WINCHESTERSYSTEMS®

Purpose-Built Storage

Best Practices

for

FlashNAS ZFS

Redundant NAS Systems

Abstract:

These application notes offer a convenient step-by-step deployment guideline for making the most of the high availability and reliability delivered by Winchester Systems FlashNAS ZFS redundant NAS storage systems.

Contents

FlashNAS ZFS Series

FlashNAS ZFS series systems deliver truly consolidated storage systems for application server and file server deployment. They are available in a wide variety of hardware configurations, including high availability active/active dual controllers for assured redundancy and fast failover. Power supplies are also redundant and energy-efficient. In all situations, FlashNAS ZFS products protect your data and continued ability to work and provide services to your customers. Additionally, controllers, power supplies, and cooling modules use a modular cable-free design that makes installation, maintenance, and upgrades simple and quick.

FlashNAS is enhanced by the ZFS file system, which has sophisticated data corruption prevention and healing capabilities built in. You gain access to features such as unlimited snapshot, remote replication, and pool mirror. Powerful computing components and up to 1.5 PB in storage via JBOD make FlashNAS ZFS series systems highly scalable and capable solutions for every enterprise and organization.

Active/Active Dual Redundant Controllers
Select FlashNAS ZFS series models provide active/active dual controller architecture instead of an active/standby design. Having both controllers remain active concurrently translates into twice the system performance and much better high availability protection with significantly more rapid failover. If one controller requires maintenance or otherwise stops working, its twin immediately takes over to ensure continuity. In an active/standby design, there is a much longer delay before the second controller kicks in.

User-Friendly and Detailed Interface
The comprehensive GUI helps customers manage FlashNAS ZFS systems with ease, providing clear information and intuitive management for all configurations.

Best practices for FlashNAS ZFS redundant NAS systems

System Information

NAS System / Components / Peripheral Devices Status

View the model name, version information, and profiles of hardware components.

Device Information :

Model Name:	FlashNAS 3000
Software Version:	3.3.8
Service ID:	8487975

CPU :

Controller	CPU ID	Manufacturer	Speed	Family
A	CPU 0	Intel(R) Corporation	3300MHz	Intel(R) Core(TM) i3-2120 CPU @ 3.30GHz
B	CPU 0	Intel(R) Corporation	3300MHz	Intel(R) Core(TM) i3-2120 CPU @ 3.30GHz

Memory :

Controller	Memory ID	Type	Location	Size
A	Mem 0	DDR3	ChannelA-DIMM0	8192MB
A	Mem 1	DDR3	ChannelA-DIMM1	8192MB
A	Mem 2	DDR3	ChannelB-DIMM0	8192MB
A	Mem 3	DDR3	ChannelB-DIMM1	8192MB
B	Mem 0	DDR3	ChannelA-DIMM0	8192MB
B	Mem 1	DDR3	ChannelA-DIMM1	8192MB
B	Mem 2	DDR3	ChannelB-DIMM0	8192MB
B	Mem 3	DDR3	ChannelB-DIMM1	8192MB

Network

Interface	IP Address	Subnet Mask	MAC Address
Mgmt1	(A - Primary) 192.168.150.95 (B - Secondary) 192.168.150.96	255.255.255.0 255.255.255.0	00:21:3a:11:84:27 00:21:3a:19:84:27
CH0	(A) 0.0.0.0 (B) 0.0.0.0	255.0.0.0 255.0.0.0	00:21:3a:51:84:27 00:21:3a:59:84:27
CH1	(A) 0.0.0.0 (B) 0.0.0.0	255.0.0.0 255.0.0.0	00:21:3a:61:84:27 00:21:3a:69:84:27
CH2	(A) 192.168.150.80 (B) 192.168.150.117	255.255.255.0 255.255.255.0	00:21:3a:71:84:27 00:21:3a:79:84:27
CH3	(A) 192.168.150.74 (B) 192.168.150.118	255.255.255.0 255.255.255.0	00:21:3a:81:84:27 00:21:3a:89:84:27

Dashboard

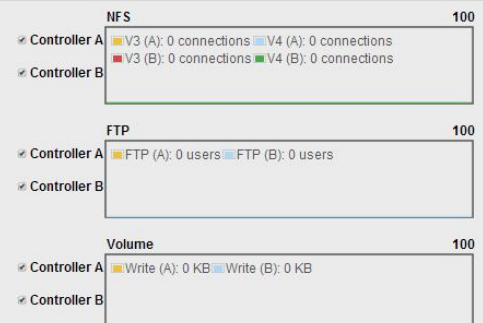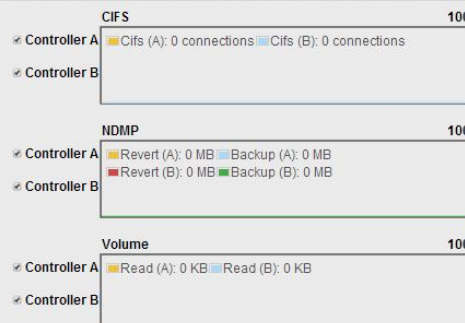### Hardware Status

Monitor the usage of hardware components: CPU, network bandwidth, internal memory, and disk drives.

CPU 100%
- ☑ Controller A — CPU (A): 6% / CPU (B): 3%
- ☑ Controller B

Network 100%
- ☑ Controller A — Network (A): 0% / Network (B): 0.01%
- ☑ Controller B

Memory 100%
- ☑ Controller A — Total (A): 93.0% / OS (A): 38.0%
- ☑ Controller B — Total (B): 41.0% / OS (B): 30.0%

Disk 100%
- ☑ Controller A — Disk (A): 16.0% / Disk (B): 0.0%
- ☑ Controller B
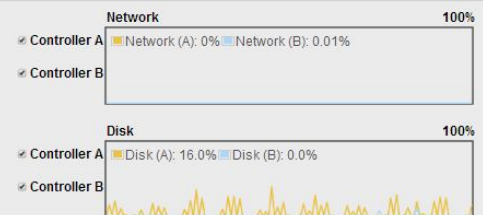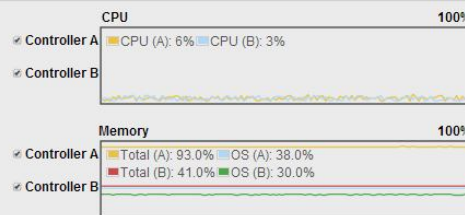
Software Status

Monitor the status of network services: number of connections, number of users, and the amount of transactions.

CIFS 100
- ☑ Controller A — Cifs (A): 0 connections / Cifs (B): 0 connections
- ☑ Controller B

NFS 100
- ☑ Controller A — V3 (A): 0 connections / V4 (A): 0 connections
- ☑ Controller B — V3 (B): 0 connections / V4 (B): 0 connections

NDMP 100
- ☑ Controller A — Revert (A): 0 MB / Backup (A): 0 MB
- ☑ Controller B — Revert (B): 0 MB / Backup (B): 0 MB

FTP 100
- ☑ Controller A — FTP (A): 0 users / FTP (B): 0 users
- ☑ Controller B

Volume 100
- ☑ Controller A — Read (A): 0 KB / Read (B): 0 KB
- ☑ Controller B

Volume 100
- ☑ Controller A — Write (A): 0 KB / Write (B): 0 KB
- ☑ Controller B

Deployment

For customers who need large capacity more than premium performance, we recommend deployment cases 1 and 2. Deployment case 3 has been designed for customers who place an emphasis on high speed performance over capacity. The flexibility of FlashNAS ZFS series solutions allows them to cater to nearly every scenario along these lines.
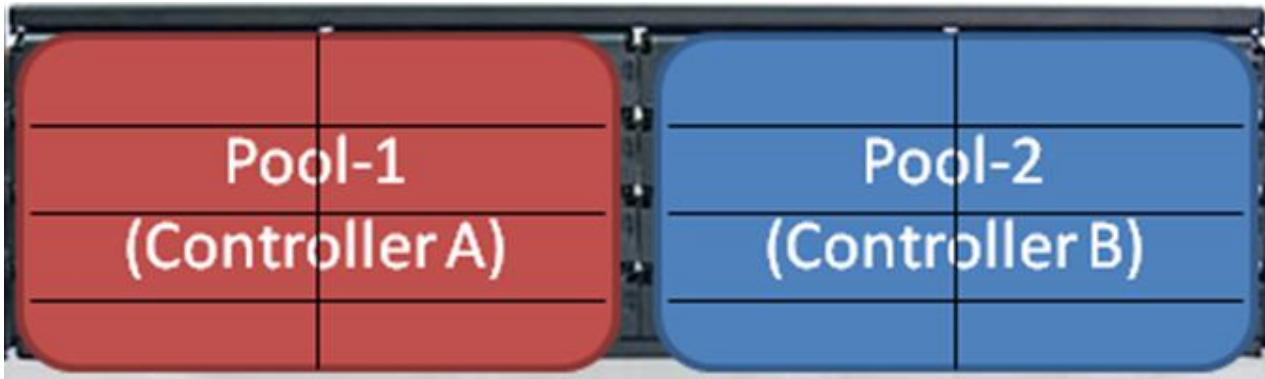
Deployment Case 1: 16 HDD Deployment with two pools

Figure 1: **Intelligent Wizard Allocation**

Follow the steps below to create a typical setup that uses all available drives in a redundant NAS configuration. For the purposes of this example, we use 16 NL-SAS 4TB HDDs to create two pools which are assigned to controller A and controller B, respectively. The **Intelligent Setup Wizard** helps us complete configuration with minimal effort. Choose RAID 6, and the wizard will group the HDDs into two pools automatically as shown. This configuration offers active/active controller redundancy and also leverages the computing power of both controllers to increase overall NAS performance.

Step 1: enter and confirm your password

Step 2: click Next

Interface	IP Address		Netmask	Gateway	Link
Mgmt0 (Primary)	○ DHCP	⦿ 10.0.0.2	255.255.0.0		●
CH0 (Controller A)	⦿ DHCP	○ 10.0.0.3	255.255.255.0		●
CH1 (Controller A)	⦿ DHCP	○ 10.0.0.4	255.255.255.0		●
CH2 (Controller A)	⦿ DHCP	○ 10.0.0.5	255.255.255.0		●
CH3 (Controller A)	⦿ DHCP	○ 10.0.0.6	255.255.255.0		●
Mgmt0 (Slave)	⦿ DHCP	○ 10.0.0.7	255.255.255.0		●
CH0 (Controller B)	⦿ DHCP	○ 10.0.0.8	255.255.255.0		●
CH1 (Controller B)	⦿ DHCP	○ 10.0.0.9	255.255.255.0		●
CH2 (Controller B)	⦿ DHCP	○ 10.0.0.10	255.255.255.0		●
CH3 (Controller B)	⦿ DHCP	○ 10.0.0.11	255.255.255.0		●

Network

Network Interface

View the network interface status and specify the IP address.

System · Network · Storage · Users · Shares · Summary

Back   Next

Step 3: use default RAID 6 settings for pool 1

Storage

Storage Pool (For Controller A)

Enter the pool name and choose the data protection level.

System · Network · Storage · Users · Shares · Summary

Pool Name: Pool-1

Data Protection Level:

○ RAID 1: Provides best protection. Your data will be mirrored.

⦿ RAID 6: Provides protection against two simultaneous drive failures.

○ RAID 5: Provides protection against one drive failure.

○ RAID 0: Provides no protection but offers maximum capacity.

○ Configuring storage after system initialized.

Number of Drives: 8

Usable Capacity: 21.83 TB

Back   Next

Step 4: use default RAID 6 settings for pool 2

✔ System	**Storage**
✔ Network	Storage Pool (For Controller B)
Storage ▶	Enter the pool name and choose the data protection level.
Users	
Shares	Pool Name: Pool-2
Summary	Data Protection Level:

Pool Name: Pool-2

Data Protection Level:

🛡 ○ RAID 1: Provides best protection. Your data will be mirrored.

🛡 ● RAID 6: Provides protection against two simultaneous drive failures.

🛡 ○ RAID 5: Provides protection against one drive failure.

🛡 ○ RAID 0: Provides no protection but offers maximum capacity.

🛡 ○ Configuring storage after system initialized.

Number of Drives: 8

Usable Capacity: 21.83 TB

Back   Next

Step 5: select Next in all following steps

✔ System	**Users**
✔ Network	New User
✔ Storage	Add user accounts. Create the home directory if necessary.
Users ▶	
Shares	
Summary	

Name	Password	Confirm Password	Home Directory
guest	•••••	•••••	☑
			☐
			☐

Back   Next

✔ System	**Shares**
✔ Network	Shared Folder
✔ Storage	Create folders to be shared and configure access rights.
✔ Users	
Shares ▶	
Summary	

Folder	Access Rights	
EonShare	● Full Control	○ Read Only
	○ Full Control	○ Read Only
	○ Full Control	○ Read Only

Back   Next

Step 6: You will see the 16 drives equally divided into two pools and assigned to their respective controllers
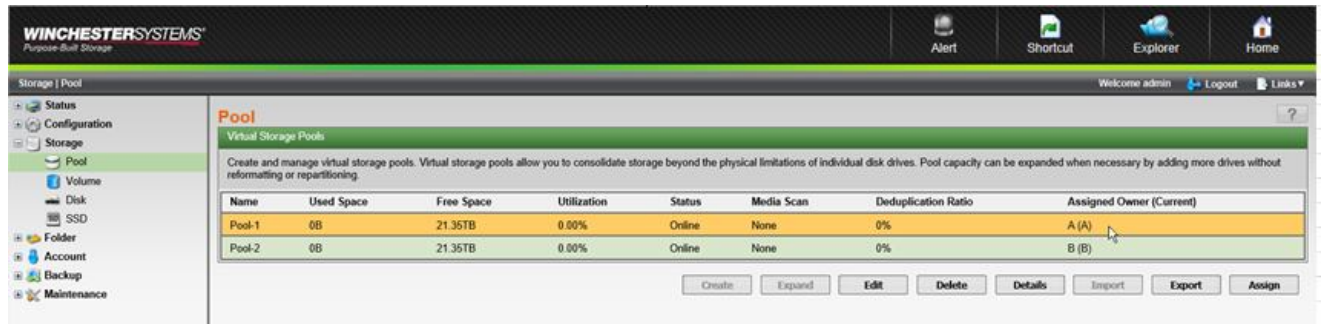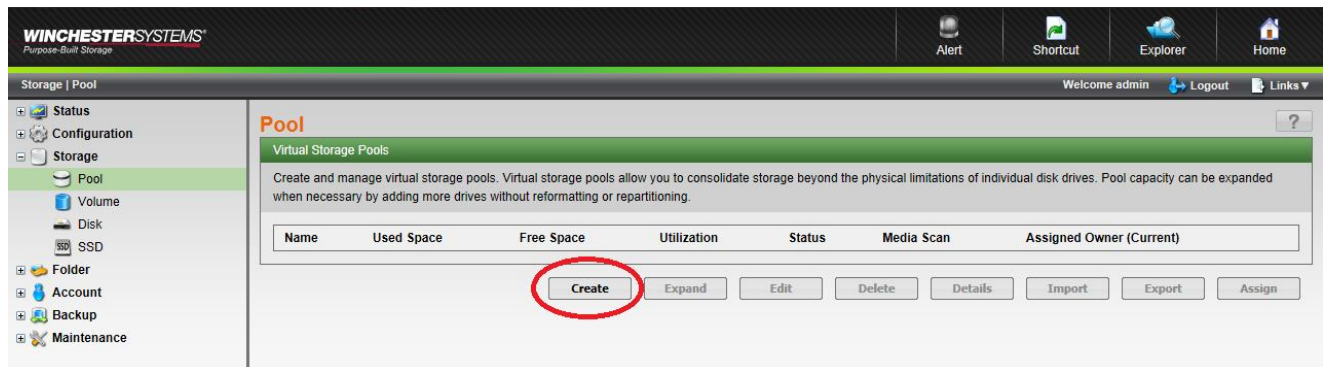
Deployment case 2: 16 HDD deployment with one pool

In the event that customers prefer to create just one pool, the controllers are placed in active/standby mode. Although performance and failover are not as fast in this configuration as in deployment case 1, high availability is still offered with one controller backing up the other. The advantage of having one pool is more consolidated large storage capacity, as all drives are pooled together.

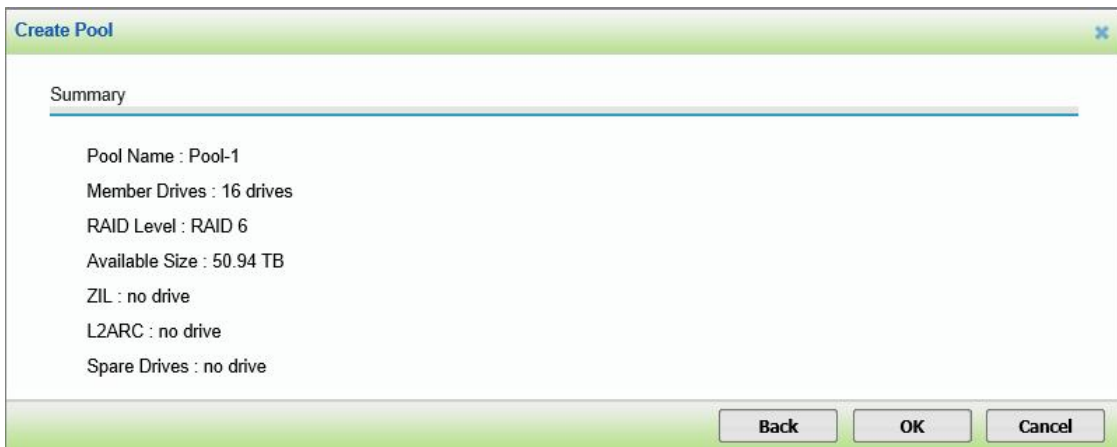Figure 2: high capacity with high availability protection
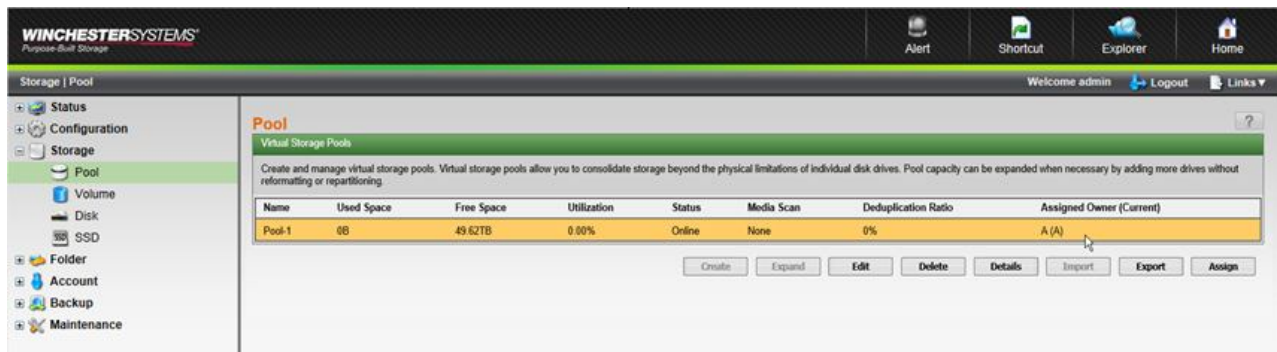
Step 1: select Storage -> Pool -> Create

Step 2: select 16 HDDs with RAID 6 to create pool 1 and assign it to controller A
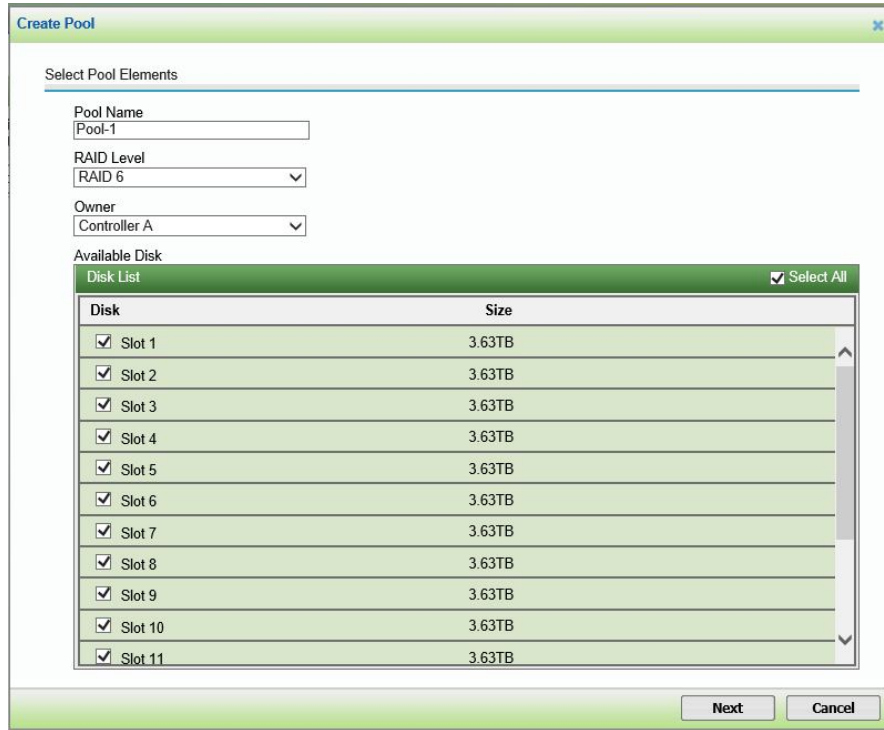
Step 3: click OK to finish creating pool 1

### Step 4: view pool 1 configuration

## Deployment case 3: 12 HDD + four SSD deployment (two pools)

Figure 3: high performance deployment

This is a very high performance deployment scenario, leveraging SSDs via ZIL and L2ARC. This setup makes full use of the computing power, speed, and redundancy of the FlashNAS ZFS series dual controllers, and is the most desirable configuration whenever possible.
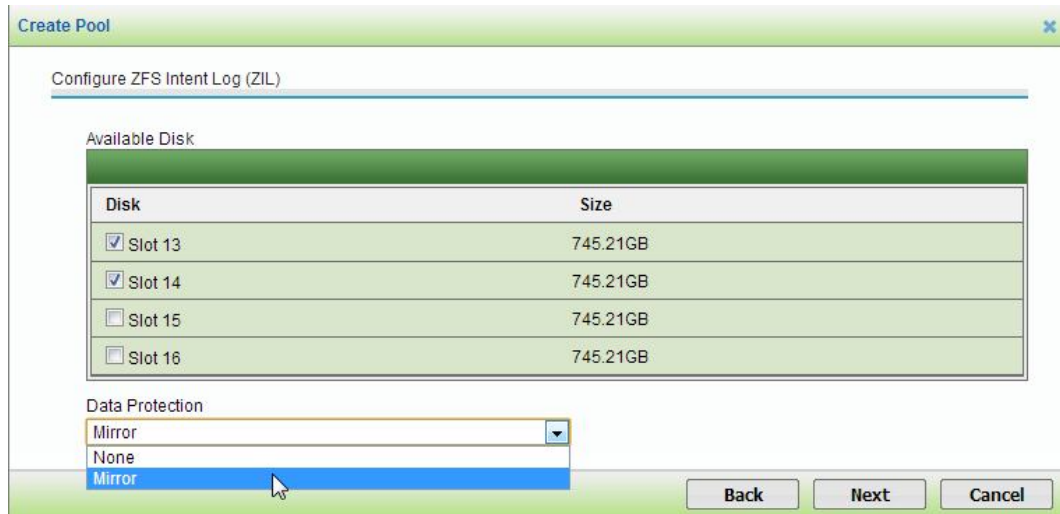
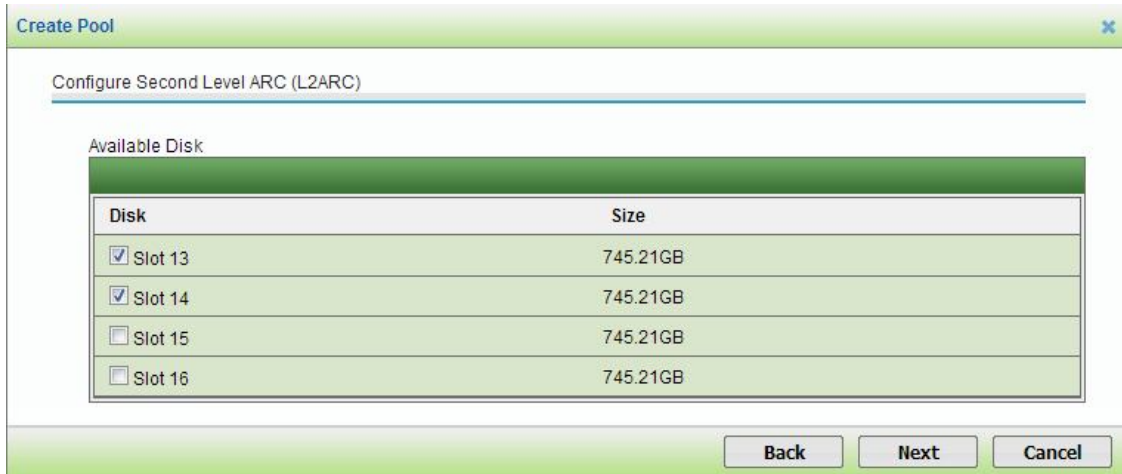### Step 1: select Storage -> Pool -> Create
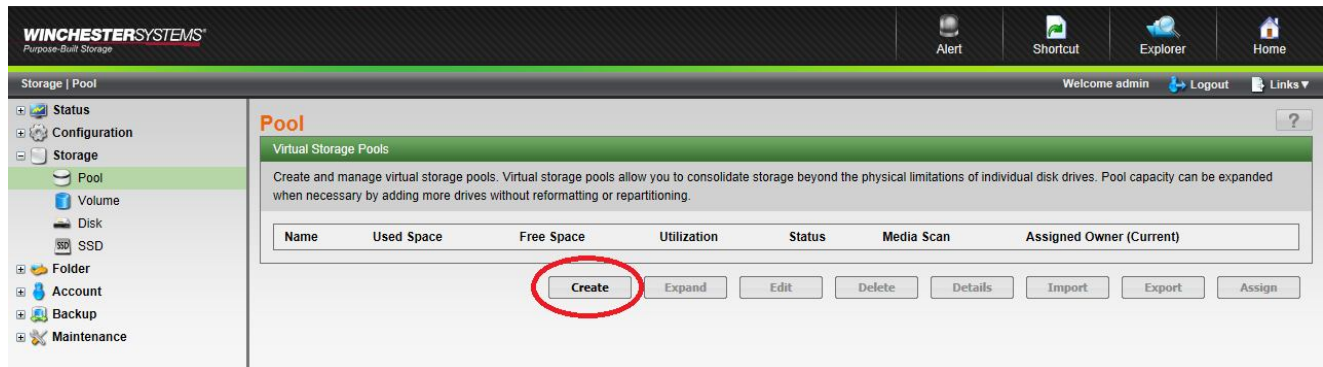
Step 2: select six HDDs with RAID 5 to create pool 1 and assign it to controller A
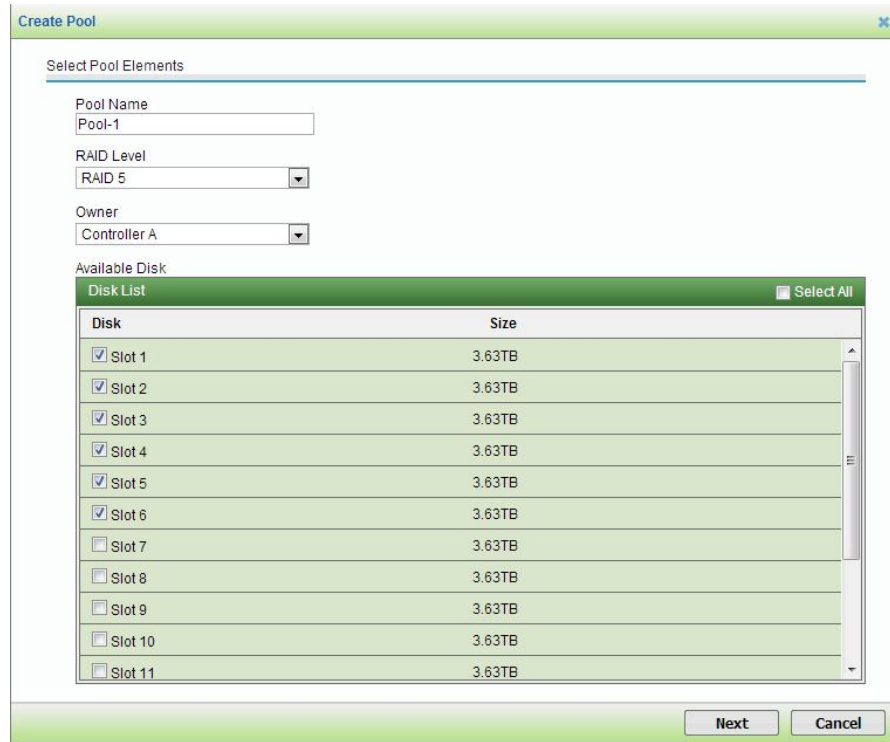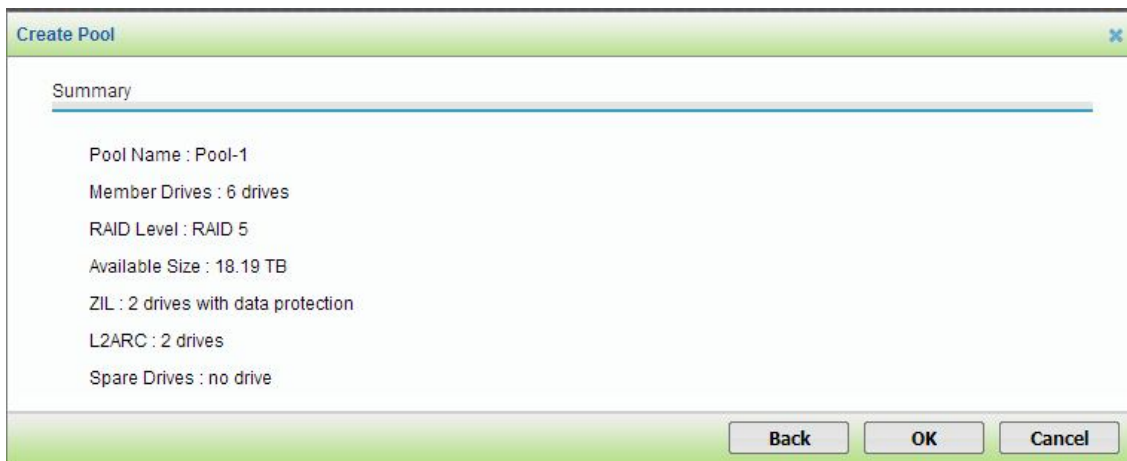

Step 3: select two SSDs using ZFS Intent Log (ZIL) with mirror to enhance data protection

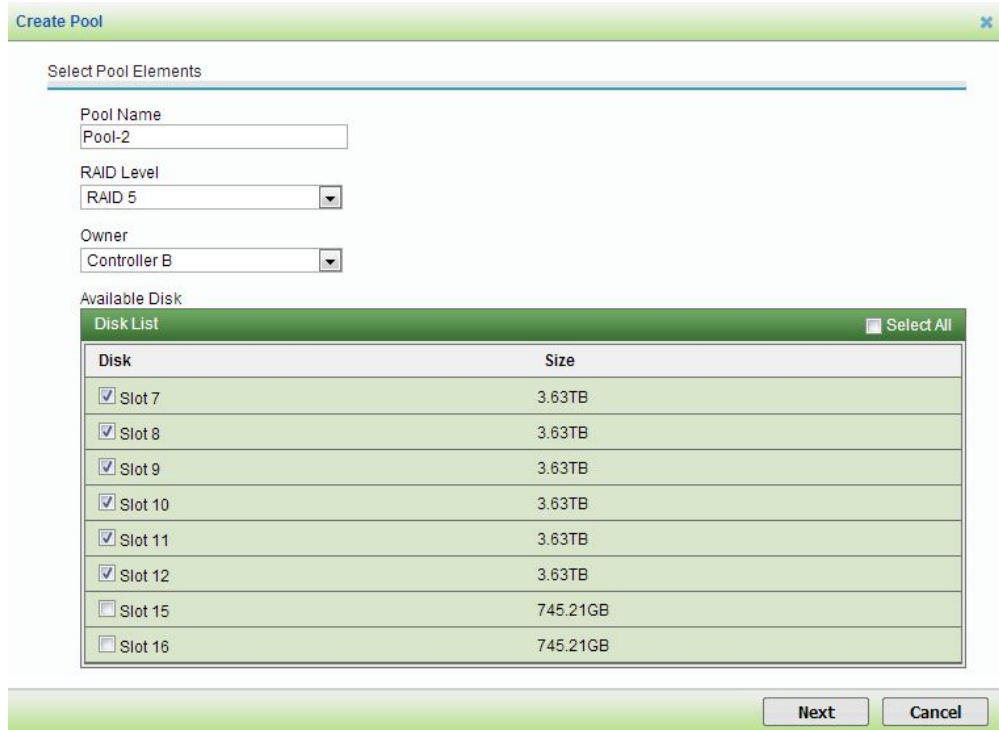**Step 4: select the same two SSDs as Second Level ARC (L2ARC) to enhance read performance**
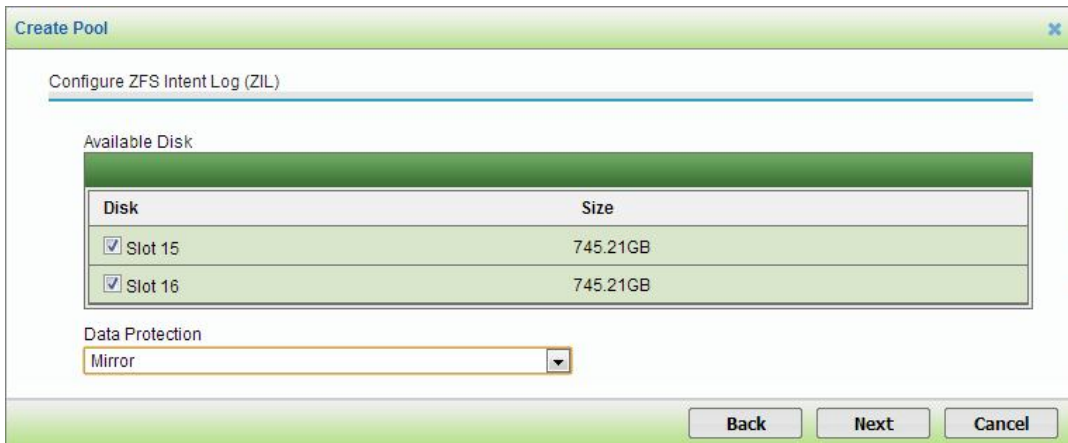

Step 5: click OK to finish creating pool 1
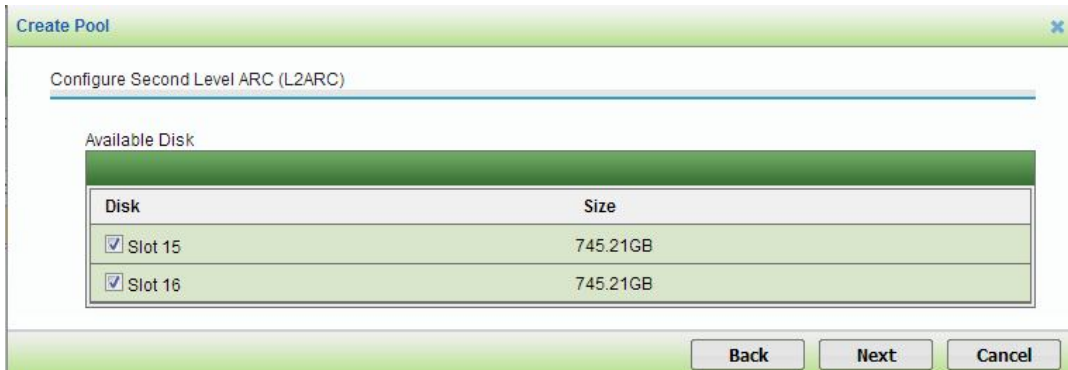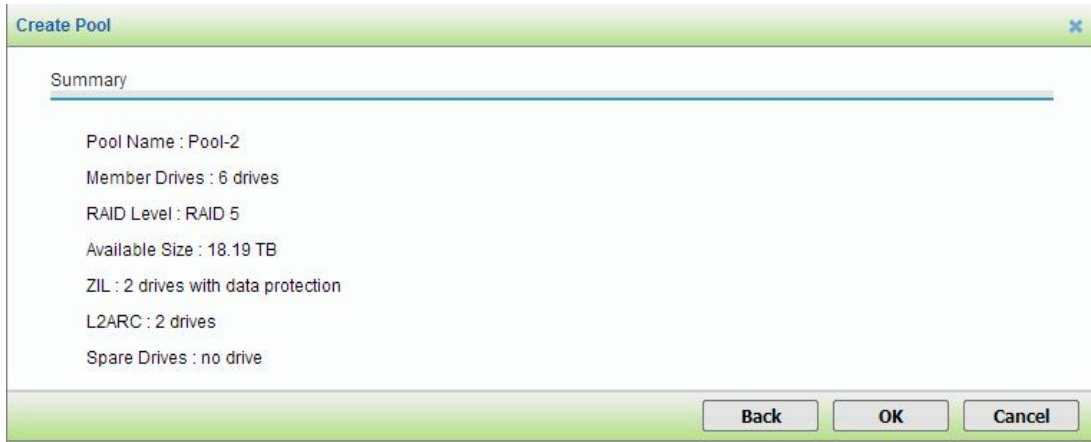

Step 6: select Storage -> Pool -> Create

Step 7: select six HDDs with RAID 5 to create pool 2 and assign it to controller B

Create Pool ✖

Select Pool Elements

Pool Name
Pool-2

RAID Level
RAID 5

Owner
Controller B

Available Disk

Disk List	Select All
Disk	**Size**
☑ Slot 7	3.63TB
☑ Slot 8	3.63TB
☑ Slot 9	3.63TB
☑ Slot 10	3.63TB
☑ Slot 11	3.63TB
☑ Slot 12	3.63TB
☐ Slot 15	745.21GB
☐ Slot 16	745.21GB

Next   Cancel

Step 8: select two SSDs as ZFS Intent Log (ZIL) with mirror to enhance data protection

Create Pool ✖

Configure ZFS Intent Log (ZIL)

Available Disk

Disk	Size
☑ Slot 15	745.21GB
☑ Slot 16	745.21GB

Data Protection
Mirror

Back   Next   Cancel

Step 9: select the same two SSDs as Second Level ARC (L2ARC) to enhance read performance

Create Pool ✖

Configure Second Level ARC (L2ARC)

Available Disk

Disk	Size
☑ Slot 15	745.21GB
☑ Slot 16	745.21GB

Back   Next   Cancel

Step 10: click OK to finish creating pool 2

Step 11: check both pools to make sure they are assigned to their respective controllers
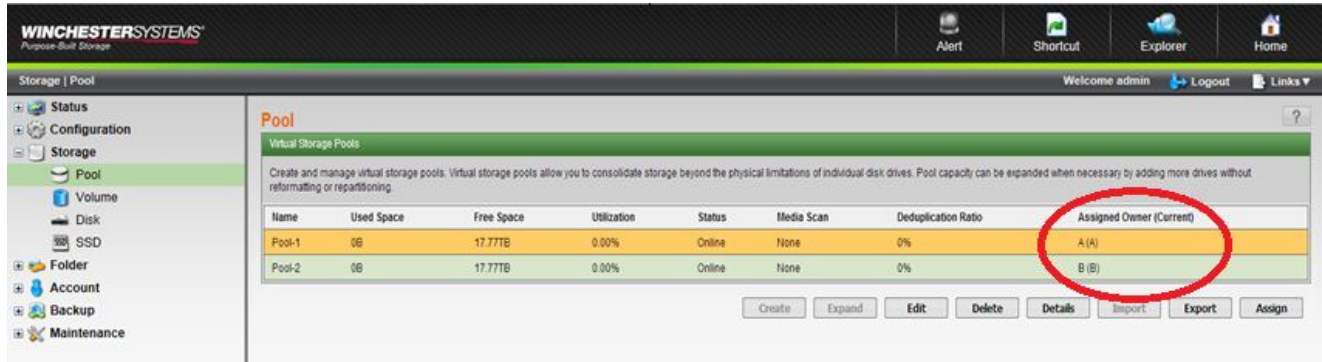
Conclusion

This quick guide shows the ease with which redundant dual controller FlashNAS ZFS series systems can be setup in several very unique ways. Their adaptability means they can be effortlessly configured for high speed performance and maximum capacity utilization, all with high availability. You can use these typical configurations as excellent starting points for your own solution, and benefit from the advanced data protection and reliability they offer, especially with SSD employment of powerful ZIL and L2ARC to ensure better performance and tighter data integrity protection.