COMPAQ

Software
Product
Description

Product Name: TruCluster Available Server Software
Version 1.6

DESCRIPTION

TruCluster™ Available Server Software Version 1.6 for Tru64 UNIX (formerly known as DIGITAL UNIX) is part of the Tru64 UNIX TruCluster product suite. The TruCluster product suite consists of Production Server Software, Available Server Software, and Memory Channel Software. The Memory Channel Software product provides high-performance data delivery for applications over the Memory Channel interconnect. The Available Server Software product provides high availability for applications. These capabilities combine in the Production Server Software to provide a high-performance, highly available, and scalable operating environment.

TruCluster Available Server Software significantly reduces downtime due to hardware and software failures. A TruCluster Available Server Software environment is an integrated organization of systems and external disks and tape devices connected to shared SCSI buses that together provide highly available software and disk data and tape service to client systems.

TruCluster Available Server Software is a high availability solution that minimizes, but does not eliminate, the impact of hardware and software failures. It is designed for computing environments that can tolerate a short disruption, but need critical applications automatically restarted.

TruCluster Available Server Software provides multi-host access to SCSI disks and a generic failover mechanism for disks and applications. In this environment, system administrators can set up services that make disks and applications highly available to client systems. For example, services may be set up for exported NFS file systems, raw disks, and disk-based applications such as database programs or mail. Services may also be set up as non-disk-based applications such as a remote login service. TruCluster Available Server Software provides all the necessary software to fail over disks on a shared SCSI bus. To fail over an application, shell scripts are created that the software executes to stop the application and restart it on another host.

The systems connected to the shared bus run the services. Client systems may access a service through the network to the system on which it is running. Each system can run every service and fail over all the disks on the shared bus. A service runs on only one system at a time, and can automatically be restarted on another system in the event of a device or system failure with the proper hardware configuration.

Each system within the TruCluster Available Server Software environment monitors the networks and the status of the systems, disks, and buses. If a hardware or software failure prevents a system from running a service, TruCluster Available Server Software automatically moves (relocates) the service to another system to maintain the availability of the applications and disks. A service can optionally have Internet protocol addresses assigned to it to provide transparent access to clients.

TruCluster Available Server Software provides the ability to manually relocate a service from one system to another when needed to perform maintenance or load balancing on a system. In addition, administrators can update a service's storage configuration as well as other service information in the service configuration without interrupting a service's availability to clients. TruCluster Available Server Software enables connection of systems and disks and tapes to the shared bus so that modifications may be made to the hardware configuration without affecting the environment.

FEATURES

Concurrently Active Servers

If there are as many services as there are systems in a TruCluster Available Server Software environment, then each member can run a service. This enables all systems to optimize workload, eliminating idle time for any systems.

Master/Standby Servers

A Master/Standby configuration may be set up in which the Master system runs all the services. If a failure prevents the Master system from running the services, TruCluster Available Server Software then relocates the services to the Standby system(s). Master/Standby configurations generally provide more predictable performance within the environment before and after the occurrence of failures.

Support for Fibre Channel Solutions

TruCluster Available Server Software Version 1.6 supports Fibre Channel as cluster storage as well as supports the use of the Fibre Channel Protocol (FCP) for SCSI-3 to use Fibre Channel as a physical interface. Fibre Channel, with its serial transmission, provides the following benefits:

- Greater performance
- Greater scalability
- More reliability, serviceability, and availability

For more details on the specific supported TruCluster configurations using Fibre Channel, see the TruCluster Software Products *Hardware Configuration* manual.

Highly Available Backup Services

Tape devices and media changers can be configured on the cluster-shared storage interconnect, enabling highly available backup services such as Legato NetWorker.

Transparent NFS Failover

In the event that TruCluster Available Server Software relocates a service that provides access to exported NFS data, the change in the system exporting the data is virtually transparent. Clients experience only a temporary NFS server timeout. NFS locking is also supported.   Both NFS UDP and NFS TCP are supported as a transport mechanism.

Fast File System Recovery

The Advanced File System (AdvFS) is a journaled, local file system that provides higher availability and greater flexibility and recovery than traditional UNIX file systems. Using transaction journaling, AdvFS recovers file domains in seconds rather than hours after an unexpected restart such as a power failure. AdvFS journaling also provides increased file system integrity. In addition, a separately licensed, optional layered product, the Advanced File System Utilities, can perform management functions online while file systems are active. See the OPTIONAL SOFTWARE section of this SPD for more information on AdvFS Utilities.

Increased Data Integrity

Tru64 UNIX Logical Storage Manager (LSM) is an integrated, host-based solution to data storage management. Basic LSM functionality, including disk spanning and concatenation, is provided with the Tru64 UNIX operating system. Extended functions such as striping (RAID 0), mirroring (RAID 1), and online management are available with a separate license. LSM is RAID Advisory Board (RAB) certified for RAID Levels 0 and 1. See the OPTIONAL SOFTWARE section of this SPD for more information.

Global Error Logger

TruCluster Available Server Software can log messages about events that occur in the TruCluster environment to one or more systems. TruCluster administrators can also receive notification through electronic mail of critical problems when they occur.

Cluster Network Failover

The systems in the TruCluster Available Server Software environment can be configured using multiple networks to reduce the chance that the environment will experience a lack of network connectivity between members.   With networks configured, the cluster will fail over network communications between members when the network path between members fails.

Network Interface Monitoring

The TruCluster Available Server Software environment can be configured to monitor the health of up to eight (8) network interfaces per member. When any monitored network interface fails on a member, the status of all monitored network interfaces on that member is passed to a script that can be customized. The default behavior of the script is for all services to be relocated from a member that has experienced a failure of all monitored network interfaces. This allows another member that has at least one monitored network interface working to continue providing the relocated service to clients.

NetRAIN

TruCluster Available Server Software is integrated with NetRAIN to provide a highly available solution for the network interfaces, including use of NetRAIN devices as primary cluster interface as well as the client network interfaces.   In addition, TruCluster Available Server Software also supports monitoring of the NetRAIN devices, which allows users to customize failure policies upon NetRAIN device failures. For more details on NetRAIN functionality, see the Tru64 UNIX Version 4.0F *Release Notes* and Tru64 UNIX *Network Administration* guides.

Service Configuration Files

The ASE Manager can be used interactively to define highly available services. In addition, for applications that require many services and large disk farms,

service configuration files can be used to decrease the number of repetitive tasks that have to be done. TruCluster Available Server now supports the use of the ASE manager with a service configuration file, which eliminates the need to run the ASE manager utility (asemgr) numerous times and to re-enter the same information repeatedly to define disk, DRD, NFS, tape, or user-defined services.

Cluster Monitor

The Cluster Monitor provides a graphical view of the cluster configuration and may be used to determine the current state of availability and connectivity in the cluster. The administrator can invoke management tools, allowing the system to be managed from a single location.

Cluster MIB

TruCluster Available Server Software supports the Compaq Common Cluster MIB. This Cluster MIB is implemented by each member of a cluster, and shows member views of the cluster. Each cluster member host name, IP addressing configuration, and status are maintained in the cluster. The Compaq ServerWorks and Insight Manager applications use this Cluster MIB to discover cluster member relationships and provide a coherent view of clustered systems across supported platforms.

Script Toolkit

TruCluster Available Server Software provides supported example scripts, which can be modified as necessary to set up highly available NIS master or print server services. TruCluster Available Server Software also provides unsupported example scripts to start and stop services for the following applications and environments:

- An Oracle database
- An INFORMIX database
- The AltaVista search internet daemons
- A Netscape Web server
- A Netscape News server
- A SAMBA PC file server
- A Baan environment
- A Tuxedo environment

Enhanced Security with Distributed Authentication

TruCluster Available Server supports the ability to enable the Enhanced Security option on individual members of the cluster. This includes support for features for enhanced login checks and password management. Audit and acl support can also be enabled independently of the Enhanced Security Option on individual members of the cluster. In addition to the above features, TruCluster Available Server now supports highly available login across the cluster and support for management of distributed authentication databases.

SOFTWARE REQUIREMENTS

TruCluster Available Server Software Version 1.6 requires at a minimum the Tru64 UNIX Version 4.0F operating system.

For more information on the Tru64 UNIX operating system, a separately licensed product, see SPD 41.61.

Additional Required Subsets

TruCluster Available Server Software requires that additional software subsets be installed. See the TruCluster Software Products *Software Installation* manual for further details.

OPTIONAL SOFTWARE

Legato NetWorker is an integrated product offering that completely addresses the storage management needs of the heterogeneous enterprise environment. Legato NetWorker delivers manageability, availability, and performance necessary to protect multi-platform environments with one integrated solution. NetWorker Version 5.5 single server version is bundled with the Tru64 UNIX Version 4.0F operating system, enabling backup of any directly attached storage. To obtain NetWorker V5.5 full product and service, contact Legato via email at compaqanswers@legato.com, phone 408-530-3296, or visit the online Legato Web site at www.legato.com/compaqanswers/.

The Advanced File System Utilities extend the high availability and flexibility of AdvFS. AdvFS Utilities provide a graphical user interface (GUI) to ease management tasks, and online utilities to dynamically resize file systems, defragment files, balance percentage of space used on volumes, undelete files using trashcans, stripe files, and clone files for hot backup. AdvFS Utilities is a separately licensed software product for Tru64 UNIX. See SPD 44.52 for more information.

The Tru64 UNIX Logical Storage Manager (LSM) is an integrated, host-based solution to data storage management, providing concatenation, striping, mirroring, and a graphical user interface that allows data storage management functions to be performed online, without disrupting users or applications. The Logical Storage Manager is a separately licensed software product for Tru64 UNIX. See SPD 51.24 for more information.

The StorageWorks Software package includes these two key storage products: The Tru64 UNIX Logical Storage Manager and the Advanced File System Utilities. StorageWorks delivers high availability, configuration flexibility online, optimal file system performance, and data protection. The product part number needed to order StorageWorks is QB-5RZA*-AA.

Performance Manager for Tru64 UNIX systems is a management application that centralizes the monitoring of UNIX system performance information for a network of systems. A single instance of

Performance Manager for Tru64 UNIX systems can monitor resources for many systems and alert the user when problems arise. Performance Manager is a separately licensed product for Tru64 UNIX. See SPD 46.97 for more information.

SOFTWARE CONFIGURATION REQUIREMENTS

- At least 64 MB of memory is required on each member system.
- 16 MB of permanent free disk space is required for use.

These requirements refer to the disk space required on the system disk. The sizes are approximate; actual sizes may vary depending on the system environment, configuration, and software options.

ORDERING INFORMATION

TruCluster Available Server Software is for those environments that require high availability for applications and the benefits of failover capabilities.

Software License and Documentation: QB-05SA*-AA
Software License: QL-05SA*-AA
Software Upgrade License: QL-05SA*-RA
Software License (30-day loan): QL-05SA9-LB
Software License (60-day loan): QL-05SA9-LD
Software License (90-day loan): QL-05SA9-LA
Software License (180-day loan): QL-05SA9-LG
Software Documentation: QA-05SAA-GZ

* Denotes variant fields. For additional information on available services, refer to the appropriate price book.

SOFTWARE LICENSING

TruCluster Available Server Software is licensed as a standard Compaq software layered product and is provided only under a license. Each system in the TruCluster environment requires a separate license. For more information about Compaq's licensing terms and policies, contact your local Compaq representative or reseller.

Systems	Software License
AlphaServer™ 800, 1000A, 1200, DS10, DS20, DS20E	QL-05SAC-AA
AlphaServer ES40	QL-05SAE-AA
AlphaServer 2000, 2100, 2100A, 4000, 4000A, 4100, GS60E, GS80	QL-05SAG-AA
AlphaServer 8200, 8400, GS60, GS140, GS160	QL-05SAQ-AA

This product supports the Tru64 UNIX License Management Facility (LMF). License units for this product are allocated on an unlimited-system-use basis.

For more information on the License Management Facility, see the Tru64 UNIX Operating System

Software Product Description (SPD 41.61) or the Tru64 UNIX operating system documentation.

GROWTH CONSIDERATIONS

The minimum hardware and software requirements for any future version of this product may be different from the requirements for the current version.

DISTRIBUTION MEDIA

TruCluster Available Server Software, a separately licensed product, is distributed as part of the Tru64 UNIX Operating System Associated Products Volume 2 CD-ROM (QA-MT4AA-H8).

SOFTWARE PRODUCT SERVICES

A variety of service options are available from Compaq. For more information, contact your local Compaq service representative.

SUPPORTED HARDWARE

TruCluster Available Server Software supports the following systems, with up to four (4) systems in a configuration. TruCluster Available Server Software supports up to 32 shared buses with KZPSA-BB, KZPBA-CB, KGPSA-BC and KGPSA-CA adapters, subject to individual platform restrictions. TruCluster Available Server supports a maximum of 32 shared buses in total, subject to platform configurations. The TruCluster Software Products *Release Notes* provide information regarding configuration and firmware requirements.

Supported Systems

System	SCSI or Fibre Channel Adapter
DEC™ 3000	PMAZC, KZTSA
DEC 7000	KZMSA
DEC 10000	KZPSA
AlphaServer 300 4/266	KZPSA
AlphaServer 400 4/166, 4/233	KZPSA
AlphaServer 800 5/333, 5/400, 5/500	KZPSA, KZPBA-CB, KGPSA
AlphaServer 1000 4/200, 4/233, 4/266, 5/300	KZPSA
AlphaServer 1000A 4/233, 4/266, 5/300, 5/333, 5/400, 5/500	KZPSA, KZPBA-CB, KGPSA
AlphaServer 1200 5/400, 5/533	KZPSA, KZPBA-CB, KGPSA
AlphaServer 2000 4/200, 4/233, 4/275, 5/250, 5/300, 5/350	KZPSA, KZPBA-CB
AlphaServer 2100	KZPSA, KZPBA-CB
AlphaServer 2100A 4/200, 4/233, 4/275, 5/250, 5/300, 5/350	KZPSA, KZPBA-CB
AlphaServer 4000 and 4000A , 4100 5/300,	KZPSA, KZPBA-CB, KGPSA

5/400, 5/466, 5/466, 5/600	
AlphaServer 8200 5/300, 5/350, 5/440, 5/625	KZPSA, KZPBA-CB, KGPSA
AlphaServer 8400 5/300, 5/350, 5/440, 5/625	KZPSA, KZPBA-CB, KGPSA
AlphaServer DS10	KZPBA-CB, KGPSA
DS20 & DS20E	KZPBA-CB, KGPSA
AlphaServer ES40	KZPBA-CB, KGPSA
AlphaServer GS60 & GS60E	KZPSA, KZPBA-CB, KGPSA
AlphaServer GS140	KZPSA, KZPBA-CB, KGPSA
AlphaServer GS80	KZPBA-CB, KGPSA
AlphaServer GS160	KZPBA-CB, KGPSA

NOTE:
Tru64 UNIX Version 4.0F and TruCluster Available Server Version 1.6 are the minimum versions required for configurations using AlphaServer DS10, DS20 and ES40.

NOTE:
Tru64 UNIX Version 4.0G and TruCluster Available Server Version 1.6 are the minimum versions required for configurations using AlphaServer GS80 and GS160.

NOTE:
There is a restriction of four (4) clustered systems per Fibre Channel fabric. There can be eight (8) members in the cluster if multiple fabrics are used.

Supported SCSI Controllers

The systems are connected to shared SCSI buses using an adapter from the following list. The TruCluster Software Products *Release Notes* provide more information regarding SCSI controller configuration and firmware revisions:

- KZPSA - PCI to Fast Wide Differential SCSI-2 adapter
- PMAZC - TURBOchannel dual channel to SCSI-2 adapter
- KZTSA - TURBOchannel to Fast Wide Differential SCSI-2 storage adapter
- KZMSA* - XMI to SCSI-2 adapter
- KZPBA-CB - UltraSCSI adapter

* AlphaServer 8200 and 8400 systems do not support the KZMSA for shared SCSI buses.

Supported SCSI Signal Converters

TruCluster Available Server Software supports the following SCSI signal converters. The TruCluster Software Products *Release Notes* provide information regarding supported SCSI signal converters configuration.

Signal Converter	Description
DWZZA-AA	Standalone unit, single-

	ended/narrow to differential/wide
DWZZA-VA	SBB, single-ended/narrow to differential/wide
DWZZB-AA	Standalone unit, single-ended/wide to differential/wide
DS-DWZZH-03	UltraSCSI hub
DS-DWZZH-05	UltraSCSI hub

Supported SCSI Cables

TruCluster Available Server Software supports the following SCSI cables:

Device	Description
BN21W-0B	SCSI-2 Cable "Y"
BN21R or BN23G	SCSI-2 Cable "A"
BN21K or BN21L	SCSI-3 Cable "P"
BC06P or BC19J	50 pin LD Cable
BN38C or BN38D	VHDCI to HD68 Cable
BN37A	Ultra VHDCI Cable

Supported Fibre Channel Hardware

TruCluster Available Server Software supports the following Fibre Channel hardware. For more information on the supported Fibre Channel solutions, see the TruCluster Software Products *Release Notes* and the *Hardware Configuration* manual.

Device	Description
KGPSA-BC	LP7000, PCI-to-Fibre Channel host adapter
KGPSA-CA	LP8000, PCI-to-Fibre Channel host adapter
DS-DSGG-AA/AB	8/16 port Brocade Fibre Channel switch
HSG60	Array Controller
HSG80	Array Controller

NOTE:
The following are the current maximum number of Fibre Channel (FC) adapters (KGPSAB-BC and KGPSA-CA) that can be configured on a shared bus with the following AlphaServer systems:

System	# of FC Adapters
AlphaServer 800	2
AlphaServer 1000A	2
AlphaServer 1200	4
AlphaServer 4x00	4
AlphaServer 8200	32
AlphaServer 8400	32
AlphaServer DS10	2

AlphaServer DS20	4
AlphaServer ES40	4
AlphaServer GS60	32
AlphaServer GS60E	32
AlphaServer GS140	32

Supported Terminators and Connectors

TruCluster Available Server Software supports the following terminators and connectors:

- H8574-A or H8860-AA terminator
- H879-AA HD68 terminator
- 12-37004-04 terminator
- H885-AA HD68 trilink connector
- 12-41667-01 terminator
- H8861-AA VHDCI trilink connector
- H8863-AA VHDCI terminator

Supported Disk Devices for Shared Storage

Every SCSI and Fibre Channel storage disk currently sold by Compaq that appears in the supported options list for a supported AlphaServer is supported for use in a cluster on a shared bus.

Some legacy disk devices are not supported for use on a shared bus. TruCluster Server supports the following disk devices on shared storage. Any SCSI or Fibre Channel storage disk manufactured by Compaq later than the ones in the following list, and appearing in the supported options list for a supported AlphaServer, is supported.

- RZ26-VA Narrow
- RZ26L-VA Narrow
- RZ26L-VW Wide
- RZ26N-VA Narrow
- RZ26N-VW Wide
- RZ28-VA Narrow
- RZ28-VW Wide
- RZ28B-VA Narrow
- RZ28D-VA Narrow
- RZ28D-VW Wide
- RZ28L-VA Narrow
- RZ28L-VW Wide
- RZ28M-VA Narrow
- RZ28M-VW Wide
- RZ29-VA Narrow
- RZ29-VW Wide
- RZ29B-VA Narrow
- RZ29B-VW Wide
- RZ29L-VA Narrow
- RZ29L-VW Wide
- RZ40-VA Narrow
- RZ40-VW Wide
- RZ40L-VA Narrow
- RZ40L-VW Wide

Supported Tape Devices and Media Changers

TruCluster Available Server Software supports the following tape devices and media changers:

- TZ88
- TZ885   DLT Mini Library
- TZ887   DLT Mini Library
- TZ89
- TL890   Mini Library Expansion Unit
- TL891   Mini Library
- TL892   Mini Library
- TL893   Automated Tape Library
- TL894   Automated Tape Library
- TL895   Automated Tape Library
- TL896   Automated Tape Library
- TL881
- Compaq 20/40 GB DLT Tape Drive
- ESL9326D Enterprise Library
- 340654-001 Fibre Channel Tape Controller
- 152975-001 Fibre Channel Tape Controller II

The TL881, TL890, TL891, TL892, TL893, TL894, TL895, TL896, Compaq 20/40 GB DLT Tape Drive and ESL9326D Enterprise Library are supported with both the KZPSA and KZPBA-CB adapters. All other SCSI-attached tape device and media changer support is provided with KZPSA adapters only.

The TL891 Mini Library, TL895 Automated Tape Library, and the ESL9326D Enterprise Library are also supported on a Fibre Channel storage bus with the KGPSA-BC and KGPSA-CA adapters.

The Compaq Fibre Channel Tape Controller is a Fibre Channel-to-SCSI bridge that allows a differential SCSI tape device to communicate with other devices on a Fibre Channel.

Supported Storage Boxes

TruCluster Available Server Software supports the following storage boxes:

Storage box	Description
BA350	Single ended, narrow
BA353	Single ended, narrow
BA356	Single ended, wide
DS-BA356	Ultra SCSI, SBB shelf

Supported Array (RAID) Controllers

TruCluster Available Server Software supports the following RAID controllers. The TruCluster Software Products *Release Notes* provide information regarding supported Array (RAID) controllers firmware revisions.

RAID Controller
SWXRA-Z1 Array Controller (HSZ20)
HSZ40-Ax Array Controller
HSZ40-Bx Array Controller
HSZ40-Cx Array Controller
HSZ50-Ax Array Controller
HSZ70 Array Controller

RAID Array 3000 (RA3000) with HSZ22 controller
HSZ80 Array Controller
HSG80 Array Controller
RAID Array 8000 (RA8000) with HSG80
Storage Array 12000 (ESA12000) w/ HSG80

NOTES:
The KZPBA-CB adapter only supports the RAID Array 3000, and HSZ50, HSZ70, and HSZ80 RAID Controllers.

The RAID Array 3000 is currently supported with AlphaServer 800, AS1000A, AS1200, AS4x00, DS10, and DS20.

The HSZ80 is currently supported with AlphaServer 800, 1200, 4x00, 8200, 8400, DS20, and ES40 systems.

For details on configurations with the HSG80 Array Controller, see the TruCluster Software Products *Hardware Configuration* manual.

Network Adapters

TruCluster Available Server Software supports monitoring for the following network adapters:

Adapter	Description
DE435	PCI/Ethernet
DE450-CA	PCI/Ethernet
DE500-XA	PCI/Fast Ethernet
DE500-AA	PCI/Fast Ethernet
DE500-BA	PCI/Fast Ethernet
DE500-FA	PCI/Fast Ethernet
DE504-BA	Quad Ethernet Channel
DE600-AA	Single Channel Ethernet
DE602-AA	Multi-Channel Ethernet
DEFEA	EISA/FDDI
DEFPA	PCI/FDDI
DE422	EISA/Lance Ethernet
DE425	EISA/Ethernet
DEMFA	XMI/FDDI
DEMNA	XMI/Ethernet
PMAD	TURBOchannel/Ethernet
DEFTA	TURBOchannel/FDDI
DEFZA	TURBOchannel/FDDI
DGLPB-AB	ATMworks 350 ATM
DAPCA-FA	ATM
3X-DAPBA-FA	ATM 155Mbit adapter
DEGPA-SA	Gigabit Ethernet

NOTE:
The DE500-XA and DE500-AA are supported in half-duplex mode only.

HARDWARE RESTRICTIONS

The following are hardware restrictions for TruCluster Available Server Software. The TruCluster Software Products *Hardware Configuration* manual and the individual technical updates provide additional information regarding hardware restrictions.

- All nonshared devices such as the boot disk and CD-ROMs must be locally connected on a private SCSI bus.

- Prestoserve NVRAM failover is not supported on shared disk devices.

HARDWARE CONFIGURATION EXAMPLES

The TruCluster Software Products *Hardware Configuration* manual and the individual technical updates provide information regarding hardware configuration examples.

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