

# *Shared Storage for DIGITAL UNIX Using UltraSCSI Hubs*

**COMPAQ**  
STORAGEWORKS

**Application Note**  
EK-SMA20-AN. C01

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**and**

<http://www.service.digital.com/>

## **DIGITAL UNIX Shared Storage Configuration Components**

### **NOTE**

Please review the *Shared Storage Solutions Using UltraSCSI Hubs Application Note* before referencing this document.

The shared storage configuration consists of:

- Up to four Compaq AlphaServer systems running:
  - DIGITAL UNIX 4.0B, Patch Kit 6 (DUV40BAS00006-19971216) or newer
  - HSZ70 Solution Software Kit for DIGITAL UNIX
- STORAGEWORKS RAID Array (RA) 7000 or STORAGEWORKS Enterprise Storage Array (ESA) 10000 with a single or dual-redundant HSZ70 controllers using HSOF V7.0 or newer firmware, up to two pairs of controllers.

### **OR**

- STORAGEWORKS RAID Array (RA) 450 with a single or dual-redundant HSZ50 controllers using HSOF V5.2 or newer firmware, but only in clustered configurations. Non-clustered homogeneous and heterogeneous configurations are not supported by the RA450 subsystem as it does not support exclusive storage unit access.

**NOTES**

- The RA450 subsystem only supports SCSI IDs 0-7. Devices requiring SCSI IDs 8-15 **cannot** be used in a configuration without causing substantial RA450 SCSI bus problems.
- The RA450 SCSI bus transfer rate is limited to Fast-10 (20 MB/sec, 10 MHz).

- UltraSCSI Hub, DWZZH-03, with three differential ports

**NOTE**

The DWZZH-21 3-port UltraSCSI hub, with 2 single-ended ports and 1 differential port, is for special OEM applications only. It is not supported in shared storage configurations.

**OR**

UltraSCSI Hub, DWZZH-05, with five differential ports and fair arbitration

**Configuration Set-up Procedures**

**NOTE**

Please refer to the *DWZZH 16-Bit UltraSCSI Hub User's Guide* before proceeding with the following configuration set-up procedures.

The following describes the set-up procedures for a shared storage configuration, which includes a non-clustered standalone DIGITAL UNIX host. These procedures apply to homogeneous (same operating system) and heterogeneous (different operating systems) configurations. The differences required by a DIGITAL UNIX cluster are described following the procedures.

Before connecting the host systems to the storage subsystem via the Hub, complete the following:

**Host Adapters:**

1. Verify the host adapters are internally terminated; i.e., the host terminators are securely installed on the host adapter board.
2. Set each host bus adapter to a unique SCSI ID.

**NOTE**

For a 5-port hub with fair arbitration enabled, the host adapter SCSI IDs **must** be set to 3, 2, 1 and 0. At the time of this writing, DIGITAL UNIX only supports narrow SCSI addressing. For further information on adapter SCSI ID settings, consult the *DWZZH 16-Bit UltraSCSI Hub User's Guide*.

3. Set the SCSI bus transfer speed to either *Fast-20* or *UltraSCSI*.
4. Disable SCSI Bus Reset. Most hosts will issue one or more Bus Resets during boot and possibly during shutdown. These Bus Resets will interrupt any SCSI operation being performed by other hosts, but they may not cause data loss or corruption. The hosts will retry the SCSI operation and may report a warning or error from the "unexpected" Bus Reset. The actual warning or error reported is dependent on the operating system of that host. Disabling SCSI Bus Reset on the adapter will prohibit it from issuing its own Bus Resets. This reduces the impact a booting host has on other hosts.

**NOTE**

Please refer to the specific host adapter's configuration guide for detailed information on setting the SCSI bus parameters.

**Storage Controller:****NOTE**

The following controller function settings are modified using either STORAGEWORKS Command Console (SWCC) or Command Line Interface (CLI).

1. Set the HOST\_FUNCTION mode to "A" for all controller target IDs (storage sets) that will be used by the DIGITAL UNIX host system. For example, if you are using the HSZ70 Command Line Interface, enter:

```
SET THIS_CONTROLLER HOST_FUNCTION=( 4 , A )
```

This sets the HSZ70 controller SCSI target ID 4 to HOST\_FUNCTION mode A.

2. Restrict the access to the storage units used by the DIGITAL UNIX server (HSZ70 controller only). The access to the storage unit is made exclusive to a specific host initiator SCSI ID. For example, if you are using the HSZ70 Command Line Interface, enter:

```
SET D400 ACCESS_ID=3
```

This restricts access to storage unit D400 to the host with SCSI ID 3.

**NOTE**

Exclusive storage unit access is **not** supported by the RA450 subsystem (HSZ50 controller).

For further instructions on setting up the storage controllers, refer to:

- HSZ70; *HSZ70 Array Controller, HSOF Version 7.0, Configuration Manual*
- HSZ50; *HSZ50 Array Controller, HSOF 5.1, Configuration Manual*

### UltraSCSI Hub:

1. Place the UltraSCSI hub in either a STORAGEWORKS BA356 storage shelf or pedestal, or in the lower right-hand device slots of the BA370 shelf within the RA7000 or ESA10000. Installation in a BA356 shelf is the preferred approach.

**CAUTION**

Do not exceed 25 meters maximum length per bus segment when installing the UltraSCSI hub.

2. Cable the host port of the storage controller to a port of the UltraSCSI hub. When using fair arbitration on a 5-port hub, the top port is designated as the storage controller port.
3. Cable the host adapters to the other ports of the UltraSCSI hub.

**NOTE**

For a 5-port hub with fair arbitration enabled, the correct adapters must be cabled to the correct ports. In a narrow SCSI addressing configuration, it is necessary to connect the jumper pins on the back of the 5-port hub. For further information on 5-port hub settings, refer to the *DWZZH 16-Bit UltraSCSI Hub User's Guide*.

### Clustering:

DIGITAL UNIX clusters with UltraSCSI hubs are configured with:

- All host servers running DIGITAL UNIX 4.0B ASE/TruCluster 1.4A, Patch Kit TCR14Ahsz70-bl8er.tar or newer.
- KZPSA-BB host bus adapters only. At the time of this writing, the KZPBA-CB host bus adapter is not supported in a DIGITAL UNIX cluster.
- A cluster having exclusive use of the SCSI bus. A cluster is not supported with additional non-clustered hosts nor with additional clusters on the same UltraSCSI hub.
- HSZ70 controllers (RA7000 or ESA10000) set up as described above, but **without** restricted access to the storage units. If access has been restricted, reset the storage units for access by all hosts. For example, if you are using the HSZ70 Command Line Interface, enter:

**SET D400 ACCESS\_ID=ALL**

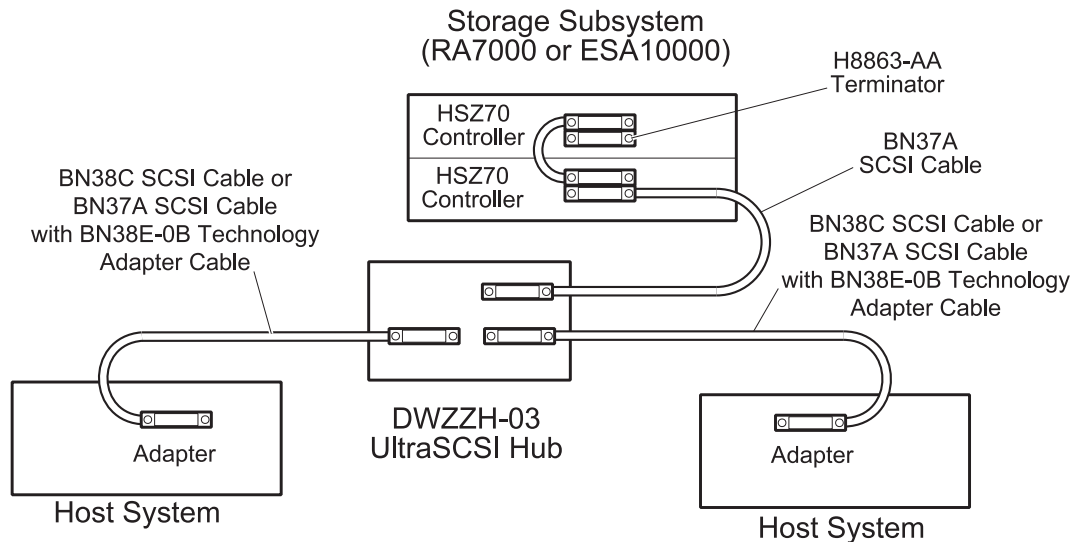
This allows access to storage unit D400 by all hosts, as required in a cluster environment.

**NOTE**

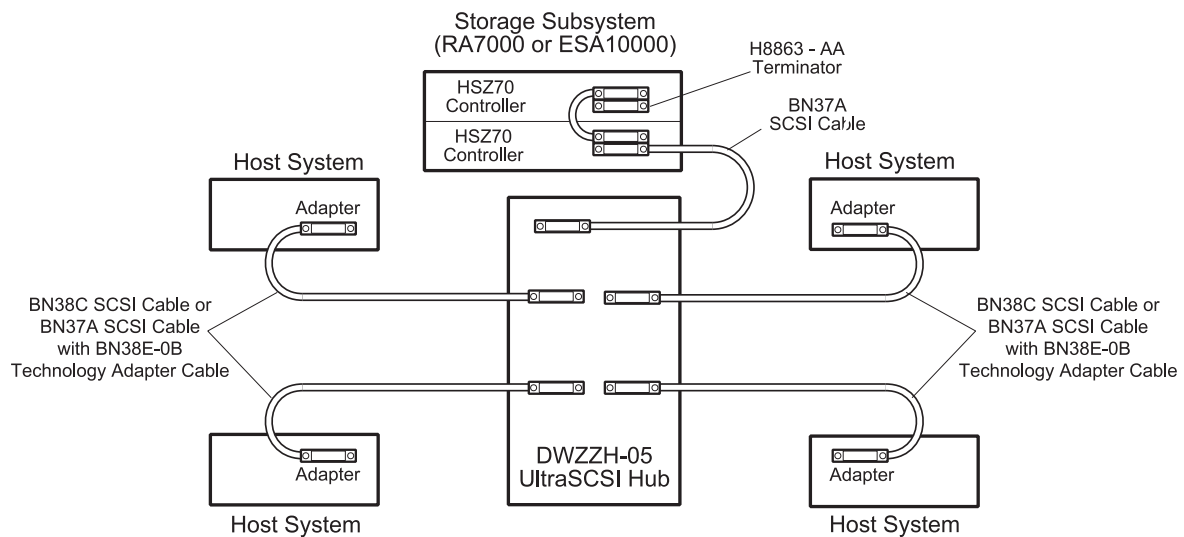
See your host server's "Supported Options List" for more information concerning cluster-supported adapters.

**Example Configurations:****NOTE**

The host adapters shown in the following diagrams are configured with internal termination.

**Figure 1 Example 3-Port UltraSCSI Hub Configuration Layout**

SHR-1101

**Figure 2 Example 5-Port UltraSCSI Hub Configuration Layout**

SHR-1132

The host adapters can be connected to the UltraSCSI hubs using two interchangeable cabling options:

- BN38C VHDCI-to-HD68 SCSI cables
- BN37A VHDCI-to-VHDCI SCSI cables coupled with BN38E-0B VHDCI-to-HD68 technology adapter cables

The BN38C cables are recommended. See the *UltraSCSI Configuration Guidelines* for a complete list of the available cables.

**Configuration Parts List:**

**Required Components (Minimum) for 3-Port UltraSCSI Hub**

<b>3-Port Hub:</b>	<b>Part Name</b>	<b>Part #</b>	<b>Quantity</b>
	<p><b>Storage Subsystem:</b>  <b>RA7000 or ESA10000</b></p> <p>HSZ70 Controller, HSOV V7.0 firmware or newer</p> <p>VHDCI UltraSCSI Tri-Link</p> <p>VHDCI UltraSCSI Differential Terminator</p>	<p>DS-HSZ70-AH</p> <p>H8861-AA</p> <p>H8863-AA</p>	<p>1 to 4</p> <p>1 to 4</p> <p>1</p>
	<p><b>RA450</b></p> <p>HSZ70 Controller, HSOV V5.2 firmware or newer</p> <p>HD68 SCSI-3 Tri-Link</p> <p>HD68 SCSI-3 Differential Terminator</p>	<p>HSZ50-xx</p> <p>H885-AA</p> <p>H879-AA</p>	<p>1 or 2</p> <p>1 or 2</p> <p>1</p>
	<p><b>Host Adapters (Wide Differential):</b></p> <p>HD68 UltraSCSI, firmware version 5.53 or newer (non-cluster configuration only)</p> <p>HD68 SCSI, firmware version A11 or newer</p>	<p>KZPBA-CB</p> <p>KZPSA-BB</p>	<p>1 or 2</p>
	UltraSCSI Hub (3 Differential Ports)	DS-DWZZH-03	1
	<p><b>UltraSCSI Cables:</b>  <b>RA7000 or ESA10000</b></p> <p>VHDCI UltraSCSI, to connect the HSZ70 controller with the UltraSCSI Hub</p> <p>VHDCI to HD68 UltraSCSI, to connect the Adapters with the UltraSCSI Hub</p> <p><b>OR</b></p> <p>VHDCI UltraSCSI</p> <p>VHDCI to HD68 UltraSCSI Technology Adapter Cable</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN37A-xx</p> <p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>1</p> <p>2</p> <p>3</p> <p>2</p>

**Required Components (Minimum) for 3-Port UltraSCSI Hub (continued)**

<b>3-Port Hub:</b>	<b><u>Part Name</u></b>	<b><u>Part #</u></b>	<b><u>Quantity</u></b>
	<p><b>UltraSCSI Cables: RA450</b></p> <p>VHDCI-to-HD68 UltraSCSI</p> <p><b>OR</b></p> <p>VHDCI UltraSCSI</p> <p>VHDCI to HD68 UltraSCSI Technology Adapter Cable</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>3</p> <p>3</p> <p>3</p>
	STORAGEWORKS shelf with dual power supplies, for the UltraSCSI Hub.	DS-BA356-xx	1

**Required Components (Minimum) for 5-Port UltraSCSI Hub**

<b>5-Port Hub:</b>	<b>Part Name</b>	<b>Part #</b>	<b>Quantity</b>
	<p><b>Storage Subsystem: RA7000 or ESA 10000</b></p> <p>HSZ70 Controller, HSOF V7.0 firmware or newer</p> <p>VHDCI UltraSCSI Tri-Link</p> <p>VHDCI UltraSCSI Differential Terminator</p>	<p>DS-HSZ70-AH</p> <p>H8861-AA</p> <p>H8863-AA</p>	<p>1 to 4</p> <p>1 to 4</p> <p>1</p>
	<p><b>RA450</b></p> <p>HSZ50 Controller, HSOF V5.2 firmware or newer</p> <p>HD68 SCSI-3 Tri-Link</p> <p>HD68 SCSI-3 Differential Terminator</p>	<p>HSZ50-xx</p> <p>H885-AA</p> <p>H879-AA</p>	<p>1 or 2</p> <p>1 or 2</p> <p>1</p>
	<p><b>Host Adapters (Wide Differential):</b></p> <p>HD68 UltraSCSI, firmware version 5.53 or newer (non-cluster configuration only)</p> <p>HD68 SCSI, firmware version A11 or newer</p>	<p>KZPBA-CB</p> <p>KZPSA-BB</p>	<p>1 to 4</p>
	UltraSCSI Hub (5 Differential Ports)	DS-DWZZH-05	1
	<p><b>UltraSCSI Cables: RA7000 or ESA10000</b></p> <p>VHDCI UltraSCSI, to connect the HSZ70 controller with the UltraSCSI Hub</p> <p>VHDCI to HD68 UltraSCSI, to connect the Adapters with the UltraSCSI Hub</p> <p><b>OR</b></p> <p>VHDCI UltraSCSI</p> <p>VHDCI to HD68 UltraSCSI Technology Adapter Cable</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN37A-xx</p> <p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>1</p> <p>4</p> <p>5</p> <p>4</p>



**Required Components (Minimum) for 5-Port UltraSCSI Hub (continued)**

<b>5-Port Hub:</b>	<b><u>Part Name</u></b>	<b><u>Part #</u></b>	<b><u>Quantity</u></b>
	<p><b>UltraSCSI Cables: RA450</b></p> <p>VHDCI-to-HD68 UltraSCSI</p> <p><b>OR</b></p> <p>VHDCI UltraSCSI</p> <p>VHDCI-to-HD68 UltraSCSI Technology Adapter Cable</p> <p>See the <i>UltraSCSI Configuration Guidelines</i> for a complete list of the available cables</p>	<p>BN38C-xx</p> <p>BN37A-xx</p> <p>BN38E-0B</p>	<p>5</p> <p>5</p> <p>5</p>
	STORAGEWORKS shelf with dual power supplies, for the UltraSCSI Hub.	DS-BA356-xx	1

## Configuration References

The following documents provide further information for the configuration of the components utilized in shared storage configurations:

<b>Topic</b>	<b>Document Title</b>	<b>Order Number</b>
<i>DIGITAL UNIX</i>	<i>Getting Started, HSZ70 Solution Software V7.0A for DIGITAL UNIX, Installation Guide</i>	<i>AA-R60KC-TE</i>
<i>DIGITAL UNIX</i>	<i>Release Notes RAID Array 7000/Enterprise Storage Array 10000 for OpenVMS</i>	<i>AA-R60LC-TE</i>
<i>RA7000 / ESA10000 (HSZ70 Controller)</i>	<i>RA7000 and ESA10000 Storage Subsystems, User's Guide</i>	<i>EK-SMCPP-UG</i>
<i>HSZ70 Controller</i>	<i>HSZ70 Array Controller, HSOF Version 7.0, Configuration Manual</i>	<i>EK-HSZ70-CG</i>
<i>RAID Array 450 (HSZ50 Controller)</i>	<i>HSZ50 Array Controller, HSOF 5.1, Configuration Manual</i>	<i>EK-HSZ50-CG</i>
<i>STORAGWORKS Command Console</i>	<i>Command Console Version 2.0, User's Guide</i>	<i>AA-R60EA-TE</i>
<i>UltraSCSI</i>	<i>UltraSCSI Configuration Guidelines</i>	<i>EK-ULTRA-CG</i>
<i>UltraSCSI Hub</i>	<i>DWZZH 16-Bit UltraSCSI Hub, User's Guide</i>	<i>EK-DWZZH-UG</i>
<i>Shared Storage</i>	<i>Shared Storage Solutions Using UltraSCSI Hubs</i>	<i>EK-SMA21-AN</i>