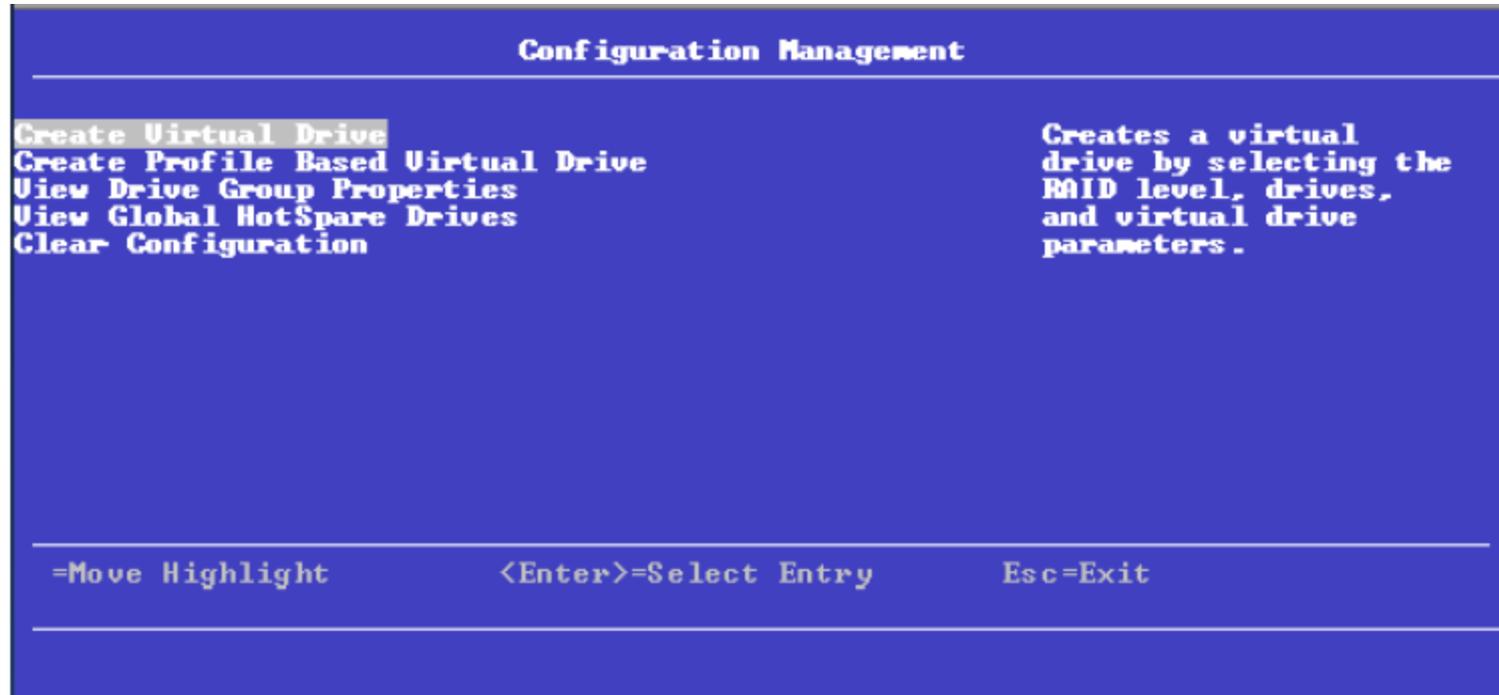
BACKGROUND OPERATIONS
Virtual Drive Operations  None
in Progress
Drive Operations in Progress: 1

MegaRAID ADVANCED SOFTWARE OPTIONS
MegaRAID RAID6           <Enabled>
MegaRAID RAID5           <Enabled>
MegaRAID SafeStore       <Enabled>
MegaRAID FastPath        <Enabled>
MegaRAID CacheCade 2.0   <Enabled>
MegaRAID CacheCade Pro 2.0 <Enabled>
Manage MegaRAID Advanced Software Options

Shows menu options such as Configuration Management, Controller Management, Virtual Drive Management, Drive Management and Hardware Components.

No virtual drive operation is in progress.

```



Create Configuration

---

<b>Save Configuration</b>		Submits the changes made to the entire form and creates a virtual drive with the specified parameters.
Select RAID Level	<RAID0>	
Secure Virtual Drive	[ ]	
Protect Virtual Drive	[ ]	
Select Drives From	<Unconfigured Capacity>	
<b>Select Drives</b>		
CONFIGURE VIRTUAL DRIVE PARAMETERS:		
Virtual Drive Name	-	
Virtual Drive Size Unit	<GB>	
Strip Size	<128 KB>	
Read Policy	<Adaptive>	
Write Policy	<Write Back>	
I/O Policy	<Direct>	

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↑↓=Move Highlight      <Enter>=Select Entry      Esc=Exit

Select Drives

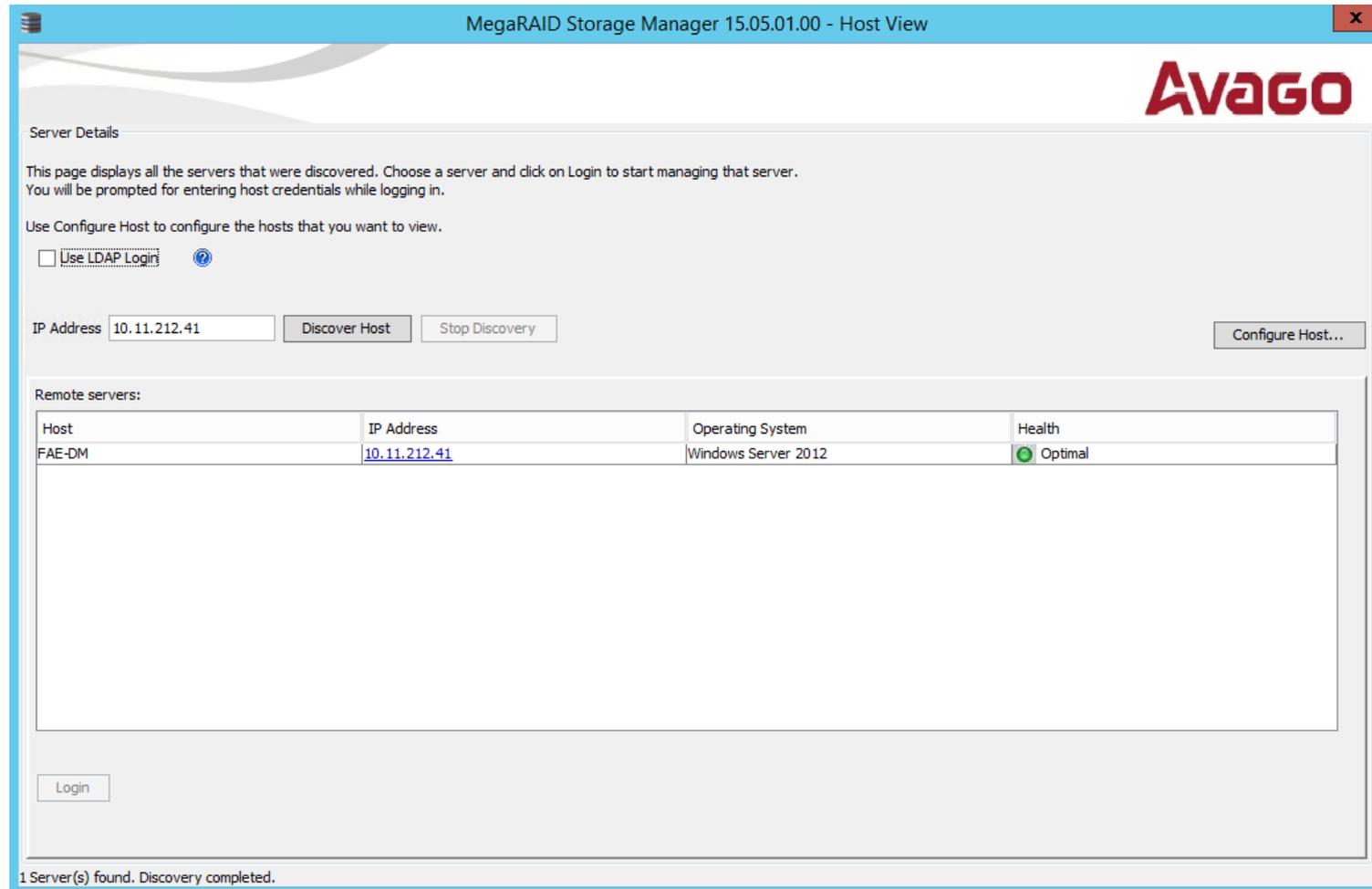
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<b>Apply Changes</b>		Submits the changes made to the entire form.
Select Media Type	<HDD>	
Select Interface Type	<Both>	
CHOOSE UNCONFIGURED DRIVES:		
Drive Port 4 - 7:01:00:	[ ]	
SAS, 278GB, Unconfigured Good, Protection-Type 2		
Drive Port 4 - 7:01:10:	[ ]	
SAS, 67GB, Unconfigured Good		
Drive Port 4 - 7:01:11:	[ ]	
SAS, 67GB, Unconfigured Good		
Drive Port 4 - 7:01:12:	[ ]	

---

↑=Move Highlight      <Enter>=Select Entry      Esc=Exit

# MegaRAID Storage Manager



MegaRAID Storage Manager 15.05.01.00 - Host View

**AVAGO**

Server Details

This page displays all the servers that were discovered. Choose a server and click on Login to start managing that server. You will be prompted for entering host credentials while logging in.

Use Configure Host to configure the hosts that you want to view.

Use LDAP Login

IP Address: 10.11.212.41    Discover Host    Stop Discovery    Configure Host...

Remote servers:

Host	IP Address	Operating System	Health
FAE-DM	<a href="#">10.11.212.41</a>	Windows Server 2012	<span style="color: green;">●</span> Optimal

Login

1 Server(s) found. Discovery completed.

MegaRAID Storage Manager - 15.05.01.00

Manage Go To Log Tools Help

Welcome: Administrator [Full Access] [Log Off](#)

Dashboard Physical Logical

Controller 0: LSI MegaRAID SAS 9260-8(Bus 2,Dev 0,Domain 0)
Controller 1: SAS9300-8e(Bus 3,Dev 0)

**Properties**

- Status: ✔ Optimal
- Enclosures: 0
- Backplanes: 1
- Drives: 2
- Drive groups: 1
- Virtual Drive(s): 6

[View server profile](#)

**Usage**

100%

Total capacity: 475.937 GB

- Configured Capacity: 475.937 GB
- Unconfigured Capacity: 0 Bytes

**Background Operations**

Virtual drive operations in progress: 0

Drive operations in progress: 0

[More details](#)

**MegaRAID Advanced Software Options**

MegaRAID FastPath	Enabled
MegaRAID Recovery	Enabled
MegaRAID CacheCade Pro 2.0	Enabled
MegaRAID SafeStore	Enabled
MegaRAID RAID6	Enabled
MegaRAID RAID5	Enabled

[Manage MegaRAID Advanced Software Options](#)

**Actions**

- [Create virtual drive](#)
- [Create CacheCade™ - SSD Caching](#)
- [Load configuration](#)
- [Update firmware](#)
- [Silence alarm](#)

**Help**

- [How to use MSM?](#)
- [How to create virtual drive?](#)
- [How to enable MegaRAID Advanced Software Options?](#)
- [Glossary](#)

ID	Error Level	Date / Time	Description
10000	[Information, 0]	2015-09-21, 23:45:37	Successful log on to the server User: Administrator, Client: 10.11.212.41, Access Mode: Full, Client Time: 2015-09-21,23:45:37
0	[Information, 0]	26971 seconds from reboot	Controller ID: 1 Firmware initialization started: (PCI ID 0x97/ 0x1000/ 0x30e0 / 0x1000)
389	[Information, 0]	2015-09-21, 22:47:42	Controller ID: 0 Host driver is loaded and operational
44	[Information, 0]	2015-09-21, 22:46:42	Controller ID: 0 Time established since power on: Time 2015-09-21, 22:46:42 45 Seconds
455	[Warning, 1]	25 seconds from reboot	Controller ID: 0 Controller booted in headless mode with errors :
247	[Information, 0]	25 seconds from reboot	Controller ID: 0 Device inserted Device Type: Disk Device Id: 28
91	[Information, 0]	25 seconds from reboot	Controller ID: 0 PD inserted: -:-6
247	[Information, 0]	25 seconds from reboot	Controller ID: 0 Device inserted Device Type: Disk Device Id: 23

Displaying log from server

MegaRAID Storage Manager - 15.05.01.00

Manage Go To Log Tools Help

**AVAGO**

Welcome: Administrator [Full Access] [Log Off](#)

Dashboard Physical Logical

FAE-DM

- Controller0: LSI MegaRAID SAS 9260-8i(Bus 2,Dev 0)
  - Backplane
    - Slot: 4, SSD (SATA), 238.475 GB, Online,(512)
    - Slot: 6, SSD (SATA), 238.475 GB, Online,(512)
  - Controller1: SAS9300-8e(Bus 3,Dev 0)

**Properties**

General			
Product Name	LSI MegaRAID SAS 9260-8i	Backend SAS Address 0	0x4433221104000000
Serial No	SV15208423	Backend SAS Address 1	0x4433221106000000
Vendor ID	0x1000	Backend SAS Address 2	0x0
SubVendor ID	0x1000	Backend SAS Address 3	0x0
Device ID	0x79	Backend SAS Address 4	0x0
SAS Address	500605B00423B280	Backend SAS Address 5	0x0
Boot Error Handling	Safe Mode On Errors	Backend SAS Address 6	0x0
Device Port Count	8	Backend SAS Address 7	0x0
Host Interface	PCI-E	Correctable ErrorCount	0
Metadata Size	512 MB	Memory uncorrectable count	0
Host Port Count	0	SSD Guard	Enabled
FRU	60A	SSD Disk Cache Setting	Enabled
Alarm Present	Yes	Online Firmware Update	Enabled
		Drive Security Properties:	

ID	Error Level	Date / Time	Description
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Displaying log from server

MegaRAID Storage Manager - 15.05.01.00

Manage Go To Log Tools Help

AvAGO

Welcome: Administrator [Full Access] [Log Off](#)

Dashboard Physical Logical

**FAE-DM**

Controller0: LSI MegaRAID SAS 9260-8i(Bus 2,Dev 0,0)

Drive Group: 0, RAID 1

Virtual Drive(s):

- Virtual Drive: 0, VD\_0, 50.000 GB, Optimal
- Virtual Drive: 1, VD\_1, 30.000 GB, Optimal
- Virtual Drive: 2, VD\_2, 30.000 GB, Optimal
- Virtual Drive: 3, VD\_3, 50.000 GB, Optimal
- Virtual Drive: 4, VD\_4, 30.000 GB, Optimal
- Virtual Drive: 5, VD\_5, 47.969 GB, Optimal

Drives

- Backplane, Slot: 4, SSD (SATA), 238.475
- Backplane, Slot: 6, SSD (SATA), 238.475

Controller 1: SAS9300-8e(Bus 3,Dev 0)

Properties

Host Name	FAE-DM
IP Address	10.11.212.41
Operating System	Windows Server 2012
OS Version	6.2
OS Architecture	x86_64

ID	Error Level	Date / Time	Description
10000	[Information, 0]	2015-09-21, 23:45:37	Successful log on to the server User: Administrator, Client: 10.11.212.41, Access Mode: Full, Client Time: 2015-09-21,23:45:37
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389	[Information, 0]	2015-09-21, 22:47:42	Controller ID: 0 Host driver is loaded and operational
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Displaying log from server

# StorCLI

# OS Unterstützung

- **Windows**
- **Linux**
  - RHEL
  - SLES
  - Fedora
  - Ubuntu
- **Solaris**
- **VMware**
- **FreeBSD**
- **UEFI**
- **Pre-Boot (limitiert)**

# StorCLI Syntax

<[object identifier]> <verb> <[adverb | attributes | properties] >  
<[key=value]>

Object Identifier	Description
No object identifier specified	If there is no object identifier, the command is a system command.
/cx	This object identifier is for controller x.
/cx/vx	This object identifier is for a virtual drive x on controller x.
/cx/vall	This object identifier is for all virtual drives on controller x.
/cx/ex	This object identifier is for an enclosure x on controller x.
/cx/eall	This object identifier is for all enclosures on controller x.
/cx/fx	This object identifier is for a foreign configuration x on controller x.
/cx/fall	This object identifier is for all foreign configurations on controller x.
/cx/ex/sx	This object identifier is for the drive is slot x on enclosure x on controller x.
/cx/ex/sall	This object identifier is for all the drives on enclosure x on controller x.
/cx/ex/dx	This object identifier is for the drive group x on enclosure x on controller x.
/cx/ex/dall	This object identifier is for the all drive groups on enclosure x on controller x.

```

Administrator: C:\Windows\system32\cmd.exe - storcli.exe help page=10
C:\MegaRAID\StorCLI_Windows>
C:\MegaRAID\StorCLI_Windows>
C:\MegaRAID\StorCLI_Windows>storcli.exe help page=10
Storage Command Line Tool Ver 1.03.11 Jan 30, 2013

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storcli -v
storcli -h! -help! ?
storcli -h! -help! ? legacy
storcli show
storcli show all
Press any key to continue

storcli show ctrlcount
storcli /cx add vd type=raid[0:1:5:6:00:10:50:60]
[Size=<UD1_Sz>,<UD2_Sz>,...!all] [name=<UDNAME1>,...]
drives=e:s!e:s-x!e:s-x,y,e:s-x,y,z [PDperArray=x]!SED]
[pcache=on!off!default]!pi]!DimmerSwitch(ds)=default!automatic(auto)!
none!maximum(max)!MaximumWithoutCaching(maxnocache)
[direct!cached] [CachedBadBBU!NoCachedBadBBU] [cache
[Strip=<8:16:32:64:128:256:512:1024>] [AfterVd=X]
[Spares = [e:ls![e:]s-x![e:]s-x,y] [force]
storcli /cx add vd each type=raid0 [name=<UDNAME1>,...] [driv
]
Press any key to continue

```

```

Administrator: cmd
c:\>storcli show
Status Code = 0
Status = Success
Description = None

Number of Controllers = 1
Host Name = FAE-DM
Operating System = Windows Server 2012

System Overview :
=====
-----
Ctl Model          Ports PDs DGs DNOpt UDs UNOpt BBU  sPR DS  EHS ASOs Hl
th
-----
0 LSI MegaRAID SAS9260-8i 8 2 1 0 6 0 Msng On 1&2 Y 7 Op
t
-----

Ctl=Controller Index!DGs=Drive groups!UDs=Virtual drives!Fld=Failed
PDs=Physical drives!DNOpt=DG NotOptimal!UNOpt=UD NotOptimal!Opt=Optimal
Msng=Missing!Dgd=Degraded!NdAttn=Need Attention!Unkwn=Unknown
sPR=Scheduled Patrol Read!DS=DimmerSwitch!EHS=Emergency Hot Spare
Y=Yes!N=No!ASOs=Advanced Software Options!BBU=Battery backup unit
Hlth=Health!Safe=Safe-mode boot

```

## /c0 show

```

Administrator: C:\Windows\system32\cmd.exe
C:\Users\Administrator\Desktop>storcli.exe /c0 show
Controller = 0
Status = Success
Description = None
Product Name = LSI MegaRAID SAS 9361-8iCC
Serial Number = 5R3160044
SAS Address = 500605b00404ee50
Mfg. Date = 04/23/13
System Time = 09/03/2013 17:53:19
Controller Time = 09/03/2013 17:53:19
FW Package Build = 24.0.2-0009
BIOS Version = 0x12.00.4.12.05.00_0x06000500
FW Version = 4.200.20-2769
Driver Name = megasas2.sys
Driver Version = 6.600.23.00
Controller Bus Type = N/A
PCI Slot = N/A
PCI Bus Number = 2
PCI Device Number = 0
PCI Function Number = 0
Drive Groups = 1
TOPOLOGY :
=====
-----
DG Arr Row EID:Slot DID Type State BT Size PDC PI SED DS3 FSpace
-----
0 0 - - - RAID1 Optl N 100.210 6B dflt N N none Y
0 0 - - - RAID1 Optl N 100.210 6B dflt N N none Y
0 0 0 252:0 12 DRIVE Onln N 100.210 6B dflt N N none -
0 0 1 252:1 15 DRIVE Onln N 100.210 6B dflt N N none -
-----
DG=Disk Group Index;Arr=Array Index;Row=Row Index;EID=Enclosure Device ID
DID=Device ID;Type=Drive Type;Onln=Online;Rbld=Rebuild;Dgrd=Degraded
Pddg=Partially degraded;Offln=Offline;BT=Background Task Active
PDC=PD Cache;PI=Protection Info;SED=Self Encrypting Drive;Frn=Foreign
DS3=Dimmer Switch 3;dflt=Default;Msng=Missing;FSpace=Free Space Present
Virtual Drives = 1
VD LIST :
=====
-----
DG/VD TYPE State Access Consist Cache Cac sCC Size Name
-----
0/0 RAID1 Optl RW No RWTD - ON 100.0 MB Test_Volume
-----
Cac=CacheCade;Rec=Recovery;OfLn=Offline;Pddg=Partially Degraded;dgrd=Degraded
Optl=Optimal;RO=Read Only;RW=Read Write;B=Blocked;Consist=Consistent;
R=Read Ahead Always;INR=No Read Ahead;WB=WriteBack;
AWB=Always WriteBack;WT=WriteThrough;C=Cached IO;D=Direct IO;sCC=Scheduled
Check Consistency
Physical Drives = 4
PD LIST :
=====
-----
EID:SlT DID State DG Size Intf Med SED PI SeSz Model Sp
-----
000000:0 10002 Onln 00 1006.210 6B 00000 HDD N ZZZ 00000 MBFF02147RC 000
000000:1 10001 Onln 00 1006.210 6B 00000 HDD N ZZZ 00000 MBFF02147RC 000
000000:2 14000 UGood 00 1006.210 6B 00000 HDD N ZZZ 00000 MBFF02147RC 000
000000:3 14001 UGood 00 1006.210 6B 00000 HDD N ZZZ 00000 MBFF02147RC 000
-----
EID=Enclosure Device ID;SlT=Slot No.;DID=Device ID;DG=DriveGroup
DHS=Dedicated Hot Spare;UGood=Unconfigured Good;GHS=Global Hotspare
UBad=Unconfigured Bad;Onln=Online;Offln=Offline;Intf=Interface
Med=Media Type;SED=Self Encryptive Drive;PI=Protection Info
SeSz=Sector Size;Sp=Spin;U=Up;D=Down;T=Transition;F=Foreign
UGUnsp=Unsupported
C:\Users\Administrator\Desktop>storcli\storcli_ALL_OS\Windows>

```

# /c0 show in JSON Format

```

Administrator: C:\Windows\system32\cmd.exe
C:\Users\Administrator\Desktop\storcli>storcli.exe /c0 show
{"Controllers": [
  {
    "Command_Status": {
      "Controller": 0,
      "Status": "Success",
      "Description": "None"
    },
    "Response_Data": {
      "Product Name": "LSI MegaRAID SAS 9361-8iCC",
      "Serial Number": "55000005D000404e50",
      "SAS Address": "50000005D000404e50",
      "Mfg. Date": "04/23/13",
      "System Time": "09/03/2013 18:16:39",
      "Controller Time": "09/03/2013 18:16:39",
      "FW Package Build": "24.0.2-0003",
      "BIOS Version": "e.12.00.4.12.05.00_0x06000500",
      "FW Version": "4.200.20-2763",
      "Driver Name": "megasas.sys",
      "Driver Version": "6.000.33.00",
      "Controller Bus Type": "N/A",
      "Port Slot": "N/A",
      "Port Bus Number": 2,
      "PCI Device Number": 0,
      "PCI Function Number": 0,
      "Physical Drives": 4,
      "PD LISA": [
        {
          "FID:Slit": "252:0",
          "Port": 12,
          "Date": "UGood",
          "Size": "136,218 GB",
          "Int": "SAS",
          "Model": "HDD",
          "Status": "NN",
          "PIT": "N",
          "Size": "512B",
          "Model": "MBE2147RC",
          "SP": "U"
        },
        {
          "FID:Slit": "252:1",
          "Port": 15,
          "Date": "UGood",
          "Size": "136,218 GB",
          "Int": "SAS",
          "Model": "HDD",
          "Status": "NN",
          "PIT": "N",
          "Size": "512B",
          "Model": "MBE2147RC",
          "SP": "U"
        },
        {
          "FID:Slit": "252:2",
          "Port": 13,
          "Date": "UGood",
          "Size": "136,218 GB",
          "Int": "SAS",
          "Model": "HDD",
          "Status": "NN",
          "PIT": "N",
          "Size": "512B",
          "Model": "MBE2147RC",
          "SP": "D"
        },
        {
          "FID:Slit": "252:3",
          "Port": 14,
          "Date": "UGood",
          "Size": "136,218 GB",
          "Int": "SAS",
          "Model": "HDD",
          "Status": "NN",
          "PIT": "N",
          "Size": "512B",
          "Model": "MBE2147RC",
          "SP": "D"
        }
      ]
    }
  }
]
  
```

# MegaCLI Syntax enthalten

```

Administrator: cmd
c:\DoMu>storcli -adpallinfo -aall !more
Adapter #0

-----
                        Versions
=====
Product Name      : LSI MegaRAID SAS 9260-8i
Serial No        : SU15208423
FW Package Build : 12.14.0-0167

                        Mfg. Data
=====
Mfg. Date        : 12/19/11
Rework Date     : 00/00/00
Revision No     : 60A
Battery FRU     : N/A

                        Image Versions in Flash:
=====
FW Version       : 2.130.393-2551
BIOS Version     : 3.28.00_4.14.05.00_0x05270000
Preboot CLI Version: 04.04-020:##00009
WebBIOS Version  : 6.0-52-e_48-Rel
MUDATA Version   : 2.09.03-0045
Boot Block Version : 2.02.00.00-0000
BOOT Version     : 09.250.01.219

                        Pending Images in Flash
=====
None

                        PCI Info
=====
Controller Id    : 0000
Vendor Id       : 1000
Device Id       : 0079
SubVendorId     : 1000
SubDeviceId     : 9261

Host Interface   : PCIE

ChipRevision    : B4

Number of Frontend Port: 0
Device Interface : PCIE

Number of Backend Port: 8
Port : Address
0    4433221104000000
1    4433221106000000

```

# Fragen & Antworten

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