

# Veritas NetBackup<sup>™</sup> Release Notes

UNIX, Windows, and Linux

Release 6.5

# Veritas NetBackup Release Notes

Copyright © 1998 - 2007 Symantec Corporation. All rights reserved.

NetBackup 6.5

Symantec, the Symantec logo, and NetBackup are trademarks or registered trademarks of Symantec Corporation or its affiliates in the U.S. and other countries. Other names may be trademarks of their respective owners.

Portions of this software are derived from the RSA Data Security, Inc. MD5 Message-Digest Algorithm. Copyright 1991-92, RSA Data Security, Inc. Created 1991. All rights reserved.

The product described in this document is distributed under licenses restricting its use, copying, distribution, and decompilation/reverse engineering. No part of this document may be reproduced in any form by any means without prior written authorization of Symantec Corporation and its licensors, if any.

THIS DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID, SYMANTEC CORPORATION SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING PERFORMANCE, OR USE OF THIS DOCUMENTATION. THE INFORMATION CONTAINED IN THIS DOCUMENTATION IS SUBJECT TO CHANGE WITHOUT NOTICE.

The Licensed Software and Documentation are deemed to be "commercial computer software" and "commercial computer software documentation" as defined in FAR Sections 12.212 and DFARS Section 227.7202.

Symantec Corporation  
20330 Stevens Creek Blvd.  
Cupertino, CA 95014  
[www.symantec.com](http://www.symantec.com)

Printed in the United States of America.

## Third-party legal notices

Third-party software may be recommended, distributed, embedded, or bundled with this Symantec product. Such third-party software is licensed separately by its copyright holder. All third-party copyrights associated with this product are listed in the accompanying release notes.

Linux is a registered trademark of Linus Torvalds.

Windows is a registered trademark of Microsoft Corporation.

## Licensing and registration

Veritas NetBackup is a licensed product. See the *NetBackup Installation Guide* for license installation instructions.

## Technical support

For technical assistance, visit <http://entsupport.symantec.com> and select phone or email support. Use the Knowledge Base search feature to access resources such as TechNotes, product alerts, software downloads, hardware compatibility lists, and our customer email notification service.



# Contents

Chapter 1	New features in NetBackup 6.5	
	New publications or changes .....	2
	Media Manager Guide Mappings for NetBackup 6.5 .....	2
	Documentation changes for NetBackup 6.5 .....	3
	NetBackup 6.5 primary features .....	5
	Storage lifecycle policies (including protection service levels and advanced staging) .....	5
	AdvancedDisk storage option .....	7
	SharedDisk storage option .....	7
	SAN client .....	7
	NetBackup Fibre Transport .....	8
	OpenStorage option .....	8
	SCSI persistent reserve .....	8
	VTL Direct to Tape .....	9
	NetBackup Snapshot Client (formerly Advanced Client) .....	9
	New snapshot support for disk arrays .....	10
	VSS snapshot method supports Instant Recovery and new disk arrays	
	10	
	Media sharing .....	10
	NetBackup Bare Metal Restore enhancements .....	11
	Windows fast restores .....	11
	Windows Network Booting .....	11
	Windows Discovery Boots .....	12
	Platform Proliferations .....	12
	NetBackup for VMWare .....	12
	PureDisk Storage Option (formerly named PureDisk Optimization Option)	
	12	
	PureDisk Enterprise Edition .....	13
	Other NetBackup features and enhancements .....	13
	NetBackup database agent enhancements .....	13
	General database agent feature .....	13
	Lotus Notes agent .....	14
	DB2 agent .....	15
	Oracle agent .....	15
	SAP agent .....	16
	NetBackup for Microsoft Exchange .....	16

NetBackup for Microsoft SharePoint Portal .....	17
SQL agent .....	17
NetBackup disk backup capabilities .....	17
Improved disk performance - meeting or exceeding tape performance	
18	
Capacity management .....	18
Disk spanning .....	18
Reporting for disk based data protection resources .....	18
NetApp P3 file system export .....	18
NetBackup installation enhancements .....	19
NetBackup LiveUpdate .....	19
UNIX Secure push install .....	19
Additional cluster support .....	19
NetBackup-java interfaces .....	20
Back-level administration capabilities by the NetBackup-java console	
20	
Support for day light saving changes .....	20
NetBackup Operations Manager (NOM) .....	20
New standard reports .....	21
Enhancements to NOM 6.0 standard reports .....	21
Enhancements to NOM reporting .....	21
Support for using a remote Symantec Product Authentication Service	
22	
Client and policy groups .....	22
New alert conditions for alert policies .....	22
Single sign-on and cross launch for NOM and VBR .....	22
Enhancements to logging functionality .....	22
More Managing views for Storage Units and Devices .....	22
NetBackup proliferations and general enhancements .....	22
NDMP direct copy .....	23
NetBackup Support Utility (nbsu) .....	23
Back-end capacity licensing .....	23

## Chapter 2 Supported platforms and peripherals

Server and client platform support .....	26
Platform life cycle issues .....	26
Adding a platform .....	27
NetBackup 6.5 supported platforms and operating systems .....	27
Operating systems not supported as of NetBackup 6.5 and beyond ...	36
Operating systems not supported as of the next major release .....	37
OSs with 64-bit binary support only - as of the next major release ....	39
NetBackup backward compatibility .....	40
NetBackup binary sizes .....	40

Other NetBackup compatibility lists .....	45
NetBackup access control compatibility list .....	45
NetBackup snapshot client .....	48
NetBackup Bare Metal Restore compatibility lists .....	50
BMR supported operating systems .....	50
BMR supported shared resource tree (SRT) versions .....	51
BMR supported file systems and volume managers .....	51
BMR VxVM and VxFS dependencies on Solaris SPARC .....	52
BMR supported cluster solutions .....	53
BMR disk space requirements .....	54
NetBackup database agent platform support .....	54
NetBackup Operations Manager .....	55
Platforms supported for the NOM server .....	55
NetBackup managed master server platforms supported by NOM .....	56
Component levels supported for NOM .....	57
Email clients supported by NOM .....	57
Web browsers supported by NOM .....	58
NetBackup for Network Data Management Protocol (NDMP) .....	58
NetBackup SharedDisk Option .....	58
Supported systems .....	58
Supported Arrays and HBAs .....	59
NetBackup SAN Client and Fibre Transport .....	59
Supported systems .....	59
Supported host bus adapters (HBAs) .....	59
NetBackup Shared Storage Option (SSO) .....	60
Supported Robot Types for SSO .....	60
NetBackup supported peripherals compatibility lists .....	60
NetBackup Vault .....	61
Platforms supporting the NetBackup administration consoles for UNIX ..	62
Additional NetBackup-Java Administration Console - supported platform information .....	63
Chapter 3	NetBackup product dependencies
Operating system patches and updates .....	65
Other patch information .....	74
Product dependencies .....	75
Other Third-Party updates .....	76
Supported versions of VxFS and VxVM .....	77
Chapter 4	Operational Notes
NetBackup installation and start-up notes .....	81
NetBackup CD-ROM and rebranding changes .....	81

General installation items .....	84
General startup/shutdown notes .....	89
NetBackup LiveUpdate .....	89
Secure push install .....	89
NetBackup cluster .....	89
NetBackup licenses .....	90
NetBackup client .....	91
NetBackup Documentation Notes .....	91
Internationalization and localization Notes .....	95
NetBackup Bare Metal Restore .....	96
General NetBackup operational notes .....	96
NetBackup access control .....	100
NetBackup database agents .....	101
DB2 agent .....	101
Lotus Notes agent .....	101
SAP agent .....	103
NetBackup for Microsoft Exchange .....	103
NetBackup for Microsoft SharePoint Portal .....	106
General Setup .....	106
Operational Issues .....	106
Portal Recovery .....	106
Document Restore .....	107
SPSRecoveryAsst Command .....	107
Redirecting a Restore .....	107
SQL Server Agent .....	108
NetBackup interfaces .....	108
NetBackup Administration Console for Windows .....	108
General notes .....	108
Activity monitor interface .....	112
Device monitor interface .....	114
NetBackup java interfaces .....	114
General Notes .....	114
Activity monitor .....	119
Storage Unit .....	120
Media and Device Management .....	120
Reports .....	120
File system analyzer & Storage migrator .....	120
NDMP .....	120
Host properties .....	121
Backup, archive, and restore .....	121
Storage unit configuration .....	122
NetBackup media and device management .....	122
Media Sharing .....	122



Media and device selection (MDS) .....	122
Enterprise Media Manager .....	124
Media management interfaces .....	127
Device support .....	128
Multi-path tape device support .....	129
NDMP .....	129
SAN Client and Fibre Transport .....	131
SharedDisk storage option .....	132
Shared Storage Option .....	134
Device configuration interfaces .....	134
Test utilities .....	136
NetBackup Snapshot Client .....	137
NetBackup configuration file .....	137
Media Manager configuration file .....	138
NetBackup "Touch" files .....	138
NetBackup commands .....	139
NetBackup OpenStorage option .....	140
NetBackup storage units .....	140
Disk storage units .....	140
NetBackup Vault .....	141
NetBackup Operations Manager .....	143
Chapter 5	NetBackup features - end of life
Features, enhancements, and commands no longer supported .....	149
General NetBackup features .....	149
Devices no longer supported .....	150
NetBackup commands no longer supported .....	150
Last release of Storage Migrator .....	150
End of life notifications .....	150
General NetBackup notifications .....	151
NetBackup Database Notifications .....	151
NetBackup for Microsoft Exchange .....	151
NetBackup for Microsoft SharePoint Portal .....	151
NetBackup for Microsoft SQL .....	152
NetBackup Operations Manager .....	152
Notification of NetBackup commands for next major release .....	152
Appendix A	Related documents
Release Notes .....	155
Getting started guides .....	155
Installation guides .....	156
Administrator's guides .....	156

Administrator's guides - agents and options .....	157
User's guides .....	160
Device configuration guide .....	160
Troubleshooting guide .....	160
NetBackup commands .....	161

## Appendix B Third-Party Copyright

# New features in NetBackup 6.5

Veritas NetBackup™ 6.5 contains many new features and enhancements that are designed to increase scalability and functionality of NetBackup for its large enterprise customers. Some of the more prominent features in this release are:

- Storage Lifecycle Policies
- AdvancedDisk storage option
- SharedDisk storage option
- SAN client
- NetBackup Fibre Transport
- OpenStorage option
- Virtual Tape Library (VTL) backup direct to Tape
- NetBackup Snapshot Client
- Media Sharing
- Bare Metal Restore
- PureDisk Storage Option
- PureDisk Enterprise Edition

As Symantec continues to improve NetBackup in the areas of scalability, improved disk backup capabilities (and product integration) many changes are underway. The following abbreviated list contains other new features and enhancements that make it possible for NetBackup to continue to be a market leader.

- NetBackup database agent enhancements
- NetBackup disk backup capabilities include

- NetBackup installation enhancements
- NetBackup-java interfaces
- Enterprise Media Manager (EMM)
- NetBackup Operations Manager (NOM) enhancements
- NetBackup proliferations and general enhancements

The following subsections within this chapter summarize each feature that is outlined in the preceding list. Each of these features and enhancements are documented in the NetBackup documentation that is included in your NetBackup media kit.

## New publications or changes

The following publications and help files have changed for the NetBackup 6.5 release:

### Media Manager Guide Mappings for NetBackup 6.5

As of the NetBackup 6.5 release, the NetBackup Media Manager System Administrator's Guides (Linux/UNIX and Windows) are retired.

The Media and Device Management node content within the NetBackup Administration Console is merged into the *NetBackup Administrator's Guide, Volume I*. In the Administration Console online help, the content is merged into the NetBackup Administration Console Help.

Other Media Manager content from the Media Manager guides is moved into the following documents:

- *NetBackup Administrator's Guide, Volume II* (UNIX and Linux, Windows, or both as appropriate)
- The new *NetBackup Shared Storage guide* contains information about the following: OpenStorage option, SharedDisk option, Shared Storage Option, SAN client, and Fibre Transport.
- The *NetBackup Media Manager Device Configuration Guide* was renamed to in the *NetBackup Device Configuration Guide*.

[Table 1-1](#) on page 3 shows the new locations of the Media Manager System Administrator's Guide contents.

For information about other documentation changes, see "[Documentation changes for NetBackup 6.5](#)" on page 3.

**Table 1-1** Media Manager chapter name mappings for NetBackup

NetBackup 6.0 chapter name	NetBackup 6.5 chapter name	NetBackup 6.5 guide
“Configuring Storage Devices”	“Configuring storage devices”	<i>NetBackup Administrator's Guide for [platform], Volume I</i>
“Managing Media”	“Media”	<i>NetBackup Administrator's Guide for [platform], Volume I</i>
“Managing Media In Robots (Robot Inventory)”	“Media”	<i>NetBackup Administrator's Guide for [platform], Volume I</i>
“Monitoring Storage Devices”	“Device Monitor”	NetBackup Administrator's Guide for UNIX and Linux, Volume I
“Tape I/O Commands”	“Reference topics”	<i>NetBackup Administrator's Guide for UNIX and Linux, Volume II</i>
“Shared Storage Option (SSO) topics”	“Shared Storage Option for Tape” section	<i>NetBackup Shared Storage Guide</i>
“Media Manager Reference Topics”	“Reference topics”	<i>NetBackup Administrator's Guide for [platform], Volume II</i>
“Using tpconfig”	“Menu user interfaces”	<i>NetBackup Administrator's Guide for UNIX and Linux, Volume II</i>
“Using the Media Management Utility (vmadm)”	“Menu user interfaces”	<i>NetBackup Administrator's Guide for UNIX and Linux, Volume II</i>
“STK Automated Cartridge System (ACS)”	“STK Automated Cartridge System (ACS)”	<i>NetBackup Device Configuration Guide</i>
“IBM Automated Tape Library (ATL)”	“IBM Automated Tape Library (ATL)”	<i>NetBackup Device Configuration Guide</i>
“ADIC Distributed AML Server/Scalar Distributed Library Controller”	“ADIC Automated Media Library (AML)”	<i>NetBackup Device Configuration Guide</i>

## Documentation changes for NetBackup 6.5

The following subsections describe the documentation changes for NetBackup 6.5.

- As of NetBackup 6.5 release, the *NetBackup Media Manager System Administrator's Guides* (UNIX and Linux, Windows, or both as appropriate) are retired.

For more information, see “[Media Manager Guide Mappings for NetBackup 6.5](#)” on page 2.

- The word "System" is removed from all manual titles that formerly used it to describe “system administrator” as a user. For example, the *NetBackup System Administrator's Guide, Volume I* becomes the *NetBackup Administrator's Guide, Volume I*.
- The *NetBackup Encryption Administrator's Guide for UNIX, Windows, and Linux* is retired beginning with this release. Its content is now in the *NetBackup Security and Encryption Guide for UNIX, Windows, and Linux*. The new *NetBackup Security and Encryption Guide for UNIX, Windows, and Linux*. This guide covers security implementation types for NetBackup that include: standard security, MSEO (Media Server Encryption Option) security, client-side encryption security, and NBAC (NetBackup Access Control) security. Security deployment workgroups, single DataCenters, and multi-DataCenters are described in relationship to NetBackup where security is applied to geographically distributed local and world wide systems. The chapters include, Increasing NetBackup security, Security deployment models, Port security, Access control security, and Data at rest encryption security
- The *NetBackup Operations Manager Getting Started Guide* was renamed *NetBackup Operations Manager Guide*. It explains how to install and use the NetBackup Operations Manager software.
- NetBackup 6.5 contains two new documents that accompany the PureDisk feature. Those documents are the *Veritas NetBackup PureDisk Remote Office Edition Getting Started Guide* and the *Veritas NetBackup PureDisk Remote Office Edition Administrator's Guide*. You can download a copy of these documents from the Symantec Support Web site using the following URL. <http://www.symantec.com/enterprise/support/downloads.jsp?pid=52672>
- NetBackup 6.5 now supports Solaris 10 x64 (Opteron) on server and client computers. In the past, NetBackup supported only Solaris SPARC. As you read through the NetBackup documentation, any reference to *Solaris* refers to both the Solaris Opteron and Solaris SPARC platforms. Any time support is offered for only one Solaris platform, then that specific platform is noted in the documentation. In addition, a note may be used at the beginning of a section where multiple references are made about one specific platform.
- In NetBackup 6.5, Symantec provides *Release Updates* instead of maintenance packs for each of its major product releases. (This new release model does not affect earlier versions of NetBackup.)  
Maintenance packs continue to be a useful method of providing product fixes to our customers, but they can be restrictive. The new Release Update model enables Symantec to continue:

- To provide the same level of fixes as before
- To provide new and timely features that are complete with documentation, training, and a full release test verification with each Release Update.

Symantec considered, the content and size of each release, and the frequency in which a new update would occur when it designed this release model. Symantec decided to provide our customers with new features in a shorter range of time; rather than wait as long as two years for the next major release. By including new features with each Release Update, NetBackup customers can take advantage of those features much sooner, and enable them to do their job more efficiently. Features in Release Updates are smaller, non-invasive features, that are available to those who want them and harmless to those who do not.

With a new release model comes a new labeling scheme. Release Updates are numbered according to the major NetBackup release that it corresponds with. For example, the first release update after NetBackup 6.5 GA releases are labeled, NetBackup 6.5.1, the second will be 6.5.2, and so on.

How often will Release Updates become available? Our intent is to deliver our first Release Update (6.5.1) about 3 months after a major release has officially shipped. After this, the users can expect to see the next three Release Updates to be released every four months in succession (6.5.2 - 6.5.4). After that, Release Updates will be released every six months.

## NetBackup 6.5 primary features

NetBackup 6.5 contains many new features and enhancements to existing product features. The following subsections describe the more prominent features in the base NetBackup product.

### Storage lifecycle policies (including protection service levels and advanced staging)

The advanced staging capability in NetBackup 6.5 can be described as “Lifecycle policy management for backup data”. Advanced staging overcomes fundamental limitations in *basic disk staging* or the *disk staging storage unit* available before NetBackup 6.5. Some of these fundamental limitations of basic staging are:

- Lack of staging flexibility:
  - The staging behavior is defined on and tied to the basic staging storage unit.
  - All backup data that is sent to that basic staging storage unit is treated the same: same schedule, same retention(s), same destination(s).

- Backup data with different storage plans cannot share the same disk space.
- Multiple copies are not guaranteed. An image can expire before duplication occurs if the original backup has a very short retention, and it is not duplicated before regular expiration rules expire the image.)
- The disk full variable is the only variable that controls the expiration of images from the source storage unit. There is no ability to keep the most important backups on disk for a specified period of time for quick restores, while allowing lessor important backups to expire when disk space is needed for incoming backups.
- Basic disk staging (DSU or DSSU) does not support staging to a tape device, in particular to a VTL.

NetBackup 6.5 advanced staging introduces a whole new paradigm for backup data management and allows the user to define *Protection Service Levels* to classify different types of backup data based on their business value, and then to treat these different types of backup data uniquely with respect to how they move through the tiered backup infrastructure. Advanced staging enables the following:

- Highly flexible staging policies:
  - You can tie staging behavior to the Protection Service Level classification of the data (for instance Gold, Silver, and Bronze), rather than the storage unit.
  - Different types of backup data (classified by the Protection Service Level) can have different schedules, retention periods, and destinations when using the same storage device.
- Image copies (both backup and duplication) are guaranteed to complete if the storage is available. If the storage is not available, the lifecycle continues to retry the duplication to that device until it succeeds or the operator cancels it.
- Image availability on disk for fast restores can be controlled with new types of expiration definitions.
- Storage lifecycle policies support many types of storage, including VTL (or any other tape device) and all of the disk types that NetBackup 6.5 supports. (The basic disk type storage unit is not supported because it does not support the new *capacity management* and load balancing functionality.)



## AdvancedDisk storage option

The AdvancedDisk disk type is NetBackup's low-impact offering into the new Enterprise Disk Foundation feature set provided by NetBackup 6.5. With AdvancedDisk you can use any supported, direct-attached disk (or SAN-attached disk). However, unlike BasicDisk, AdvancedDisk gives you Storage Lifecycles, Advanced Staging, Protection Service Levels, Capacity Management, and Load Balancing.

The AdvancedDisk disk type enables you to share file systems across multiple disk storage units. In theory, an AdvancedDisk disk pool can be written to (or read by) multiple media servers, using NFS, CIFS, or some other network file system.

## SharedDisk storage option

The SharedDisk Storage option improves the utilization of NetBackup disk and media server resources and increases the reliability, scalability, and performance of the NetBackup infrastructure. This feature enables you to share SAN-connected NetBackup disk volumes and media servers. Disk volumes within the group are shared dynamically among the associated media servers. Disk volumes are assigned to and mounted by any media server in the group at backup or restore runtime. In addition, the backup and restore jobs are load-balanced across the media servers in the pool. Loss of any media server does not prevent data protection operations; backup and restore simply uses another media server in the pool. To control resources efficiently, any media server in the pool or a specified subset of media servers can perform other operations such as image duplication.

## SAN client

The SAN client is a new type of NetBackup client that is designed for high-performance data protection. The SAN client uses SCSI protocol to send backup (restore) data over the FC SAN instead of TCP/IP protocols to send backup (restore) data over the LAN. The result is backup (restore) performance up to 150MB/s for each backup stream when using high-performance disk media as a target with fast clients. The SAN client provides all the performance benefits of the SAN media server with none of the associated impact on the applications (smaller footprint, lower resource consumption, and less complex NetBackup upgrade scenarios). The following client platforms support the SAN client: AIX, HP-UX, Linux, Solaris, and Windows, and the following media server platforms support the SAN client: Red Hat 4 update 3 Linux x86\_64 and Solaris 9/10 SPARC. The SAN client will be supported in this release with disk storage. Support for tape storage may be added in a future release.

## NetBackup Fibre Transport

NetBackup Fibre Transport is a method of data transfer that uses a storage area network. Fibre Transport uses Fibre Channel and a subset of the SCSI command protocol for data movement over a SAN rather than TCP/IP over a LAN. It supports multiple, concurrent logical connections. The NetBackup systems that support Fibre Transport contain Fibre Channel HBAs that are dedicated to FT communication. NetBackup server and client administration occurs over the LAN not the SAN.

Throughout the NetBackup documentation set, Fibre Transport connections between NetBackup clients and NetBackup servers are referred to as FT pipes.

## OpenStorage option

The OpenStorage option supports backup to intelligent disk appliances by providing a software development toolkit (API) that disk appliance vendors can use to write plug-ins. NetBackup uses these plug-ins to communicate with the disk appliances. NetBackup recognizes new plug-ins at run time and exposes the plug-in's associated disk type as a disk type available for storage.

To determine a disk appliance's capabilities, NetBackup uses the plug-in to query the storage appliance. Capabilities can include single-instance storage, optimized off-host duplication, and so on.

Disk appliances typically are hardware and software solutions. The disk appliance vendors participate in the Symantec OpenStorage Partner Program. Symantec qualifies their storage solutions for the OpenStorage API. Refer to the *NetBackup Shared Storage Guide for UNIX, Windows, Linux* for more information regarding the OpenStorage option.

## SCSI persistent reserve

NetBackup 6.5 contains a new protection option for the **Enable SCSI reserve** property, called SCSI persistent reserve. SCSI reservations provide protection for NetBackup Shared Storage Option environments or any other multiple-initiator environment in which drive are shared. The SCSI persistent reserve option provides protection for SCSI devices. The devices must conform to the SCSI Primary Commands - 3 (SPC-3) standard. SCSI persistent reserve is valid for NetBackup 6.5 and later servers only. If you enable SCSI persistent reserve, NetBackup does not send persistent reserve commands to NetBackup media servers earlier than release 6.5.

## VTL Direct to Tape

This feature addresses one of the most common complaints with Virtual Tape Libraries (VTLs): The limited ability to create physical tape copies of virtual tape backups. Without this feature, there are only two ways to make physical tape copies:

- Use NetBackup duplication, which routes data through the NetBackup media server and creates overhead and resource consumption.
- Use VTL capability to make copies to the physical tape that is connected to the VTL.

The latter approach keeps the input/output load off of the media server. However, NetBackup does not catalog the physical tape copy. This causes more complex, two-step restores and a non-supported usage model. This feature enables NetBackup to manage the duplication of backup images, and it enables the VTL to move the data from virtual tape to physical tape (or another virtual tape). This enables NetBackup to catalog the duplications, so restores can be activated from virtual or physical tape as needed.

## NetBackup Snapshot Client (formerly Advanced Client)

The NetBackup Snapshot Client provides low-impact backups and improved RPO/RTO for recovery through the following capabilities:

- Array and software snapshot integration  
Enables the user to select and leverage a variety of software or hardware point-in-time copy capabilities for backup and recovery operations.
- Off-host backups  
Reduces overhead and increases data protection performance by shifting backup processing to an alternate data mover in a variety of storage architectures.
- FlashBackup  
Uses a file system snapshot to significantly improve backup performance for systems that store large numbers of files.
- Block-level incremental backup  
Delivers high performance protection for Oracle and DB2 databases by greatly reducing the amount of data during backup and recovery.
- Instant recovery  
Delivers all the benefits of data protection without the need for data movement.

In this release of NetBackup the following new enhancements of the capabilities that are listed above are added:

## New snapshot support for disk arrays

This 6.5 release introduces new snapshot methods to support the EMC CLARiiON and HP StorageWorks Enterprise Virtual Array (EVA) disk arrays. This release also introduces new snapshot methods for the EMC Symmetrix/DMX disk array series, and for the Hitachi 77xx/92xx/99xx and TagmaStore USP/NSC disk array series. All the new disk array snapshot methods in this release support UNIX and Linux clients, for local and alternate client backup and Instant Recovery.

## VSS snapshot method supports Instant Recovery and new disk arrays

The VSS snapshot method now supports Instant Recovery. From the viewpoint of the NetBackup administrator, this VSS method replaces the VSS\_Transportable snapshot method. (VSS uses the Volume Shadow Copy Service of Windows 2003 and Vista.)

The VSS snapshot method also adds support for several disk arrays. For snapshot backup to disk or tape (without Instant Recovery), VSS now supports the following: EMC Symmetrix/DMX, HP StorageWorks Enterprise Virtual Array (EVA), and Network Appliance Network Attached Storage devices. For a backup that uses the Instant Recovery feature, VSS supports Symmetrix/DMX, Hitachi 77xx/92xx/99xx and TagmaStore USP/NSC, EMC CLARiiON, and HP EVA.

---

**Note:** For all disk arrays that the VSS snapshot method supports, only the NTFS file system is supported on Windows *basic* disks (as opposed to dynamic disks). Since logical volume managers use dynamic disk format, volume managers such as Veritas Storage Foundation for Windows are not supported.

---

## Media sharing

The media sharing feature allows multiple NetBackup media servers to actively share a given tape media for write purposes. Media sharing reduces tape, media-related expenses by enabling increased media utilization that reduces the amounts of partially full media and the total number of tape media that are required to store a given amount of backup data. Media sharing reduces the vaulting related expenses because fewer pieces of media need to be vaulted and fewer pieces of empty media need to be placed into the scratch pool. Media sharing also provides the ability to "hand off" a mounted tape to another media server, eliminating mount time for backup to different media servers.

## NetBackup Bare Metal Restore enhancements

As a NetBackup licensed option, BMR is packaged and delivered with NetBackup and installed from the NetBackup media. A NetBackup license key that includes BMR activates its functionality. The following subsections describe the new features and the enhancements made in this area.

### Windows fast restores

Using a startup CD/DVD image, you can restore a Windows system using the Bare Metal Restore (BMR) 6.5 version in under 15 minutes. The new restore process requires only one restart, and is designed to be fully compatible with all NetBackup 6.5 Clients and Servers that BMR supports. The following standard BMR functionality is supported with the new fast restore feature:

- Restoration using the standard NetBackup backups
- Restoration to completely different hardware
- Restoration to a different number, size, and type of disks
- Restoration to any Point-in-Time that has a Full or incremental backup
- Running user-written external procedures during the restore process
- Full BMR Configuration Editing
- Management of most functionality using the NetBackup Administration Console
- Full restoration of Windows Dynamic Disk (logical disk manager) disk layouts
- Restoration to and from Virtual Systems

The legacy (DOS-based) start infrastructure is retained in this release to support the few systems that do not meet the requirements to use the Fast Restore mechanism. The only systems that require the Legacy Windows Restore options are systems with:

- Less than 512MB of memory
- Systems using Veritas Storage Foundation for Windows

### Windows Network Booting

Windows Boot Servers now install the network services that are required to support Network booting of PC hardware. When you perform a Prepare To Restore operation on a Windows system, the Boot Server is automatically configured to start a fully automated Fast Restore image. To use the new Network Boot capability, you must have a DHCP server in your environment.

## Windows Discovery Boots

The BMR hardware discovery process has been extended from UNIX and Linux to work with Windows hardware. With a single nondestructive boot, you can capture the component inventory for new hardware. This process streamlines the restore process.

## Platform Proliferations

- BMR Support has been added for the following operating system versions to the NetBackup 6.5 release of NetBackup/BMR:
  - AIX 5.3
  - Solaris 10
  - SuSE 9
  - Red Hat 4
- Veritas Storage Foundation 5.0 - Support has been added on Solaris (SPARC) and AIX

## NetBackup for VMWare

NetBackup for VMware provides backup and restore of Windows VMware virtual machines (guest operating systems). NetBackup for VMware uses VMware's Consolidated Backup (VCB) framework.

In this 6.5 release, NetBackup for VMware supports file-level backup and restore of Windows virtual machines, and also supports VMware Virtual Centers.

For updates on the release status of this feature, see the "NetBackup 6.5 Additional Operational Notes" TechNote (TechNote 288211) on the Symantec Support Web site. The following is a link to this document.

<http://entsupport.symantec.com/docs/288211>.

For configuration assistance with NetBackup for VMware, see the "NetBackup for VMware Configuration" TechNote, at:

<http://entsupport.symantec.com/docs/289771>.

## PureDisk Storage Option (formerly named PureDisk Optimization Option)

The PureDisk Storage Option provides a single-instance store (SIS) storage unit on a traditional NetBackup media server. You can configure a NetBackup media server to use a PureDisk storage pool as a NetBackup storage unit. When you use NetBackup to send backup copies to PureDisk storage option, you take advantage of PureDisk's single instance store (SIS) technology. SIS reduces the amount of network bandwidth and storage media that is required for backup

copies because PureDisk writes only one copy of each unique file to disk storage. This technology is useful if multiple copies of the same file exist on the individual clients that you want to back up.

You can configure the PureDisk storage option in one of the following ways:

- As the original backup target.
- As a secondary target for disk staging operations. In this case, the initial backup activity is directed to a traditional disk storage unit or an AdvancedDisk storage option pool.

## PureDisk Enterprise Edition

PureDisk Enterprise Edition offers all the capabilities of PureDisk Remote Office Edition and PureDisk Storage Option, plus two additional integration capabilities with NetBackup:

- PureDisk disaster recovery protection protects PureDisk backup data and configuration information on NetBackup-connected tapes in native PureDisk format. These backups are incremental and are used to recover the PureDisk environment in the event of a disaster.
- Duplicate and archive PureDisk data to NetBackup duplicates (and optionally expires) data from PureDisk to NetBackup tape, in native NetBackup tar format. You can use these backups for extended retention, compliance requirements, or alternate server restores by NetBackup clients. Duplicated data can be directly restored from NetBackup. In addition, duplication filtering is available for clients and subsets of data.

# Other NetBackup features and enhancements

## NetBackup database agent enhancements

The following subsections describe the many enhancements that were made in the area of NetBackup database agents.

### General database agent feature

Client compression for database backups provides client-side compression for standard and Snapshot Client database backups. Data that is compressed from the database increases backup performance over the network and reduces the

size of the backup image that is stored on disk or tape. The following table identifies those database agents that support client compression.

**Table 1-2** Platforms for the NetBackup 6.5 Release

Supported Database	Standard Compression	Snapshot Compression
NetBackup for Oracle	Yes	No
NetBackup for SAP	Yes	Yes
NetBackup for Exchange	Yes	No
NetBackup for Lotus	Yes	Not an option
NetBackup for SQL-Server	Yes	Yes
NetBackup for Sybase	Yes	Not an option
NetBackup for Informix	Yes	Not an option
NetBackup for DB2	Yes	Yes
NetBackup for SharePoint	Yes	Not an option

## Lotus Notes agent

The Lotus Notes agent contains enhancements to Checkpoint restart, improved control over restore and recovery, and performance improvements during log recovery.

- Checkpoint restart: Checkpoint Restart capabilities available with file backup and restore has been extended to Lotus backups. Refer to the *NetBackup for Lotus Notes Administrator's Guide* for details on how to use this feature.
- Improved performance during log recovery: The NetBackup for Lotus agent provides an enhancement that performs transaction log recovery on restored databases. With the new capabilities, multiple transaction logs can be restored at a time during log recovery which reduces the number of restore requests; thereby enhances the performance. Refer to the *NetBackup for Lotus Notes Administrator's Guide* for details on how to configure and use this feature.
- Improved control over restore and recovery
  - The NetBackup for Lotus agent can now perform restore-only of logged Lotus databases. This means that the recovery phase for logged Lotus databases can be skipped and the database can be brought online immediately following the restore. Refer to the *NetBackup for Lotus Notes Administrator's Guide* for details on how to use this feature.



- The NetBackup for Lotus agent can disable the replication of Lotus databases on a restore by assigning a new replica ID to the restored database. This capability was already available for logged Lotus databases and can now be done for unlogged Lotus databases also.

## DB2 agent

### DB2 Alternate Restore

A DB2 restore now has the ability to redirect a DB2 database to a different owner from the original owner (both owners being from the same group). A new backup of the source DB2 database is required so the correct group permission is on the image to allow the alternate user to perform a restore to the new instance, or database.

## Oracle agent

The following enhancements have been made with the Oracle agent.

### Dynamic reconfiguration support

New to this database agent is the ability to provide dynamic reconfiguration support for the NetBackup Oracle Agent for Windows. Currently the Oracle agent runs using the NetBackup configuration settings (for example, VERBOSE, CLIENT\_TIMEOUT, and so forth) that were present at the time the agent was loaded into memory by Oracle. Subsequent changes to the NetBackup configuration settings are not picked up by the Oracle agent until the database is restarted.

Although this practice improves system performance, it also results in DLLs not having their internal static data structures refreshed on the subsequent DLL loads. In addition, our customers must take their production databases offline to pick up changed NetBackup configuration settings.

This Dynamic reconfiguration feature enables the Oracle agent to update its configuration setting without having to restart the database instance. This means our customers no longer have to take their production databases offline to pick up changed NetBackup configuration settings.

### Oracle Alternate Restore to a different instance owner

A Recovery Manager (RMAN) restore now has the ability to redirect an Oracle instance to a different owner from the original owner (both owners being from the same group). This change is only effective for new NetBackup 6.x backups. A new backup of the source Oracle database is required so the correct group permission is on the image to allow the alternate user to perform a restore to the new instance, or database.

### Restore from any copy

In this release, this database agent can take advantage of the restore from any copy feature. To take advantage of this feature, users can add the following to the Oracle RMAN send command.

NB\_ORA\_COPY\_NUMBER=*x*, where *x* is the copy number you want to restore.

### SAP agent

The following list describes the enhancements that were made to the SAP agent.

- The following Snapshot enhancements are included in this release:
  - Snapshot methods available within NetBackup are now available for SAP Backup and Restore operations. In particular, NetBackup for SAP now supports on-host snapshot backups, off-host snapshot backups and Instant Recovery.  
With a snapshot backup capability, the database down time is significantly reduced. And with the instant recovery capability, restores can happen directly from the snapshot (disk) which makes it much faster than regular restores.
  - NetBackup for SAP Agent with a Snapshot client enables you to use the Network Attached Storage (NAS) as a data mover.
  - The platforms that are supported are: Windows (32-bit), Solaris, HP-UX (PA RISC), and AIX.

For more information about these snapshot enhancements, refer to the *NetBackup for SAP Administrator's Guide* and the *NetBackup Snapshot Client Administrator's Guide*.

- The following Check-point restart enhancements are included in this release: The SAP agent now supports `-f/fill` option of `brbackup` & `brrestore`. With this option, failed backup or restore jobs can be restarted from a previous point of failure. Please refer to *NetBackup SAP Administrator's Guide* for details
- Other SAP agent enhancements
  - NetBackup for SAP now supports restores in disaster recovery situations in which `brrecover` calls `backint` without `-p` parameter (util file).
  - NetBackup for SAP now supports backup of files from NFS mounted file systems, Loopback file systems (LoFS).

### NetBackup for Microsoft Exchange

NetBackup introduces support for Exchange 2007 on Windows 2003 X64 servers. In this release, Exchange 2007 storage group and database backup &

recovery are supported. Also supported is Exchange 2007 cluster environments. In the next release update, support will be added for mailbox backup & restore, the NetBackup Snapshot Client option to back up from snapshots, and Veritas Cluster Server environments.

Also to be added in the next release update is Instant Recovery for Exchange 2003. This feature enables the recovery of storage groups and databases from a snapshot. These snapshots can also be staged to tape

## NetBackup for Microsoft SharePoint Portal

This release of NetBackup provides a new document-level restore for Microsoft SharePoint Portal Server 2003. This feature enables both database recovery and document-level restore from the same SharePoint 2003 backup image. Conventional solutions required you to back up the SharePoint data twice: first for databases and second for documents.

NetBackup for SharePoint now supports Windows SharePoint Services (WSS) 2.0, in addition to existing support for SharePoint Portal Server 2003.

See the “Enable document restore” setting on the NetBackup MS-SharePoint policy. In addition, please consult the *NetBackup for Microsoft SharePoint Portal Server 2003 Administrator’s Guide* for setup and configuration instructions.

## SQL agent

- **Retry of failed backups**  
When executing a SQL backup script (\*.bch file), the agent can now identify backup failures of individual objects, and then generate a new script to back up only the failed objects. The retry script can be run automatically or saved for later.
- **New INSTANCE \$ALL**  
The new INSTANCE \$ALL macro allows a single SQL backup script to back up all instances that are discovered at run time. Also, it is now possible to exclude specific instances, databases, and so forth, from the \$ALL run-time expansion.

## NetBackup disk backup capabilities

The following features highlight some of the enhancements in the NetBackup disk backup area.

## Improved disk performance - meeting or exceeding tape performance

Disk-based data protection (DBDP) addresses many issues that are encountered in tape-based environments. With this feature you can configure the disk buffer size enabling data to be transferred directly to disk and bypass the file system buffers. Thus, this enables you to protect more data in a shorter window of time and without adversely affecting application performance.

## Capacity management

The Load Balance option is now available for the selection of storage units within a storage unit group. With the Capacity Management license installed, the Load Balance option allows storage units to be selected based on the following factors:

- Free space available on the volume,
- Potential free space
- Estimated size of new and current jobs

## Disk spanning

Backups can now span from one disk storage unit to another when a disk storage unit becomes full. Enabling the Allow Backups to Span Disk property in the Media host properties allows backups to continue on another disk storage unit. The disk spanning feature is available between Basic Disk storage units and between Array Disk volumes.

## Reporting for disk based data protection resources

The Reports utility contains a new subset of reports that pertains specifically to disk storage: Images on Disk, Disk Logs, and Disk Storage Units.

## NetApp P3 file system export

This release contains an additional option for Network Appliance NearStore disk storage units, available with the Disk Optimization Capacity license.

When the Enable File System Export option is enabled backups to a NearStore storage unit becomes user-mountable when exported as a CIFS or NFS file system.

## NetBackup installation enhancements

### NetBackup LiveUpdate

NetBackup 6.5 includes a LiveUpdate agent option that enables you to download and install patches for NetBackup, NetBackup add-on products, and PBX. Only NetBackup versions 6.5 and later can be used with NetBackup LiveUpdate.

NetBackup LiveUpdate features include the following:

- Patches can be downloaded for both Windows and UNIX platforms.
- Downloaded patches can be installed remotely to NetBackup servers and clients.
- Cross-platform installation of patches is supported for both Windows and UNIX.
- Patches can be downloaded and installed on UNIX clustered systems.
- Administrator privileges are not required for patch installation on NetBackup servers and clients.

NetBackup LiveUpdate is an additional method to obtain patches quickly and more conveniently. The current program for customers to obtain patches remains in place.

### UNIX Secure push install

In previous versions of NetBackup, you were able to push UNIX client software from a UNIX master server to a UNIX client host by using the rsh and ftp installation methods by using the user interface, the bpadm utility, or by running the `install_client_files` script on the command line. This feature enables you to now push UNIX client software from a UNIX master server to a UNIX client host by using the ssh and sftp installation methods that consist of running the `install_client_files` script on the command line. Both of these methods are based on the usage of SunSSH and OpenSSH products that require you to ensure you have upgraded the SunSSH software to v.1.1 on computers running SunOS 5.9 (Solaris SPARC) and additional patch software for systems running SunOS 5.9 (Solaris x86). In addition, if a host is running OpenSSH, it must be at version 3.5 or greater. Refer to Chapter 3, Product Dependencies to obtain the correct patches and revisions.

### Additional cluster support

This version of NetBackup includes support for an HACMP cluster on an AIX platform. For more specific information on the operating system versions in

regards to HACMP, refer to the NetBackup Cluster Compatibility list on the Symantec Support Web site.

## NetBackup-java interfaces

The following new features and enhancements have been to the NetBackup-java interfaces.

### **Back-level administration capabilities by the NetBackup-java console**

NetBackup 6.5 provides additional ways to perform back-level administration of the supported back-level versions. This includes the packaging and the installation of the NetBackup 6.0 MP4, 5.1 MP6, and 5.0MP7 versions of the NetBackup-Java console on supported UNIX and Linux platforms.

---

**Note:** For back-level administration of a NetBackup 5.0 server in NetBackup 6.5, the server should be at least at a 5.0 MP6 (or higher) patch level. In addition, for NetBackup 5.1 the server should be at a NetBackup 5.1 MP4 patch (or higher). No such restriction exists for NetBackup 6.0

---

### **Support for day light saving changes**

The Energy Policy Act of 2005 resulted in a change to the beginning and end of Daylight Savings Time (DST). These changes take effect starting in March of 2007. Daylight savings time begin at 2am local time on the second Sunday in March and end at 2am on the first Sunday in November. There are tools available from Sun, IBM, and HP to correct the time zone database in the Java Runtime Environment (JRE). Users need to download and run this tool to update the NetBackup implementation of the JRE. No such tools are available for the Tru64 platform, for updating the timezone database. There is no updated JRE available for this platform with the DST fixes. Therefore, Tru64 will continue to have timezone issues for the NetBackup 6.5 release.

For additional information and a workaround for this issue, refer to TechNote 286497 on the Symantec support Web site. Or you can refer to the following link. <http://entsupport.symantec.com/docs/286497>.

## NetBackup Operations Manager (NOM)

NetBackup Operations Manager (NOM) is a product that addresses the NetBackup management needs of enterprise customers. It combines active real-time monitoring, operational reporting, administration, alert management, and troubleshooting assistance in a centralized web-based user interface.

NOM offers you the ability to quickly gain an understanding of the health of your entire NetBackup server environment. You can choose to monitor selected subsets of servers using server groupings and advanced data filtering options.

Using NOM enables you to diagnose problems, identify potential issues, or just review the operational status of multiple NetBackup master and media servers at many locations, all from a centralized location.

The following subsections describe new NOM features and enhancements offered with NetBackup 6.5.

## **New standard reports**

Over 30 new reports added. Many include drill-down links to other related reports.

## **Enhancements to NOM 6.0 standard reports**

As many as eight reports have been improved. These reports have either been renamed and/or modified from simple reports to composite reports and vice-versa for better understanding and ease-of-use. Four job summary reports have been merged into a single report for greater ease-of-use.

## **Enhancements to NOM reporting**

The following list represents many of the changes and improvements that have been made to the NOM reports in this release.

- Added the ability to hyper-link to other reports to obtain drill-down information.
- New hierarchical report import and export tasks.
- Added an automatic hyperlink to the NetBackup troubleshooting guide from exit status in standard reports and exit the status used when you create custom reports.
- Report builder has been improved. Along with other new features, the improved report builder lets you select the desired color to be filled in your report charts.
- Also icons can be displayed in some columns in reports which makes the report easy-to-use and understand.
- New icons for passed, failed and partially successfully jobs. New icons used in job-related standard reports.
- Default time frames added for all the standard reports online help.

## **Support for using a remote Symantec Product Authentication Service**

NOM supports using a remote Symantec Product Authentication Service configuration for security. The service can be installed on remote servers or locally on the NOM server.

## **Client and policy groups**

Changes have been made that allow client or policy grouping for monitoring and managing views and tasks. By using client and policy context groups, you can view data that is specific to these context groups.

## **New alert conditions for alert policies**

Eight new alert conditions related to disk volume, media and policies are available.

## **Single sign-on and cross launch for NOM and VBR**

You can now switch between using NOM and Veritas Backup Reporter (VBR), using a single user sign-on that allows cross navigation between these two Symantec products.

## **Enhancements to logging functionality**

With NOM 6.5, you can export log files from jobs, services, master servers, or media servers. The logs can be directly exported from the NOM console in an Excel format and can be used to troubleshoot NetBackup issues.

## **More Managing views for Storage Units and Devices**

Lifecycle policies, SAN clients, disk pools, and FT media servers configured in NetBackup can be monitored using NOM 6.5.

## **NetBackup proliferations and general enhancements**

NetBackup 6.5 includes additional platform support for selected 32- and 64-bit servers and clients. A complete list of supported platforms can be found in Chapter 2, “Supported Platforms and Peripherals”.

In addition, NetBackup 6.5 adds platform support for additional database agents. Refer to Chapter 2, “Other NetBackup Compatibility Lists” on page 37 for more information on how to view these lists.



## NDMP direct copy

NetBackup can now copy images from a virtual tape library (VTL) to a physical tape library, without using media server I/O resources or network bandwidth. This feature is called NDMP Direct Copy, and supports regular NetBackup images as well as NDMP images. (A virtual tape library is a storage system that uses disk-based technology to emulate a tape library or robot.)

## NetBackup Support Utility (nbsu)

On tier-one client and server platforms, a new NetBackup utility titled, *nbsu*, is available to assist in gathering NetBackup and operating system diagnostic information. The NetBackup Support Utility (nbsu) is a command line tool that queries the host on which it runs and gathers diagnostic information about NetBackup and the operating system. nbsu provides a wide range of control over the types of diagnostic information gathered. For instance, you can obtain information about NetBackup configuration settings, about troubleshooting areas, or about NetBackup or Media Management job status codes.

Symantec recommends that you run nbsu in the following circumstances:

- To obtain baseline data on your NetBackup installation. If you encounter problems later, this data can be useful.
- To document changes in your NetBackup or operating system environment. nbsu should be run periodically, to keep your baseline data up to date.
- To help isolate a NetBackup or operating system issue.
- To report issues to Symantec support.

For more information about this tool, refer to the *NetBackup Command Guides*.

## Back-end capacity licensing

A new, back-end licensing tool enables the user to determine what amount of storage they have purchased and if they are within that limit. The new `nbstcapacity` command can be run from within the goodies directory to help determine what amount of storage is licensed and used for Advanced Disk, Shared Disk, SnapVault, OpenStorage, and PureDisk. `nbstcapacity` executes `bpminlicense`, `bpstsinfo`, and `nbstlutil` to gather the needed information and display it in an easy to read format. The user can then determine if they are within the amount they purchased. Refer to the following is an example.

```
[root@cookmini goodies]# ./nbstcapacity
Flexible - Licensed: 0 Used: 0
      Disktype: AdvancedDisk
              TotalCapacity: 0 TotalUsed: 0
      Disktype: SharedDisk
              TotalCapacity: 0 TotalUsed: 0
```

Other NetBackup features and enhancements

```
SnapVault - Licensed: 0 Used: 0
            Disktype: SnapVault
            TotalCapacity: 0 TotalUsed: 0
OpenStorage - Licensed: 0    Used: 0
            Disktype: OpenStorage
            TotalUsed: 0
PureDisk - Licensed: 0 Used: 0
            Disktype: PureDisk
            TotalUsed: 0
```

# Supported platforms and peripherals

This chapter provides information on the platforms and peripherals that this release of NetBackup supports. The following table identifies the primary functionality of this release and the platforms that support these functions.

**Table 2-1** Platforms for the NetBackup 6.5 Release

Functionality	Platform support
Core Product / Servers	AIX, HP-UX, Linux <sup>1</sup> , Solaris, Tru64, and Windows
Bare Metal Restore	AIX, HP-UX, Linux, Solaris (SPARC), Windows
Vault	AIX, HP-UX, Linux <sup>1</sup> , Solaris, Tru64, and Windows
NetBackup Operations Manager (NOM)	Solaris <sup>2</sup> and Windows <sup>3</sup>

1. Core product and server support is on the Linux Red Hat and SuSE SLES platforms.
2. NOM is a 32-bit application that runs on the 64-bit-capable Solaris SPARC as a 32-bit application.
3. NOM does not support Windows 64-bit platforms in this release.

## Server and client platform support

The supported platform information that this release of NetBackup supports is also located on the Symantec Support Web site. The supported platform tables in this chapter provide the following types of information:

- The operating system (OS) level and version required to support a NetBackup master or media server.
- The OS level and version required to support a NetBackup client. Predecessors and successors to the supported operating system levels may function without difficulty, as long as the release provides binary compatibility with the supported level.

NetBackup support for a platform or OS version requires platform vendor support for that product. The following platform support lists are subject to change as vendors add and drop support for platforms or OS versions.

---

**Note:** You will also find the most up-to-date information on peripherals, drives, and libraries on the Symantec Support Web site.

---

### To locate supported platform information on the Symantec Support Web site

- 1 Go to <http://www.symantec.com/enterprise/support>.
- 2 Type **NetBackup Enterprise Server** in the Product Lookup field.
- 3 Click ">" search icon.
- 4 Click on the **NetBackup Enterprise Server** link in the bulleted list below the title, Support for Top Products. The NetBackup Enterprise Server Web page appears.
- 5 In the list on the right side of this Web page, click on **Compatibility List**. A Compatibility and Reference Web page appears that contains a list of compatibility documents. From this Web page, you are able to refine your search to find a link to the appropriate document. (The compatibility list documents are in PDF format. You must have Adobe Acrobat Reader to view these documents.)

## Platform life cycle issues

NetBackup software supports an ever-changing set of platforms and must be flexible enough to handle platform life cycle issues; issues such as adding and removing a platform from NetBackup's support list.

## Adding a platform

Adding support of a platform to NetBackup introduces a situation where the platform has a future, but no history. In this situation, backward compatibility cannot be guaranteed without exhaustive testing. As a general rule, when a platform is added for a NetBackup release, the platform is supported in that version and subsequent versions (but not previous versions).

## Removing a client platform

The customer commitment for client platform version support is one version back with every effort made to support all versions. An exception is that the client version cannot be newer than the Master/Media Server version.

You can mix individual clients that are at different versions within a NetBackup domain, however it is possible that during an alternate restore, the restore is sent to an older version. Alternate restores should go to the same or newer versions.

Database agents are to be at the same version level as the client upon which they reside. As with the client agent, support is one version back with every effort made to support all versions. An exception is that the agent version cannot be newer than the Master/Media Server version.

## NetBackup 6.5 supported platforms and operating systems

The following table contains a list of platforms and the associated operating systems (including the version levels of the operating systems) that NetBackup Enterprise Server and NetBackup Server support at the time of this product release. In addition, the Client Selection column defines the client type that you should select when installing NetBackup as a client on the corresponding operating system listed in the table.

It is possible for this information to change after the product is released. Symantec documents these changes in an online PDF and posts this document on the Symantec Support Web site. The name of the online document is similar to, NetBackup 6.5 Operating System Compatibility List.

<http://www.symantec.com/enterprise/support>.

---

**Note:** An enhancement has been added to this release of NetBackup that enables a NetBackup client to back up and restore the NSS file system on SLES Linux (OES Linux).

---

**Table 2-2** Platform support matrix for the NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor platform	Server	Client	Client selection	Notes
AIX 5L	5.1 (32/64 bit)	IBM Power3, Power4, Power5	X	X	RS6000,AIX5	23, 28, 98
	5.2 (32/64 bit)	IBM Power3, Power4, Power5	X	X	RS6000,AIX5	7, 28, 96
	5.3 (32/64 bit)	IBM Power3, Power4, Power5	X	X	RS6000,AIX5	19, 28, 29, 30, 96
FreeBSD	5.3	Intel IA-32		X	INTEL,FreeBSD5.3	98
	5.4	Intel IA-32		X	INTEL,FreeBSD5.3	98
	6.0	Intel IA-32		X	INTEL,FreeBSD5.3	32
HP-UX	11.0 (32/64 bit)	HP 9000	X	X	HP9000-700,HP-UX11.00 -or- HP9000-800,HP_UX11.00	98
	11i v1 (11.11) (32/64 bit)	HP 9000	X	X	HP9000-700,HP-UX11.11 -or- HP9000-800,HP_UX11.11	96
	11i v2 (11.23) (32/64 bit)	HP 9000	X	X	HP9000-700,HP-UX11.23 -or- HP9000-800,HP_UX11.23	29, 96
	11i v2 (11.23)	HP Integrity (IA-64)	X	X	HP-UX-IA64 or HP-UX11.23	29
	11i v2 (11.23)	HP Integrity (IA-64) Virtual Machines v1.2 and v2.0		X	HP-UX-IA64 or HP-UX11.23	
	11i v3 (11.31)			X	HP-UX-IA64 or HP-UX11.23	
IRIX	6.5.23+	SGI MIPS		X	SGI,IRIX65	98
Mac OS X Version 10	10.3	Apple Macintosh		X	MACINTOSH,MacOSX10.3	98
	10.4	Apple Macintosh and Intel		X	MACINTOSH,MacOSX10.4	14

**Table 2-2** Platform support matrix for the NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor platform	Server	Client	Client selection	Notes
MetaFrame (Citrix)	1.8	Intel IA-32		X	Use Appropriate Windows NB Client	
	XPs, XPa, XPe	Intel IA-32		X	Use Appropriate Windows NB Client	3
	Citrix Access Suite 3 for Windows	Intel IA-32		X	Use Appropriate Windows NB Client	
NetWare	5.1	Intel IA-32		X	Novell, NetWare	5, 98
	6.0	Intel IA-32	Media Server Option	X	Novell, NetWare	5, 8
	6.5	Intel IA-32	Media Server Option	X	Novell, NetWare	5, 8
Linux Open Enterprise Server (OES), OES SP1		Intel IA-32		X	NSS file sys: Novell, NetWare Linux file sys: Linux, SuSE SLES9 2.6	5, 8, 15, 31
OpenVMS	6.1 - 8.3	HP Alpha		X	OpenVMS, OpenVMS_Alpha, Separate Media Installation	1, 5, 6
	5.5 - 7.2	HP VAX		X	OpenVMS, OpenVMS_VAX, Separate Media Installation	1, 5, 6
	8.2, 8.3	HP Integrity (IA-64)		X	OpenVMS, OpenVMS_I64, Separate Media Installation	1, 5, 6
RedFlag Linux Data Center	4.1	Intel IA-32	X	X	Linux, RedHat2.4	98
	5.0	Intel IA-32	X	X	Linux, RedHat2.6	96
	5.0 SP1	Intel Itanium IA-64	X	X	Linux-IA64, RedHat2.6	
	5.0	AMD64/EM64T	X	X	Linux, RedHat2.6	10, 96

**Table 2-2** Platform support matrix for the NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor platform	Server	Client	Client selection	Notes
Red Hat Enterprise Linux ES/AS	2.1 Intel x86	Intel IA-32	X	X	Linux,RedHat2.4	17, 25, 98
	3.0 Intel x86	Intel IA-32	X	X	Linux,RedHat2.4	25, 98
	4.0 Intel x86	Intel IA-32	X	X	Linux,RedHat2.6	96
	5.0 Intel x86	Intel IA-32		X	Linux,RedHat2.6	96
	3.0 for X64	AMD64 / EM64T		X	Linux,RedHat2.4	25, 10, 98
	4.0 for X64	AMD64 / EM64T	X	X	Linux,RedHat2.6	10, 96
	5.0 for X64	AMD64 / EM64T		X	Linux,RedHat2.6	10, 96
	3.0 Intel Itanium	Intel Itanium IA-64		X	Linux-IA64,RedHat 2.4	98
	4.0 Intel Itanium	Intel Itanium IA-64	X	X	Linux-IA64,RedHat 2.6	
	4.0 for POWER	IBM pSeries (64 bit only)		X	Linux,IBMpSeriesRedHat 2.6	
Red Hat Linux Desktop	2.1 Intel x86	Intel IA-32		X	Linux,RedHat2.4	98
	3.0 Intel x86	Intel IA-32		X	Linux,RedHat2.4	25, 98
		AMD64/EM64T		X	Linux,RedHat2.4	25, 98
	4.0 Intel x86	Intel IA-32		X	Linux,RedHat2.6	
		AMD64/EM64T		X	Linux,RedHat2.6	
	5.0 Intel x86	Intel IA-32		X	Linux,RedHat2.6	
AMD64/EM64T			X	Linux,RedHat2.6		
Red Hat zSeries	3.0 zSeries	IBM z800/900 (31 and 64 bit mode)		X	Linux,IBMzSeriesLinux2.4.2 1	98
	4.0 zSeries	IBM z800/900 (31 and 64 bit mode)		X	Linux,IBMzSeriesRedHat 2.6	98



**Table 2-2** Platform support matrix for the NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor platform	Server	Client	Client selection	Notes
Solaris	8	SUN SPARC Fujitsu PRIMEPOWER	X	X	Solaris,Solaris8	98
	9	SUN SPARC Fujitsu PRIMEPOWER	X	X	Solaris,Solaris9	96
	10	SUN SPARC Fujitsu PRIMEPOWER	X	X	Solaris,Solaris10	13, 24, 27, 96
Solaris x86	8	Intel IA-32		X	Solaris,Solaris_x86_8	98
	9	Intel IA-32		X	Solaris,Solaris_x86_9	98
		AMD Opteron		X	Solaris,Solaris_x86_9	10, 98
	10	Intel IA-32		X	Solaris,Solaris_x86_10	13, 98
		AMD64 / EM64T	X	X	Solaris,Solaris_x86_10_64	13
SuSE Linux Desktop	9.0	Intel IA-32		X	Linux,RedHat2.4	98
	9.2, 9.3	Intel IA-32		X	Linux, SuSE 2.6	98
SuSE Linux Enterprise Server	SLES8 for x86	Intel IA-32	X	X	Linux,RedHat2.4	25, 98
	SLES9 for x86	Intel IA-32	X	X	Linux, SuSE 2.6	96
	SLES10 (SP1) for x86	Intel IA-32	X	X	Linux, SuSE 2.6	96
	SLES8 for x64	AMD64 / EM64T	X	X	Linux,RedHat2.4	10, 25, 98
	SLES9 for x64	AMD64 / EM64T	X	X	Linux, SuSE 2.6	10, 96
	SLES10 (SP1) for x64	AMD64 / EM64T	X	X	Linux, SuSE 2.6	10, 96
	SLES8 for Intel Itanium	Intel Itanium IA-64		X	Linux-IA64,SuSE2.4	98
	SLES9 for Intel Itanium	Intel Itanium IA-64	X	X	Linux-IA64,SuSE2.6	
	SLES10 (SP1) for Intel Itanium	Intel Itanium IA-64	X	X	Linux-IA64,SuSE2.6	
SLES9.0 for Power	IBM pSeries (64 bit only)		X	Linux,IBMpSeriesSuSE 2.6		

**Table 2-2** Platform support matrix for the NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor platform	Server	Client	Client selection	Notes
SuSE Linux Enterprise Server zSeries	SLES 9.0	IBM z800/900 (31 and 64 bit mode)		X	Linux, IBMzSeriesSuSE 2.6	
Tru64	V5.1B	HP Alpha	X	X	ALPHA, OSFI_V5	98
	V5.1B-2	HP Alpha	X	X	ALPHA, OSFI_V5	97
	V5.1B-3	HP Alpha	X	X	ALPHA, OSFI_V5	97
VMware	See Note 11	VMware		X	Host: Use appropriate NetBackup Windows Client Client: Use appropriate NetBackup Windows Client	11, 22
VMware ESX	Version 2 and 3	VMware		X	VMware Host: Linux, RedHat 2.4 Client: Use appropriate NetBackup Client	11, 22
Windows Server 2003	Server 2003, Server 2003 SP1, SP2 Standard, Enterprise, Datacenter, and Web Editions Server 2003 R2 Standard, Enterprise and Datacenter	Intel IA-32	X	X	PC, Windows Server 2003	16

**Table 2-2** Platform support matrix for the NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor platform	Server	Client	Client selection	Notes
	Server 2003, Server 2003 SP1, SP2 Standard, Enterprise, Datacenter, and Web Editions Server 2003 R2 Standard, Enterprise, and Datacenter	Supported with 32-bit NetBackup binaries. 32-bit Windows Server 2003 on AMD64 and EM64T platforms	X	X	PC, Windows Server 2003	10, 16
	Server 2003, Server 2003 SP1, SP2 Standard, Enterprise, Datacenter, and Web Editions Server 2003 R2 Standard, Enterprise, and Datacenter	64-bit Windows Server 2003 on AMD and EM64T platforms supported with 64-bit NetBackup binaries	X	X	PC-X64, Windows Server 2003	20, 21, 26
	Server 2003, SP1, SP2 (Enterprise and Datacenter Editions)	Intel Itanium IA-64	X	X	PC-IA64, Windows Server 2003	9
Virtual Server 2005	Host and virtual OS's that are supported NetBackup Clients	Intel IA-32		X	PC, Windows Server 2003	

**Table 2-2** Platform support matrix for the NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor platform	Server	Client	Client selection	Notes
Windows XP	XP SP2	Intel IA-32, 32-bit XP on AMD64 and EM64T		X	PC,WindowsXP	12
	XP SP2	64-bit XP on AMD64 and EM64T		X	PC-X64,Windows Server 2003	5, 12
	XP SP2	Intel IA-64		X	PC-IA64, PC,WindowsXP	
Windows 2000	2000 SP4	Intel IA-32	X	X	PC,Windows2000	
		32-bit Windows 2000 on AMD64 and EM64T hardware	X	X	PC,Windows2000	
Windows NAS	Windows Powered NAS (2000 SAK)	Intel IA-32	Media server	X	PC,Windows2000	2, 4, 97
	Windows Storage Server 2003, Storage Server 2003 R2	Intel IA-32, AMD64 and EM64T	Media server	X	PC,Windows Server 2003	2
Windows Vista Client	Vista	Intel IA-32, AMD64, and EM64T		X	PC,WindowsVista	

1. Not packaged with NetBackup media. Requires order of separate media.
2. Supports media server and not master server.
3. See TechNote 247732.
4. See TechNote 248317.
5. Does not support encryption.
6. The NetBackup OpenVMS client is available as a downloadable patch at site: [ftp://ftp.emea.support.veritas.com/pub/support/Products/NetBackup\\_OpenVMS](ftp://ftp.emea.support.veritas.com/pub/support/Products/NetBackup_OpenVMS)
7. See Technote 256755 for AIX 5.2 support of fibre connected drives.
8. The NetWare master server not supported.
9. Intelligent Disaster Recovery (IDR) is not supported at this time.
10. Supported with 32-bit NetBackup binaries.
11. NetBackup Operating System clients are supported when operated in a VMware virtual machine guest operating system environment with the following limitations:
  - If a customer issue is determined to not be related to NetBackup, Symantec will refer the customer to the appropriate support vendor for the operating system or application.
  - VMware support is limited to supported NetBackup operating system clients-only; NetBackup servers

are not supported.

12. See TechNote 267977 for Windows XP SP2 firewall considerations.

13. See TechNote 275107 for Solaris 10 considerations.

14. No ACL support for Linux and Mac OS 10.4 at the time of this release. Targeted support for Linux ACLs is at the next major release of NetBackup.

15. See TechNote 271459 for Novell Open Enterprise Server (OES) support information.

16. BMR support does not include Windows 2003 Datacenter Version.

17. BMR support is limited to RedHat Enterprise Linux AS only; RedHat Enterprise Linux ES is not supported.

18. N/A

19. BMR is supported starting at 6.0 MP2. See TechNote 282054 for further information regarding BMR support limitations.

20. 64-bit NetBackup Windows X64 server CDs began shipping with NetBackup 6.0 in May 2006. These CDs are available for customers who have received NetBackup 6.0 prior to May 2006 by contacting the Regional Customer Care Centers at one of the following: Americas - [AmercustomerCare@veritas.com](mailto:AmercustomerCare@veritas.com); EMEA - [EMEACustomerCare@veritas.com](mailto:EMEACustomerCare@veritas.com); APAC - [apacustomerCare@veritas.com](mailto:apacustomerCare@veritas.com)

21. Does not support NetBackup Access Control (NBAC).

22. See TechNote 285515 for VMware ESX considerations.

23. Vendor has announced End-of-Support for this product. Symantec support may be affected.

24. Full BMR support started in NetBackup 6.0 MP4.

25. See TechNote 285851 for BMR Linux support limitations.

26. Encryption support began with NetBackup 6.0 MP4.

27. See TechNote 286215 for Solaris 10 considerations with BMR.

28. Symantec does not test all IBM Power-based server models and relies on the IBM AIX %L Version 5 binary compatibility statement. See: <http://www-304.ibm.com/jct03004c/servers/aix/os/compatibility>

29. Nom support started with NetBackup 6.0 MP4.

30. Some versions of AIX 5.3ML4 running x1C.aix50.rte, such as 8.0.0.4 and 8.0.0.6 cause installation errors with NetBackup. Please use version 8.0.0.8 or higher.

31. In OES SP2 and later, the NetWare metadata (netware.metadata) extended attribute was added for files and directories. To back up this attribute the ListXattrNWmetadata option must be set. It can be set persistently in the /opt/novell/nss/conf/nssstart.cfg file, or it can be set from nsscon by a user with root access as follows: `nss/ListXattrNWmetadata`. This option is disabled by default.

32. See TechNote 290079 for information on how to configure a FreeBSD 6.0 system and install NetBackup 6.5.

96. Next major or next minor release following NetBackup 6.5, NetBackup server and client will be supported with 64-bit binaries only.

97. Next major release following NetBackup 6.5 will not support a NetBackup Server on this version. NetBackup will support client only.

98. Next major release following NetBackup 6.5 will not support this OS version. This status could change if market and/or vendor support positions change.

99. Next major release following NetBackup 6.5 will not support any version of this operating system.

## Operating systems not supported as of NetBackup 6.5 and beyond

The following operating systems are no longer supported at the release of NetBackup 6.0 and beyond.

**Table 2-3** Operating systems not supported as of NetBackup 6.5 and beyond

Operating system	Operating system version	Server	Client	Notes
HP Tru64/Alpha	Tru64 5.1, 5.1a	X	X	1
HP - Integrity	HP-UX 11.23 IA-64 ARIES Translator		X	
IBM	AIX 4.3.3.10	X	X	
IBM z800/900	Red Hat 7.2		X	
IBM z800/900	Red Hat AS 2.1		X	
IBM z800/900	SuSE SLES 7, SLES 8		X	
IBM z800/900 (31-bit mode)	Linux SuSE zSeries 8		X	
Intel X86/Novell	Novell 5.0		X	
Intel X86/Novell	Novell 6.0	X	X	2
Intel X86,Windows	Windows NT 4.0 SP6	X	X	
Intel X86,Windows	Windows XP SP1		X	4
Intel X86/FreeBSD	FreeBSD 4.7, 4.8, and 4.9		X	
Intel X86/Linux	Linux Debian GNU/Linux 3.0		X	
Intel X86/Linux	Linux Red Hat 8.0 and 9.0		X	3
Intel X86/Linux	SuSE 8.1 and SuSE 8.2 Desktop		X	
Intel X86/Novell	SCO UnixWare 7.1.2 and 7.1.3		X	
Intel X86/UNIX	Solaris 7 (X86)		X	
Macintosh (680x0 or PPC)	MacOS X10.2.2 and 10.2.6		X	
SGI	IRIX 6.5.15 — 6.5.22		X	

**Table 2-3** Operating systems not supported as of NetBackup 6.5 and beyond (continued)

Operating system	Operating system version	Server	Client	Notes
SGI	IRIX - All versions for Media server	X		
Sun (Sparc)	Solaris 7	X	X	

**Note:** All operating system versions for these platforms are not supported with NetBackup 6.5.

1. Replaced with Tru64 5.1b and 5.1b2.
2. Only provided support for the Media server; thus, support for the Media server has been dropped. The client for Novell 6.0 is supported with Service Pack 2 or Service Pack 3.
3. Linux Red Hat 9.0 was replaced with Linux Red Hat 2.1 WS.
4. Service Pack 1 (SP1) was replaced by (SP2), which is standard practice when a new service pack is available.

## Operating systems not supported as of the next major release

The next major release of NetBackup no longer contains software to upgrade some operating system levels to include new product features and capabilities. Backward compatibility with NetBackup 6.5 client software is retained for one release level.

**Table 2-4** Operating systems not supported as of the next major release

Operating system	Operating system version	Server	Client
HP9000 - PARISC	HP-UX 11.00	X	X
HP Tru64/Alpha	Tru64 5.1b, 5.1b2 (all versions)	X	
HP Tru64/Alpha	Tru64 5.1b		X
IBM	AIX 5.1 RS/6000, SP, pSeries - (32 bit and 64 bit)	X	X
Intel 32-bit/Novell	Novell 5.1, SP5		X
Intel 32-bit/Novell	Novell 6.0, SP2		X
Intel 32-bit/Windows	Windows 2000 (includes SAK and Citrix)	X	
Intel 32-bit/FreeBSD	FreeBSD 5.3		X

**Table 2-4** Operating systems not supported as of the next major release

Operating system	Operating system version	Server	Client
Intel 32-bit/Linux	Red Flag Linux Data Center 4.1	X	X
Intel 32-bit/Linux	Linux Red Hat AS/ES 2.1	X	X
Intel 32-bit/Linux	Linux Red Hat WS 2.1		X
Intel 32-bit/Linux	Linux Red Hat AS/ES 3.0	X	X
Intel 32-bit/Linux	Linux Red Hat WS 3.0		X
IA64/Linux	Linux Red Hat AS/ES 3.0	X	X
IA64/Linux	Linux SuSE SLES 8.0	X	X
EM64T/AMD64	Linux Red Hat AS/ES 3.0	X	X
EM64T/AMD64	Linux SuSE SLES 8.0	X	X
Intel 32-bit/Linux	SuSE 9.0, 9.2 Desktop		X
Intel 32-bit/Linux	Linux SuSE SLES 8.0	X	X
Intel 32-bit/UNIX	Solaris 8 (X86)		X
IBM z800/900 (31-bit mode)	Linux Red Hat 3.0		X
IBM z800/900 (31-bit mode)	Linux SuSE 9.0		X
Macintosh	MacOSX Server 10.3C		X
SGI	IRIX 6.5.23-26		X
Sun	Solaris 8 (SPARC & Fujitsu PRIMEPOWER)	X	X



## OSs with 64-bit binary support only - as of the next major release

Some of the operating systems will **only** be supported with 64-bit binaries as of the next major release of NetBackup. The following table shows those operating systems.

**Table 2-5** Operating systems not supported as of the next major release

Operating system	OS version	Vendor platform	Server	Client
AIX 5L	5.2 (32/64 bit)	IBM Power3, Power4, Power5	X	X
	5.3 (32/64 bit)	IBM Power3, Power4, Power5	X	X
HP-UX	11i v1 (11.11) (32/64 bit)	HP 9000	X	X
	11i v2 (11.23) (32/64 bit)	HP 9000	X	X
RedFlag Linux Data Center	5.0	Intel IA-32	X	X
	5.0	AMD64/EM64T	X	X
Red Hat Enterprise Linux	4.0 Intel x86	Intel IA-32	X	X
	5.0 Intel x86	Intel IA-32		X
ES/AS	4.0 for X64	AMD64 / EM64T	X	X
	5.0 for X64	AMD64 / EM64T		X
Solaris	9	SUN SPARC Fujitsu PRIMEPOWER	X	X
	10	SUN SPARC Fujitsu PRIMEPOWER	X	X
SuSE Linux Enterprise Server	SLES9 for x86	Intel IA-32	X	X
	SLES10 for x86	Intel IA-32	X	X
	SLES9 for x64	AMD64 / EM64T	X	X
	SLES10 for x64	AMD64 / EM64T	X	X

## NetBackup backward compatibility

NetBackup has provided the ability to support a mixture of NetBackup servers that are at various release levels. However, Symantec only supports certain combinations of servers and clients within a NetBackup environment. For detailed information about NetBackup's backward compatibility, see the NetBackup 6.5 Release Impact Bulletin on the Symantec Support Web site at the following location.

<http://entsupport.symantec.com/docs/288210>

## NetBackup binary sizes

This section provides vital information to help you ensure that your NetBackup environment has the proper amount of memory allocated to your servers to safely and efficiently back up and restore all of the data you want archived and in a timely fashion.

The following table shows the approximate binary size of the NetBackup and Media server software, and the NetBackup client software requirements for each platform and operating system supported by NetBackup.

**Table 2-6** Platform support matrix for NetBackup enterprise server and NetBackup server

Operating system	OS version	Vendor Platform	Server	Client
AIX 5L	5.1 (32/64 bit)	IBM Power3, Power4, Power5	2583MB	525MB
	5.2 (32/64 bit)	IBM Power3, Power4, Power5	2583MB	525MB
	5.3 (32/64 bit)	IBM Power3, Power4, Power5	2583MB	525MB
	5.3 (32/64 bit)	IBM eServer i5	-	525MB
FreeBSD	5.3	Intel IA-32	-	14MB
	5.4	Intel IA-32	-	14MB
	6.0	Intel IA-32	-	14MB

**Table 2-6** Platform support matrix for NetBackup enterprise server and NetBackup server (continued)

Operating system	OS version	Vendor Platform	Server	Client
HP-UX	11.0 (32/64 bit)	HP 9000	1479MB	497MB
	11i v1 (11.11) (32/64 bit)	HP 9000	1479MB	497MB
	11i v2 (11.23) (32/64 bit)	HP 9000	1479MB	497MB
	11i v2 (11.23)	HP Integrity (IA-64)	1821MB	641MB
	11i v2 (11.23)	HP Integrity (IA-64) Virtual Machines v1.2 and 2.0	1821MB	641MB
	11i v3 (11.31)		-	641MB
IRIX	6.5.23+	SGI MIPS	-	73MB
Mac OS X Version 10	10.3	Apple Macintosh	-	16MB
	10.4	Apple, Macintosh and Intel	-	26MB
MetaFrame (Citrix)	1.8	Intel IA-32	-	-
	XPs, XPa, XPe	Intel IA-32	-	-
	Citrix Access Suite 3 for Windows	Intel IA-32	-	-
NetWare	5.1	Intel IA-32	-	-
	6.0	Intel IA-32	-	-
	6.5	Intel IA-32	-	-
Linux Open Enterprise Server (OES), OES SP1		Intel IA-32	-	-
OpenVMS	6.1 - 8.2	HP Alpha	-	16MB
	5.5 - 8.2	HP VAX	-	16MB
	8.2 and 8.3	HP Integrity (IA-64)	-	16MB
RedFlag Linux Data Center	4.1	Intel IA-32	1328MB	392MB
	5.0	Intel IA-32	1305MB	344MB
	5.0 SP1	AMD64/EM64T	1397MB	344MB
	5.0	AMD64/EM64T	1305MB	344MB

**Table 2-6** Platform support matrix for NetBackup enterprise server and NetBackup server (continued)

Operating system	OS version	Vendor Platform	Server	Client
Red Hat Enterprise Linux ES/AS	2.1 Intel x86	Intel IA-32	1328MB	392MB
	3.0 Intel x86	Intel IA-32	1328MB	392MB
	4.0 Intel x86	Intel IA-32	1305MB	338MB
	5.0 Intel x86	Intel IA-32	-	338MB
	3.0 for X64	AMD64 / EM64T	-	392MB
	4.0 for X64	AMD64 / EM64T	1305MB	338MB
	5.0 for X64	AMD64 / EM64T	-	338MB
	3.0 Intel Itanium	Intel Itanium IA-64	-	350MB
	4.0 Intel Itanium	Intel Itanium IA-64	1397MB	341MB
	4.0 for POWER	IBM pSeries (64 bit only)	-	53MB
Red Hat Linx Desktop	2.1 Intel x86	Intel IA-32	-	392MB
	3.0 Intel x86	Intel IA-32	-	392MB
		AMD64/EM64T	-	392MB
	4.0 Intel x86	Intel IA-32	-	338MB
		AMD64/EM64T	-	338MB
	5.0 Intel x86	Intel IA-32	-	338MB
		AMD64/EM64T	-	338MB
Red Hat zSeries	3.0 zSeries	IBM z800/900 (31 and 64 bit mode)	-	16MB
	4.0 zSeries	IBM z800/900 (31 and 64 bit mode)	-	16MB
Solaris	8	SUN SPARC Fujitsu PRIMEPOWER	1375MB	427MB
	9	SUN SPARC Fujitsu PRIMEPOWER	1375MB	407MB
	10	SUN SPARC Fujitsu PRIMEPOWER	1375MB	407MB

**Table 2-6** Platform support matrix for NetBackup enterprise server and NetBackup server (continued)

Operating system	OS version	Vendor Platform	Server	Client
Solaris x86	8	Intel IA-32	-	233MB
	9	Intel IA-32	-	233MB
	10	Intel IA-32	-	233MB
		AMD64/EM64T	1309MB	356MB
SUSE Linux Desktop	9.0	Intel IA-32	-	392MB
	9.2, 9.3	Intel IA-32	-	336MB
SuSE Linux Enterprise Server	SLES8 for x86	Intel IA-32	1328MB	392MB
	SLES9 for x86	Intel IA-32	1294MB	336MB
	SLES10 for x86	Intel IA-32	1294MB	336MB
	SLES8 for x64	AMD64 / EM64T	1328MB	392MB
	SLES9 for x64	AMD64 / EM64T	1294MB	336MB
	SLES10 for x64	AMD64 / EM64T	1294MB	336MB
	SLES8 for Intel Itanium	Intel Itanium IA-64	-	350MB
	SLES9 for Intel Itanium	Intel Itanium IA-64	1367MB	338MB
	SLES10 for Intel Itanium	Intel Itanium IA-64	1367MB	338MB
SLES9.0 for Power	IBM pSeries (64 bit only)	-	56MB	
SUSE Linux Enterprise Server zSeries	SLES 9.0	IBM z800/900 (31 and 64 bit mode)	-	16MB
Tru64	V5.1B	HP Alpha	1499MB	372MB
	V5.1B-2	HP Alpha	1499MB	372MB
	V5.1B-3	HP Alpha	1499MB	372MB
Windows XP	XP SP2	Intel IA-32, 32-bit XP on AMD64 and EM64T	750MB	150MB
	XP SP2	64-bit XP on AMD64 and EM64T	1000MB	200MB
	XP SP2	Intel IA-64	1250MB	300MB

**Table 2-6** Platform support matrix for NetBackup enterprise server and NetBackup server (continued)

Operating system	OS version	Vendor Platform	Server	Client
Windows 2000	2000 SP4	Intel IA-32	750MB	150MB
		32-bit Windows 2000 on AMD64 and EM64T hardware	750MB	150MB
Windows Server 2003	Server 2003, Server 2003 SP1 Standard, Enterprise, Datacenter, and Web Editions	Intel IA-32	750MB	150MB
		Server 2003 R2 Standard, Enterprise and Datacenter		
	Server 2003, Server 2003 SP1, Standard, Enterprise, Datacenter, and Web Editions	Supported with 32-bit NetBackup binaries.	750MB	150MB
		32-bit Windows Server 2003 on AMD64 and EM64T platforms		
	Server 2003 R2 Standard, Enterprise, and Datacenter			
Server 2003, Server 2003 SP1, Standard, Enterprise, Datacenter, and Web Editions	64-bit Windows Server 2003 on AMD and EM64T platforms supported with 64-bit NetBackup binaries	1000MB	200MB	
	Server 2003 R2 Standard, Enterprise, and Datacenter			
Server 2003, SP1 (Enterprise and Datacenter Editions)	Intel Itanium IA-64	1250MB	300MB	
Virtual Server 2005	Host and virtual OS's that are supported NetBackup Clients	Intel IA-32	-	-
Windows NAS	Windows Powered NAS (2000 SAK)	Intel IA-32	750MB	150MB
	Windows Storage Server 2003, Storage Server 2003 R2	Intel IA-32	750MB	150MB

**Table 2-6** Platform support matrix for NetBackup enterprise server and NetBackup server (continued)

Operating system	OS version	Vendor Platform	Server	Client
Windows Longhorn Vista Client	2000 SP4	Intel IA-32	750MB	150MB

## Other NetBackup compatibility lists

The Symantec Support Web site contains multiple compatibility lists that contain up-to-date information about which platforms and operating systems support the various products and features of NetBackup. To view these lists, follow the procedure described on page 26 of this chapter. The following list outlines many of the compatibility lists that you can view from your Web browser.

- NetBackup access control platform support
- NetBackup SnapShot Client
- Veritas Bare Metal Restore (BMR) compatibility
- NetBackup database agent compatibility
- NetBackup Operations Manager (NOM) compatibility
- NetBackup for Network Data Management Protocol (NDMP)
- NetBackup Shared Storage Option
- NetBackup supported peripheral compatibility lists
- Platforms supporting the NetBackup Administration consoles for UNIX
- NetBackup Vault

### NetBackup access control compatibility list

The following table contains a list of platforms, the associated operating systems, and version levels, that NBAC Authentication (AT) and Authorization (AZ) supports on NetBackup Enterprise Server and NetBackup Server systems at the time of this product release. It is possible for this information to change after the product is released. Symantec documents these changes and posts them on the Symantec Support Web site, <http://www.symantec.com/enterprise/support/>.

**Table 2-7** Operating systems that NBAC and NBAT support in this release

Operating system	OS version	Vendor Platform	NBAC AT	NBAC AZ
AIX 5L	5.1 (32/64 bit)	IBM RS/6000, SP, pSeries	X	X
	5.2 (32/64 bit)	IBM RS/6000, SP, pSeries	X	X
	5.3 (32/64 bit)	IBM RS/6000, SP, pSeries	X	X
	5.3 (32/64 bit)	IBM eServer i5	X	X
HP-UX	11.0	HP 9000	X	X
	11i v1 (11.11)	HP 9000	X	X
	11i v2 (11.23)	HP 9000	1	-
Red Hat Enterprise Linux ES/AS	2.1 Intel x86	Intel IA-32	X	X
	3.0 Intel x86	Intel IA-32	X	X
		AMD64 / EM64T	X	X
	4.0 Intel x86	Intel IA-32	X	X
		AMD64 / EM64T	X	X
	4.0 Intel Itanium	Intel Itanium IA-64	X	X
Solaris	8	SUN SPARC Fujitsu PRIMEPOWER	X	X
	9	SUN SPARC Fujitsu PRIMEPOWER	X	X
	10	SUN SPARC Fujitsu PRIMEPOWER	X	X
SUSE Linux Enterprise Server	SLES8 for x86	Intel IA-32	X	X
	SLES8 for x86	AMD64 / EM64T	X	X
	SLES9 for x86	Intel IA-32	X	X
	SLES9 for x86	AMD64 / EM64T	X	X
	SLES9 for Intel Itanium	Intel Itanium IA-64	X	X



**Table 2-7** Operating systems that NBAC and NBAT support in this release

Operating system	OS version	Vendor Platform	NBAC AT	NBAC AZ
SUSE Linux Enterprise Server zSeries	SLES 9.0	IBM z800/900 (31 and 64 bit mode)	X	-
Tru64	V5.1B	HP Alpha	X	X
	V5.1B-2	HP Alpha	X	X
	V5.1B-3	HP Alpha	X	X
Windows Server 2003	Server 2003, Server 2003 SP1 Standard, Enterprise, Datacenter, and Web Editions	Intel IA-32	X	X
	Server 2003 R2 Standard, Enterprise and Datacenter			
	Server 2003, Server 2003 SP1, Standard, Enterprise, Datacenter, and Web Editions	64-bit Windows Server 2003 on AMD and EM64T platforms supported with 64-bit NetBackup binaries	X	X
	Server 2003 R2 Standard, Enterprise, and Datacenter			
	Server 2003, SP1 (Enterprise and Datacenter Editions)	Intel Itanium IA-64	X	X
Windows XP	XP SP2	Intel IA-32, 32-bit XP on AMD64 and EM64T	X	-
	XP SP2	64-bit XP on AMD64 and EM64T	X	-

**Table 2-7** Operating systems that NBAC and NBAT support in this release

Operating system	OS version	Vendor Platform	NBAC AT	NBAC AZ
Windows 2000	2000 SP4	Intel IA-32	X	X
		32-bit Windows 2000 on AMD64 and EM64T hardware	X	-
Windows NAS	Windows Powered NAS (2000 SAK)	Intel IA-32	1	-
	Windows Storage Server 2003, Storage Server 2003 R2	Intel IA-32	X	X
Windows Longhorn Vista Client	2000 SP4	Intel IA-32	X	-

1. This platform only supports the client component of VxSS.

## NetBackup snapshot client

NetBackup Snapshot Client provides data protection services for snapshot data. It also supports offhost backup over Fibre Channel networks (in addition to conventional backups to locally attached devices). In addition, this version of NetBackup brings Snapshot capabilities to various Linux, AIX, and HP platforms using a NetApp storage device. To view the latest supported platforms for this this feature, refer to the procedure below on how to find snapshot client information on the Web.

The Symantec Support Web site contains tables that list the platforms, operating systems, and snapshot methods that Snapshot Client supports for certain backup methods. The following list identifies some of these backup methods.

- Local backups using a snapshot
- Offhost backup (via an alternate backup client, media server copy, or third party copy) using a snapshot
- Instant recovery using persistent snapshots
- Disk Array Snapshot methods
- File system performance backup using Flashbackup

These backup methods are described in the *NetBackup Snapshot Client Administrator's Guide*.

The Symantec Support Web site also includes a compilation of notes on Snapshot Client. These notes include up-to-date lists of supported operating systems and peripherals, and assistance for some of the configuration procedures found in the *NetBackup Snapshot Client Administrator's Guide*. To locate this information, do the following:

---

**Note:** NetBackup Snapshot Client was referred to as Advanced Client in previous versions of NetBackup. When searching for Snapshot proliferation information on the Symantec Support Web site, you will need to locate a document that is titled using the Advanced Client name. The following instructions will guide you to the proper document on the Symantec Support Web site.

---

#### To obtain snapshot client information on the Web

- 1 Go to <http://www.symantec.com/enterprise/support>.
- 2 Type **NetBackup Enterprise Server** in the Product Lookup field.
- 3 Click ">" search icon.
- 4 Click on the **NetBackup Enterprise Server** link in the bulleted list below the title, Support for Top Products. The NetBackup Enterprise Server Web page appears.
- 5 In the list on the right side of this Web page, click on **Compatibility List**. A Compatibility and Reference Web page appears that contains a list of compatibility documents. From this Web page, you are able to refine your search to find a link to the appropriate document. (The compatibility list documents are in PDF format. You must have Adobe Acrobat Reader to view these documents.)
- 6 Locate a link with a name similar to the following and click on that link.  
*Veritas NetBackup (tm) Enterprise Server 6.x / NetBackup Server 6.x Advanced Client (ADC) Supported Arrays, Operating Systems and Database Agent Compatibility*

OR

You can type the following link in the Address field of your browser.

<http://entsupport.symantec.com/docs/279042>

---

**Note:** For NetBackup 6.5, Snapshot Client for Solaris is supported on SPARC machines only (not on AMD or Intel x86).

---

## NetBackup Bare Metal Restore compatibility lists

NetBackup Bare Metal Restore supports a subset of the systems supported by NetBackup. For more information, see the following subsections.

### BMR supported operating systems

The following table shows the operating systems supported by BMR for servers and clients.

**Table 2-8** BMR supported operating systems

Operating System	Version	Master Server	Boot Server	Client	Notes
AIX	5.1, 5.2, 5.3	X	X	X	
HP-UX	11.00, 11.11 (11i)	X	X	X	
Linux	Red Hat Linux Advanced Server 2.1	X	-	-	
Red Hat Enterprise Linux WS	Red Hat Enterprise Linux WS 3.0 and 4.0	X	X	X	1
Red Hat Enterprise Linux ES/AS	3.0 Intel x86 (Intel IA-32)	X	X	X	1
	4.0 Intel x86 (Intel IA-32)	X	X	X	
	3.0 for X64 (AMD64 / EM64T)	X	X	X	1
	4.0 for X64 (AMD64 / EM64T)	X	X	X	
SuSE Linux Enterprise Server	SLES8 for x86 (Intel IA-32)	X	X	X	
	SLES9 for x86 (Intel IA-32)	X	X	X	
	SLES8 for x64 (AMD64 / EM64T)	X	X	X	
	SLES9 for x64 (AMD64 / EM64T)	X	X	X	
Solaris (SPARC only)	8, 9, 10	X	X	X	
Windows 2000	Professional, Server, Advanced Server	X	X	X	
Windows 2003	Standard, Enterprise, Web Edition	X	X	X	
Windows XP	Home Edition, Professional	-	-	X	

1. The `compat-libstdc++` library is required on Red Hat Linux 3.0 systems. Refer to your Linux distribution documentation to locate this library.

## BMR supported shared resource tree (SRT) versions

A Shared Resource Tree (SRT) is a collection of operating system (OS) files that BMR uses to create a restore environment. An SRT is created on a BMR boot server, and is subject to the following rules:

- The boot server must be at the same or higher operating system version level than the SRT it holds. For example, an AIX 5.1.0.12 boot server cannot hold an AIX 5.1.0.25 SRT.
- For Linux, Boot Servers running a 32-bit OS version cannot hold an SRT for a 64-bit OS.

## BMR supported file systems and volume managers

The following table shows the file systems and volume managers supported by BMR.

**Table 2-9** BMR supported files systems and volume managers

Platform	File systems	Volume managers	Striping, Mirroring, RAID	Notes
AIX	Native AIX JFS and JFS2 on all AIX versions	Native AIX LVM	LVM Striping, LVM Mirroring	
	Veritas File System 3.4 and 4.0 and 5.0	Veritas Volume Manager 3.2 and 4.0 and 5.0	VxVM Striping, Mirroring, RAID	1
HP-UX	Native HFS, JFS 3.3 (Veritas VxFS 3.3)	Native HP LVM	LVM Striping, LVM Mirroring	2, 3
	Veritas File System 3.5	Veritas Volume Manager 3.5	VxVM Striping, Mirroring, RAID	
Linux	EXT2, EXT3	Native Partitioning, LVM		4, 5, 6
Solaris (SPARC only)	UFS	Solstice Disk Suite 4.2.1 on Solaris 8	Striping, Mirroring, RAID	7
		Solaris Volume Manager on Solaris 9	Striping, Mirroring, RAID	8
	Veritas File System 3.5 4.0, and 5.0	Veritas Volume Manager 3.5 4.x, and 5.0	VxVM Striping, Mirroring, RAID	1, 9
Windows 2000, Windows XP, Windows 2003	FT32, NTFS	Windows Logical Disk Manager	Striping, Mirroring, RAID	10

**Table 2-9** BMR supported files systems and volume managers (continued)

Platform	File systems	Volume managers	Striping, Mirroring, RAID	Notes
		Veritas Storage Foundation for Windows 4.0 - 4.3	VxFS Striping, Mirroring, RAID	

1. If a Veritas Volume Manager 4.0 managed disk has the Cross Platform Data Sharing (CDS) attribute enabled and you map that disk to an IDE disk, the CDS capability will be lost. For more information, see the VxVM administrator's guide.
2. BMR supports only HP-UX versions that contain embedded versions of VxVM and VxFS; therefore, you do not have to install separate versions of VxVM and VsFS in an HP-UX SRT.
3. JFS 3.3 is the version of the Veritas File System (VxFS 3.3.2) shipping on HP-UX since December 1999.
4. Support for Linux multidevices is limited, and BMR may not restore some configurations exactly.
5. If the root file system is created on a Linux multidevice, when performing a dissimilar disk restore you must map the root file system and retain the original level (for example, if the original level is RAID-1 the mapped file system must be RAID-1 also). If the level is changed, the kernel may panic and the system may not recover.
6. To perform system-only restores on Linux systems, use the dissimilar disk restore feature to map the original system volumes to the target disks (even if you are performing a normal self restore).
7. BMR does not recreate SDS database replicas. BMR only restores SDS concatenated volumes spanning a single slice and SDS mirrored volumes composed of submirrors that each span a single slice. Each of these is recreated by breaking the volume down to a single underlying slice. Dissimilar disk restore can be used on the underlying slice. After the restore, SDS is disabled.
8. SVM database replicas, disk sets, and volumes are fully recreated, and SVM remains active after a BMR restore.
9. For mixed versions of VxVM and VxFS, install the latest version of the Symantec licensing software into the SRT.
10. FT32 supported on client systems only; NTFS required on BMR master and boot servers.

## BMR VxVM and VxFS dependencies on Solaris SPARC

Solaris (SPARC) Bare Metal Restore clients have specific requirements for the versions of the Veritas Volume Manager (VxVM) and Veritas File System (VxFS). The client VxFS and VxVM major version numbers must match those in the shared resource tree (SRT) but do not need to match each other. For example, a client with VxVM 4.0 MP1 and VxFS 3.5 should be restored with an SRT with VxVM 4.0 GA and VxFS 3.5.

**Note:** VxVM and VxFS are only required in the SRT if the restore produces VxVM volumes or VxFS file systems. For example, neither VxVM or VxFS is required to do a system-only restore in which the system disks do not have VxVM volumes or VxFS file systems. Another example is a dissimilar disk restore during which no VxVM volumes nor VxFS file systems are created and restored.

The following table identifies the patch and package prerequisites for VxVM and VxFS on Solaris (SPARC) operating systems only. Note that the patches may already be installed in the operating system on the Solaris (SPARC) installation media. If the CD date is earlier than that listed in the following table, the patches will have to be manually applied.

**Table 2-10** Prerequisites for VxVM and VxFS on Solaris (SPARC) operating systems

Solaris OS Version	VxVM/VxFS Versions	Prerequisites
Solaris 8 (SPARC) versions earlier than 02/2002	VRTSvxvm 3.5	Patch 108528 (replacement for 110383)

## BMR supported cluster solutions

The following table shows the BMR master server and boot server support for cluster environments. For information about the specific clustering software versions supported, see the NetBackup 6.5 Cluster Compatibility document on the Symantec Support Web site.

**Table 2-11** BMR supported cluster solutions

Operating system	Master server	Boot server
AIX	X	-
HP-UX	X	-
Linux	X	-
Solaris (SPARC only)	X	X
Windows	X	X

## BMR disk space requirements

The following are guidelines for disk space used by BMR.

**Table 2-12** Disk space used by BMR

Item	Description	Sizes	Notes
BMR master server executable files	<code>/usr/opensv/netbackup/bin</code> (UNIX) <code>install_path\NetBackup\bin</code> (Windows)	AIX 800 MB HP-UX 250 MB Linux 150 MB Solaris 150 MB Windows 2000300 MB Windows 2003300 MB	1
BMR master server database		Less than 1 MB per client	
BMR boot server executable files	One per platform (AIX, Windows) One per subnet (Solaris (SPARC) and HP-UX)	AIX 300 MB HP-UX 125 MB Linux 50 MB Solaris 75 MB Windows 2000300 MB Windows 2003300 MB	1
Shared resource trees	Varies by platform: Typically one SRT per OS level to be restored (such as, AIX 5.1, 5.2)	AIX 250-600 MB HP-UX 150-500 MB Linux 100-150 MB Solaris 250-600 MB Windows 250-300 MB	1
Optional Restore logs	On the master server, stored in: <code>/usr/opensv/netbackup/logs/bmrrst</code> (UNIX) <code>install_path\NetBackup\logs\bmrrst</code> (Windows)	20 - 40 MB per client per restore	

1. References to Solaris in this table imply Solaris SPARC only.

## NetBackup database agent platform support

The Symantec Support Web site contains the most current platform support information for NetBackup database agents. You can use the following procedure to locate this information.

- 1 Go to <http://www.symantec.com/enterprise/support>.
- 2 Type **NetBackup Enterprise Server** in the Product Lookup field.
- 3 Click ">" search icon.



- 4 Click on the **NetBackup Enterprise Server** link in the bulleted list below the title, Support for Top Products. The NetBackup Enterprise Server Web page appears.
- 5 On the right side of this Web page, click on **Compatibility List**.  
A Compatibility and Reference Web page appears that contains a list of compatibility documents. From this Web page, you are able to refine your search to find a link to the appropriate document. (The compatibility list documents are in PDF format. You must have Adobe Acrobat Reader to view these documents.)
- 6 Within this list of documents, you may see a document with a title similar to the following:  
*NetBackup (6.x) Enterprise Server / Server 6.x Database Agent Compatibility*  
Click on this title to view the most current database agent compatibility list.

## NetBackup Operations Manager

See the following sections for supported NOM server platforms, managed NetBackup master servers platforms, E-mail clients, Web browsers, and other software components.

### Platforms supported for the NOM server

NetBackup Operations Manager server software can be installed on the following operating system platforms:

**Table 2-13** Platforms supported for the NOM server

Operating system	Supported versions	Notes
Microsoft Windows	Microsoft Windows 2000 SP4	No 64 bit support
	Microsoft Windows 2003 SP1	No 64 bit support
Solaris	Solaris 8, 9, and 10	SUN SPARC No 64 bit support

## NetBackup managed master server platforms supported by NOM

NOM software supports management and monitoring of NetBackup master servers on the following operating systems:

**Table 2-14** NetBackup-managed master server platforms supported by NOM

Operating system	Supported versions	Notes
Windows 2000	Microsoft Windows 2000 SP4	Intel IA-32 (32-bit only on AMD64 and EM64T hardware)
Windows Server 2003 <sup>2</sup>	Microsoft Windows Server 2003, Microsoft Windows 2003 SP1, SP2 Standard Enterprise, Datacenter, and Web editions. Server 2003 R2 Standard Enterprise and Datacenter	Supported with 32-bit NetBackup binaries; 32-bit Windows server 2003 on AMD64 and EM64T platforms; and on Intel IA-32.
Solaris <sup>2</sup>	8, 9, and 10	SUN SPARC Fujitsu PRIMEPOWER
HP-UX	11.0 (32 and 64 bit)	HP9000
	11i v1 (11.11) <sup>1</sup> (32/64 bit)	HP9000
	11i v2 (11.23) <sup>1</sup> (32/64 bit)	HP9000
	11i v2 (11.23) <sup>1</sup> (32/64 bit)	HP Integrity (IA-64)
AIX	5.1, 5.2, and 5.3 (32 and 64 bit)	Power3, Power4, Power5
Redhat Enterprise Linux	2.1, 3.0, and 4.0 Intel x86	Intel IA-32
SuSE Linux Desktop	9.0	Intel IA-32

1. NOM support started in NetBackup 6.0 MP4.

2. Supported as a server and as a managed server.

**Note:** Refer to NetBackup 6.5 Operating System Compatibility List on the Symantec Support Web site for the latest information on supported platforms.

## Component levels supported for NOM

NetBackup Operations Manager requires the following minimal levels for these software components. NOM has been verified with these versions and upgrading them may impact NOM operation.

**Table 2-15** Component levels supported for NOM

Component	Supported versions	Notes
VxSSAT	4.3.32.4	Symantec Product Authentication Service
VxPBX	1.3.25.8 (UNIX) 1.3.25.7 (Windows)	Symantec Private Branch Exchange
VRTSweb	4.2.0.1	Veritas Web Server
VRTSjre	1.4	Veritas JRE redistribution
VRTSicsco	1.3.25.4	Symantec Infrastructure Core Services Common

## Email clients supported by NOM

NOM email uses SMTP protocol to send email (JavaEmail API). It conforms to specification RFC 822 (Standard for the Format of ARPA Internet Text Messages) and RFC 2045 (Multipurpose Internet Mail Extensions). All email clients conforming to these standards should work with NOM.

Some of the HTML email viewers, like Yahoo, strip off the HTML header and attach their own header when displaying emails. This corrupts the NOM emailed reports.

**Table 2-16** Email clients supported by NOM

Mail Client	Client Level
Lotus Notes	7
Microsoft Outlook	2000 and 2003
Mozilla Thunderbird	1.5

**Note:** SMTP server password authentication is not supported by NOM.

## Web browsers supported by NOM

The NetBackup Operations Manager user interface (the NOM console) is supported with the following Web browsers:

**Table 2-17** Web browsers supported by NOM

Web browser	Supported versions	Notes
Microsoft Internet Explorer	6.0 or higher	
NetScape	7.0 or higher	
Mozilla Firefox	1.0 or higher	Microsoft Windows only

## NetBackup for Network Data Management Protocol (NDMP)

For NetBackup 6.5, NetBackup for NDMP on Solaris is supported on SPARC machines only (not on AMD or Intel x86).

## NetBackup SharedDisk Option

All NetBackup components (master server, media servers, and clients) must have NetBackup 6.5 or later installed. The following subsections show the supported systems.

### Supported systems

The following tables shows the systems on which you can install the SharedDisk Option.

**Table 2-18** Systems that support the SharedDisk Option

NetBackup system	Supported systems
Master server	You can use any supported NetBackup master server platform. If you use the master server as a media server then it can only be a supported media server type.
Media server	You can use the following systems for the NetBackup media servers that host that are attached to the SAN: <ul style="list-style-type: none"> <li>■ Windows server (x86 and x64)</li> <li>■ Solaris 9 and 10 (SPARC)</li> </ul>

## Supported Arrays and HBAs

For additional information on supported Arrays and HBA's, refer to the Hardware Compatibility List on the Symantec Support Web site, <http://entsupport.symantec.com>

## NetBackup SAN Client and Fibre Transport

The following subsections show the supported systems and the supported host bus adapters.

### Supported systems

The following table shows the systems on which you can install the NetBackup Fibre Transport (FT).

**Table 2-19** Systems that support the NetBackup Fibre Transport

NetBackup system	Supported systems
Master server	You can use any supported NetBackup master server platform.
Media server	You can use the following systems for the NetBackup media servers that host that are attached to the SAN: <ul style="list-style-type: none"> <li>■ Linux - RedHat 4.0 Update 3 X86_64 (EM64T or AMD64)</li> <li>■ Solaris 9 and 10 (SPARC)</li> </ul>
NetBackup SAN client	The SAN clients must be systems in the SAN and their operating system must be of the following type: <ul style="list-style-type: none"> <li>■ AIX 5.1, 5.2, and 5.3 (32 and 64 bit)</li> <li>■ HP-UX 11.0, 11i, and 11iv2</li> <li>■ HP-UX 11iv2 (IA-64)</li> <li>■ Linux RedHat AE/ES 3.0 and 4.0 (32 bit)</li> <li>■ Linux RedHat AE/ES 4.0 (EM64T or AMD64)</li> <li>■ Linux X86 SuSE SLES 8.0, and 9.0 (32 bit)</li> <li>■ Linux SuSE SLES 9.0 (EM64T or AMD64)</li> <li>■ Solaris 8, 9, and 10 (SPARC)</li> <li>■ Solaris 10 (AMD64)</li> <li>■ Windows 2000 and 2003 (32 bit)</li> <li>■ Windows 2003 x86 (64 bit)</li> </ul>

### Supported host bus adapters (HBAs)

For NetBackup media servers, only 64-bit, PCI-X slots are supported for the QLogic Fibre Channel host bus adapters (HBAs) that are used to connect to the

NetBackup SAN clients. Legacy PCI 33 and 66 Mhz slots are not supported. Also, slots that share an interrupt are not supported.

For the HBAs you can use for NetBackup Fibre Transport and SAN clients, see the NetBackup 6.5 hardware compatibility list at the NetBackup support Web site:

<http://entsupport.symantec.com>

Refer also to the Hardware Compatibility List for additional information on supported HBA's.

## NetBackup Shared Storage Option (SSO)

The following list shows the supported server platforms for SSO.

- AIX
- Enterprise Linux (from Red Hat and SuSE)
- HP-UX
- Solaris
- Tru64 UNIX
- Windows

### Supported Robot Types for SSO

There is a distinction between standard Media Manager supported robot types and supported robot types for SSO. SSO is supported *only* with the following Media Manager robot types:

- ACS, TLH, and TLM (these are API robot types)
- TL8 and TLD

Media Manager robot types ODL, TL4, and TSH are *not* supported for SSO.

SSO is also supported for standalone (non-robotic) drives.

## NetBackup supported peripherals compatibility lists

NetBackup Server 6.5 Hardware Compatibility List (HCL) - includes information for supported drives, libraries, virtual tape devices, robot-types, fibre-channel HBAs, switches, routers/bridges, iSCSI configurations, and encryption devices

NetBackup supports a variety of robots, drives, tape devices, libraries, and switch and router configurations on different platforms. Each robot type, for example, classifies the devices and peripherals either by their physical characteristics, by their media type, or by the communication methods used by their underlying robotics. (See the *NetBackup Administrator's Guide* for more

volume information about the robot types.) The following list identifies the supported robot types at the release of NetBackup 6.5.

ACS - Automated Cartridge System	TLD - Tape Library DLT
ODL - Optical Disk Library	TLH - Tape Library Half-inch
TL4 - Tape Library 4MM	TLM - Tape Library Multimedia
TL8 - Tape Library 8MM	TSH - Tape Stacker Half-inch

As with many products, soon after a given release, additions and deletions can occur. For the most current information on the supported peripherals and robot types, drives, libraries, tape devices, and so forth, refer to the NetBackup Enterprise Server Hardware Compatibility List on the Symantec Support Web site. To locate this document, perform the following procedure.

- 1 Go to <http://www.symantec.com/enterprise/support/>.
- 2 In the Product Lookup field, enter the following:  
**NetBackup Enterprise Server**
- 3 Click the “>” search icon.
- 4 Click on the **NetBackup Enterprise Server** link in the bulleted list below the title, Support for Top Products. The NetBackup Enterprise Server Web page appears.
- 5 Click the **Compatibility** link on the right side of the Web page.  
A new Compatibility and Reference Web page appears that is populated with various NetBackup compatibility lists. A document with a title similar to the following should appear in this list:

*Veritas NetBackup Enterprise Server 6.x Hardware Compatibility Lists*

## NetBackup Vault

NetBackup Vault supports the same operating systems and versions as NetBackup with following exceptions:

- Inline Tape Copy does not support the following destination storage types:
  - NDMP
  - Third-party copies
  - Optical devices
- Inline Tape Copy does not support storage units that use a QIC (quarter-inch cartridge) drive type.

- A single Inline Tape Copy operation cannot use destination storage devices on multiple media servers.

## Platforms supporting the NetBackup administration consoles for UNIX

Symantec supports only the window managers in the following table when using NetBackup Java. There are a number of user interface anomalies using the various window managers available on UNIX platforms. Many of these problems are documented. Most of these problems are because of unusual or non-standard window manager configurations and occur randomly. In the most common cases of misplaced or shifted components within a dialog, simply resizing the dialog repaints the display and causes the interface to display correctly. Although CDE, MWM and OLWM have the most reported bugs, this is largely due to their popularity; do not use `fvwm` or `twm` instead.

Symantec has seen the best overall performance with the CDE window manager and recommends this window manager on the non-Linux UNIX platforms. For more information on how to improve performance of your NetBackup-Java Administration Console environment, refer to the *NetBackup Administrator's Guide, Volume I*.

The following table identifies the platforms that support the NetBackup Administration Console for UNIX and the NetBackup-Java Client user interface in this release.

**Table 2-20** Platforms supporting NetBackup-Java administration console and NetBackup-Java administration client user interface

Platform	NetBackup-Java Administrative Console	NetBackup-Java Client GUI	Supported Window Managers (UNIX)
Windows 2000 (SP4), (32-bit)	Yes	Yes	NA
Windows XP, (32 and 64 bit)	Yes	Yes	NA
Windows 2003 (SP1), (32 and 64 bit)	Yes	Yes	NA
Solaris Sun SPARC & Fujitsu PRIMEPOWER versions 8, 9, and 10	Yes	Yes	CDE, Motif
Solaris 10 (AMD/Opteron)	Yes	Yes	CDE, Motif
Solaris x86 (32 bit) versions 8, 9, and 10	Yes	Yes	CDE, Motif



**Table 2-20** Platforms supporting NetBackup-Java administration console and NetBackup-Java administration client user interface (continued)

<b>Platform</b>	<b>NetBackup-Java Administrative Console</b>	<b>NetBackup-Java Client GUI</b>	<b>Supported Window Managers (UNIX)</b>
HP-UX, HP9000 versions 11.0, 11.i v1 (11.11)	Yes	Yes	CDE, Motif
HP Integrity (IA-64) version 11i v2	Yes	Yes	CDE, Motif
Tru64, HP Alpha versions 5.1b, 5.1b2	Yes	Yes	CDE
Red Hat Enterprise Linux - AS/ES (32 bit) versions 3.0 (x86), 4.0 (x86)	Yes	Yes	GNOME/Enlightment KDE/KWM
SuSE Linux Enterprise Server (32 bit) versions SLES 8.0 for x86 and SLES 9.0 for x86	Yes	Yes	GNOME/Enlightment KDE/KWM
SuSE Linux Enterprise Server (AMD64/EM64T) versions SLES 8.0 for x64 and SLES 9.0 for x64	Yes	Yes	GNOME/Enlightment KDE/KWM
SuSE Linux Enterprise Server (Intel Itanium IA-64) versions SLES 8.0 and SLES 9.0 (for Intel Itanium)	Yes	Yes	GNOME/Enlightment KDE/KWM
AIX 5L, IBM Power3, Power 4, Power 5 (32 and 64 bit) versions 5.2 and 5.3	Yes	Yes	CDE

## Additional NetBackup-Java Administration Console - supported platform information

NetBackup-Java Administration Console for AIX is only supported on the CHRP platform.

The Java run-time environment (JRE) for the AIX platform is only supported on IBM's Common Hardware Reference Platform (CHRP) machines. On an AIX host, the NetBackup installation will check to ensure the host is a CHRP machine. If not, the NetBackup-Java Administration Console code will not be installed. Java 1.4 is the minimum level of JRE necessary for the NetBackup-Java Administration Console to run on a CHRP platform.



# NetBackup product dependencies

This chapter provides information on the product dependencies of NetBackup 6.5. It is important that you verify that your operating system is up-to-date with all of the latest patches and upgrades before you install NetBackup. This section is a guide to inform you of known operating systems that require a patch or an upgrade. For your convenience (and when possible), a link is provided for each patch that will direct you to the proper web site where you can find the patches and upgrades that you need to install.

The following table contains a list of platforms, the associated operating systems, and version levels, that NetBackup supports. If your operating system version is older than those shown in this chapter, then you should refer to previous versions of the NetBackup Release Notes documents to determine if a known dependency exists for your operating system version. (Refer to the Symantec Support web site, <http://www.symantec.com/enterprise/support/>, to download a previous revision of the NetBackup Release Notes.)

## Operating system patches and updates

The following table provides the known, minimum operating system (OS) patches and updates. It is possible that a patch listed here has been superseded by a more recent patch released by the vendor. Symantec recommends that users visit the support web site of a particular vendor for their latest patch information.

**Table 3-1** Operating system patches and updates for NetBackup

Hardware Type	OS Version	Patch	Description
SPARC/ UltraSPARC	Solaris 8	108993-20 or later	This patch resolves a mutex unlock issue with multi-threaded programs. Additional information can be found at <a href="http://sunsolve.sun.com">http://sunsolve.sun.com</a> .
		109041-04 <sup>1</sup>	This patch resolves a problem where NetBackup Java Administration Console hangs before entering the Scheduling Service.
		SUNWsan package (see your vendor to obtain) 109529-06 (or later) 111413-02 (or later)	If using Snapshot Client with VxVM 3.2 Release, then users need to install this patch.  Users must install the SUNWsan package and patch 109529 before installing patch 111413. Users can then install VxVM. The order of these steps is important.
		110722-01 (or later)	If using Snapshot Client with VxVM 3.2 Release, then users need to install this patch.  If users have Sun's Alternate Pathing (AP), they must install Solaris patch 110722-01 for VxVM 3.2 to co-exist with the AP driver version 2.3.1. However, users must also upgrade AP. Please see DMP Coexistence with Alternate Pathing before installing VxVM.
		108528-08	The 4354397 <code>semop ( )</code> hangs because of a signal that is received. A conflict exists between GUID code that SMUX and SIG FCL uses. SMUX GUID code is based on SIG FCL so both were creating semaphore with the same ID.
		110383-01	The 4354397 <code>semop ( )</code> hangs because of a signal that is received. A conflict exists between GUID code that SMUX and SIG FCL uses. SMUX GUID code is based on SIG FCL so both were creating semaphore with the same ID.
		108434-15, 108435-15, 109147-28, 108528-29, 108989-02, 108993-33, 110386-03, 111023-03, 111317-05, 113648-03, 115827-01, 116602-01	These patches are necessary to run a multi-threaded program on Solaris 8.

**Table 3-1**      Operating system patches and updates for NetBackup (continued)

Hardware Type	OS Version	Patch	Description
		JRE 1.4 <sup>2</sup> (required OS patches)	These fixes to the Operating System are required to ensure proper operation of the Veritas NetBackup-Java Administration Console.
SPARC/ UltraSPARC	Solaris 9	112908-29 (or greater) 113273-11 (or greater) 114356-08 (or greater) (These patches upgrade SunSSH to v.1.1)	<p>The secure push install feature relies on the SunSSH and OpenSSH products. Symantec recommends that you install these SunSSH patches on a Solaris 9 system (SPARC) so you are able to successfully perform a secure push install.</p> <p><b>Note:</b> You must upgrade the SunSSH software to v.1.1 on machines running SunOS 5.9 (SPARC only). If a host is running OpenSSH, it must be at version 3.5 or greater.</p> <p>For more information on SunSSH patches and more please visit: <a href="http://sunsolve.sun.com">http://sunsolve.sun.com</a>. And for more information on OpenSSH patches and more please visit <a href="http://www.openssh.com">http://www.openssh.com</a>.</p>
Intel x86	Solaris 8	108994-20 or later	This patch resolves a mutex unlock issue with multi-threaded programs. Additional information can be found at <a href="http://sunsolve.sun.com">http://sunsolve.sun.com</a> .
		109042-04 <sup>1</sup>	This patch resolves a problem where NetBackup Java Administration Console hangs before entering the Scheduling Service.
		108529-08	The 4354397 <code>semop ( )</code> hangs because of a signal that is received. A conflict exists between GUID code that SMUX and SIG FCL uses. SMUX GUID code is based on SIG FCL so both were creating semaphore with the same ID.
		110397-01	The 4354397 <code>semop ( )</code> hangs because of a signal that is received. A conflict exists between GUID code that SMUX and SIG FCL uses. SMUX GUID code is based on SIG FCL so both were creating semaphore with the same ID.

**Table 3-1** Operating system patches and updates for NetBackup (continued)

Hardware Type	OS Version	Patch	Description
		109148-34 (or later), 108529-29, 108990-02, 108994-48 (or later), 110400-03, 111024-03, 111318-06 (or later), 113649-04 (or later), 115828-01, 116603-01	These patches are necessary to run a multi threaded program on Solaris 8.
		JRE 1.4 <sup>2</sup> (required OS patches)	These fixes to the Operating System are required to ensure proper operation of the Veritas NetBackup-Java Administration Console.
Intel x86	Solaris 9	114858-08 (or greater)	<p>The secure push install feature relies on the SunSSH and OpenSSH products. Symantec recommends that you install this SunSSH patch on a Solaris 9 system (x86) so you are able to successfully perform a secure push install.</p> <p><b>Note:</b> If a host is running OpenSSH, it must be at version 3.5 or greater.</p> <p>For more information on SunSSH patches and more please visit: <a href="http://sunsolve.sun.com">http://sunsolve.sun.com</a>. And for more information on OpenSSH patches and more please visit <a href="http://www.openssh.com">http://www.openssh.com</a>.</p>
Intel x86	Solaris 10	118833-36 (or later) Other patches required with this patch: 118918-13, 119042-09, 119254-14, 119578-30 (or greater)	If you are installing NOM on Solaris 10 then you should make sure that Solaris patch 118833-36 is installed on the system. Otherwise NOM will not work. For more information on SunSSH patches and more please visit: <a href="http://sunsolve.sun.com">http://sunsolve.sun.com</a> .
Intel x86 and x64	Solaris 10	Server supported on Update 2 (06/06) and newer	
HP	HP-UX 11.00	PHKL_29385 (or later)	Required to run NetBackup Advanced Reporter on HP-UX 11.00

**Table 3-1** Operating system patches and updates for NetBackup (continued)

Hardware Type	OS Version	Patch	Description
	HP-UX 11.00	PHNE_26771 (or later)	On HP/UX 11.0, if a connection is initiated re-using the port number used by a previously closed connection that is in TIME_WAIT, the new connection times out. The above fix has been added to eliminate the conditions that lead to the connection time-out problem experienced via the NetBackup-Java Administration Console.
	HP-UX 11.00	PHSS_35378 <sup>3</sup>	This is a recommended critical patch from HP that is required for successful NetBackup client backups. (Supersedes PHSS_30967 and PHSS_30969)
	HP-UX 11.00	PHCO_28425	This is a recommended critical patch from HP that is required for NetBackup to use VxSS.
	HP-UX 11.00	PHSS_24627 <sup>3</sup>	This patch is necessary to enable any C++ runtime code to work properly.
	HP-UX 11.00	PHKL_28766 <sup>3</sup>	This patch will allow HP-UX 11.00 mmap() to use large files from 2GB to 4GB.
	HP-UX 11.00 with IPR0103 and IPR0106 <sup>5</sup>	PHSS_24044	Allow POLL_INTERVAL to be set to zero in /var/stm/config/tools/monitor/dm_stape.cfg. This disables the dm_stape monitor within the Event Monitoring System.
	HP-UX 11.00	JRE 1.4 <sup>4</sup> (required OS patches)	These fixes to the Operating System are required to ensure proper operation of the Veritas NetBackup-Java Administration Console.
	HP-UX 11.00 PARISC	PHSS_32229 PHSS_26945 PHSS_28425 PHSS_24303	If you install HP-UX 11.00 as a server with ICS installed, the following patches are required. - PHSS_32229 is a LIBCL patch. - PHSS_26945 contains C++ -AA runtime libraries (aCC A.03.61) - PHCO_28425 is a libc cumulative patch - PHSS_24303 contains a linker tools cumulative patch

**Table 3-1** Operating system patches and updates for NetBackup (continued)

Hardware Type	OS Version	Patch	Description
HP	HP-UX 11.11 PARISC	PHSS_32226 PHSS_26946 PHSS_27740 PHSS_26560	If you install HP-UX 11.00 as a server with ICS installed, the following patches are required. - PHSS_32226 is a LIBCL patch. - PHSS_26946 contains C++ -AA runtime libraries (aCC A.03.61) - PHCO_27740 is a libc cumulative patch - PHSS_26560 contains a linker tools cumulative patch
	HP-UX 11.11	PHSS_32864 <sup>3</sup>	This is a recommended critical patch from HP that is required for successful NetBackup client backups.
	HP-UX 11.11	PHSS_26946 <sup>3</sup> (replaced by 26946)	These patches are necessary to enable any C++ runtime code to work properly.
	HP-UX 11.11	PHKL_25227 <sup>3</sup> (replaced by 26233)	Patch which allow HP-UX 11.11 mmap() to use large files from 2GB to 4GB.
	HP-UX 11.11	PHCO_29029	This is a recommended critical patch from HP that is required for NetBackup to use VxSS.
	HP-UX 11.11	PHSS_35379 <sup>3</sup>	This is a recommended critical patch from HP that is required for successful NetBackup client backups. (Supersedes PHSS_30968 and PHSS_30970)
	HP-UX 11.11 with IPR0103 and IPR0106 <sup>5</sup>	PHSS_24045	Allow POLL_INTERVAL to be set to zero in /var/stm/config/tools/monitor/dm_stape.cfg. This disables the dm_stape monitor within the Event Monitoring System.
	HP-UX 11.11	JRE 1.4 <sup>4</sup> (required OS patches)	These fixes to the Operating System are required to ensure proper operation of the Veritas NetBackup-Java Administration Console.
HP	HP-UX 11.23	PHCO_33431	Symantec recommends that all customers running 11.23 install this patch. It is possible that without installing this, an updated versions of 11.23 may fail the installation procedure of NetBackup.
	HP-UX 11.23 PARISC on IA64	PHSS_32228 PHSS_31855	If you install HP-UX 11.00 as a server with ICS installed, the following patches are required. - PHSS_32228 is a LIBCL patch. - PHSS_31855 contains C++ -AA runtime libraries (aCC A.03.61)
	HP-UX 11.23	PHSS_34858	This is a recommended critical patch from HP that is required so that dlopen will work properly.



**Table 3-1**      Operating system patches and updates for NetBackup (continued)

Hardware Type	OS Version	Patch	Description
	HP-UX 11.23	PHKL_31500	This is a recommended critical patch from HP that is required by NetBackup, particularly when attempting to run NetBackup with NetBackup access control (NBAC). For more information about this patch, refer to the Hewlett-Packard web site and perform a search using PHKL_31500 as a keyword.
Intel x86	Red Hat Linux 7	glibc (RHBA-2000:079-04)	The NetBackup-Java Administration Console segfaults on Red Hat Linux 7 when it is started. This is a known Red Hat Linux 7 issue. You must install at least the <code>glibc (RHBA-2000:079-04)</code> fix from Red Hat ( <a href="http://www.redhat.com">http://www.redhat.com</a> ).
		ncurses.5.2-12	If you do not have this installed, you will see the following error when trying to start the NetBackup menu interface on the client:  <pre>error while loading shared libraries: libncurses.so.5: cannot open shared object file: No such file or directory.</pre> The error appears to be more serious on a server, because license keys will appear invalid, when the real problem is that <code>ncurses</code> is not installed.
Intel x86	Red Hat Linux ES 3.0	compat-libstdc++-7.3-2.9 6.128	If you do not have this installed, you will see the following error when trying to execute some of the binaries on the client:  <pre>error while loading shared libraries: libstdc++-libc6.2-2.so.3: cannot open shared object file: No such file or directory.</pre> The error appears to be more serious on a server, because license keys will appear invalid, when the real problem is that the package is not installed.

**Table 3-1** Operating system patches and updates for NetBackup (continued)

Hardware Type	OS Version	Patch	Description
IA64/Linux	Red Hat Linux 4.0	compat-libstdc++-33-3.2.3-46.1	This operating system compatibility package is a patch requirement if you are installing on Linux IA 64 systems running Red Hat 4.0.
		compat-libstdc++-33-3.2.3-47.3.ia64.rpm	This is also true for IA64 Red Hat 4.0. Users of this platform, should also install the second patch package listed (compat-libstdc++-33-3.2.3-47.3.ia64.rpm) because it contains the library libstdc++.so.5, which is available in C.D. 4 of Red Hat 64 bit installation. If users do not install the second patch, they will receive error while starting VxPB, such as: <code>./pbx_exchange: error while loading shared libraries: libstdc++.so.5: cannot open shared object file: No such file or directory.</code>
AIX	(All versions)	4330-02 (or later)	For AIX 5.0, the NetBackup-Java Administration Console requires the AIX 5100-03 Recommended Maintenance Level. This maintenance package is intended for customers who already have AIX 5.0 installed. The AIX 5100-03 maintenance package can be downloaded from, <a href="http://techsupport.services.ibm.com/server/nav?fetch=ffa5e">http://techsupport.services.ibm.com/server/nav?fetch=ffa5e</a> , using APAR number IY32749 (PTF U484854). If you are a licensee of AIX 5.0, you can obtain an update CD dated 10/2002 by contacting your point of sale. In addition, you also need APAR IY35108 (for AIX 5.0) or APAR IY35844 (for AIX 5.2) to fix a thread safety problem with the AIX dup2 system call.
AIX	AIX 5.1 (64-bit)	APAR IY27467 (Emergency Fix)	This patch can be found on <a href="http://www.ibm.com">www.ibm.com</a> web site and by entering, <b>IY27467</b> in the search field.  <b>Caution:</b> You must install this IBM patch prior to installing NetBackup. Installing and running NetBackup Media Server on an AIX 5.0 64-bit operating system can result in core dumps and system crashes if this patch is not installed.
AIX	5.2	APAR IY76141	This patch may be required if you are installing NetBackup on an AIX 5.2 system (maintenance level 7 or below). This patch can be found on <a href="http://www.ibm.com">www.ibm.com</a> web site and by entering, <b>IY76141</b> in the search field.

**Table 3-1** Operating system patches and updates for NetBackup (continued)

Hardware Type	OS Version	Patch	Description
AIX	5.3	APAR IY76140	This patch may be required if you are installing NetBackup on an AIX 5.3 system (maintenance level 3 or below). This patch can be found on <a href="http://www.ibm.com">www.ibm.com</a> web site and by entering, <b>IY76140</b> in the search field.
AIX	5.3	APAR IY92889	This patch is required when installing NetBackup on a system using the xlC.aix50.rte C++ runtime version 8.0.0.0 or later. This patch can be found on <a href="http://www.ibm.com">www.ibm.com</a> web site and by entering, IY92889 in the search field.
AIX	5.3	Service Pack 6 (Service Pack 5300-05-06 Mar 2007)	Due to a potential problem with the AIX kernel's garbage memory collector, Symantec requires customers running AIX 5.3 to update to at least Maintenance Level 5, Service Pack 6 (Service Pack 5300-05-06 Mar 2007). Failure to do so could result in kernel panics in the memory garbage collector (xm_gc) after running certain NetBackup command lines that do not interface directly with the kernel, or drivers.
AIX	5.3	APAR IY84780	This patch is required if you are installing NetBackup on an AIX 5.3 system. This patch is required for systems with more than 4 CPUs to avoid system hangs when applications such as NetBackup (that require large amounts of memory) are running. This patch can be found on <a href="http://www.ibm.com">www.ibm.com</a> web site and by entering, IY84780 in the search field.
X86/ Windows	2000 SP2	Obtain from Microsoft	Required on all 2000 machines to install. Install will notify user if not at required level
Windows	2003 SP1	Windows 2003 Server SP1 and Hotfix KB913648	This Microsoft service pack and hotfix contains necessary updates for the Volume Shadow Copy. This service pack and hotfix are required on all 2003 server systems if you are using Volume Shadow Copy.
Windows	x86 and x64 on both SP1 and SP2	Microsoft storport hotfix	This is a required fix that applies to Windows x86 and x64 computers, on both SP1 and SP2. See, <a href="http://support.microsoft.com/?id=932755">http://support.microsoft.com/?id=932755</a> .
Windows	Server 2003, XP, and Vista (32 & 64 bit)	Microsoft microcode reliability update	This is a suggested fix that applies to 32- and 64-bit versions of Windows Server 2003, XP, and Windows Vista. See, <a href="http://support.microsoft.com/?kbid=936357">http://support.microsoft.com/?kbid=936357</a> .

Note: The following list contains URLs to other vendor's web sites. Changes to these sites can occur without notification. If a URL is no longer valid, please contact the vendor directly for assistance.

1. For information about the Sun patch bundles, refer to: <http://sunsolve.sun.com>.
2. For information about the operating system patches for Java 1.4 that are associated with Sun Solaris, refer to: <http://sunsolve.sun.com/pub-cgi/show.pl?target=patches/J2SE>.
3. For information about the HP patches, refer to: <http://us-support.external.hp.com/common/bin/doc.pl>. To check for the existence of a patch, use the following command syntax: 'swlist -l patch {PATCHNAME}'. If the patch is in a bundle, use the following syntax: 'swlist -l bundle {PATCHNAME}'.  
  
NOTE: Symantec recommends that you do not install the following HP-UX patches for NetBackup 6.5: PHSS\_30967 (for HP-UX 11.00), and PHSS\_30968 (for HP-UX 11.11).  
  
HP-UX patches PHSS\_30969 (for HP-UX 11.00) and PHSS\_30970 (for HP-UX 11.11) may cause problems in programs that have the `setuid` bit set. For more information about HP patches, you can also go to: <http://www1.itrc.hp.com>.
4. For information about the java patches associated with HP, refer to: <http://www.hp.com/products1/unix/java/patches/index.html>.
5. Using the patch IPR0106 works fine, however, Symantec recommends you upgrade to IPR0109.

## Other patch information

- 1 If you have a system running HP-UX 11.00 and install the PHKL\_26239 or PHKL\_27800 patches, you will experience problems with Block-level Incremental Backups. This problem does not occur with these patches on systems running HP-UX 11.11.
- 2 HP-UX patches PHSS\_30969 (HP11.00) and PHSS\_30970 (HP11.i v1 or 11.11) can cause problems with programs that have the `setuid` bit set. Hewlett Packard is working to resolve this problem. To obtain the latest information about HP-related patches, go to the Hewlett Packard's IT Resource Center web site at, <http://www1.itrc.hp.com>.

# Product dependencies

The following tables define the product-related dependencies associated with this release.

**Table 3-2** Product related dependencies

Dependency	Vendor	Description
Internet Explorer 5.0 or higher	Microsoft	Required for Explorer Extension in the Windows NetBackup GUI. If this is not available, the installation will fail.
VxVM 3.2 or higher for HP-UX 11i and Solaris 7, 8 (SPARC only)	Symantec	Required for Snapshot Client - VxVM being used on client.
VxVM 3.5 or higher for Solaris 9 (SPARC only)	Symantec	Required for Snapshot Client - VxVM being used on client.
VxVM 3.3.1 SP1 HF3 or higher for Windows 2000	Symantec	Required for Snapshot Client - VxVM being used on client.
VxFS 3.4 or higher for Solaris 8 (SPARC only)	Symantec	This is required for Snapshot Client - VxFS file system being used on client.
VxFS 3.5 or higher for Solaris 9 (SPARC only)	Symantec	This is required for Snapshot Client - VxFS file system being used on client.
VxFS 3.3 or higher for HP-UX 11i	Symantec	This is required for Snapshot Client - VxFS file system being used on client.
Windows Operating System	Symantec	Required Symantec AntiVirus update. Update to the latest version (10.2 for Corporate Edition) and the latest update when running on a Windows operating system.
Windows Operating System	Symantec	Required SYMEVENT driver updates. Update to the latest driver version
Online JFS 3.3 or higher for HP-UX	HP website	This is required for Snapshot Client - Online JFS file system being used on HP-UX 11i client.
VxFS 3.5 or higher or Online JFS 3.3 or higher for HP-UX 11i	HP website	This is required for VxFS_Checkpoint snapshots in Snapshot Client - VxFS file system being used on HP-UX 11i client.
Oracle 8i or above with RMAN proxy copy capability	Oracle	This is required to use Oracle DB Agent with Snapshot Client.

**Table 3-2** Product related dependencies (continued)

Dependency	Vendor	Description
TimeFinder release for Solaris SPARC or HP-UX; SYMAPI Library release 4.2-154 or higher for Solaris SPARC or HP-UX	EMC	This is required for Snapshot Client - TimeFinder snapshots.  <b>Note:</b> The SYMAPI Library is installed on the host but the TimeFinder firmware gets installed on the EMC Symmetrix disk array - NOT on the host where NetBackup is installed.
RAID Manager Library version 01-03-03/01 or higher for Solaris SPARC or HP-UX; ShadowImage release for Solaris SPARC or HP-UX	Hitachi Data Systems	This is required for Snapshot Client - ShadowImage snapshots.  <b>Note:</b> The RAID Manager Library is installed on the host but the ShadowImage firmware gets installed on the HDS 7700/9900 array - NOT on the host where NetBackup is installed.
RAID Manager Library version 01-03-03/01 or higher for Solaris SPARC or HP-UX; BusinessCopy release for Solaris SPARC or HP-UX	HP	This is required for Snapshot Client - BusinessCopy snapshots.  <b>Note:</b> The RAID Manager Library is installed on the host but the BusinessCopy firmware gets installed on the HP XP256 and 512 series disk arrays - NOT on the host where NetBackup is installed.
LibAttach version 1.1 for Windows 2000	Sun StorageTek	Required to control Sun StorageTek ACSLS robotics on Windows NT and Windows 2000 platforms.  IBM moved the ACL interfaces to libc starting with AIX 5.1F, known as AIX 5.1 Maintenance level 3 (ML3). If the build server is brought up to ML3 you would then see bos.rte.libc at 5.1.0.28 level or higher, which means the change is applied to the system.

## Other Third-Party updates

Symantec recommends that you make the following required third-party updates.

- QloQLA2340 Q\*Logic HBA driver 9.1.4.15  
[http://support.qlogic.com/support/oem\\_product\\_detail.asp?p\\_id=253&oemid=65&oemname=QLA2340](http://support.qlogic.com/support/oem_product_detail.asp?p_id=253&oemid=65&oemname=QLA2340)
- QLA2340 Q\*Logic HBA BIOS 1.47  
[http://support.qlogic.com/support/oem\\_product\\_detail.asp?p\\_id=253&oemid=65&oemname=QLA2340](http://support.qlogic.com/support/oem_product_detail.asp?p_id=253&oemid=65&oemname=QLA2340)

Symantec recommends that you make the following third-party update.

- All other Q\*Logic HBA's use latest driver & BIOS  
[http://support.qlogic.com/support/oem\\_product\\_list.asp?oemid=65](http://support.qlogic.com/support/oem_product_list.asp?oemid=65)

## Supported versions of VxFS and VxVM

The following table shows the different versions of VxFS and VxVM that Veritas NetBackup supports, and the corresponding operating systems for each.

**Table 3-3** Versions VxFS and VxVM Currently Supported by Veritas NetBackup

Operating System	OS Version	Version of VxFS	Version of VxVM
AIX 5L	5.1 (32/64 bit)	VxFS 3.4.2 or higher <sup>1</sup>	VxVM 3.2 or higher <sup>1</sup>
	5.2 (32/64 bit)	VxFS 3.4.2 or higher <sup>1</sup>	VxVM 3.2 or higher <sup>1</sup>
	5.3 (32/64 bit)	VxFS 3.4.2 or higher <sup>1</sup>	VxVM 3.2 or higher <sup>1</sup>
HP-UX	11.0	VxFS 3.3 or higher <sup>1</sup>	VxVM 3.1 or higher <sup>1</sup>
	11i v1 (11.11)	VxFS 3.3 and 3.5 or higher <sup>1</sup>	VxVM 3.1, 3.2, and 3.5 or higher <sup>1</sup>
	11i v2 (11.23)	VxFS 3.3 and 3.5 or higher <sup>1</sup>	VxVM 3.1, 3.2, and 3.5 or higher <sup>1</sup>
Red Hat Enterprise Linux	2.1 Intel x86 Intel IA-32	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	3.0 Intel x86 Intel IA-32	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
ES/AS	3.0 Intel x86 AMD64 / EM64T	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	4.0 Intel x86 Intel IA-32	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	4.0 Intel x86 AMD64 / EM64T	VxFS 3.4 update 1 or higher <sup>1,2</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	3.0 for X64	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	4.0 for X64	VxFS 3.4 update 1 or higher <sup>1,2</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	3.0 Intel Itanium IA-64	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	4.0 Intel Itanium IA-64	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	Red Hat Enterprise Linux WS	2.1 Intel x86	VxFS 3.4 update 1 or higher <sup>1</sup>
	3.0 Intel x86	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	4.0 Intel x86	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
Solaris (SPARC)	8	VxFS 3.4, 3.5, and 4.0 or higher <sup>1</sup>	VxVM 3.1, 3.2, 3.5, and 4.0 or higher <sup>1</sup>
	9	VxFS 3.5, 4.0, and 4.1 or higher <sup>1</sup>	VxVM 3.5, 4.0, and 4.1 or higher <sup>1</sup>
	10	VxFS 4.1 or higher <sup>1</sup>	VxVM 4.1 or higher <sup>1</sup>

**Table 3-3** Versions VxFS and VxVM Currently Supported by Veritas NetBackup

Operating System	OS Version	Version of VxFS	Version of VxVM
SuSE Linux Enterprise Server	SLES8 for x86 Intel IA-32	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	SLES8 for x86 AMD64 / EM64T	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	SLES9 for x86 Intel IA-32	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	SLES9 for x86 AMD64 / EM64T	VxFS 3.4 update 1 or higher <sup>1,2</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	SLES8 for x64 AMD64 / EM64T	VxFS 3.4 update 1 or higher <sup>1</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
	SLES9 for x64 AMD64 / EM64T	VxFS 3.4 update 1 or higher <sup>1,2</sup>	VxVM 3.2 update 1 or higher <sup>1</sup>
Windows 2000 and 2003		--	VxVM 3.1HF3 (Hot Fix 3)

1. Snapshot Client only supports VxFS and VxVM 4.0 and later on these platforms.
2. If running VxFS 5.0 it is necessary to apply VxFS 5.0 MP1-RP1 to ensure proper NetBackup client operation.

**Note:** NetBackup has improved its integration with the Veritas File System (VxFS) product to ensure interoperability on all supported VxFS versions. If running a VxFS version prior to VxFS 4.0 then new VxFS libraries need to be installed on the client in order to backup systems running VxFS.

You must download the appropriate VxFS libraries to your system using the Symantec support web site. Use the procedure described in TechNote number 262225 to guide you through this process.

**Table 3-4** Improved Integration with Veritas File System (VxFS)

Operating System	OS Version	VxFS 5.0	VxFS 4.1	VxFS 4.0	VxFS 3.5	VxFS 3.4	VxFS 3.3
AIX	5.2	X	NA	NA	NA	NA	NA
	5.3	X	NA	NA	NA	NA	NA



**Table 3-4** Improved Integration with Veritas File System (VxFS) (continued)

Operating System	OS Version	VxFS 5.0	VxFS 4.1	VxFS 4.0	VxFS 3.5	VxFS 3.4	VxFS 3.3
HP-UX	11.0	NA	NA	NA	NA	NA	X
	11i v1 (11.11)	NA	NA	NA	X	NA	X
	11i v2 (11.23)	X	NA	NA	X	NA	X
Red Hat Enterprise Linux ES/AS	4.0 Intel x86 Intel IA-32	X	NA	NA	NA	NA	NA
	4.0 Intel x86 AMD64 / EM64T	X	NA	NA	NA	NA	NA
	4.0 for X64	X	NA	NA	NA	NA	NA
SuSE Linux Enterprise Server	SLES9 for x86 Intel IA-32	X	NA	NA	NA	NA	NA
	SLES10 for x86 Intel IA-32	X	NA	NA	NA	NA	NA
	SLES9 for x86 AMD64 / EM64T	X	NA	NA	NA	NA	NA
	SLES10 for x86 AMD64 / EM64T	X	NA	NA	NA	NA	NA
	SLES9 for x64 AMD64 / EM64T	X	NA	NA	NA	NA	NA
	SLES10 for x64 AMD64 / EM64T	X	NA	NA	NA	NA	NA
Solaris (SPARC)	8	NA	NA	X	X	X	NA
	9	NA	NA	X	X	NA	NA
	10	X	X	NA	NA	NA	NA



# Operational Notes

The following notes explain important aspects of NetBackup 6.5 operations that may not be documented elsewhere in the NetBackup documentation set. For additional operational note information about this release, you can refer to an online PDF titled, NetBackup 6.5 Additional Operational Notes contained in TechNote number 288211 on the Symantec support web site. This TechNote contains the latest information relating to this product release.

<http://entsupport.symantec.com/docs/288211>.

In addition, Symantec has supplied a Release Impact Bulletin that contains other NetBackup 6.5 information that is aimed at helping our customers prepare to install or upgrade this product.

<http://entsupport.symantec.com/docs/288210>.

---

**Note:** References to UNIX also apply to Linux, unless otherwise stated.

---

## NetBackup installation and start-up notes

The following items offer additional information that may help you install NetBackup or use NetBackup after you have installed the product.

### NetBackup CD-ROM and rebranding changes

- All UNIX clients are no longer present on every server CD, they are on a separate CD. Each server package now only contains the client types that belong to that server's hardware class. To load additional UNIX clients on a server, the user must install them from the new UNIX Client CDs.
- Permissions have been changed so that in most cases a root user may install from UNIX NetBackup CD images mounted via NFS.
- A duplicate definition of a Linux client is no longer being created.

Symantec has been providing a duplicate definition for Linux clients. This allowed the user to define a client as INTEL/RedHat2.4 or Linux/RedHat2.4. The ability to do this was removed in NetBackup 6.0. Existing client definitions will remain unchanged.

---

**Note:** Symantec suggests you update any existing policies containing clients configured as "INTEL RedHat2.4" to "Linux RedHat2.4".

---

- All compressed files are compressed using gzip. The installation of these files requires that gunzip, as well as gzip, be installed on the machine before NetBackup is installed. For all UNIX platforms, except HP-UX, the binaries are expected to be in /bin or /usr/bin and that directory is expected to be part of the root user's PATH variable. On HP-UX, the gzip and gunzip commands are expected to be in /usr/contrib/bin. Installation scripts will add that directory to the PATH variable. These commands must be present to have successful UNIX installations.
- AIX BMR Boot Server System Startup Script Name Changed  
Due to the rebranding of "VERITAS" products to Symantec, the name of the file, /etc/rc.bmrbd.veritas has been changed to /etc/rc.bmrbd.netbackup. The /etc/inittab file will be updated accordingly when the BMR Boot Server package is installed.  
Refer to the *NetBackup Bare Metal Restore Administrator's Guide* for more information.
- AIX NetBackup System Startup Script Name Changed  
Due to the rebranding of "VERITAS" products to Symantec, the name of the file /etc/rc.veritas.aix has been changed to /etc/rc.netbackup.aix.  
If local modifications have been made to /etc/rc.veritas.aix, you should evaluate them and move pertinent changes to the new file name.  
If /etc/inittab was previously updated to contain an entry for /etc/rc.veritas.aix, that entry should be deleted and a new entry for /etc/rc.netbackup.aix should be added.  
Refer to the *NetBackup Installation Guide* for more information.
- The following are special instructions that provide clarification for installing NetBackup client software in Solaris 10 non-global zones.

---

**Note:** NetBackup server is supported only in a global zone. For more information, refer to TechNote 275107 on the Symantec Support Web site.

---

On a server whose non-global zone is not using a read-only loopback device for the /usr directory, the client push-install or local install is done normally. Please see the appropriate installation guide.

On a server that:

- Does not have a master/media server on the global zone
- Has a sparse non-global zone using a read-only loopback device for the `/usr` directory

The procedure is:

- a** In the global zone, create `/usr/opencv` as a symbolic link to the location in which you will be installing the software to in the non-global. This will need to be done even if the global zone does NOT have that directory.

For example:

```
# ln -s /nonglobdir/opencv /usr/opencv
# ls /nonglobdir/opencv
/nonglobdir/opencv: No such file or directory
# ls -al /usr/opencv
rwxrwxrwx  1 root root 10 Aug 23 15:13
/usr/opencv -> /nonglobdir/opencv
```

- b** In the non-global zone, make sure that `/usr/opencv` exists as a link.

For example:

```
# ls -al /usr/opencv
rwxrwxrwx  1 root root 10 Aug 23 15:13
/usr/opencv -> /nonglobdir/opencv
```

- c** In the non-global zone, make sure that the directory linked exists and is writable.

For example:

```
# ls -al /nonglobdir/opencv
total 32
drwxr-xr-x  9 root bin 512 Aug 18 15:23 ./
drwxr-xr-x 18 root bin 512 Aug 18 15:30 ../
```

- d** Client push-install or local install can now be done normally according to guides.

On a server that:

- Has a master/media server installed on the global zone
- Has a sparse non-global zone using a read-only loopback device for the `/usr` directory

The procedure is:

- a** In the global zone, the `/usr/opencv` in a default installation is a link to `/opt/opencv`. Alternatively, the master or media server can be installed in a BASEDIR other than the default `/opt`, and `/usr/opencv` can be

linked to `/BASEDIR/openv`. In either case, verify the directory linked to by `/usr/openv`.

For example:

```
# ls -al /usr/openv
rwxrwxrwx  1 root other 10 Aug 18 11:39
/usr/openv -> /opt/openv/
```

- b** In the non-global zone, create a writable directory where the `/usr/openv` points to.  
For example:  

```
# mkdir /opt/openv
```
- c** Client push-install or local install can now be done normally according to guides.

## General installation items

- Upgrading to NetBackup 6.5 from a previous version of NetBackup:
  - For more information about upgrading NetBackup from 5.x to 6.5, go to the Symantec Support Web site, <http://entsupport.symantec.com> and click on the **NetBackup Enterprise Server** link. The next page that appears includes a Hot Topics section that provides a link to a **NetBackup Upgrade Portal**. Click on the upgrade portal link and following the procedures described in the linked documents at that Web site to ensure a successful upgrade.
  - For more information about upgrading NetBackup 6.0 to 6.5, refer to the *NetBackup Installation Guide* for your operating system. The upgrade section contain various mixed-version scenarios and how they must be upgraded to this version of NetBackup. However, the general rules for a mixed-server environment are as follows:
- In a future release, it may be required that clients connect to the master server in order to complete an installation.
- Symantec recommends the following updates when running on Windows Operating Systems:
  - Microsoft updates
    - Microsoft storport hotfix. This fix applies to Windows x86 and x64, on both SP1 and SP2: (required)  
<http://support.microsoft.com/?id=932755>
    - Microsoft microcode reliability update. This fix applies to 32-bit and 64-bit versions of Windows Server 2003, Windows XP, and Windows Vista: (suggested)  
<http://support.microsoft.com/?kbid=936357>

- Symantec updates
  - Symantec AntiVirus. Update to latest version (10.2 for Corporate Edition) and latest update (required).
  - SYMEVENT driver updates (required). Update to latest driver version.
- Other Third-Party updates
  - QloQLA2340 Q\*Logic HBA driver 9.1.4.15 (required)  
[http://support.qlogic.com/support/oem\\_product\\_detail.asp?p\\_id=253&oemid=65&oemname=QLA2340](http://support.qlogic.com/support/oem_product_detail.asp?p_id=253&oemid=65&oemname=QLA2340)
  - QLA2340 Q\*Logic HBA BIOS 1.47 (required)  
[http://support.qlogic.com/support/oem\\_product\\_detail.asp?p\\_id=253&oemid=65&oemname=QLA2340](http://support.qlogic.com/support/oem_product_detail.asp?p_id=253&oemid=65&oemname=QLA2340)
  - All other Q\*Logic HBA's use latest driver & BIOS (suggested)  
[http://support.qlogic.com/support/oem\\_product\\_list.asp?oemid=65](http://support.qlogic.com/support/oem_product_list.asp?oemid=65)
- A new script named, `/usr/opensv/netbackup/bin/bp.start_all`, is available with NetBackup 6.5. Symantec recommends that you use `bp.start_all` to start all NetBackup server and client daemons. The `netbackup/goodies` script is the UNIX NetBackup server system startup script and it does not start all of the possible NetBackup daemons.
- The default shared memory requirements on UNIX systems are greater for NetBackup 6.5 than for previous releases. For additional information regarding shared memory requirements, refer to the *NetBackup Installation Guide for UNIX and Linux*, and the *NetBackup Troubleshooting Guide for UNIX, Windows, and Linux*.
- Beginning with the NetBackup 6.0 release, `NetBackup\bin` is no longer added to the Path environment variable on Microsoft Windows systems. If you use scripts that depend on that path, you must modify them so they use the complete path to commands in the `NetBackup\bin` directory. Symantec recommends that you do not include `NetBackup\bin` in the Path environment variable; it may conflict with other Symantec products.
- At the next major release that follows NetBackup 6.5, the NetBackup binaries for certain AIX, HP9000 PA-RISC, Solaris SPARC, and Linux x86 machines are going to be built as 64-bit binaries only. For detailed information about which machines are affected, refer to the “[Platform support matrix for the NetBackup enterprise server and NetBackup server](#)” on page 28 in this document.  
If you have a 32 and 64-bit OS bootable machine and the machine is booted in 64-bit mode, NetBackup will install and run as designed. If you run the machine in 32-bit mode only, then NetBackup will not install.

- Symantec recommends that you have the master server services up and available during a media server upgrade.
- When installing Windows 2000 systems and non-plugin-n-play tape class drivers are installed, you must reboot the system before the fiber transport device discovery will detect those devices.

- **NetBackup Client System Startup/Shutdown Scripts**

In NetBackup 6.5, installation of the Bare Metal Restore Boot Server product put a system startup/shutdown script for it in the proper OS location. Links for the K (shutdown) and S (startup) scripts were then created. For example:

- **AIX**  
`/etc/rc.bmrbd.veritas`
- **HP**  
`/sbin/init.d/rc.bmrbd`  
`/sbin/rc0.d/K001bmrbd`  
`/sbin/rc2.d/S951bmrbd`
- **Linux (Red Hat)**  
`/etc/rc.d/init.d/rc.bmrbd`  
`/etc/rc.d/rc0.d/K01bmrbd`  
`/etc/rc.d/rc6.d/K01bmrbd`  
`/etc/rc.d/rc2.d/S95bmrbd`  
`/etc/rc.d/rc3.d/S95bmrbd`  
`/etc/rc.d/rc5.d/S95bmrbd`
- **Linux (SLES)**  
`/etc/init.d/rc.bmrbd`  
`/etc/init.d/rc0.d/K01bmrbd`  
`/etc/init.d/rc6.d/K01bmrbd`  
`/etc/init.d/rc2.d/S95bmrbd`  
`/etc/init.d/rc3.d/S95bmrbd`  
`/etc/init.d/rc5.d/S95bmrbd`
- **Solaris (SPARC)**  
`/etc/init.d/rc.bmrbd`  
`/etc/rc0.d/K01bmrbd`  
`/etc/rc2.d/S95bmrbd`

In NetBackup 6.5, the NetBackup client now has its own system startup/shutdown script called `nbclient` and the separate Bare Metal Restore Boot Server script has been eliminated and moved into the `nbclient` script. The installation of the NetBackup 6.5 Bare Metal Restore Boot Server product will clean up the old files.



For the NetBackup client script, the numbers and file locations listed above are the same except the string `bmrbd` is replaced by `nbclient`.

- Possible `pkgrm` failure on Solaris servers  
On solaris servers that have NetBackup 5.1MP4 (or higher) or NetBackup 5.0MP6 (or higher) patches installed, you may encounter the following messages when executing `pkgrm VRTSnetbp`:  
`pkgrm: ERROR: preremove script did not complete successfully ...`  
`Removal of <VRTSnetbp> partially failed.`  
Please execute the following command and then retry the `pkgrm` command:  
`rm -f /usr/opensv/netbackup/bin/driver/snapct110_x`  
`pkgrm` should be successful.
- NetBackup 6.5 contains features that are dependent on a new Infrastructure Core Service (ICS) product called, Veritas Private Branch Exchange (PBX). PBX helps limit the number of TCP/IP ports used by many new features in NetBackup. In addition, it allows all socket communication to take place while connecting through a single port. Refer to the NetBackup Installation Guide for instructions on how to install this product.
- Symantec recommends that all customers running HP-UX 11.23 install the patch (PHCO\_33431). It is possible that without first installing this patch, customer running on systems using an updated version of 11.23 may fail the installation procedure of NetBackup.
- Port usage for NetBackup  
Network administrators need to open a PBX port in following directions for backup and restore jobs finish successfully.
  - Master (EMM host) server...to...PBX port...to...the Media server
  - Media server...to...PBX port...to...Master (EMM host) serverA PBX port needs to be opened in both directions between master and media servers.
- In NetBackup 6.0, the scan utility on UNIX only resides in `/usr/opensv/volmgr/bin/scan` and no longer resides in `/usr/opensv/volmgr/bin/goodies/scan`.  
For Windows, the scan utility only resides in `install_path\volmgr\bin\scan.exe`.
- Mac OS X 10.2 and later has the capability to use `/etc/services` in addition to NetInfo services. Previous to NetBackup 6.0, the client pushing scripts added the NetBackup port numbers to the NetInfo services. As of NetBackup 6.0, the client pushing scripts are changed to check for NB entries `/etc/services` first, then NetInfo. If entries are not found in either

place, `/etc/services` is updated. If entries are found in either location, no changes are made.

The Apple supplied `/etc/services` file for Mac OS X 10.3 includes NetBackup service entries. If you installed a NetBackup pre-6.0 client on a Mac OS X 10.3 or later system, it's possible that NetBackup entries for `bprd`, `bpcd`, `vopied`, `vnetd` and `bpjava-msvc` may exist in both `/etc/services` and `NetInfo`. This is not harmful, but you may delete the `NetInfo` entries if they also exist in `/etc/services`.

- UNIX media servers are now allowed to push NetBackup client software and database agents to a client using the `-ClientList` option on the `update_clients/update_dbclients` commands. Previously, only master servers could push software. This feature also applies to pushing NetBackup UNIX add-ons such as Snapshot Client and Encryption. Refer to the appropriate product's Administrator's Guide for more information.
- In most cases, UNIX installation trace files are written to directory `/usr/opensv/tmp` in addition to the `/tmp` directory.
- A local UNIX client install attempts to provide defaults for the server and client name. If a `bp.conf` file already exists, the first `SERVER` entry will be the default server name and the existing `CLIENT_NAME` will be the default client name. If `bp.conf` does not exist, the user is prompted for the server name and the value returned by the `hostname` command is used as the default for the client name. The user can override both of these defaults.
- Previously, the client binaries in directories `/usr/opensv/netbackup/client/<hw>/<os>` were stored as individual files. Now, most of those files are contained within a tar file compressed with `gzip`.
- On a UNIX initial NetBackup server install, a symbolic link is no longer created from `/usr/opensv/netbackup/client/Linux` to `/usr/opensv/netbackup/client/INTEL` or from `/usr/opensv/netbackup/client/SGI` to `/usr/opensv/netbackup/client/C910_920`. Any Linux clients configured using the `INTEL` hardware class or SGI clients configured using the `C910_920` hardware class should be changed to use the `Linux` and `SGI` hardware classes, respectively.
- The operating system may open a user interface window (for example, File Manager on a Solaris system,) when the CD-ROM is inserted into the drive. Symantec recommends that you do not use this window to install NetBackup products because unpredictable results may occur. Follow the installation instructions provided in the NetBackup 6.5 documentation set.

## General startup/shutdown notes

Processes like NBEMM, NBSTSERV and NBEVTMgr may stop when you attempt to start or stop services on the NetBackup master server using the bpup or bpdwn utility. This issue is known to occur only on configurations that have multiple remote media servers (more than 10) attached to a NetBackup master server along with a very large amount of data (more than 60,000 jobs in NetBackup's database). The items in the following lists describe the various impacts:

- If the nbemm process stops, there would be loss of data of multiple NetBackup components such as media, devices, storage units, and so forth (all the components that are dependant on EMM for data collection).
- If nbstserv stops it leads to mismanagement in Storage Lifecycle operations and scheduling of duplication jobs. In addition, other dependant functions like monitoring of disk capacity on capacity-managed volumes and the removal of older images when required might be hampered.
- If nbvtmgr stops, all dependant services like nbpem, nbsl, nbrmms, and nbemm go down. All related functionality might be hampered for these dependant services, and NetBackup may not be accessible through the user interfaces.

Killing the related service manually (SCM) and restarting might resolve the issue, however it is not always known to work.

## NetBackup LiveUpdate

NetBackup LiveUpdate is not compatible with Open VMS (UNIX), Novell, or Windows Vista operating systems. In addition, it is not supported with Tru64 Trucluster.

## Secure push install

The new installation methods (ssh and sftp) of pushing UNIX client software from a UNIX master server to a UNIX client host consist of running the `install_client_files` script on the command line. Both of these methods are based on the usage of SunSSH and OpenSSH products that must be at specific version and patch levels. For more information about these patches, refer to Table 3-1 in Chapter 3, NetBackup product dependencies.

## NetBackup cluster

- For VCS Windows (SFW-HA 4.1, SFW-HA 4.2), Symantec recommends that users make sure patch 278307 is installed prior to installing or upgrading to

NetBackup 6.5. The patch is available at <http://entsupport.symantec.com/docs/278307>

- When launching the NetBackup Administration Console, Symantec recommends that you login to the server using the virtual name associated with NetBackup.
- With the need for increased security, it is becoming critical to be able to configure NetBackup with Access Control (NBAC) in a clustered NetBackup server environment. Refer to the following TechNote on the Symantec Support Web site for detailed instructions on how to configure NBAC in a clustered environment.  
<http://entsupport.symantec.com/docs/288471>
- When configuring disk storage units, only basic disk supports the use of application clusters. When configuring disk pools or storage servers, application clusters are not supported.
- After installing or upgrading NetBackup on UNIX clusters other than Suncluster, the NetBackup resource offline timeout should be increased to at least 600 seconds.
- When installing or upgrading NetBackup on Sun Clusters, to ensure successful failover/switchover of the NetBackup resource group, Symantec recommends the following changes to the NetBackup resource group tuning parameters:
  - Increase the STOP\_TIMEOUT parameter from the default of 300 seconds to at least 600 seconds.
  - Set the pmf Retry\_count parameter to 0.

These changes can be accomplished using the following commands. Note that running these commands will cause shutdown and restart of NetBackup.

```
# scrgadm -c -j scnb-hars -y Retry_count=0
# scrgadm -c -j scnb-hars -y STOP_TIMEOUT=600
# scswitch -n -j scnb-hars
# scswitch -e -j scnb-hars
```

## NetBackup licenses

The license key for each system is entered when the software is installed. In this release of NetBackup, the summary of the active capacity-based licensed features does not display all values for the OpenStorage Disk Option, the PureDisk Storage Option, and the Virtual Tape Option at this time.

## NetBackup client

- When you install NetBackup 6.5 client on a cluster system, such as a clustered Exchange server or a clustered SQL server, you may encounter an error message (an access violation) stating that there is an exception that is not handled in the VCSAgDriver.exe executable. NetBackup is not a user of this driver.

According to <http://entsupport.symantec.com/docs/247403>, the Veritas Cluster Server Lanman resource is a user of VCSAgDriver.exe.

When using NetBackup, you can ignore the error message and continue to use the NetBackup Client features. However, for this release, NetBackup cannot warrant the operability of the Veritas Cluster Server.

- CLIENT\_NAME changes  
UNIX initial NetBackup server installations now always have a CLIENT\_NAME entry in bp.conf (previously media servers did not). The CLIENT\_NAME entry matches whatever the user entered for the local SERVER entry EXCEPT if a virtual name was entered. In that case, whatever the hostname command returns is what is used for the CLIENT\_NAME. (Previously, the master server CLIENT\_NAME entry was equal to the hostname minus any domain name.)  
For restores to work like one would expect, the client name specified in a backup policy must match the name specified by CLIENT\_NAME.

---

**Note:** UNIX upgrade installations do not change an existing CLIENT\_NAME entry.

---

## NetBackup Documentation Notes

The following information should be considered as part of the NetBackup 6.5 documentation set.

- An additional item needs to be added to the NetBackup catalog recovery procedures section within the *NetBackup Troubleshooting Guide for UNIX, Windows, and Linux*. The following text should be considered as an additional bulleted item and belongs with the bulleted list contained in the subsection, “Before starting”.
  - Freeze the cluster before stopping the services. Stopping the services causes a failover.
- Additional error codes have been created for a NetBackup SharedDisk. For detailed information about these errors codes, refer to the following TechNote on the Symantec Support Web site.  
<http://entsupport.symantec.com/docs/288177>

- Changes to the Storage Lifecycle Manager

Two additional parameters were added in the `LIFECYCLE_PARAMETERS` file and were omitted from the NetBackup Administrator's Guide. The following parameters enable a systems administrator to fine-tune how the Storage Lifecycle Manager (`nbstserv`) runs duplication jobs.

In addition, three other parameters were documented using the wrong units of measure. The following accurately describes the parameters and uses the proper units of measure.

### Optional duplication job configuration

The NetBackup administrator can customize how the NetBackup Storage Lifecycle Manager (`nbstserv`) runs duplication jobs. The `nbstserv` default values work well for most environments. However, to change the values, the administrator must create a file named `LIFECYCLE_PARAMETERS` and save it in the following location:

UNIX:

```
install_path\NetBackup\db\config
```

Windows:

```
/usr/opensv/netbackup/db/config
```

The following parameters can be included in the `LIFECYCLE_PARAMETERS` file:

- `DUPLICATION_SESSION_INTERVAL_MINUTES`

This parameter indicates how frequently `nbstserv` starts a duplication session. During a duplication session, NetBackup looks for completed backups on backup storage destinations and decides whether or not it is time to start a new duplication job. Default: 5 minutes. Minimum: 1 minute.

Syntax: `DUPLICATION_SESSION_INTERVAL_MINUTES 5`

- `IMAGE_EXTENDED_RETRY_PERIOD_IN_HOURS`

All copies must be completed in a lifecycle. If necessary, NetBackup initially tries three times to duplicate an image to a duplication destination. This prevents NetBackup from retrying too frequently. If, after three tries, the copy is still unsuccessful, this parameter indicates how long NetBackup waits before an image copy is added to the next duplication job. (The frequency is determined by the `DUPLICATION_SESSION_INTERVAL_MINUTES` parameter.)

The NetBackup administrator may need more than two hours (the default) to solve the problem. Alternatively, the administrator can temporarily de-activate a lifecycle using `nbstlutil`. Default: 2 hours. Minimum: 1 hour.

Syntax: `IMAGE_EXTENDED_RETRY_PERIOD_IN_HOURS 2`

The following three parameters help the lifecycle to run duplication jobs as efficiently as possible. To prevent the lifecycle from running numerous small duplication jobs in frequent succession, NetBackup accumulates lists of similar images into a batch. Then, each batch of images is copied as a set in one duplication job, instead of one image at a time.

The NetBackup administrator can adjust how large the batch can become, or adjust how frequently batch jobs are requested.

- **MIN\_KB\_SIZE\_PER\_DUPLICATION\_JOB**

This parameter indicates the size that the batch of images should reach before one duplication job is run for the entire batch.

The lifecycle does not request a duplication job until either:

- the aggregate size of the images in a batch reaches the minimum size as indicated by `MIN_KB_SIZE_PER_DUPLICATION_JOB`, or
- the `MAX_MINUTES_TIL_FORCE_SMALL_DUPLICATION_JOB` time has passed. This parameter determines the maximum time between batch requests.

Default: 8192 kilobytes.

Syntax: `MIN_KB_SIZE_PER_DUPLICATION_JOB 8192`

- **MAX\_KB\_SIZE\_PER\_DUPLICATION\_JOB**

This parameter determines how large the batch of images is allowed to grow. When the size reaches the size as indicated by this parameter, no more images are added to the batch. Default: 25600 kilobytes.

Syntax: `MAX_KB_SIZE_PER_DUPLICATION_JOB 25600`

- **MAX\_MINUTES\_TIL\_FORCE\_SMALL\_DUPLICATION\_JOB**

If the minimum batch size is not reached by the time indicated by this parameter, the lifecycle requests a duplication job, regardless of the size. Default: 30 minutes.

Syntax: `MAX_MINUTES_TIL_FORCE_SMALL_DUPLICATION_JOB 30`

These parameters will be included in the NetBackup Administrator's Guide at the next major release.

- The `nbfirescan` and the `nbshreddisk` commands in the NetBackup Commands documents (UNIX and Windows) and the man pages contain an incorrect paths. In addition, the `nbshreddisk` command The following changes should be noted for this release and will be incorporated into the next revision of the NetBackup documentation set and the online man page descriptions.
  - An incorrect path was given for the `nbfirescan` command in the online man page and the NetBackup Commands documents for UNIX and Windows.

- The UNIX path should be,  
`/usr/opensv/netbackup/bin/nbfirescan` instead of  
`/usr/opensv/bin/admincmd/firescan`.
- The Windows path should be,  
`%CommonProgramFiles%\Symantec Shared\VxFI\4\Bin`  
instead of  
`install_path\NetBackup\bin\admincmd\firescan`.
- An incorrect path was given for the `nbshreddisk` command in the online man page and the NetBackup Commands documents for UNIX and Windows.
  - The UNIX path should be,  
`/usr/opensv/netbackup/bin/admincmd/nbshreddisk`  
instead of `/usr/opensv/netbackup/bin/nbshreddisk`.
  - The Windows path should be,  
`install_path\NetBackup\bin\admincmd\nbshreddisk`  
instead of `install_path\NetBackup\bin\nbshreddisk`.
- The Name of the `nbshreddisk` command should state:  
`nbshreddisk - A utility that enumerates and formats array devices`
- The `nbshreddisk format` command description contains a few errors. The following is a corrected version of the `nbshreddisk format` command:  

```
nbshreddisk format -udid UDID##nn#nn##nn |  
-udid_file UDID_FileName [-fstype native | vxfs]  
[-novm] [-noPrompt]
```

Formats all specified devices to prepare them for use by SharedDisk. The format operation unmarks, partitions, formats, mounts, unmounts, then masks each device in the device(s). You can use format devices in a call to the `nbdevconfig` command to create a disk group. The `-udid` option formats only device `UDID##nn#nn##nn`, whereas the `-udid_file` option formats all devices that are listed in filename. The file must contain one or more UDIDs (unique device IDs) on separate lines. A valid line must contain a UDID## character string. `-fstype` is optional. This option specifies the filesystem with which to format a disk, valid options are "native" and "vxfs". Default is native filesystem. Windows does not use the `-fstype` suboption. It formats the device in a simple partition. `-novm` is optional. This option will ensure that file-system is created on raw partition. For file-system vxfs SharedDisk does not support this option. `-noPrompt` is optional. This option will ensure that no confirmation is asked during format operation.



- The following command should state the following:  
`online UDID##nn#nn##nn | -udid_file filename`  
Masks the LUN to grant it local host access, then detects the file system type and attempts to mount the file system.

## Internationalization and localization Notes

- After installing NetBackup (or any add-on products such as BMR) on UNIX and Linux systems, you must stop and start the NetBackup daemons (including daemons for any add-on products) in the native locale shell. NetBackup installation starts some of the daemons in the C locale, which may not be the desired locale.
- Starting with NetBackup 6.0, the following Internationalization support levels were provided.
  - Level 1: English support  
NetBackup operates in English in native operating systems. The operating system runtime LC\_CTYPE can be in one of the native encodings for NetBackup. Users can select English files and directory names for backup and restore, across all major platforms. The contents underneath the selected directories can be in any multibyte characters. (All user inputs are English.)
  - Level 2: Homogeneous encoding support  
NetBackup operates in one native encoding. The operating system runtime LC\_CTYPE can be in one of the supported native encodings. User inputs are in the same encoding of LC\_CTYPE. (Limited support for this in this release.)
    - Level 2.1: UNIX Heterogeneous platform support
      - Level 2.1.1: File and directory name  
NetBackup operates in one native encoding in native operating systems. File and directory names can be multi-byte characters in backup and restore selections, across UNIX heterogeneous platforms.
      - Level 2.1.x: Other user inputs (NetBackup Entities / NetBackup Object Names)  
This level is not supported in this release of NetBackup. NetBackup entity user inputs are limited to English at this release.

## NetBackup Bare Metal Restore

- You can upgrade to NetBackup 6.5 only from NetBackup 6.0. The older standalone BMR product (BMR 4.7) cannot be directly upgraded to NBU 6.5, but it can be migrated to NBU 6.5 in a deliberate fashion.  
BMR 4.7 clients can operate with NetBackup 6.5 servers. So you can install NetBackup BMR 6.5 while your 4.7 version of BMR continues to protect your clients.  
To migrate from BMR 4.7, refer to the, *Upgrading and migrating from older BMR versions*, section in the *NetBackup™ Bare Metal Restore™ Administrator's Guide*.
- BMR does not work with the Encryption option of NetBackup.
- After a dissimilar system restore on a Microsoft Windows system, networking is not configured until an administrator logs in to the system. Before the login, Windows may try to reach Active Directory servers, which may delay the appearance of the Windows login prompt.
- After a Windows Fast Restore, a second CD-RW Drive may be listed as a, "Local Disk" in the Window Explorer. The workaround, is to uninstall and reinstall the device from the Windows device manager.
- The Windows Fast Restore feature requires a DNS server to be able to resolve the client and Servers.
- In cases where EMC PowerPath software is running on the original client, BMR can only support the restoration of a client back onto the original hardware. BMR does not support restoring the Remote Installation Folder location of an RIS Server. An RIS Server may be restored using the System Only feature or editing the client configuration, and removing the volume used for the Remote Installation Folder location from the map.
- Windows 2003 Service Pack 2 (2003 SP2) can not be used in a legacy style Shared Resource Tree (SRT). Systems running Windows 2003 SP2 may be restored with the new BMR Windows FastRestore method, or if the Legacy method is required, an SRT using 2003 SP1, or 2003 base must be used.

## General NetBackup operational notes

- An upgrade to Sybase ASA 9.0.2 has been made in NetBackup 6.5. However, there is a restriction within that version that requires the database server name to be less or equal to 31 characters. The database server name cannot exceed 31 characters. NetBackup has been modified to change the server name, found in `/usr/openv/db/bin/servername`, from

*VERITAS\_NB\_hostname.domain\_name* to *NB\_hostname* and trimmed to 31 characters if needed.

- An Instant Recovery restore will fail when attempting to restore a raw partitioned data file, if the device path is a symbolic link.
- After starting NetBackup, the directory, */opt/VRTSnbu/var/global* should be created. An issue currently exists that causes this directory to not be created, and results in an NBSL core dump. To resolve this issue, manually create the directory before starting NetBackup.
- When backing up and restoring a RedHat Security-enhanced Linux (RH SEL) system with extended attributes (EAs) disabled and the access control lists (ACLs) enabled, any file with ACLs will cause the restore to complete with “partially successful” status. This is due to the RH SEL system always returning the ACLs as EAs.

To back-up and restore ACLs on a RH SEL volume, you must have “user\_xattr” enabled in the mount parameters; the “acl” mount parameter setting will have no effect.

- A logic error had been identified and corrected in daemons that run on Veritas NetBackup master, media, and client servers. Successful access to and manipulation of this logic error could potentially lead to arbitrary command execution with elevated privileges on a vulnerable system. For customers who need to back out this patch and want to automate the down-rev process on their clients using the *update\_clients* script can contact Support to obtain a revised *bpinst* file for their respective version. The following scenarios do NOT require a new *bpinst* from Support:
  - If you are downgrading to 50MP7 or higher, 51MP6 or higher, or 6.0MP4 or higher.
  - If you are running Windows on your server.
  - If you are only downgrading any of the following add-ons:
    - DB agents (DB2, Lotus Notes, Oracle, SAP, Sybase, or Informix)
    - Encryption (all key lengths)
    - Java
    - Snapshot Client
    - BMR master or BMR boot server
    - NDMP
    - Vault
    - GDM (5.x only)
    - Advanced Reporter (5.x only)
    - NetBackup Operations Manager (6.0 only)

- Storage Migrator
- Japanese or Chinese Language Packs
- The changes that have occurred in NetBackup between 5.1 version and NetBackup 6.x are great and in some cases invisible to the user. To help our users understand some of the product changes that have occurred, Symantec has identified the external\_\*.txt files and vnetd log directory that have either been renamed or moved from NetBackup 5.x to NetBackup 6.x.
  - The following Media Manager definition files have moved:  
In NetBackup 5.0 and 5.1, these files were located in the `/usr/opensv/share` directory on UNIX servers, and in the `install_path\NetBackup\share` directory on Windows servers. For NetBackup 6.0 and greater, these files are located in the `/usr/opensv/var/global` directory on UNIX servers and the `install_path\NetBackup\var\global` directory on Windows servers.
    - device\_mappings.txt
    - external\_densities.txt
    - external\_drivetypes.txt
    - external\_mediatypes.txt
    - external\_robotics.txt
    - external\_types.txt
  - The debug log directory for vnetd has moved for UNIX servers:  
In NetBackup 5.0 and 5.1, the debug log directory was `/usr/opensv/log/vnetd`. In NetBackup 6.x, the directory is `/usr/opensv/netbackup/logs/vnetd`. If the old directory exists and the new directory does not, vnetd will log to the old directory. If the old directory exists and the new directory exists, vnetd will log to the new directory.
  - Veritas File System (VxFS)  
Named data streams on HP-UX 11.23 systems running VxFS 4.1 and AIX systems running VxFS 4.0 are not backed up. The message “Unable to back up VxFS Named Data Streams, VxFS 5.0 or later required.” appears in the bpbkar log if verbose is set to 5 or greater in bp.conf.  
To resolve this issue, the following was added in the “Backup and restore of extended attribute files and named data streams” section in Chapter 4 of the *NetBackup Administrator’s Guide, Volume I for UNIX and Linux*.  
NetBackup clients must run:

- HP 11.23 running VxFS 4.1 or greater. Note: Access control lists (ACLs) are not backed up unless running VxFS 5.0 or greater.
- AIX running VxFS 4.0 or greater. Note: ACLs are not backed up unless running VxFS 5.0 or greater.
- Solaris SPARC 8, 9, 10 running VxFS 5.0 or greater
- Solaris SPARC 9, 10 running VxFS 4.0 or greater

This is in error. The text should read:

NetBackup clients must run:

- HP 11.23 running VxFS 5.0 or greater.
  - AIX running VxFS 5.0 or greater.
  - RHEL4 running VxFS 5.0 MP1-RP1 or greater.
  - SLES9 running VxFS 5.0 MP1-RP1 or greater.
  - Solaris SPARC 8, 9, 10 running VxFS 5.0 or greater
  - Solaris SPARC 9, 10 running VxFS 4.0 or greater
- When a large number of jobs are running simultaneously, Windows Open File Backup (WOFB) jobs may sometimes hang.
  - Support for the Windows Vista client is restricted to backing up and restoring files and folders.
  - Starting with NetBackup 6.0, a new `-x` option was added to `bpps`.  
`bpps` functions prior to NetBackup 6.0:
    - `bpps` with no options showed NetBackup processes only.
    - `bpps -a` showed NetBackup and Media Manager processes.New `bpps` function included in NetBackup 6.x:
    - `bpps -x` shows NetBackup and Media Manager processes (same as `-a`) plus some additional shared Symantec processes, such as `pbx_exchange`, `vxatd` and `vxazd`.
  - Backup jobs and all kinds of duplicate jobs (including vault, staging and synthetics) will be accounted for when determining the current concurrent job/drive count for the write side of the storage unit. The *Maximum Concurrent Write Drives* and the *Maximum Concurrent Jobs* storage unit attributes will apply to backup jobs and all kinds of duplicate jobs.
  - NDMP files restored to an alternate location are now restored in the same way as non-NDMP restores. The old restriction that required the destination path to end with the original path no longer applies. However, this applies only to NDMP V4. NDMP V2 and V3 remain unchanged.  
Also, if NetApp is used and DAR is not enabled, the old method will apply. This is because NetApp does not support the new method unless DAR is enabled.

- The NDMP tape server that controls the tape drive for backup jobs and a variety of duplicate jobs (including vault, staging, and synthetics) will match the NDMP host that is specified in an NDMP storage unit.
- NetBackup performs multi-streamed restores from multi-streamed backups if sufficient resources exist. For example, a multi-streamed backup sends separate images to separate tapes. A user requests to restore data from that backup. As long as there are sufficient tape drives to access the media, the data is restored concurrently from multiple images on multiple tapes.
- An image mode backup to a NearStore storage unit will not finish because the backup makes a second call for the same resource (the NearStore storage unit that is being used) and it does not appear to receive it. To resolve this issue, the concurrent jobs on the NearStore storage unit needs to be set to a high value (for example, 8).
- Unified logging in NetBackup 6.5 will display log messages in the time zone where the message was originally logged. For more information, see the following TechNote on the Symantec Support Web site.  
<http://entsupport.symantec.com/docs/287601>

## NetBackup access control

- If you are upgrading to NetBackup 6.5 from a previous version that has been configured to use NBAC, you should run the `bpnbat -login` command prior to running the upgrade procedure. During the upgrade, the installer connects to the AZ server and upgrade NBAC data. The user that is specified during `bpnbat -login` should therefore be a member of the `NBU_Security Admin` group. If the upgrade of NBAC data fails then a message will appear informing you that you must manually run `bpnbaz -Upgrade`. Prior to running this command, you must perform a `bpnbat -login`
- Symantec recommends that the NBAC `NBU_Security Administration` group never be modified.
- With the need for increased security, it is becoming critical to be able to configure NetBackup with Access Control (NBAC) in a clustered NetBackup server environment. The difficulty to configure VxSS in a VCS Windows environment has prompted the need to provide detailed steps to enable NBAC for a highly available NetBackup Master Server in a clustered environment. These procedures are available to the user in the following TechNote on the Symantec Support Web site.  
<http://entsupport.symantec.com/docs/288471>

- On a Windows system, a non-root NBU\_Admin member (in a NBAC configuration) is unable to perform a task (such as a restore) that the user should be able to perform.  
The following symptoms occur:
  - The destination client drop-down field is grayed out in the Backup, Archive, and Restore (BAR) user interface. Ad the destination client can only be the local machine.
  - A restore fails to recover some (or all) of the files with the message, “Access denied for restore of file”. This happens if:
    - The user does not have write permission on the destination of the restore.  
Or...
    - The file being restored was not readable by the user at that time that it was backed up.

To avoid this issue, make the non-root NBU\_Admin a member of the “Backup Operator’s” operating system group on Windows. Members of this group have the necessary privileges.

---

**Note:** The term “non-root” on Windows means “not an Administrator”.

---

## NetBackup database agents

The following subsections contain general notes associated with various databases agents that NetBackup supports.

### DB2 agent

The NetBackup DB2 Administrator’s Guide contains an error in the “Preparing the master server for an alternate restore” section of the document. Step 4 in that procedure should be removed. The same step should be added to the “Performing the alternate restore on the clients” section as the new Step 2.

In an effort to make this change more clear to our customer, you can view these procedures on the Symantec Support Web site. Refer to the following TechNote.

<http://entsupport.symantec.com/docs/288910>

### Lotus Notes agent

- Compression is supported only for Lotus Domino servers on Windows and not on UNIX. In addition, Windows compressed images are not restorable to Lotus Domino servers on UNIX.

- Requirements for Lotus r6.0.3 and Lotus r6.5.0 on Linux  
Support for Lotus R6.0.3 and Lotus R6.5.0 on Linux requires a hotfix to resolve the following SPR: SPR#JCHN5QVL3E (which addresses a transaction log recovery issue).  
Once the hotfix is installed on the Lotus Domino server, a change to the notes.ini file must be made in order for Domino to work properly with NetBackup.
  - a Add the following line to the end of the notes.ini file for each Domino partition:  
DEBUG\_SEMOP\_ERRNO0\_EINTR=1

---

**Note:** The last character in ERRNO0 is a zero.

---

- b Restart the Domino server partition  
The hotfix was integrated into the R6.5.1 and R6.0.4 releases. In these releases, customers need to set the flag DEBUG\_SEMOP\_ERRNO0\_EINTR in the notes.ini file. This flag allows retries to happen if and when the operating system returns an unexpected EINTR when LN is dealing performing semaphore operations. For additional information, refer to the following link:

<http://www-10.lotus.com/ldd/r5fixlist.nsf/Search?SearchView&Query=JCHN5QVL3E>

- Requirements for Lotus r6.0.3 or r6.5.0 on Solaris SPARC and AIX  
Support for Lotus R6.0.3 or R6.5.0 requires an IBM hotfix to address SPR# JCHN5QVL3E, which involves a transaction log recovery issue. This issue has been fixed in R6.0.4 and R6.5.1. For additional information, see:  
<http://www-10.lotus.com/ldd/r5fixlist.nsf/Search?SearchView&Query=JCHN5QVL3E>
- Requirements for Lotus r6 and r6.5 on Linux  
In addition to the requirement above, support for any version of Lotus R6 or R6.5 on Linux requires a change to the notes.ini file for Domino to work properly with NetBackup.  
For each Domino partition, perform the following steps:
  - a Add the following line to the end of the notes.ini file:  
DEBUG\_SEMOP\_ERRNO0\_EINTR=1  
(NOTE: The last character in ERRNO0 is a zero.)
  - b Restart the Domino server partition

---

**Note:** For Lotus R6.5.5, R7.0, and going forward, the setting in notes.ini file is not required.

---



- Requirements for Lotus r6.03 and Lotus r6.5.0 on Windows  
Support for Lotus R6.0.3 and Lotus R6.5.0 on Windows requires a combination hotfix to resolve the following two SPRs: SPR#THUR5LPPW9 (which addresses a file path syntax) and SPR#JCHN5QVL3E (which addresses a transaction log recovery issue).  
There is a single IBM hotfix available to address both issues. Previous Lotus hotfixes may need to be removed before installing this new combination hotfix. These issues have been fixed in R6.0.4 and R6.5.1. For additional information, see  
<http://www-10.lotus.com/ldd/r5fixlist.nsf/Search?SearchView&Query=JCHN5QVL3E>  
and  
<http://www-10.lotus.com/ldd/r5fixlist.nsf/Search?SearchView&Query=THUR5LPPW9>

## SAP agent

When upgrading from NetBackup 5.x to NetBackup 6.5, refer to APPENDIX I of the NetBackup for SAP Administrator's Guide to ensure you have the latest information.

## NetBackup for Microsoft Exchange

The following list contains operational notes for the NetBackup for Microsoft Exchange database agent as they pertain to this release of NetBackup.

- Off-host snapshot backup of uncommitted logs  
In this release, selecting the "backup only uncommitted logs" option does not work when performing off-host snapshot backups. This will be resolved in the next release update.
- GUI initiation of an off-host snapshot backup  
When using the NetBackup Client GUI or the bpbbackup command to initiate an Exchange off-host alternate client backup, the backup will fail. Instead, use the NetBackup Administration Console to initiate a manual backup for that Exchange policy. See the "Testing Configurations Settings" section in the NetBackup for Exchange System Administrator's Guide for instructions regarding a manual backup operation.
- Concurrent restore of multiple storage groups  
When using multiple backup streams, i.e. one stream for each storage group, only the last storage group restored from the last restore job will be properly mounted. Recovery of the remaining storage groups will not be complete. Instead, take one of these corrective actions:

- If restoring from a snapshot backup, simply mount the unmounted storage groups.
- If restoring from a regular (non-snapshot) backup, restore the logs from the last backup set for each storage group individually. To avoid these steps, one could also restore the storage groups individually in separate restore operations.

- **Erroneous restore error message**

When performing a restore that does not mount the database, you can safely ignore errors similar to this in the tar32 log:

```
10:37:17.582 AM: [5424.7024] <2> ov_log::V_GlobalLog: ERR -  
bedsExchange2000Term():FS_DetachDLE() for '\\server\Microsoft  
Information Store\ShareG_2' Failed! (0xE000FEC1:A failure  
occurred performing the post-restore operation.)
```

Instead, rely upon the final restore operation status as reported in the Activity Monitor.

- **Restore of KMS or SRS**

For a restore of the Microsoft Key Management Service or Microsoft Site Replication Service, failure to remove the contents of the kmsdata or srsdata directory prior to initiating the restore may result in a corrupt database, even after a restore status 0.

- **Restoring Exchange in a Cluster**

When restoring data in an Exchange cluster environment, one must set the destination client value to be the virtual server name. If restoring an Exchange database using a NetBackup client-only installation on a cluster, it may not be possible to change the destination client value to match the virtual server name. In that case, use a NetBackup Client GUI on a NetBackup server to change the destination client value to the virtual server name.

- **Exchange 2007 Recovery Storage Group**

In NetBackup 6.5, the procedure for restoring to the Exchange 2007 recovery storage group (RSG) is to specify the RSG name as the redirected destination. In a future release, redirection to the RSG will be automated and will not require specifying a name.

- **Recovery of an Exchange 2007 Single Copy Cluster (CCR) environment**

The NetBackup Client Service must be running as a domain administrator or equivalent user on each node. Otherwise NetBackup will not be properly authorized to perform dismounts or restores.

- **Recovery of an Exchange 2007 Local Continuous Replication (LCR) environment**

Follow these steps when recovering an LCR environment. This process will be automated by NetBackup in a future release update.

- The powershell command `Suspend-StorageGroupCopy` must be issued for a storage group before restoring that storage group.
- After the restore is complete, you may need to re-seed the copy before resuming the copy. The database files, all log files and checkpoint files need to be removed from the copy location. The powershell command `Update-StorageGroupCopy` must be issued. Refer to “How to Seed a Local Continuous Replication Copy” for more information:  
<http://technet.microsoft.com/en-us/library/aa995973.aspx>
- The powershell command `Resume-StorageGroupCopy` must be issued to properly resume the copy.
- Refer to “Managing Local Continuous Replication” for more information:  
<http://technet.microsoft.com/en-us/library/aa998823.aspx>
- Recovery of an Exchange 2007 Clustered Continuous Replication (CCR) environment

Follow these steps when recovering a CCR environment. This process will be automated by NetBackup in a future release update.

- The NetBackup Client Service must be running as a domain administrator or equivalent user on each node. Otherwise NetBackup will not be properly authorized to perform dismounts or restores.
- A restore can only be directed to the active node.
- The powershell command `Suspend-StorageGroupCopy` must be issued for a storage group before restoring that storage group.
- After the restore is complete, you may need to re-seed the cluster copy before resuming the copy. The database files, all log files and checkpoint files need to be removed from the passive node. The powershell command `Update-StorageGroupCopy` must be issued from the passive node. Refer to “How to Seed a Cluster Continuous Replication Copy” for more information:  
<http://technet.microsoft.com/en-us/library/bb124706.aspx>
- The powershell command `Resume-StorageGroupCopy` must be issued to properly resume the cluster copy.

Refer to “Managing Cluster Continuous Replication” for more information:  
<http://technet.microsoft.com/en-us/library/aa997676.aspx>

## NetBackup for Microsoft SharePoint Portal

### General Setup

- The farm databases (configuration, single sign on, portal indexes) cannot be backed up via a policy enabled for document-level backup. For comprehensive farm disaster recovery, it is recommended that those databases be backed up via a separate policy with document-level backup disabled.
- When using document-level backup, the top-level folder of a site must contain at least 1 document. Otherwise, documents are not enumerated correctly for restore. This will be resolved in a release update.
- When using SharePoint load balancing, all load-balanced Web sites must be uniformly identified in IIS using either host headers or IP addresses, but not both. Environments which mix host headers and IP addresses across load-balanced servers are not supported.
- To prevent restore failures, the IIS Default Application Pool identity must be a valid SharePoint user id.
- At this time, NetBackup for SharePoint is not yet integrated with SQL Server environments running Veritas Cluster Server. VCS for SQL Server requires the use of SQL instance aliasing, which is not yet supported by NetBackup for SharePoint.

### Operational Issues

- When attempting to open multiple NetBackup Client Backup windows to browse SharePoint resources, the windows unexpectedly terminate. Instead, use a single client window to browse SharePoint resources for backup.
- When performing recovery of a load-balanced portal, only the first web front-end server is automatically extended and connected to the portal site. The other load-balanced servers must be manually extended and connected via the SharePoint Administrator Console.
- When the SharePoint Search Index service is updating databases, it sometimes contends with NetBackup for access to the portal index database. This can result in a failed backup or restore operation of that database. If this occurs, repeat the backup or restore operation until successful.

### Portal Recovery

- SharePoint recovery must be initiated from either a SharePoint front-end web server or the NetBackup master server.

- During a SharePoint portal recovery, there will be a 2 minute delay before the index database is restored. This allows previously restored databases to be committed.
- When restoring a backward-compatible document library store, the Microsoft Information Store service must be running.

## Document Restore

- Documents larger than 50MB fail to restore. Contact NetBackup Technical Support for a patch.
- Restoring a document is only possible when the backup image resides on a disk storage unit. If the desired image resides on tape, use the `bpduplicate` command to copy the image to disk storage.
- The NetBackup-Java Client user interface does not yet support browsing of SharePoint documents for restore. Instead, use the Windows Client user interface to restore documents.
- When restoring a document, it is safe to ignore certain `bprd` errors in the Activity Monitor similar to this:  

```
7/12/2007 11:01:39 AM - Error bpdm (pid=2928) did not receive  
EXIT STATUS from bprd, all blocks may not have been restored
```

Instead, rely upon the final status reported in the Activity Monitor to determine the true success or failure of the restore operation.

## SPSRecoveryAsst Command

- When using the `SPSRecoveryAsst` command to initiate a recovery, the specified parameters are case sensitive and must match the case as recorded in the NetBackup catalog.
- The start time (`-s`) and end time (`-e`) settings do not yet accept local time formats. These times must be formatted in UNIX-time (see [http://wikipedia.org/wiki/Unix\\_time](http://wikipedia.org/wiki/Unix_time)). See <http://unixepoch.com/> for one example of a UNIX-time conversion tool.
- To reduce catalog search times, the start time (`-s`) and end time (`-e`) should be specified when restoring the farm configuration database.

## Redirecting a Restore

- Restoring these objects to a location other than the original source is not yet supported:
  - A site in another farm (but to another site within the original farm is supported)

- Farm configuration database and single-sign-on database
- Portal index database
- A document
- When backing up a Windows Microsoft SQL Server 2000 Desktop Engine (WMSDE) database, attempting to restore that database to an alternate location is not supported because of a WMSDE limitation.

## SQL Server Agent

When using the NetBackup for SQL Server user interface on 64-bit platforms, the online help cannot be opened. This problem originates within the Windows 64-bit SDK and is expected to be resolved in a future release. Until then, open the help file directly using the Windows Explorer:  
install\_path\VERITAS\Help\nbmssql.chm.

# NetBackup interfaces

## NetBackup Administration Console for Windows

### General notes

- There is no support in the NetBackup Administration Console for Windows for administering pre-NetBackup 6.x servers.
- The Energy Policy Act of 2005 resulted in a change to the beginning and end of Daylight Savings Time (DST). These changes will take effect starting in March of 2007. Daylight savings time will begin at 2am local time on the second Sunday in March and end at 2am on the first Sunday in November. There are tools available from Sun, IBM, and HP to correct the time zone database in the Java Runtime Environment (JRE). Users will need to download and run this tool to update the NetBackup implementation of the JRE. No such tools are available for the Tru64 platform, for updating the timezone database. There is no updated JRE available for this platform with the DST fixes. So Tru64 will continue to have timezone issues for the NetBackup 6.5 release.  
For additional information and a workaround for this issue, see the following link on the Symantec Support Web site.  
<http://entsupport.symantec.com/docs/286497>.
- When logging errors from a 6.5 media server, NetBackup will store the errors in the Media log. In addition, NetBackup will also log the errors into

separate error logs so that you can view specific error types such as tape errors in Tape log report or disk errors in the Disk log report.

However, if you are attempting to log errors from a 6.0 media server or less, you can only view the errors in the Media log. NetBackup will not log the errors into separate error logs. Thus, selecting NetBackup Management > Reports > Tape reports > Tape logs, for example, will produce no result. The Tape log report will appear empty.

#### ■ Disk-based Data Protection Resources

The following items describe limitations with the disk-based data protection reporting in this release of NetBackup.

- Help for the Images On Disk report might not provide complete information at all times.
- Images On Disk report will not show data for a few columns (such as, Number of Files and Offset) for report on any disk type.
- The Disk Log report will not show information for the columns Schedule, Policy and Status for Disk based reports.

#### ■ NetBackup Administration Console for Windows - disk array host node

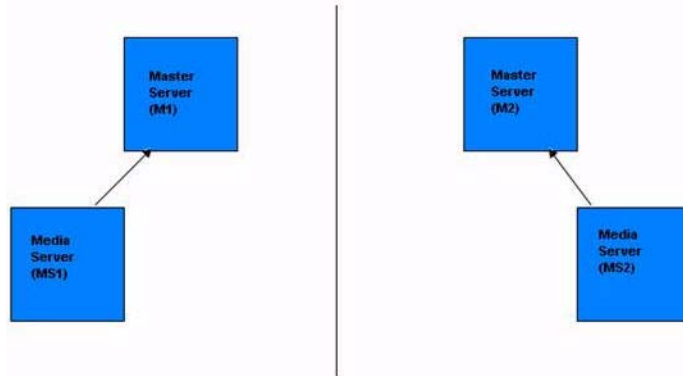
Sometimes when disk array host credentials are added or deleted, the user interface does not display the changes. (For example, newly added credentials may not be displayed and credentials that have been deleted may remain displayed when they should have been removed.) To resolve this issue, users must close NetBackup Administration Console and restart it.

You can be assured that the changes are being saved in the database, they are just not appearing in the user interface right away.

- The storage unit creation pages are not available in the Disk Pool wizard if the logged-in host is a media server. These pages are applicable only for a master server.
- A user cannot create a NearStore storage unit from NetBackup Remote Administration Console.
- The NetBackup Remote Administration Console does not display the properties of a BasicDisk storage unit path.
- To change a media server to another media server, the user must first change master servers. The following example explains the issue and the work-around.

Consider the configuration below. There are two master servers M1 and M2, each has one media server attached. Media server MS1 is attached to master server M1 and MS2 is attached to master server M2. The user cannot perform a change server from media server MS1 to media server MS2. To

resolve this issue, the user must first do a change server to master server M2 and then perform a change server to media server MS2.



- The storage unit user interface shows a blank field for the Capacity, Available Space, and percent full fields for the following storage units:
  - For a newly created storage unit for a NetBackup 6.5 media server, these fields will eventually populate
  - For OpenStorage storage units, these fields are currently not applicable
  - For storage units that are created for pre-NetBackup 6.5 media servers
- There are two different timeout variables that can be set in the Administration Console. The following two bullets describe these in detail.
  - A user can now set a time out value to the GUI\_CORBA\_LONG\_TIMEOUT parameter. This setting is present in HKEY\_LOCAL\_MACHINE\SOFTWARE\VERITAS\NetBackup\CurrentVersion.
 

The default timeout is 30 minutes. This timeout value is applicable in the following scenarios:

    - Scanning devices in the device configuration wizard
    - Saving scanned devices in the device configuration wizard
    - NetBackup Disk pool creation
    - Scanning for Disk Arrays in the Disk Pool wizard
    - NetBackup Disk Pool inventory (query) operation
    - NetBackup Disk Pool inventory commit operation
  - The user can now set a time out value to the GUIConnectTimeout parameter. This setting is present in the following registry location: HKEY\_LOCAL\_MACHINE\SOFTWARE\VERITAS\NetBackup\CurrentVersion.



The default timeout is 20 Seconds. A user can configure this value from NetBackup Administration Console for Windows. Select **View Menu > Options** sub menu. From the Options dialog, open the Administration Console tab. The **GUI connect timeout** value will map the registry entry above. This timeout value is applicable to following scenarios:

- OPRD connections
  - Device configuration wizard
  - Media operations
  - All the other NBSL communication
  - Disk Pools operations
  - Data classification and storage life cycle policy operations
  - Storage server operations
  - Run LiveUpdate operation
  - SAN Client operations and so forth
- If all the services are stopped from the command line interface (CLI), the Activity Monitor does not display the Service, Process, Jobs, and Drives details.
  - The NetBackup Administration Console may stop while in the media node under following situations:
    - The user selects any volume pool under the Volume Pools node or selects the Volume Pools node and double clicks on any volume pool in the right pane.
    - The user selects any volume group under the Volume Groups node or selects the Volume Groups node and double clicks on any volume group in the right pane.
    - The user selects any robot under the Robots node or selects the Robots node and double clicks any robot in the right pane.
    - It may also stop if the user selects the Media node.

This issue occurs because of incorrect values in the registry. To resolve this issue, check the registry entries for media node and delete them if they are unreadable. Use the following procedure to verify and delete any unreadable registry entries.

- a Close the NetBackup Administrator Console if it is running.
- b Run the `regedit` command through `Start->Run...` menu or on the command line to open the registry editor.
- c Go to the following node in the registry:  
HKEY\_CURRENT\_USER\Software\VERITAS\NetBackup\NBPMedia

- d Check the values of the keys: `SortLevel`, `SortDir`, and `SortOrder` under the nodes `VolumeList-41`, `VolumePoolList-6`, `VolumeGroupList-6`, and `RobotList-7`.
- e The following values should apply:
  - The value of `SortLevel` should be between 0 and 4.
  - The value of `SortDir` should be `#, #, #, #` - where # can be -1, 0, or 1.
  - The value of `SortOrder` should be `#, #, #, #` - where # can be -1 or a value that is less than the number specified in the parent node name (for example, `VolumeList-41`, where 41 is the number).
- f If any of these values are unreadable [generally a huge number] then the “NBPMedia” node should be deleted to resolve the issue.
- g Select the “NBPMedia” and delete it. Start the NetBackup Administrator Console; it should not crash.  
It would be good idea to export the registry key before deleting the “NBPMedia”, which will be useful later on for diagnose of the issue.

## Activity monitor interface

- The NetBackup 6.5 Activity Monitor displays additional job types, that include jobs for tape drive cleaning, optical media formatting, physical media inventory, and device diagnostic tests.
- If there was no cleaning tape defined or zero cleanings left for the cleaning tape for the robotic drive, `tpclean` would return the following message in previous versions:  

```
No cleaning tape is defined in the device's robot or 0 cleanings remaining
```

This no longer happens in NetBackup 6.0 and greater because this information/result appears in the Activity Monitor instead.
- The following states have been added to the state of a Service that is displayed in the **Services** tab in Activity Monitor view.
  - Failed
  - Unknown
  - Not Installed
  - Unlicensed
  - Restart Pending

This change is applicable only to the NetBackup Administration Console for Windows and not to NetBackup-Java Administration Console.

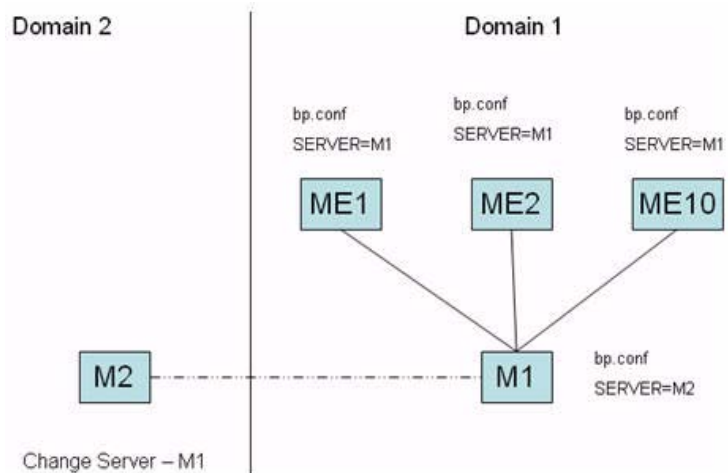
- Sometimes the Activity Monitor may not show the master and media server services due to the absence of some bp.conf entries.

The Activity Monitor retrieves process and service information from master servers and connected media servers within a configuration. For an administrator to monitor these processes remotely the following configuration is needed.

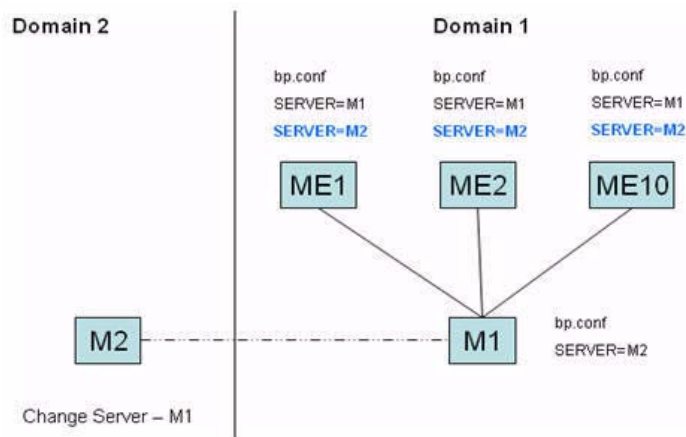
- Master Server (M1) - Has multiple media servers connected.
- Media Servers (ME1, ME2, through ME10) - Can be UNIX or Windows systems.
- Master Server (M2) - M2 is added in M1's bp.conf file so M2 server can be changed to M1.

(If M1 is a Windows system, then you would add M2 by selecting, NetBackup Management > Host properties > Master Servers.

No media servers are connected to M2.



To ensure the Activity Monitor displays all process and service information from master servers and connected media servers within a configuration, you must add the other server (M2) to the bp.conf file of each of the media servers in the configuration. The following diagram provides an example of how the configuration should be changed.



## Device monitor interface

- Default display information for the `vmopr cmd` command line has been changed to include the status of all Media Servers, and all drives' paths on all media servers and all pending requests on all media servers. The `-d` option provides the pre-NetBackup 6.0 display format and functionality.
- Additional options have been added to the `vmopr cmd` command line to manage and display the drive's status per-path. Refer to the *NetBackup Command* document for more information about these commands.
- The Device Monitor in the NetBackup Administration Console provides additional host/path specific information for drives, only when the drive is selected. The default display is an overview of all drives' status.

## NetBackup java interfaces

### General Notes

- The NetBackup-Java Administration Console now exposes a configurable parameter for use in environments that utilize a firewall. This parameter enables users to configure the hostname or IP address and the port number that the Java Administration Console should use, to connect to `nbsl` daemon on the NetBackup host being administered. For more details refer to the following TechNote on the Symantec Support web site.
- The NetBackup-Java Administration Console has introduced two new `nbj.conf` parameters (`NBJAVA_CORBA_DEFAULT_TIMEOUT`,

NBJAVA\_CORBA\_LONG\_TIMEOUT) to make CORBA timeouts configurable in this release. While the default values of the parameters will suffice for most users, there may be times when these parameters need to be adjusted. For example, the default value may not suffice for a user who wants to delete 50 volumes on a configuration that has say 100,000 volumes. This user would want to set a higher value for the NBJAVA\_CORBA\_DEFAULT\_TIMEOUT parameter.

For more information about these parameters and the default values, refer to the *NetBackup Administrator's Guide*.

- The copyright text in the About dialogs, located in the interfaces, is not available in the NetBackup 5.0 and NetBackup 5.1 versions of the interfaces that are packaged in this release. This data is available in the NetBackup 6.0 and 6.5 versions of the interfaces in their respective 'About dialogs'.
- Preserving older versions of language extension files  
During an upgrade install of NetBackup on a host that has a NetBackup Language Extension installed, the older version Language Extension files get saved and then re-installed. While this can be useful in these environments, it is possible that issues may occur, for example, you may see English instead of a different, expected language. This is an unsupported NetBackup configuration for the locale of the relevant Language Extension.
- Improving NetBackup-Java Administration Console performance  
The user has the choice of running the NetBackup-Java console either locally on your desktop or remotely and displaying back to your desktop host. Which platform you are running the GUI from is a big factor when you are faced with performance issues. For information and helpful tips on how to improve the performance of your NetBackup-Java GUI Environment, refer to the *NetBackup Administrator's Guide, Volume I*.
- Long waits for application response, incomplete data, reduced functionality and/or unexpected error messages may be returned in the applications as a result of invalid NetBackup configurations or inadequate file system space in `/usr/opensv/netbackup/logs` on the host specified in the login dialog or in the same directory on the host that the NetBackup-Java Administration Console was started. Following are some example results when these things occur.
  - No response during login
  - Cannot connect socket errors during login to the NetBackup Java application server (bpjava)
  - Reduced functionality in the NetBackup Java Administration Console, for example, only Backup, Archive and Restore and Files System Analyzer nodes in the tree

- Error dialog with Unable to login, status: 35 cannot make required directory message
- Error dialog with /bin/sh: null: not found (1) message
- Empty warning dialogs
- Error dialog with An exception occurred:  
vrts.nbu.admin.bpmgmt.CommandOutputException: Invalid or unexpected class configuration data: <rest of the message varies>
- Reduced functionality (only the Backup, Archive and Restore component available) or 'cannot connect' errors during initialization of the NetBackup-Java Administration Console will result if one or more of the NetBackup services or daemons on the host specified in the login dialog is not running.
- Restart NetBackup-Java Administrative Console after restart of daemons  
After restarting daemons/services in Activity Monitor or using other interfaces, we recommend exiting all instances of the NetBackup-Java administration console and starting a new copy of it via the `jnbSA` command. If the VSM product has been installed and available in the user interface, the same applies for the VSM `migrd` daemon.
- Window managers configured for auto focus are not supported. Auto focus means that windows are activated (get the focus) when you position the mouse cursor over them. The following explains how to correctly set up a CDE environment.  
In the CDE environment, use the Style Manager -- Window dialog to change the window behavior to Click In Window To Make Active. NetBackup Java does not run properly if the Style Manager has the following selected: Point in Window To Make Active.
- If you are not set up properly to display to a machine from where you are executing `jnbSA`, you see one of the following happen: nothing (it is probably displaying on the machine where `jnbSA` is executing), the command fails with no error message (that is, the OS command prompt is received) or the following error message is placed in the log file (the log file name is displayed to the window in which you executed the `jnbSA` command).  

```
java.lang.InternalError: Can't connect to X11 window server using "host_name" as the value of the DISPLAY variable.
```

  
Prior to starting `jnbSA`, be sure to execute the `xhost` command on the machine where you intend to see the user interface and set the `DISPLAY` environment variable on the machine executing `jnbSA` prior to starting

`jnbSA`. Reference the man page for the `xhost` command for additional capabilities.

- Evaluation software expiration and the NetBackup Java interface application.  
Attempts to use the NetBackup Java Administration Console after an evaluation copy of NetBackup has expired results in the following error message being displayed in an error dialog and all the NetBackup Java applications except Backup, Archive, and Restore disabled.  
Administrator applications are not accessible due to the following error:  
Unable to get the attribute table.
- Administrative capabilities depend on licenses and user authorization  
The existence of various administrative capabilities (for example, Vault Management in the Administration Console's tree) is dependent on whether it is licensed and/or a nonroot user has been authorized for it on the relevant NetBackup host. This is checked during each *change server* operation.  
In addition, upon completion of any *change server* operation, the Backup, Archive, and Restore capability is not available as it is only available for tasks on the host specified in the console's login dialog.
- Symantec recommends that only one administrator work on an object at a time. Doing this eliminates the possibility of configuration conflicts if more than one administrator attempts administration tasks simultaneously on the same object. If this situation should occur, the last update made will prevail.
- Deleting all license keys causes the administration console to be non-functional. You'll have to use the `bpminlicense` command to update the licensing database prior to use of the console.
- Configuring Host Properties or Snapshot Client Policies for a Client.  
For the clients and media servers of a server that is the target of a change server, the server specified in the console login dialog is required to be in the server list of all clients and the media servers of the target change server host. If a client or media server does not have the console login server in its server list; Host Properties will not be available for the client or media server, Snapshot Client policies cannot be created or modified with Policies and the Snapshot Backup Policy wizard cannot be used to create Snapshot Client policies.
- Memory requirements to run the NetBackup-Java Administration Console  
Symantec recommends that you run the console (`jnbSA`, `jbpSA`, or Java Windows Display Console) on a machine with 1 gigabyte of physical memory and 256 megabytes of memory available to the application.

- Remote display back of the NetBackup-Java Administration Console not recommended

Symantec does not recommend running the NetBackup-Java Administration Console in any remote display back configuration. Problems have occurred with certain user interface controls (such as, incorrect combo box operations, very sluggish table scrolling with large numbers of rows, and table display problems with large numbers of rows). In addition, other serious problems have occurred with the GUI aborting or hanging caused by a Java Virtual Machine (JVM) failure due solely to the remote display back configuration. These JVM failures have most often been seen on the AIX platform.

Therefore, Symantec can only recommend that you run the NetBackup-Java Administration Console on your local desktop for administering any NetBackup host (by specifying that remote host in the login dialog of the user interface). The NetBackup-Java Administration Console runs on the following platforms:

- Solaris SPARC, Solaris Intel, Solaris AMD
- HP-UX
- Tru64
- AIX
- Red Hat and SuSE Linux
- Windows platforms.

For the Windows platform, installation is done using the **Install Java Administration Console** option in the NetBackup Windows installation GUI. Refer to Chapter 2 (Platforms Supporting the NetBackup Administration Consoles for UNIX) of this document for the supported versions of these platforms.

- Access Management always available in the NetBackup Administration Console

With the NetBackup Access Control feature in this release, there is a new node in the NetBackup Administration Console titled Access Management. If you are not using this new feature and authorizing nonroot users for various administrator capabilities using the interface's Capabilities Authorization functionality, you will still see this node in the console's tree for any master or media server that is being administered. This behavior is expected, even when restricting nonroot user's per users authorization in the `auth.conf` file. The Access Management capability has to be configured and if it is not, all users will see an appropriate informative message in the right hand pane of the interface when accessing it.



---

**Note:** NetBackup Access Control was not available until the first maintenance update of NetBackup 5.0.

---

- An Invalid username error could indicate an invalid password or username. The Windows platform API does not delineate between invalid passwords and invalid user names. The following error message could mean either an invalid password or invalid username. This error is received when attempting to login to the interface's application server on a Windows host.  

```
Unable to login, status: 503  
Invalid username
```
- Multiple `bpjava` processes per instance of the console  
For increased performance and support for better multi-tasking ability in the console, you will see multiple `bpjava` processes on the host specified in the login dialog. The number will vary depending on the tasks attempted in the console.
- Remote display of the NetBackup-Java console in multi-byte locale environments is not supported.

## Activity monitor

- Deleting large number of jobs  
When deleting a large number of jobs, do not leave the Activity Monitor node or close the NetBackup Administration Console while any of the deleted jobs are still visible in the Jobs tab. If Activity Monitor is shut down by leaving the Activity Monitor node or by closing the NetBackup Administration Console while jobs are being deleted, some of the jobs may not be deleted.
- The following message will be displayed if you stop the `bpdbm` daemon on the relevant server when Activity Monitor is active.  

```
Activity Monitor failed and must be restarted.  
To recover, first correct the problem described below and  
then refresh.  
Connection to bpjobd on server <server_name> failed.  
The reason this message occurs is that stopping the bpdbm daemon will also  
stop the bpjobd process. Upon successful startup of bpdbm (which will  
start bpjobd), you can use the refresh button on the toolbar to refresh the  
Activity Monitor job data. The refresh button is only available upon lost  
communications with the job daemon, bpjobd.
```

## Storage Unit

- The Storage Unit and Storage Unit Groups nodes are grouped under the parent node that is labeled, *Storage* in NetBackup 6.5 version. The Storage Unit group node is no longer a child to the Storage Unit node.

## Media and Device Management

- The Credentials node is a new addition in NetBackup 6.5 under the Media and Device Management node in the user interface. The NDMP Hosts node is now a child node under the Credentials Node rather than the Devices node.
- The Server Groups node is also new in NetBackup 6.5 under the Devices node.

## Reports

- NetBackup 6.5 now has the ability to organize reports. All tape-based reports are grouped under the label Tape Reports and disk-based reports are grouped under the label Disk Reports.

The types of new reports that will appear under Disk Reports are:

- Images On Disk
- Disk Logs
- Disk Storage Unit status.

The types of new reports that will appear under Tape Reports are:

- Images on Tape
- Tape Logs
- Tape Contents
- Tape Summary
- Tape Written

## File system analyzer & Storage migrator

- The File System Analyzer and Storage Migrator utilities of the NetBackup-Java Administration Console will only be available upon specifying the root account in the console's login dialog. Nonroot usage of these utilities is not supported.

## NDMP

- The NDMP Credential Configuration for back-level (5.x) media servers can fail if the NDMP credential command length becomes too long (or greater

than 256 characters). This can happen if the host names in the configuration are quite long.

- The NDMP credential configuration for a back-level (5.x) media server has to be done using the Advanced Credential button on the New/Change NDMP Hosts dialog.

## Host properties

- In the Host Properties "Media" node, the current label, "Enable SCSI reserve/release" for checkbox is now renamed to, "Enable SCSI Reserve" checkbox. Under this checkbox there are two available options labeled "SPC-2 SCSI Reserve" and "SCSI Persistent Reserve".
- NetBackup Server Host Properties in a cluster
  - To ensure that all nodes in the NetBackup failover group are properly registered in the EMM database, you must failover the NetBackup Group to all nodes in the NetBackup cluster group.
  - The NetBackup administration console obtains node information from the EMM database. Therefore, Host Properties changes will only affect nodes that are already registered in the EMM database.
  - All hostnames listed in the Properties panel can have their host properties updated using the Host Properties user interface. The exception to this is the host property, Authorization, which is only updated on the active node.
  - Saving to All hosts' functionality is applicable only for a clustered master server and not for clustered media servers. To update Host Properties on clustered media servers, the user needs to update each node individually or by selecting multiple nodes of the clustered media server.

## Backup, archive, and restore

- On the Task Progress tab, the Status column of the Tasks Performed list may be empty or all jobs listed with status of In Progress. When the `DISALLOW_SERVER_FILE_WRITES` option is set in the `bp.conf` file, this status column is blank. You can check the status of the task by selecting it to be displayed in the progress log file in the bottom area of the Task Progress section.
- The end date/time for searching backups is initially set to midnight of the current day. If the application is left open over multiple days, the end date needs to be updated in order to see backups that have occurred after the initial end date.

## Storage unit configuration

- The maximum fragment size of a disk storage unit has increased from 2 gigabytes to .5 terabytes.  
If a media server of a previous release has Disk Storage Units (DSUs) configured with a different maximum fragment size, upon upgrade, the storage units are not automatically increased to the new default of 524,288 megabytes. To make the best use of the storage unit, consider increasing the fragment size on upgraded storage units.
- The `bpstuaadd` command line option `-dspath` is no longer valid or supported.

## NetBackup media and device management

- Some of the information within the following subsections were documented in the NetBackup 6.0 release. However, NetBackup 6.5 supports a direct upgrade from NetBackup 5.x, some of the items in the subsections still apply to a user who is upgrading from NetBackup 5.x to 6.5. Prior to each of these sections, a sentence has been added that identifies if the information is new for this release (NetBackup 6.5) or if it is a an item that has been carried forward from the NetBackup 6.0 release.

## Media Sharing

*The information is new for NetBackup 6.5.*

- The access control feature of Sun StorageTek ACSLS controlled robots is not currently compatible with Media Sharing. This feature restricts volume access using the requesting host's IP address. Use caution when implementing Media Sharing in an ACSLS environment.

## Media and device selection (MDS)

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

The following items describe the changes for the Media and Device Selection feature of EMM that were introduced with NetBackup 6.0.

- **Job queuing:** If NetBackup determines that resources are not currently available to run a job, the job will enter the *Queued* state. NetBackup 6.0 and beyond attempts to acquire resources and run queued jobs. The following list identifies some reasons why a job can enter a *Queued* state:
  - Media is in use

- Drives are in use
- Media server is offline
- Robotic library is down on server
- Maximum job count has been reached for the storage unit  
 Refer to the Media and Device Selection (MDS) VxUL debug logs to determine why a job is in a queued state

For UNIX:

```
/usr/openv/netbackup/bin/vxlogview -i 111 -o 143 -D -N 1
```

For Windows:

```
install_path\netbackup\bin\vxlogview -i 111 -o 143 -D -N 1
```

- Beginning with release 6.0, NetBackup allocates drives before it starts jobs on a media server. Therefore, NetBackup 6.0 and later may preempt drive selections on NetBackup 5.x media servers. To optimize resource allocation in your environment, you should update all media servers to release 6.0 or later.

- The following `tpconfig` command changes have been made for this release of NetBackup:

- You can use the `tpconfig` command to set the robot in a “pend if robot down (PIRD)” mode. The PIRD mode is set on a robot and media server connection, and tells NetBackup to *pend* mount requests to the robot even if it is "DOWN" (Refer to the *NetBackup Administrator's Guides* for more information on when a robot should be set in a PIRD state).

- You can now use the command, `tpconfig -update robot 0 -roptype tld -pird yes`, to set the robot in a PIRD state on the media server on which `tpconfig` is being run.

- You can now use the command, `tpconfig -update robot 0 -roptype tld -pird no` to clear the PIRD state of the robot on the media server on which `tpconfig` is being run.

- You can use the command, `tpconfig -d` to determine if the robot is in a PIRD state. "PIRD = yes" means that the robot is in a PIRD state

```
# ./tpconfig -d
```

```
Id DriveName Type Residence
Drive Path Status
*****
*
0 QUANTUM.SUPERDLT1.00 dlt3 TLD(0) DRIVE=2
/dev/rmt/1cbn UP
```

Currently defined robotics are:

```
TLD(0) robotic path = /dev/sg/c2t010,
PIRD = yes
```

- Starting with NetBackup 6.0, it is not possible to manually assign storage-unit-directed mount requests to drives of another storage unit.
- Access based on host, user ID, and group ID for volume pools were no longer supported in NetBackup 6.0. When allocating media from volume pools, NetBackup disregards the pool host, pool user, and pool group attributes of the volume pool.
- NetBackup cleans shared drives based on the configured cleaning frequency of the drive. Prior to NetBackup 6.0, frequency-based cleaning was not supported for shared drives.
- The following new pending action was added in NetBackup 6.0.  
"MEDIA IN INACCESSIBLE DRIVE"  
A mount request is pending with the above action if the media required to satisfy the mount request is in a drive that has no usable paths configured. This may include disabled paths, NDMP paths where the media server does not have NDMP credentials to access the NDMP tape server, paths on "OFFLINE" media servers, and so on.
- Media and Device Selection (MDS) debug logs are in VxUL format with an originator ID of 143 and a file ID of 111.
- All error and status information (including read, write, position and robotic errors, TapeAlert information, and so forth) reported to EMM from media servers are stored in the error database in EMM. The read, write, and position errors were stored in the error history file on the local media server in pre-NetBackup 6.0 versions. You can use the `nbemmcmd` executable to view and prune the EMM error database. Refer to the `nbemmcmd` usage for details on how to view and prune the EMM error database information.
- MDS will take into account media read, write and position errors across all the media servers while evaluating the error history to determine whether to freeze a media or down a drive. Accounting for errors across all the media servers enables NetBackup to make a better decision as to whether to freeze the media or down the drive. This is different than pre-NetBackup 6.0 where only the error history of the local media server was used to freeze media or down drives.

## Enterprise Media Manager

*The following items pertain to NetBackup 6.5.*

- A new script, `media_deassign_notify`, has been added to this version of NetBackup.  
The NetBackup Enterprise Media Manager calls the `media_deassign_notify` script after media is deassigned. To send an E-mail notification when media

is deassigned, include an E-mail address in the script where indicated. (The script must be run by the root user.)

Copy the script from the goodies directory into the bin directory on the EMM server (usually the master server):

- UNIX:  
/usr/opensv/netbackup/bin/goodies/media\_deassign\_notify  
into  
/usr/opensv/netbackup/bin/
- Windows:  
Install\_path\NetBackup\bin\goodies\media\_deassign\_notify.cmd  
into  
Install\_path\NetBackup\bin\

If the script exists in the bin directory, the following parameters are passed to the script: media ID, legacy media type, barcode, robot number, and robot type.

- A new script, pending\_request\_notify, has been added to this version of NetBackup.

The NetBackup Resource Manager calls the pending\_request\_notify script after a pending request is issued for a media resource (tape volume). To send an E-mail notification when a pending request is initiated, include an E-mail address in the script where indicated. (The script must be run by the root user.)

Copy the script from the goodies directory into the bin directory on the EMM server (usually the master server):

- UNIX:  
/usr/opensv/netbackup/bin/goodies/pending\_request\_notify  
into  
/usr/opensv/netbackup/bin/
- Windows:  
Install\_path\NetBackup\bin\goodies\pending\_request\_notify.cmd  
into  
Install\_path\NetBackup\bin\

If the script exists in the bin directory, the following parameters are passed to the script: media ID, barcode, action code, robot type, robot number, media server, volume group, and pending time (in seconds since the UNIX epoch).

- If NetBackup EMM runs out of RAM memory while attempting to connect to the database, a core dump may occur. This issue is more likely to occur when heap checking is enabled because heap checking requires the process to use more RAM memory than normal.

- NetBackup uses the Media ID for disk as a unique identifier that can be traced back to a volume on the array. The Media ID is an opaque string that has internal meaning to NetBackup, but to nothing else. In addition, the Media ID can be correlated to a volume by running `nbdevquery -listmediaid` command.
- SCSI persistent reserve  
NetBackup can use SCSI persistent reserve in and persistent reserve out to configure exclusive access protection to tape drives so that other host bus adaptors (HBAs) cannot control the drives during the reservation. SCSI persistent reserve provides more resiliency and fault tolerance than SPC-2 SCSI reserve and release, which is the default access protection method in NetBackup.

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- Inconsistencies between multiple volume database hosts and media databases across media servers are readily identifiable. Starting with NetBackup 6.0, the EMM database provides for centralized and merged tape and optical volume and media records. During the master or media server upgrade process, all volume and media attribute records for a given domain are merged into the EMM database. When multiple media IDs or inconsistent volume/media states are detected, a conflict state is noted. Media in conflicting states may require administrator action to resolve. Media in these conflicting states are identifiable through media management interfaces (`vmquery`, `vmadm` menu, and the NetBackup Java/Windows Administration Consoles). See the `nbemmcmd` command line interface for addressing situations with media conflicts.
- Scratch pools are defined as a volume (media) pool attribute rather than as a `vm.conf` configuration entry. Before NetBackup 6.0, scratch pools had associated `SCRATCH_POOL` entries in the Media Manager configuration file, `vm.conf`. In NetBackup 6.0 and beyond, the scratch pool designation is a pool attribute in the EMM database, configurable through the media management interfaces (`vmppool`, `vmadm` menu, and the NetBackup Java/Windows Administration Consoles).
- The NetBackup catalog data was consolidated and centralized from a number of sources to be stored in the EMM database. Starting with NetBackup 6.0, these files are no longer part of the NetBackup infrastructure.
  - `globDB` - previously stored global (centralized) device attributes
  - `ltidevs` - previously stored tape and optical disk drive attributes
  - `robotic_def` - previously stored robotic library / standalone drive residence attributes



- `.namespace.chksum` - previously stored NDMP attributes
- `ruleDB` - previously stored barcode rule attributes
- `poolDB` - previously stored volume pool attributes
- `volDB` - previously stored tape and optical disk volume attributes
- `mediaDB` - previously stored media attributes
- `storage_units` - previously stored storage unit attributes
- `stunit_groups` - previously stored storage unit group attributes
- `SSOhosts` - previously stored Shared Storage Option hosts having assigned tape drives
- `errors` - media errors database

NetBackup 5.x media servers, which are not master servers, volume database hosts, device allocator hosts, or global device database hosts, may continue to contain data used by NetBackup infrastructure as part of a mixed version NetBackup configuration.

- Users can no longer configure volume database hosts other than the EMM server using `tpconfig`. In addition, `tpconfig` will no longer display volume database host information, only the EMM server name.

## Media management interfaces

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- Media Manager command line interfaces (such as, `vmadd`, `vmdelete`, `vmchange`, etc.) now operate on the EMM Server as the host argument (`-h` option). For back-level server support (NetBackup 5.x) using that same option, they still connect to the host referred to as the volume database host. The default host target for the `-h` option has been changed to be the EMM server rather than the local host.
- Media management error messages have been improved for better problem diagnosis. The Java and Windows GUI interfaces, the menu user interface, and the command line interfaces now have error messages that provide more explanation. Additionally, detailed error codes from the EMM server component are provided. The improved error messaging is not available when connecting to back-level servers (NetBackup 5.x).
- The `vmquery -assignbyid` and `-deassignbyid` options now work only for non-NetBackup media. Non-NetBackup media includes media used by Veritas Storage Migrator, Veritas Data Lifecycle Manager, or users working outside of the NetBackup policy framework (for example, those who use `tpreq` directly). This change improves database consistency. Deassignment of NetBackup media can be accomplished using the `bpxupdate` command,

as needed. In pre-NetBackup 6.0 versions, deassignment of NetBackup media using the `vmquery` interface could lead to potential volume/media database conflicts, because that interface did not affect media states in the NetBackup media database.

- The command, `vmchange -m media_id -n num mounts/cleans` has been split into two independent usage methods. When targeting volume database hosts (`-h` option) that are NetBackup 5.x servers the previous functionality will be preserved. For NetBackup 6.0 and greater servers, the command `vmchange -m media_id -clean num cleanings` can be used to set the number of cleanings for a cleaning tape. In addition, the `vmchange -n` option will only affect non-cleaning tapes.
- The Media Manager commands (`vmadd`, `vmdelete`, `vmquery`, etc.) have been enhanced to do the following:
  - Return new error codes for EMM-specific problems. The new error codes can diagnose CORBA communication and database problems.
  - Validate the range of values passed in by a command-line option. For example, instead of `vmchange` cutting off the end of a volume description that is too long for the database to hold, the command now provides error text stating that the description provided is too long.
- The `vmglob` command now supports a new option, `-get_emmport` that will retrieve the EMM Port setting from a local or remote EMM Server. This is an additional parameter that is needed to connect to an EMM Server.

## Device support

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- The update procedure of the device mappings files changed in NetBackup 6.0, and those attributes are now centralized in the EMM database. The `tpext` utility needs to be run to update the EMM database with new versions of device mappings and external attribute files. For release upgrades and for new installations, this update procedure is done automatically. The change is in the steps that need to be done to update EMM for new device support as is done outside of the NetBackup maintenance pack procedure, for instances when changes are needed to add or update NetBackup's recognition of specific device attributes. In previous releases, device mappings files needed to be updated on all the media servers. The `device_mappings` files are not shipped on the CD-ROMs, rather they are created during the install process after the `tpext` command had completed and during the initialization of `ltid`.

- NetBackup 6.0 and greater requires pass-through access to each and every tape drive. A drive will be rejected if its pass-through path does not work (if it is being used for write operations).

Pass-through is critical for:

- a SCSI Reserve/Release.
- b Fibre Channel error recovery.
- c Block position checking (NetBackup compares actual tape position to expected tape position). This detects unplanned rewinds and/or tape driver configuration problems.
- d WORM media support.
- e Auto-discovery of devices.

The NetBackup 5.1 release required pass-through once WORM support was enabled. However, NetBackup 6.0 and greater requires pass-through by default. (Auto-discovery has been creating pass-through paths for several releases now.)

## Multi-path tape device support

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- Multiple device control paths can be discovered, automatically configured, and manually configured for tape drives. This applies to direct SCSI-control or NDMP-controlled drives. Discovered drive paths are enabled by default. They can be disabled or configured up/down by an administrator or operator. Previous to NetBackup 6.0, only one path to a tape drive was available per host, and the available drive states were limited to UP or DOWN.

## NDMP

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- NDMP credentials have been incorporated into the centralized EMM database. These credentials include the user name, password, and encrypted key attributes which were previously stored on each media server. Starting in NetBackup 6.0, users had options for configuring global, filer-specific, and media server-filer specific credentials, where before, only media server-filer specific credentials were allowed.

- You can now manage NDMP credentials per-filer or per-NetBackup-Master in addition to being managed on a per NetBackup server to NDMP host basis.
- The NDMP license key is not required to add NDMP host credentials. NetBackup supports the use of some NDMP protocols to manage some clients' volume snapshots and this functionality does not require a NDMP license.
- The `tpconfig` menu has been enhanced to include NDMP credential information.
- The `tpautoconf` command line has been enhanced to include the `-probe` and `-verify` functionality of `set_ndmp_attr`.
- An NDMP alternate path restore should not append a source path into the destination path.

When doing NDMP alternate path restores, NetBackup no longer appends the source path to the destination path. Instead, this works in the same fashion as for restore of standard backup images. Previously, it was required that the destination path must end with the original path. To accomplish this, NetBackup simply concatenated the original path to the specified destination path.

---

**Note:** This requires NDMP V4. For NDMP V2 and V3, the previous method will continue to be used.

---

The following two examples are provided to explain this change.

Backup path: `/vol/vol1/dir1`

- First example of a restore (backup path is: `/vol/vol1/dir1`)  
File to restore: `/vol/vol1/dir1/dir2/file1`  
Original path: `dir2/file1` - (This is the file to restore minus the backup path.)  
Destination: `/vol/vol1/dir1/dir2/file1.restore`

Previously, the file to be restored would be restored to:  
`/vol/vol1/dir1/dir2/file1.restore/dir2/file1`

Now it will be restored to: `/vol/vol1/dir1/dir2/file1.restore`

- Second example of restore (backup path is: `/vol/vol1/dir1`):  
Directory to restore: `/vol/vol1/dir1/dir2/dir3`  
Original path: `dir2/dir3`  
Destination: `/vol/vol1/dir1/dir2/newdir3`

Previously, the file to be restored would be restored to:

```
/vol/vol1/dir1/dir2/newdir3/dir2/dir3
```

Now, the path name, /vol/vol1/dir1/dir2/dir3, is replaced with the path name, /vol/vol1/dir1/dir2/newdir3, and the resulting path will be: /vol/vol1/dir1/dir2/newdir3.

- NDMP DAR (Direct Access Recovery) is now supported for files and directories. Previously NDMP DAR was supported only for files.

## SAN Client and Fibre Transport

*The information in this section is new for NetBackup 6.5.*

- When used for SAN Client target mode, the QLA-2344 four-port FC adapter's usable aggregate performance is not significantly greater than a two-port QLA-2342 when used in the same PCI-x slot. The advantage a QLA-2344 HBA offers is the ability to spread its aggregate performance over four ports instead of two. If you use direct-connection (rather than FC switches or bridges) between SAN clients and a Fibre Transport (FT) media server and only two ports are fully loaded with Fibre Transport traffic at the same time, the QLA-2344 HBA performs similarly to two QLA-2342 HBAs but uses one less PCI slot.
- The SAN Client HBA's and their drivers must use 256K size buffers for data transfer.
- The IBM 6228 HBAs require the following version of the AIX FC driver to ensure that the appropriate data is returned when a task is aborted. Not installing the following drive could result in a hung Fiber Transport (FT).  
AIX FC driver version level 5.2.0.75 for IBM 6228 card \_ AIX Oslvel 5200-07
- For NetBackup media servers, only 64-bit, PCI-X slots are supported for the QLogic Fibre Channel host bus adapters (HBAs) that are used to connect to the NetBackup SAN clients. Legacy PCI 33 and 66 Mhz slots are not supported. Also, slots that share an interrupt are not supported.
- On the NetBackup media servers, Symantec recommends that you do not use legacy PCI cards on the same bus as a QLogic FC HBA that is used to connect to SAN clients. A slower PCI card reduces the speed of the controlling bus and therefore all other cards in that bus. Consequently, data transfer rates are reduced and performance is degraded.
- On the NetBackup SAN clients, a legacy PCI card on the same PCI-X bus as the FC HBA that connects to the media server also reduces the speed of the

controlling bus. NetBackup FT performance may not be affected as much as on a media server, but performance may degrade to unacceptable levels.

- Fibre Transport (FT) is limited to Disk based storage units in the NetBackup 6.5 Release.
- If you use data compression or encryption for backups, backup and restore Fibre Transport pipe performance may degrade significantly. In some configurations, compression may reduce performance by up to 95% of uncompressed performance.
- NetBackup SAN clients cannot also be NetBackup servers.
- No support for FlashBackup restores over an FT pipe.
- No support for Fibre Channel Arbitrated Loop (FC-AL) hubs.

## SharedDisk storage option

*The information in this section is new for NetBackup 6.5.*

- All media servers in a disk pool must be the same system type (such as all Solaris).
- With this release of NetBackup, SharedDisk mount times are directly related to the number of LUNs that are exposed to a media server. The more LUNs exposed to a media server, the longer the mount time will be.
- Veritas Cluster File System (CFS) is not supported on the disk volumes because the SharedDisk requires exclusive use of disks for backups and restores.
- If you add SharedDisk disk array credentials, the new credentials may not appear in the NetBackup Administration Console. Similarly, if you delete SharedDisk disk array credentials, the deleted credentials may remain in the NetBackup Administration Console. (The credentials are updated correctly in the NetBackup database.) To avoid this issue, stop and then restart the Administration Console.
- For SharedDisk, the maximum size of each LUN that you can format is limited to the following for this release:
  - On Solaris systems, 990 GB
  - On Windows systems, 2 TB
- For NetBackup SAN clients on Windows systems, the NetBackup Shared Storage Guide advises you to install the Symantec Device Drivers for Veritas NetBackup Windows Servers (in the "SAN Client and Fibre Transport" section, "Configuring SAN clients and Fibre Transport" > "Configuring SAN client drivers" > "Windows"). However, the Symantec device drivers cannot

be installed on NetBackup client systems. You do not have to install special drivers on Windows SAN clients. The media server FT devices can appear as unconfigured, unknown devices on Windows operating systems on SAN clients.

- NetApp filers on Solaris with Storage Foundation (SF) 5.0 in stack combination is not supported because the NetApp Array Supported Library (ASL) is not available for SF 5.0. In addition, NetApp filers on Solaris in a multi-path scenario are not supported
- NetApp filers with DataONTAP 7.1 and onwards are supported. Lower versions of ONTAPI are not supported in this release.
- On Windows, the operating system drive should have an NTFS file system and not an FAT file system. A format operation during a configuration set-up, or online volumes during a backup or restore job would fail if it is a FAT file system.
- On Solaris 10, the nbshareddisk format operation for EMC CLARiiON uuids might cause a system panic if both the EMC powerpath and VxDMP are present on the host. In addition, creating an SF stack on top of EMC CLARiiON luns in a multi-path scenario can also cause the same issue. (new for 6.5 - ET1078793 - Bhaskar Singhal)
- To avoid this issue, perform the following steps.
  - a Mask (or unmap) all of the EMC CLARiiON luns from the host.
  - b Remove the EMC CLARiiON disk array class from the powerpath management. This is necessary if both the EMC Powerpath and the VxDMP are present on the host and are managing, then use the following command:  
`/etc/powermt unmanage class=clariion`
  - c Remove all cache files from the host, for example:  
`rm -rf /usr/opensv/lib/vxfi/cachefiles`
  - d Login to EMC CLARiiON disk array storage manager (EMC NaviShpere Manager), and make sure, the powerpath has not trespassed any of the vdisks that you are planning to use. The default and the current owner should be same.
  - e Run devfsadm or reboot -- -r.
  - f Now format the uuids using the nbshareddisk format, -uuid\_file <uuid\_file>.

## Shared Storage Option

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- Shared Storage Option (SSO) device allocation and remote drive scanning communications between media servers has been eliminated. Starting with NetBackup 6.0, these communications were routed to the centralized EMM server, making it easier to implement firewalls or other security mechanisms.
- Media servers no longer *register* with the Device Allocator (DA). Media server availability for drive scanning and job scheduling is now *detected* through the use of a Media Server machine state. (For example, the media server now tells the EMM server if it is online or offline.)
- Drives are no longer *reserved* with the Device Allocator (DA). The DA is fully aware of what drives are being shared by what servers. In addition, the DA has real-time information about the status of all of these drives.
- Scan host failover does not require re-registration. In fact, a media server can be dynamically assigned as scan host for each drive that it shares, individually.
- NetBackup 6.0 and greater media servers do not require intra-media-server communication to share drive because there is no longer any remote scanning of drives on media servers that are at these levels and thus no need to connect to one another, unless required for other reasons such as for robotic control.
- Users can no longer configure a drive as shared or not shared. This is done automatically by NetBackup, based upon the configuration(s) of a device across all hosts.
- The NetBackup Shared Storage Option can now be applied to NDMP attached drives.
- The Shared Storage Option can now be applied to a NetBackup Server as well as a NetBackup Enterprise Server. If a drive is configured with paths both locally and through a NDMP host or through more than one NDMP host, this will require the SSO license as this drive is now being shared among multiple hosts.

## Device configuration interfaces

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*



- The following changes have been incorporated into the `tpconfig` command in the area of device configuration:
  - The `tpconfig` command line output changed with NetBackup 6.0.
    - Multiple paths  
`tpconfig` output has been changed to display multiple device control paths.
    - (Windows Server only) Port/Bus/Target/LUN in place of Device Name  
Due to changes in the Windows operating system, device persistence can no longer be guaranteed by accessing a statically configured device name (for example, Tape0). Access of devices on Windows requires dependence on non-dynamically changing device attributes. For NetBackup 6.0 and beyond, Windows devices are now statically configured with a Port, Bus, Target, and LUN rather than with a device name. These P/B/T/L attributes are captured during device configuration and stored in the EMM database. The `tpconfig` interface now displays these on Windows servers in place of the device name. NetBackup dynamically retrieves the current device name across Plug-and-Play events, which may have caused the mapping of device names to drive addresses to change.
    - Internal tables output change  
The undocumented option `-tables` option no longer shows a "Type=0" entry. Previously, the entry was used to list attributes associated with the standalone volume database host.
    - `tpconfig -dl` output now includes serial number
  - The `tpconfig` command line has been expanded to provide the ability to add/update/delete additional paths for a drive by name.
  - The `tpconfig` menu interface (available only on UNIX) has been expanded to provide the ability to add/update/delete additional paths for a drive by name.
- The command, `vmglob -delete`, will now delete the entire device configuration, not just the former global device database (globDB) pieces. Starting with NetBackup 6.0, the device configuration (`ltidevs`, `robotic_def`, and so on) on local servers has been merged with the centralized device configuration (globDB), with all of it going into the EMM database. If `vmglob -delete` is run, there is no longer any device configuration, and `tpconfig -d` is expected to no longer return any data. WARNING: deleting the device configuration will cause tape-based jobs (for example, backups, restores, etc) to no longer function.

- Changing the robot type for a robot from one server will cause the robot type to be changed for all drives in that robot on all servers. With all device configuration attributes centralized in the EMM database, database consistency is maintained, ensuring that a robotic library's configured robot type is consistent across the domain.
- The shared drive wizard is no longer available in the NetBackup Administration Console. Drives are configured through the same interface regardless of whether or not the user intends to share them.
- Drives can now be configured to use more than one path on a single media server.
- Drives can now be configured as connected to more than one NDMP host from one or several media servers. Each of these connections is considered to be a separate drive "path".
- Drive status is now associated with a drive path, not just a drive and host pair. On the same host, there can be many paths, and they may have mixed drive statuses.
- A new drive path status "DISABLED" has been created. This is for paths that are discovered by NetBackup but the user does not wish to configure for use.
- Displays have been reformatted for `tpconfig` to display all paths for a drive. The `-d` display has been reformatted completely to ensure that all of the pertinent information for device configuration is shown as compactly as possible.
- Display options have been added to `tpconfig` to retrieve path-specific information on a per-drive-name basis.
- The automatic device configuration utility, `tpautoconf`, will detect and configure multiple paths to a drive on a single Media Server.
- The NetBackup device daemon (and NetBackup Device Manager service), `ltid`, is capable of automatically correcting multiple local drive paths at startup.

## Test utilities

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- 1 Robotic test utilities (`xxxtest`) now obtain device paths directly from the EMM server. Before NetBackup 6.0, the robotic test utilities obtained device paths from the `robttest` interface or through the command line. Starting with NetBackup 6.0, individual robotic test utilities accepted device paths

specified by the user, and robtest invoked the robotic test utilities as a single interface point requiring no parameters.

## NetBackup Snapshot Client

*The information in this section pertains to NetBackup 6.5.*

- Network Appliance does not support SnapVault destination WORM volumes. The NetBackup user interfaces inform the administrator that WORM volumes exist on the secondary system and the WORM attribute will be displayed for the individual volumes. WORM destination volumes should not be used until Network Appliance resolves the SnapVault WORM issues.
- In this 6.5 release, Instant Recovery backups for Linux clients are not allowed (policy validation will not succeed) for policies selecting hardware-based snapshot methods targeting EMC CLARiiON, EMC Symmetrix, or HP EVA disk arrays. Instant Recovery backups of Linux clients for these disk arrays will be supported in a future release.
- For this release, NetBackup will not support Snapshot Client VSS offhost file backups using a Storage Foundation for Windows (SFW) VSS provider.
- If you encounter issues with VSP snapshots when used in Windows Open File Backups while under a heavy load, Symantec recommends that you reconfigure to use VSS snapshots instead.

## NetBackup configuration file

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- The following NetBackup configuration file, bp.conf and equivalent Windows registry, entries are now stored in the EMM database and are no longer valid in bp.conf or the Windows registry:
  - ALLOW\_MULTIPLE\_RETENTIONS\_PER\_MEDIA
  - DISABLE\_STANDALONE\_DRIVE\_EXTENSIONS
  - MEDIA\_ID\_PREFIX
  - MEDIA\_REQUEST\_DELAY
  - MUST\_USE\_LOCAL\_DRIVEThese entries are configurable using the `nbemmcmd` command line interface.
- In this release, NetBackup now tracks the master server-to-media server relationship in the EMM database. This means that to change the master

server for a given media server, the user must run `nbemmcmd` to update this relationship.

- If you modify the first `bp.conf` SERVER or equivalent Windows registry entry (the master server) on a media server, the EMM database also needs to be updated. To update the EMM database, use `nbemmcmd -updatehost` to change the master server for a media server.

*The information in this section is new for NetBackup 6.5.*

- The NetBackup configuration file (`bp.conf` or the Windows registry) entry `DISABLE_SCSI_RESERVE` is obsolete in NetBackup 6.5. It is no longer valid in `bp.conf` or the Windows registry. The obsolete entry is replaced with the new EMM database entry `SCSI_PROTECTION`. On an upgrade to NetBackup 6.5, the new `SCSI_PROTECTION` entry will be set based on the old setting of `DISABLE_SCSI_RESERVE`. For a cluster, the setting of `DISABLE_SCSI_RESERVE` on the active node will determine the setting of `SCSI_PROTECTION` for all cluster nodes. The `SCSI_PROTECTION` entry is configurable using the `nbemmcmd` command line interface.

## Media Manager configuration file

*The following items were introduced in NetBackup 6.0. They still apply to this release for users who are upgrading from NetBackup 5.x.*

- The following Media Manager configuration file, `vm.conf`, entries are stored in the EMM database and are not stored in `vm.conf`:
  - `DISALLOW_NONNDMP_ON_NDMP_DRIVE`
  - `DO_NOT_EJECT_STANDALONE`
  - `DRIVE_NAME_SEED`
  - `RETURN_UNASSIGNED_MEDIA_TO_SCRATCH_POOL`
  - `SCRATCH_POOL`
  - `SSO_SCAN_ABILITY`
  - `VAULT_CLEAR_MEDIA_DESC`

These entries are configurable using the `nbemmcmd` command line interface.

## NetBackup "Touch" files

The following touch files are stored as configurable attributes in the EMM database and are no longer valid for directly affecting product behavior:

- `Install_path/netbackup/DONT_USE_SLAVE`

- *Install\_path/netbackup/DRIVE\_ERROR\_THRESHOLD*
- *Install\_path/netbackup/MEDIA\_ERROR\_THRESHOLD*
- *Install\_path/netbackup/TIME\_WINDOW*
- *Install\_path/volmgr/NO\_STANDALONE\_UNLOAD*

These entries are configurable using the `nbemmcmd` command line interface.

## NetBackup commands

- The following commands were removed from NetBackup in the NetBackup 6.5 release:
  - `beconv` - Conversion of Backup Exec on-disk catalogs to NetBackup Media Manager no longer supported. This command has been discontinued since NetBackup 5.x.
- The following commands were added to NetBackup in the NetBackup 6.5 release:
  - `bpftadm` - starts menu interface for managing the fibre transport
  - `nbdelete` - removes deleted fragments from disk volumes
  - `nbdevconfig` - previews, imports, creates, and inventories disk groups
  - `nbdevquery` - displays NetBackup disk media status
  - `nbexecute` - executes the LiveUpdate policy
  - `nbfirescan` - scans for SCSI disk devices and prints out a report
  - `nbftconfig` - configures attributes associated with fibre transport servers and clients
  - `nbhba` - runs the utility to modify an HBA cards device ID
  - `nbpsl` - adds, modifies, and lists NetBackup protection service levels
  - `nbshreddisk` - runs utility that enumerates and formats SharedDisk disk arrays
  - `nbstl` - adds, deletes, modifies, and lists NetBackup storage lifecycle policies
  - `nbsu` - runs the NetBackup Support utility that gathers a wide range of diagnostic information
  - `nbsvrgrp` - adds, changes, deletes, and lists server groups

## NetBackup OpenStorage option

- NetBackup performs optimized duplication until it encounters an image for which optimized duplication is not possible. For that image, and all subsequent images, NetBackup performs a regular duplication.
- NetBackup determines when backup images are created, copied or deleted. Images cannot be moved, expired, or deleted on the storage unless NetBackup instructs the storage appliance to do so through the API. However, Symantec and NetBackup have no control over the storage, the storage format, the capabilities of the storage appliance, or which appliance capabilities the vendor exposes through the OpenStorage API. NetBackup has no knowledge of how the backup image are actually stored. The disk appliance controls where the images reside on the storage and in what form. Similarly, Symantec and NetBackup have no control over the communication between the vendor plug-in and the storage server. The vendor determines the API or protocol to use between the plug-in and the storage server.
- NetBackup uses the fragment size setting of the source storage unit, not the setting of the destination storage unit. NetBackup copies the image fragments as is (that is, NetBackup does not resize or rearrange the backup image into a different set of fragments).

## NetBackup storage units

### Disk storage units

- Upon NetBackup installation or upgrade, the `nb_updatedssu` command runs. The command deletes `.ds` files that were used in previous releases as pointers to relocated data. Relocated data is tracked differently in the current release and the `.ds` files, while no longer necessary, are converted to the new tracking mechanism. Under some circumstances, a `.ds` file may not be deleted upon installation or upgrade. If this occurs, Symantec strongly recommends that you run the command again to ensure that all `.ds` files are removed:

```
install_path\netbackup\bin\goodies\nb_updatedssu  
/usr/opensv/netbackup/bin/goodies/nb_updatedssu
```

---

**Note:** You may have written scripts that make use of the .ds files to compute the amount of space consumed by the image files associated with the .ds files. If you use this method to determine the amount of “potential free space” on a volume, you will now need to use a different command. You can use the command, `nbdevquery -listdv -D -stype BasicDisk -dp disk_volume_name` to display the potential free space for the volume.

---

- One enhancement made to Disk Storage Units (DSUs) is a checkbox that has been added on the “New Storage Unit” dialog. This checkbox is called, “This directory can exist on the root file system or system disk.” Setting this field allows backups to occur on the root file system. This is not the best practice because, allowing backups to occur on the root file system could cause the file system to fill and eventually stop the server. This checkbox encourages users to designate a different location to allow backups.

## NetBackup Vault

- Starting with NetBackup 6.0, Vault and profile names are case-sensitive. Because directory names are not case sensitive on Microsoft Windows systems, session directories will be created in the same `vault\sessions\vault_name` directory for two or more vaults that have names that differ only in case.
- Starting with NetBackup 6.5, nbvault now vaults using the VxUL logging. The Vault OID is 166.
- Vault gives a status 0 when a duplicate job fails. When duplication jobs fail, the Vault job ends as though it was successful. Apart from this 'false positive' success status, the job behaves fine for all other things.
- The Reports for media coming on-site show the volumes that are being requested back from the off-site vault. These report types are no longer limited to being generated after media has been ejected for a current Vault session. You can generate these reports before or after media has been ejected for the current Vault session.
- The Non-vaulted images exception report has been changed to show images and media that were not vaulted when the Vault session was run. When a Non-vaulted images exception report for a given session is generated, the current status of images (in the preview.list of the session) and the media they reside on is checked for those that were not vaulted. This report lists the images (from the preview.list file) and the media that match the Choose backups criteria, and were not vaulted at the time the report was generated.

- Vault Operator Access on UNIX.

If you do not configure NetBackup Access Management, you can still set permissions on UNIX systems so that non-root users can use the operational commands in the Vault Operator Menu to inject and eject tapes and generate reports. The most efficient way to accomplish this is to add the users to whom you want to grant access to a single user group, then give that group permission to execute some of the executable files.

---

**Note:** Giving users access to the Vault Operator Menu also gives them the capability to change report destinations. If you do not want non-root users to view reports and change report destinations, do not give them access to the Vault Operator Menu. For example, you may not want non-root users to see the Recovery Report or to be able to change to whom reports are e-mailed.

---

---

**Note:** Giving users special privileges may violate your organization's computer and network security policies and allow access to private information. Check with your system administration or computer security staff to ensure that you are not violating security policies.

---

- a Create a UNIX group and add the appropriate users to this group. This group will be referred to as *opsgroup* in the following commands.
- b Log in to the system on which the NetBackup master server is installed and execute the following commands as `root`:

```
# cd /usr/opensv/volmgr/bin
# chgrp opsgroup vmchange vmquery vmupdate
# chmod 4550 vmchange vmquery vmupdate
# cd /usr/opensv/netbackup/bin
# chgrp opsgroup vltrun
# chmod 4550 vltrun
# cd /usr/opensv/netbackup/bin/admincmd
# chgrp opsgroup bpimagelist bpimmedia bpmedia bpmedialist
# chmod 4550 bpimagelist bpimmedia bpmedia bpmedialist
```
- c Log in to all systems on which NetBackup media servers are installed that control a robot and execute the following commands as `root`:

```
# cd /usr/opensv/volmgr/bin
# chgrp opsgroup vmchange vmquery vmupdate
# chmod 4550 vmchange vmquery vmupdate
```
- d If you are using Sun StorageTek ACSLS for robotic control, log in to that server and modify the `.rhosts` file in the home directory of user `acsss`. The NetBackup installation process should have added an entry to the `.rhosts` file for the NetBackup master server that grants `root`



access. Modify that entry to allow all users in the *opsgroup* access to the Sun StorageTek ACSLS server as user *acsss*:

```
master_server_name root <user1> <user2> . . . <userx>
```

- e If you are using Sun StorageTek ACSLS for robotic control, verify that the user accounts defined for the operations group exist on both the system on which the NetBackup master server is installed and on which the Sun StorageTek ACSLS server is installed. For simplicity, each user should have the same user ID on both servers. If both servers are using a naming service (such as NIS), you can skip this step.

To verify proper operation, log in as one of the non-root users on the system on which the NetBackup master server resides, start `vltopmenu`, and execute each menu option.

- The status of failed child duplications jobs may not be propagated to the parent Vault duplication status correctly leading the use to believe the Vault duplication succeeded, when it actually failed. To ensure a vault job was successful, you should

## NetBackup Operations Manager

- To change the NOM console password from the default, see, "Changing the NOM admin password," in the NOM security topics section of chapter 3 of the *Veritas NetBackup Operations Manager Guide*.
- If you are installing NOM on Solaris 10 then you should make sure that solaris patch 118833-36 is installed on the system. Otherwise NOM will not work. See also to “[Operating system patches and updates](#)” on page 65 for more information about the required patches.
- NOM 6.5 can only monitor NetBackup 6.0 MP5 and later systems.
- The “NBU Version” field within the Client Summary Dashboard report will not show the client version data. For more information about this issue, see the following TechNote on the Symantec Support Web site.  
<http://entsupport.symantec.com/docs/290076>
- The following reports may not show consistent data.
  - Skipped Files Summary
  - BMR Client Configuration Backup Failures
- The NOM services must be restarted after you install the NOM Chinese or Japanese language packs.
- After you install the Chinese and Japanese language packs on a Solaris server, the language packs may not show up when you run the `pkginfo` command.

To remove the language packs from NOM, see the Chinese or the Japanese Readme files for specific instructions

- For instructions on how to remove (or uninstall) NOM, refer to the following links on the Symantec Support Web site.
  - For Windows systems  
<http://entsupport.symantec.com/docs/289600>
  - For Solaris systems  
<http://entsupport.symantec.com/docs/289599>
- For instructions on how to upgrade NetBackup Operations Manager to version 6.5, refer to the following links on the Symantec support Web site.
  - For Windows systems  
<http://entsupport.symantec.com/docs/289769>
  - For Solaris systems  
<http://entsupport.symantec.com/docs/289770>
- The following reports show incorrect data for jobs that run on multiple storage units.
  - Drive Usage
    - Drill down from Drive usage report: Drive throughput details report
    - Drill down from Drive usage report: Drive usage details for media server report
  - Disk Usage
    - Drill down from Disk usage report: Disk throughput for storage unit report
    - Drill down from Disk usage report: Disk usage details for media server report
  - Storage unit usage
    - Drill down from Storage unit usage report: Storage unit throughput report
    - Drill down from Storage unit usage report: Storage unit usage details for media server
- NOM installer might hang if you try to install NOM in a folder whose name contains special characters like %, ~, !, @, \$, &, >, # and so forth. For example, the NOM installer might not respond if you install NOM in D:\ab%c.
- To log into NOM as the administrator, you must supply login credentials on the login screen. The default username and passwords for the administrator are `admin` and `Vxadmin`. It is recommended that you change the username and password after initial log in.

The initial domain name is `NOM_BuiltIn@FQHN`. *FQHN* is the fully qualified host name on which the NOM server and NOM web client are running.

- NOM is a NetBackup Operations Management tool. NOM may be used optionally and allows managing and monitoring of multiple NetBackup servers from a single web browser. The NetBackup Administration Console must still be used to configure NetBackup devices, job policies, and so on.
- Symantec Product Authentication Service component must be installed on the NOM server. The authentication service can be installed as a client + server or only as a client.  
When installing the authentication service as a client + server, it must be installed in Root + Authentication Broker (Root + AB) mode on the server where NOM is installed.  
When installing the authentication service as a client, you need to install the client locally on the NOM server and the server can be installed on a remote machine in the network.
- Starting with NetBackup 6.0, the NetBackup Service Layer (NBSL) and the NBproxy components are installed as a part of NetBackup on master and media servers.  
NOM requires and uses NBSL for all resource monitoring and managing, and control functions. There is an impact if NBSL stops running on a managed NetBackup server. If NBSL is stopped, NOM will stop collecting data from NetBackup server.
- The NOM server must have the NetBackup 6.0 or later client installed on the same machine.
- NOM server software should not be installed on the same server as NetBackup 6.x server software because of performance implications.
- When using the NOM console with some web browsers, you should disable popup blocking, or add the NOM server to the list of acceptable servers to view all of the NOM console windows and dialogs. The web browser should have active scripting enabled.
- NOM was a new product in NetBackup 6.0 and was based on a new architecture, data modeling, design, and implementation. It was not an incremental update to any existing Symantec products. This means that GDM and NBAR installations cannot be upgraded to NOM installations. Due to the substantial differences in architecture, design, implementation, and data model, the historical data from NBAR installations is not applicable and cannot be migrated to NOM. You may decide to run NBAR or GDM in parallel on NetBackup systems earlier than the 6.0 version level during a transition period to NetBackup 6.x.

- Suspended and incomplete jobs are not shown in standard or custom reports.
- The following reports show data with NOM 6.5 only if your managed servers are on NetBackup 6.5. If you are using NOM 6.5 and your managed servers are on an earlier version like NetBackup 6.0MP5, these reports given below will not show any data. This is because these reports depend on some capabilities implemented in NetBackup 6.5.
  - Skipped File Summary by Clients and Policies
  - Skipped Files Details for Policy
  - Skipped Files Details for Policy and Client
  - Skipped Files Details for Client
  - BMR Client Configuration Backup Failures
  - Cycle Dashboard by Job Type
  - Disk Usage
  - Disk Usage Details for Media Server
  - Disk Throughput for StorageUnit.
  - Drive Usage
  - Drive Usage Details for Media Server
  - Drive Throughput details
  - Storageunit Usage
  - Storageunit Usage Details for Media Server
  - Storageunit Throughput
  - Running vs Queued Jobs
  - Jobs Scheduled to Run
  - License Capacity
  - Trend of License Capacity for Feature
  - Current Disk Usage
  - SAN Client Jobs (It shows all jobs of the client with the value “NO” in the column “FT Job”.)
- NOM fails to start if NOM and Storage Foundation are installed on the same machine. This occurs because the NOM server service is not able to communicate with the version of authentication service that the Storage Foundation installs.
- You may need to restart NOM services after a reboot of the system, if the services do not start automatically.

- With NetBackup 6.5, NOM and Veritas Backup Reporter (VBR) do not work properly on the same system.
- The following items are clustering issues as they relate to NOM:
  - With NetBackup 6.5, NOM displays the Virtual Node name for the NetBackup services/processes on UNIX systems when NetBackup is clustered.
  - NOM shows services with a virtual node name.
  - The Job Log collection could fail in a clustered environment. The logs are collected based on time stamps that correspond to a user request. However, when an active node fails over and another node becomes active, the different server logs are verified. Users may not encounter this problem if they have a common shared location for logs.
  - NOM will not show node names in the media server list if NetBackup is reporting it as a Media server. The user may see the discrepancy in the media server list and media server name shown in job monitoring for the clustered master servers.
  - Stopping and starting the services again from NOM for a clustered master server is not recommended. It may result in a failover of NetBackup to other node.
- It may require more than a single click to select a tab in the NOM user interface if multiple master servers with a very large number of jobs and alerts are being monitored.



# NetBackup features - end of life

This chapter contains changes in how Symantec supports NetBackup features. Because some of these changes may directly impact on you, Symantec is committed to providing both a notification of one major release before discontinuing support of an item. This section contains a list features that will not be supported as of the next major release of NetBackup. For a list of Supported Platforms and Databases that will not be supported at the next major release, refer to, Chapter 2, “[Supported platforms and peripherals](#)” on page 25.

## Features, enhancements, and commands no longer supported

The following sections describe those features, enhancements, or commands that are no longer supported as of this release of NetBackup. Items within these sections were previously announced in earlier releases of NetBackup providing a warning to users that specific changes are forthcoming.

### General NetBackup features

- The Enhanced Authorization and Authentication has been removed from this release of NetBackup..
- The diagnostic information gathering utilities and programs, *support*, and *support.exe*, will not be supported in the next release of NetBackup. The new utility, *nbsu*, introduced in this release is available to gather diagnostic information.

## Devices no longer supported

The STK SN6000 device is no longer supported in this release of NetBackup.

## NetBackup commands no longer supported

The commands that are listed in this section are no longer supported with this release of NetBackup.

- The functionality to index image .f files has been removed from the NetBackup 6.5 release; therefore the `index_clients` command is no longer supported.
- The `bpstuardd` command line option `-dspath` is no longer supported.
- The `add_media_server` command is no longer supported in NetBackup.
- Symantec dropped support and removed the following commands from NetBackup. These commands are: `bpauthorize`, `bpauthsync`, `vopied`, `bpSALinfo`, and `vopie_util`.
- Symantec has dropped support and removed the following commands from the NetBackup product: `mmcrawl` and `vminitlists`.

## Last release of Storage Migrator

Storage Migrator 6.5 is the final release of the product.

Storage Migrator 6.5 is supported for the life of NetBackup 6.5 and all NetBackup 6.5 release updates. This includes supporting VSM on new versions of Solaris and HP-UX PA-RISC as NetBackup media server is proliferated to these platforms.

Storage Migrator, NetBackup media server, and the file system client must be at identical release levels when they are installed on the same computer. If the NetBackup master server is installed on the same computer, it must also be at the same version.

## End of life notifications

This section focuses on providing customers with ample notification about portions of the NetBackup product that are no longer be supported, used, or changed in the next major release of the product. The notification can be for NetBackup commands, files, directories, utilities, tools, or robots, terminology, etc.



## General NetBackup notifications

- At the next major release that follows NetBackup 6.5, the NetBackup binaries for certain AIX, HP9000 PA-RISC, Solaris SPARC, and Linux x86 computers will be built as 64-bit binaries only. For detailed information about which computers are affected, refer to the [“Platform support matrix for the NetBackup enterprise server and NetBackup server”](#) on page 28 in this document.  
If you have a bootable computer that has a 32 or 64-bit operating system, and the computer is booted in 64-bit mode, NetBackup installs and runs as designed. If you run the computer in 32-bit mode only, then NetBackup does not install.
- In the next major release, you will not be able to use the “cold” (“offline”) catalog backup method. This backup method is being deprecated from NetBackup and will no longer be supported at the next major release of NetBackup.
- The `support` script that used to reside in the `goodies` directory will no longer be supported starting in the next major release of NetBackup. This diagnostic gathering functionality is being replaced by the `nbsu` utility.
- In the next major release the Snapshot client will not support Storage Foundation 3.x versions with the exception of Online JFS version 3.5MP1 on HP-UX 11.11.
- Symantec will no longer provide the Windows Tape Device Installer or Windows Tape Drivers in the next major release of NetBackup.

## NetBackup Database Notifications

### NetBackup for Microsoft Exchange

- NetBackup 6.5 for Microsoft Exchange no longer supports backup of Microsoft Exchange 5.5. Restore and recovery from existing backup images is still supported, but will be retired in the next major NetBackup release.

### NetBackup for Microsoft SharePoint Portal

- NetBackup 6.5 is the last release to support SharePoint Portal Server 2001 backup and recovery. In the next major NetBackup release, neither backup nor recovery of SharePoint 2001 environments will be supported.

## NetBackup for Microsoft SQL

- NetBackup 6.5 is the last release to support SQL Server 7.0 backup and recovery. In the next major NetBackup release, neither backup nor recovery of SQL Server 7.0 environments will be supported.

## NetBackup Operations Manager

The catalog image data collection feature that was implemented in NetBackup 6.0 was later disabled in NetBackup 6.0 MP4 because of performance issues. Because of this, the reports that are based on the following catalog image data have been removed from NetBackup 6.5.

- Catalog image data removed from monitoring views  
The following job monitoring display fields are no longer shown.
  - Total media used (in the Jobs section of the summary).
  - The Media Used field in the summary shown at the top and in the Group Component Summary table.
- Data views dependent on catalog image data disabled  
The following data views have been disabled in the NOM custom report builder. You cannot create any new custom reports using these data views.
  - Hot Catalog Backup (Hot catalog backup information)
  - Catalog (Catalog meta-data)
  - Image (Current image information)
  - Combined Job and Image (Combined image and job information)
  - Client Media (Summarizes media usage by client)
- Standard reports dependent on catalog image data changed  
The following NOM standard reports that are based on catalog image data have changed. These reports will not show up-to-date information and using them is not recommended.
  - Catalog Files
  - Catalog Size
  - Hot Catalog Backup
  - Media Usage by Client

## Notification of NetBackup commands for next major release

The commands listed in this section will no longer be supported with the next major release of NetBackup.

- The `set_ndmp_attr` file will not exist in the next major release of NetBackup. For NetBackup 6.5, this file will exist and retain all of its currently supported functionality. However, in the next major release of NetBackup, the functionality found in `set_ndmp_attr` will only exist in `tpconfig`.
- In the next major release of NetBackup, Enhanced Authentication (noauth authentication methods) and Enhanced Authorization will no longer be supported. Symantec recommends NetBackup Access Control (NBAC) for authentication and authorization.
- Symantec will no longer support the `bpbackupdb` command in the next major release of NetBackup.
- The last release of FSAnalyzer is 6.5 and no further enhancements will occur with this version. In addition, the FSAnalyzer will no longer be supported in the next major release of NetBackup.



## Related documents

This appendix lists and describes the technical manuals that relate to NetBackup.

The CD-ROM for each NetBackup product has a copy of the related manuals in Adobe Portable Document Format (PDF). The PDF files are either in the root directory or the `Doc` directory on the CD-ROM.

To view the PDF copies of the manuals, you need an Adobe Acrobat reader, which you can download from the Adobe web site at <http://www.adobe.com>. Symantec assumes no responsibility for the correct installation or use of the reader.

### Release Notes

- *Veritas NetBackup Release Notes for UNIX, Linux, and Windows*  
`NetBackup_Release_Notes.pdf`  
Provides important information about NetBackup on UNIX- and Windows-based servers, such as the platforms and operating systems that are supported and operating notes that may not be in the NetBackup manuals or the online help.
- *Veritas NetBackup Storage Migrator Release Notes for UNIX*  
`StoMigrator_ReleaseNotes_UNIX.pdf`  
Provides information such as the platforms and operating systems that are supported and operating notes that may not be in the Storage Migrator manuals.

### Getting started guides

- *Veritas NetBackup Getting Started Guide for UNIX, Linux, and Windows*  
`NetBackup_GettingStarted_Guide.pdf`

Provides high-level description of the latest NetBackup release, as well as, information that explains the content of the NetBackup media kit.

- *Veritas NetBackup Backup, Archive, and Restore Getting Started Guide*  
NetBackup\_BAR\_GS\_Guide.pdf  
Explains how to use the NetBackup Backup, Archive, and Restore interface to perform basic backup and restore operations for UNIX, Windows, and Linux systems.

## Installation guides

- *Veritas NetBackup Installation Guide for UNIX*  
NetBackup\_Install\_UNIX.pdf  
Explains how to install NetBackup software on UNIX-based platforms.
- *Veritas NetBackup Installation Guide for Windows*  
NetBackup\_Install\_Win.pdf  
Explains how to install NetBackup software on Windows-based platforms.
- *Veritas NetBackup Security Services Installation Guide*  
VxSS\_InstallGuide.pdf on the Veritas Security Services CD-ROM.  
Explains how to install and configure the Veritas Security Services.
- *Veritas NetBackup Operations Manager Guide*  
NetBackup\_OM\_Guide.pdf  
Explains how to install and use the NetBackup Operations Manager software.

## Administrator's guides

- *Veritas NetBackup Administrator's Guide for UNIX and Linux, Volume I*  
NetBackup\_AdminGuideI\_UNIXServer.pdf  
Explains how to configure and manage NetBackup on a UNIX server, including configuring storage devices and media, managing storage units, backup policies, catalogs, and host properties.
- *Veritas NetBackup Administrator's Guide for UNIX, Volume II*  
NetBackup\_AdminGuideII\_UNIXServer.pdf  
Explains additional NetBackup features and provides overview and reference information. The guide also discusses using NetBackup with AFS and Intelligent Disaster Recovery (IDR).
- *Veritas NetBackup Administrator's Guide for Windows, Volume I*  
NetBackup\_AdminGuideI\_WinServer.pdf

Explains how to configure and manage NetBackup on a Windows server, including configuring storage devices and media, managing storage units, backup policies, catalogs, and host properties.

- *Veritas NetBackup Administrator's Guide for Windows, Volume II*  
 NetBackup\_AdminGuideII\_WinServer.pdf  
 Explains additional NetBackup features and provides overview and reference information. The guide also discusses using NetBackup with AFS and Intelligent Disaster Recovery (IDR).
- *Veritas NetBackup Security and Encryption Guide for UNIX, Windows, and Linux*  
 NetBackup\_SecEncryp\_Guide.pdf  
 This guide provides information about securing NetBackup, including using access control, enhanced authorization and authentication, and encryption. Explains additional NetBackup features such as access control and enhanced authorization and authentication. The guide also discusses using NetBackup with AFS and Intelligent Disaster Recovery (IDR).
- *Veritas Security Services Administrator's Guide*  
 VxSS\_AdminGuide.pdf on the Veritas Security Services CD-ROM.  
 Explains how to configure and manage core security mechanisms, including authentication, protected communications, and authorization.

## Administrator's guides - agents and options

- *Veritas NetBackup Snapshot Client Administrator's Guide*  
 NetBackup\_AdminGuide\_SnapshotClient.pdf  
 This guide explains how to install, configure, and use Veritas NetBackup Snapshot Client. It combines the features of snapshot backup, FlashBackup, BLI Agent, offhost backup, and Instant Recovery.
- *Veritas NetBackup Snapshot Client Quick Start Guide*  
 NetBackup\_QuickStart\_SnapshotClient.pdf  
 Provides first-time instructions for installing and configuring the Snapshot Client.
- *Veritas NetBackup for DB2 Administrator's Guide for UNIX*  
 NetBackup\_AdminGuide\_DB2\_Unix.pdf  
 Explains how to install, configure, and use NetBackup for DB2.
- *Veritas NetBackup for DB2 Administrator's Guide for Windows*  
 NetBackup\_AdminGuide\_DB2\_Win.pdf  
 Explains how to install, configure, and use NetBackup for DB2.
- *Veritas NetBackup for Informix Administrator's Guide*

NetBackup\_AdminGuide\_Informix.pdf

Explains how to install, configure, and use NetBackup for Informix to back up and restore Informix databases that are on a UNIX NetBackup client.

- *Veritas NetBackup for Lotus Notes Administrator's Guide for Windows*  
NetBackup\_AdminGuide\_LotusNotes\_Win.pdf  
Explains how to install, configure, and use NetBackup for Lotus Notes to back up and restore Lotus Notes databases and transaction logs on a Windows client.
- *Veritas NetBackup for Lotus Notes Administrator's Guide for UNIX*  
NetBackup\_AdminGuide\_LotusNotes\_Unix.pdf  
Explains how to install, configure, and use NetBackup for Lotus Notes to back up and restore Lotus Notes databases and transaction logs on a UNIX client.
- *Veritas NetBackup for Microsoft Exchange Server Administrator's Guide*  
NetBackup\_AdminGuide\_MSExchg\_Win.pdf  
Explains how to configure and use NetBackup for Microsoft Exchange Server to perform online backups and restores of Microsoft Exchange Server.
- *Veritas NetBackup for Microsoft SQL Server Administrator's Guide for Windows*  
NetBackup\_AdminGuide\_MSSQL\_Win.pdf  
Explains how to install, configure, and use NetBackup for Microsoft SQL Server to back up and restore Microsoft SQL Server databases and transaction logs.
- *Veritas NetBackup for NDMP Administrator's Guide*  
NetBackup\_AdminGuide\_NDMP.pdf  
Explains how to install, configure, and use NetBackup for NDMP to control backups on an NDMP host.
- *Veritas NetBackup for Oracle Administrator's Guide for UNIX*  
NetBackup\_AdminGuide\_Oracle\_Unix.pdf  
Explains how to install, configure, and use NetBackup for Oracle to back up and restore Oracle databases that are on a UNIX NetBackup client.
- *Veritas NetBackup for Oracle Administrator's Guide for Windows*  
NetBackup\_AdminGuide\_Oracle\_Win.pdf  
Explains how to install, configure, and use NetBackup for Microsoft Oracle to back up and restore Oracle databases that are on a Windows NetBackup Client.
- *Veritas NetBackup for SAP Administrator's Guide for UNIX*  
NetBackup\_AdminGuide\_SAP\_Unix.pdf



Explains how to install, configure, and use NetBackup for SAP on UNIX.

- *Veritas NetBackup for SAP Administrator's Guide for Windows*  
 NetBackup\_AdminGuide\_SAP\_Win.pdf  
 Explains how to install, configure, and use NetBackup for SAP on Windows-based servers.
- *Veritas NetBackup for Microsoft SharePoint Portal Server 2001 Administrator's Guide for Windows*  
 NetBackup\_AdminGuide\_SharePointPortal2001.pdf  
 Explains how to install, configure, and use NetBackup for SharePoint Portal Server 2001 to back up and restore Sybase databases that are on a Windows NetBackup client.
- *Veritas NetBackup for Microsoft SharePoint Portal Server 2003 Administrator's Guide for Windows*  
 NetBackup\_AdminGuide\_SharePointPortal.pdf  
 Explains how to install, configure, and use NetBackup for SharePoint Portal Server 2003 to back up and restore Sybase databases that are on a Windows NetBackup client.
- *Veritas NetBackup for SYBASE Administrator's Guide for UNIX*  
 NetBackup\_AdminGuide\_Sybase\_Unix.pdf  
 Explains how to install, configure, and use NetBackup for SYBASE to back up and restore Sybase databases that are on a UNIX NetBackup client.
- *Veritas NetBackup for SYBASE Administrator's Guide on Windows*  
 NetBackup\_AdminGuide\_Sybase\_Win.pdf  
 Explains how to install, configure, and use NetBackup for SYBASE to back up and restore Sybase databases that are on a Windows NetBackup client.
- *Veritas NetBackup High Availability Administrator's Guide*  
 NetBackup\_AdminGuide\_HighAvailability.pdf  
 This guide provides information on how to install and configure NetBackup to work with different clustering solutions.
- *Veritas NetBackup Bare Metal Restore Administrator's Guide*  
 NetBackup\_AdminGuide\_BMR.pdf  
 Describes how to install, configure, and use Bare Metal Restore to protect and restore client systems. For UNIX, Windows, and Linux.
- *Veritas NetBackup Vault Administrator's Guide*  
 NetBackup\_AdminGuide\_Vault.pdf  
 Describes how to install, configure, and use logical vaults and profiles to duplicate backups, perform catalog backups, eject media, and generate reports. For UNIX, Windows, and Linux.

- *Veritas NetBackup Storage Migrator Administrator's Guide for UNIX*  
StoMigrator\_AdminGuide\_UNIX.pdf  
Explains how to configure and manage Storage Migrator on a UNIX system.
- *Veritas NetBackup NetWare Media Server Option Administrator's Guide for UNIX and Windows*  
NetBackup\_AdminGuide\_NetWareServer.pdf  
This comprehensive manual provides detailed information and procedures for installing, configuring, and using the Veritas NetBackup NetWare Media Server Option.

## User's guides

- *Veritas NetBackup Vault Operator's Guide*  
NetBackup\_OperGuide\_Vault.pdf  
Describes procedures for sending tapes offsite, receiving tapes on site, and running reports on off-site media and vault jobs. For UNIX, Windows, and Linux.
- *Veritas NetBackup Administrator's Guide for Novell NetWare Client*  
NetBackup\_AdminGuide\_NetWare\_Client.pdf  
Explains how to install and use the NetBackup's NetWare Client software. With the NetWare Client, full and incremental backups can be scheduled to occur automatically and unattended under the control of the NetBackup master server. The NetWare Client also provides two methods for performing user-directed backups and restores: Target, which uses a character-based, menu-driven interface running on the NetWare server, and NonTarget, which uses the NetBackup for NetWare NonTarget Browser that is installed and run from a Windows computer.

## Device configuration guide

- *Veritas NetBackup Device Configuration Guide*  
NetBackup\_DeviceConfig\_Guide.pdf  
Explains how to add device drivers and perform other system-level configurations for the operating systems of NetBackup servers that host storage devices. Also includes information about configuring several types of tape libraries.

## Troubleshooting guide

- *Veritas NetBackup Troubleshooting Guide for UNIX and Windows*

NetBackup\_Troubleshoot\_Guide.pdf

Provides troubleshooting information for UNIX- and Windows-based NetBackup products, including Media Manager.

## NetBackup commands

- *Veritas NetBackup Commands for UNIX*  
NetBackup\_Commands\_UNIX.pdf  
Describes NetBackup and Media Manager commands and processes that can be run from a UNIX command line.
- *Veritas NetBackup Commands for Windows*  
NetBackup\_Commands\_Win.pdf  
Describes NetBackup and Media Manager commands and processes that can be run from a Windows command prompt.



# Third-Party Copyright

Certain third-party software may be distributed, embedded, or bundled with the Veritas product or recommended for use in connection with its installation and use. Such third-party software is separately licensed by its copyright holder. Use of the third-party software must be in accordance with its license terms. This appendix contains the licenses which govern the use of third-party software and its copyright holder's proprietary notices. Veritas makes no representation or warranty of any kind regarding such third-party software. Veritas offers no support for such third-party software and shall have no liability associated with its use.

## Vendor

St. BERNARD Software, Inc.

## Third-Party Software Program

Open File Manager

## Proprietary Notices

Copyright (c) 2005 "St. Bernard Software" and "Open File Manager" are trademarks of St. Bernard Software Inc. All other trademarks are hereby acknowledged

## Vendor

Sun Microsystems, Inc.

## Third-Party Software Program

Java 2 Runtime Environment

## Proprietary Notices

Copyright 2005 Sun Microsystems, Inc.,

## License Text

Sun Microsystems, Inc.

Binary Code License Agreement for the JAVATM 2 RUNTIME ENVIRONMENT (J2RE),  
STANDARD EDITION, VERSION 1.4.2\_X

SUN MICROSYSTEMS, INC. ("SUN") IS WILLING TO LICENSE THE SOFTWARE IDENTIFIED BELOW TO YOU ONLY UPON THE CONDITION THAT YOU ACCEPT ALL OF THE TERMS CONTAINED IN THIS BINARY CODE LICENSE AGREEMENT AND SUPPLEMENTAL LICENSE TERMS (COLLECTIVELY "AGREEMENT"). PLEASE READ THE AGREEMENT CAREFULLY. BY DOWNLOADING OR INSTALLING THIS SOFTWARE, YOU ACCEPT THE TERMS OF THE AGREEMENT. INDICATE ACCEPTANCE BY SELECTING THE "ACCEPT" BUTTON AT THE BOTTOM OF THE AGREEMENT. IF YOU ARE NOT WILLING TO BE BOUND BY ALL THE TERMS, SELECT THE "DECLINE" BUTTON AT THE BOTTOM OF THE AGREEMENT AND THE DOWNLOAD OR INSTALL PROCESS WILL NOT CONTINUE.

1.DEFINITIONS. "Software" means the identified above in binary form, any other machine readable materials (including, but not limited to, libraries, source files, header files, and data files), any updates or error corrections provided by Sun, and any user manuals, programming guides and other documentation provided to you by Sun under this Agreement. "Programs" mean Java applets and applications intended to run on the Java 2 Platform, Standard Edition (J2SETM platform) platform on Java-enabled general purpose desktop computers and servers.

2.LICENSE TO USE. Subject to the terms and conditions of this Agreement, including, but not limited to the Java Technology Restrictions of the Supplemental License Terms, Sun grants you a non-exclusive, non-transferable, limited license without license fees to reproduce and use internally Software complete and unmodified for the sole purpose of running Programs. Additional licenses for developers and/or publishers are granted in the Supplemental License Terms.

3.RESTRICTIONS. Software is confidential and copyrighted. Title to Software and all associated intellectual property rights is retained by Sun and/or its licensors. Unless enforcement is prohibited by applicable law, you may not modify, decompile, or reverse engineer Software. You acknowledge that Licensed Software is not designed or intended for use in the design, construction, operation or maintenance of any nuclear facility. Sun Microsystems, Inc. disclaims any express or implied warranty of fitness for such uses. No right, title or interest in or to any trademark, service mark, logo or trade name of Sun or its licensors is granted under this Agreement. Additional restrictions for developers and/or publishers licenses are set forth in the Supplemental License Terms.

4.LIMITED WARRANTY. Sun warrants to you that for a period of ninety (90) days from the date of purchase, as evidenced by a copy of the receipt, the media on which Software is furnished (if any) will be free of defects in materials and workmanship under normal use. Except for the foregoing, Software is provided "AS IS". Your exclusive remedy and Sun's entire liability under this limited warranty will be at Sun's option to replace Software media or refund the fee paid for Software. Any implied warranties on the Software are limited to 90 days. Some states do not allow limitations on duration of an implied warranty, so the above may not apply to you. This limited warranty gives you specific legal rights. You may have others, which vary from state to state.

5.DISCLAIMER OF WARRANTY. UNLESS SPECIFIED IN THIS AGREEMENT, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT THESE DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

6.LIMITATION OF LIABILITY. TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL SUN OR ITS LICENSORS BE LIABLE FOR ANY LOST REVENUE, PROFIT OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE SOFTWARE, EVEN IF SUN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. In no event will Sun's liability to you, whether in contract, tort (including negligence), or otherwise, exceed the amount paid by you for Software under this Agreement. The foregoing limitations will apply even if the above stated warranty fails of its essential purpose. Some states do not

allow the exclusion of incidental or consequential damages, so some of the terms above may not be applicable to you.

7. SOFTWARE UPDATES FROM SUN. You acknowledge that at your request or consent optional features of the Software may download, install, and execute applets, applications, software extensions, and updated versions of the Software from Sun ("Software Updates"), which may require you to accept updated terms and conditions for installation. If additional terms and conditions are not presented on installation, the Software Updates will be considered part of the Software and subject to the terms and conditions of the Agreement.

8. SOFTWARE FROM SOURCES OTHER THAN SUN. You acknowledge that, by your use of optional features of the Software and/or by requesting services that require use of the optional features of the Software, the Software may automatically download, install, and execute software applications from sources other than Sun ("Other Software"). Sun makes no representations of a relationship of any kind to licensors of Other Software. TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL SUN OR ITS LICENSORS BE LIABLE FOR ANY LOST REVENUE, PROFIT OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE OTHER SOFTWARE, EVEN IF SUN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Some states do not allow the exclusion of incidental or consequential damages, so some of the terms above may not be applicable to you.

9. TERMINATION. This Agreement is effective until terminated. You may terminate this Agreement at any time by destroying all copies of Software. This Agreement will terminate immediately without notice from Sun if you fail to comply with any provision of this Agreement. Either party may terminate this Agreement immediately should any Software become, or in either party's opinion be likely to become, the subject of a claim of infringement of any intellectual property right. Upon Termination, you must destroy all copies of Software.

10. EXPORT REGULATIONS. All Software and technical data delivered under this Agreement are subject to US export control laws and may be subject to export or import regulations in other countries. You agree to comply strictly with all such laws and regulations and acknowledge that you have the responsibility to obtain such licenses to export, re-export, or import as may be required after delivery to you.

11. TRADEMARKS AND LOGOS. You acknowledge and agree as between you and Sun that Sun owns the SUN, SOLARIS, JAVA, JINI, FORTE, and iPLANET trademarks and all SUN, SOLARIS, JAVA, JINI, FORTE, and iPLANET-related trademarks, service marks, logos and other brand designations ("Sun Marks"), and you agree to comply with the Sun Trademark and Logo Usage Requirements currently located at <http://www.sun.com/policies/trademarks>. Any use you make of the Sun Marks inures to Sun's benefit.

12. U.S. GOVERNMENT RESTRICTED RIGHTS. If Software is being acquired by or on behalf of the U.S. Government or by a U.S. Government prime contractor or subcontractor (at any tier), then the Government's rights in Software and accompanying documentation will be only as set forth in this Agreement; this is in accordance with 48 CFR 227.7201 through 227.7202-4 (for Department of Defense (DOD) acquisitions) and with 48 CFR 2.101 and 12.212 (for non-DOD acquisitions).

13. GOVERNING LAW. Any action related to this Agreement will be governed by California law and controlling U.S. federal law. No choice of law rules of any jurisdiction will apply.

14. SEVERABILITY. If any provision of this Agreement is held to be unenforceable, this Agreement will remain in effect with the provision omitted, unless omission would frustrate the intent of the parties, in which case this Agreement will immediately terminate.

15. INTEGRATION. This Agreement is the entire agreement between you and Sun relating to its subject matter. It supersedes all prior or contemporaneous oral or written communications, proposals, representations and warranties and prevails over any conflicting or additional terms of any quote, order, acknowledgment, or other communication between the parties relating to its subject matter during the term of this

Agreement. No modification of this Agreement will be binding, unless in writing and signed by an authorized representative of each party.

#### SUPPLEMENTAL LICENSE TERMS

These Supplemental License Terms add to or modify the terms of the Binary Code License Agreement. Capitalized terms not defined in these Supplemental Terms shall have the same meanings ascribed to them in the Binary Code License Agreement. These Supplemental Terms shall supersede any inconsistent or conflicting terms in the Binary Code License Agreement, or in any license contained within the Software.

A. Software Internal Use and Development License Grant. Subject to the terms and conditions of this Agreement, including, but not limited to the Java Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce internally and use internally the Software complete and unmodified (unless otherwise specified in the applicable README file) for the purpose of designing, developing, and testing your Programs.

B. License to Distribute Software. Subject to the terms and conditions of this Agreement, including, but not limited to the Java Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce and distribute the Software, provided that (i) you distribute the Software complete and unmodified (unless otherwise specified in the applicable README file) and only bundled as part of, and for the sole purpose of running, your Programs, (ii) the Programs add significant and primary functionality to the Software, (iii) you do not distribute

additional software intended to replace any component(s) of the Software (unless otherwise specified in the applicable README file), (iv) you do not remove or alter any proprietary legends or notices contained in the Software, (v) you only distribute the Software subject to a license agreement that protects Sun's interests consistent with the terms contained in this Agreement, and (vi) you agree to defend and indemnify Sun and its licensors from and against any damages, costs, liabilities, settlement amounts and/or expenses (including attorneys' fees) incurred in connection with any claim, lawsuit or action by any third party that arises or results from the use or distribution of any and all Programs and/or Software.

C. License to Distribute Redistributables. Subject to the terms and conditions of this Agreement, including but not limited to the Java Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce and distribute those files specifically identified as redistributable in the Software "README" file ("Redistributables") provided that: (i) you distribute the Redistributables complete and unmodified (unless otherwise specified in the applicable README file), and only bundled as part of Programs, (ii) you do not distribute additional software intended to supersede any component(s) of the Redistributables (unless otherwise specified in the applicable README file), (iii) you do not remove or alter any proprietary legends or notices contained in or on the Redistributables, (iv) you only distribute the Redistributables pursuant to a license agreement that protects Sun's interests consistent with the terms contained in the Agreement, (v) you agree to defend and indemnify Sun and its licensors from and against any damages, costs, liabilities, settlement amounts and/or expenses (including attorneys' fees) incurred in connection with any claim, lawsuit or action by any third party that arises or results from the use or distribution of any and all Programs and/or Software.

D. Java Technology Restrictions. You may not modify the Java Platform Interface ("JPI", identified as classes contained within the "java" package or any subpackages of the "java" package), by creating additional classes within the JPI or otherwise causing the addition to or modification of the classes in the JPI. In the event that you create an additional class and associated API(s) which (i) extends the functionality of the Java platform, and (ii) is exposed to third party software developers for the purpose of developing additional software which invokes such additional API, you must promptly publish broadly an accurate specification for such API for free use by all developers. You may not create, or authorize your licensees to create, additional classes, interfaces, or subpackages that are in any way identified as "java", "javax", "sun" or similar convention as specified by Sun in any naming convention designation.



E.Source Code. Software may contain source code that, unless expressly licensed for other purposes, is provided solely for reference purposes pursuant to the terms of this Agreement. Source code may not be redistributed unless expressly provided for in this Agreement.

F.Third Party Code. Additional copyright notices and license terms applicable to portions of the Software are set forth in the THIRDPARTYLICENSEREADME.txt file. In addition to any terms and conditions of any third party opensource/freeware license identified in the THIRDPARTYLICENSEREADME.txt file, the disclaimer of warranty and limitation of liability provisions in paragraphs 5 and 6 of the Binary Code License Agreement shall apply to all Software in this distribution.

For inquiries please contact: Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, California 95054, U.S.A.(LFI#135955/Form ID#011801)

## Vendor

Sourceforge.net

## Third-Party Software Program

JUnit

## Proprietary Notices

JUnit 3.8.1 was developed by JUnit.org (<http://www.junit.org/>). JUnit is located in junit.jar.

## License Text

JUnit 3.8.1 was developed by JUnit.org (<http://www.junit.org/>). JUnit is located in junit.jar. Your use of JUnit 3.8.1 is subject to the terms and conditions of the Common Public License v 1.0 which is available at

<http://oss.software.ibm.com/developerworks/opensource/license10.html>. More specifically:

THE ACCOMPANYING PROGRAM IS PROVIDED UNDER THE TERMS OF THIS COMMON PUBLIC LICENSE ("AGREEMENT"). ANY USE, REPRODUCTION OR DISTRIBUTION OF THE PROGRAM CONSTITUTES RECIPIENT'S ACCEPTANCE OF THIS AGREEMENT.

### 1. DEFINITIONS

"Contribution" means:

a) in the case of the initial Contributor, the initial code and documentation distributed under this Agreement, and

b) in the case of each subsequent Contributor:

i) changes to the Program, and

ii) additions to the Program;

where such changes and/or additions to the Program originate from and are distributed by that particular Contributor. A Contribution 'originates' from a Contributor if it was added to the Program by such Contributor itself or anyone acting on such Contributor's behalf. Contributions do not include additions to the Program which: (i) are separate modules of software distributed in conjunction with the Program under their own license agreement, and (ii) are not derivative works of the Program.

"Contributor" means any person or entity that distributes the Program.

"Licensed Patents " mean patent claims licensable by a Contributor which are necessarily infringed by the use or sale of its Contribution alone or when combined with the Program.

"Program" means the Contributions distributed in accordance with this Agreement.

"Recipient" means anyone who receives the Program under this Agreement, including all Contributors.

### 2. GRANT OF RIGHTS

a) Subject to the terms of this Agreement, each Contributor hereby grants Recipient a non-exclusive, worldwide, royalty-free copyright license to reproduce, prepare derivative

works of, publicly display, publicly perform, distribute and sublicense the Contribution of such Contributor, if any, and such derivative works, in source code and object code form.

b) Subject to the terms of this Agreement, each Contributor hereby grants Recipient a non-exclusive, worldwide, royalty-free patent license under Licensed Patents to make, use, sell, offer to sell, import and otherwise transfer the Contribution of such Contributor, if any, in source code and object code form. This patent license shall apply to the combination of the Contribution and the Program if, at the time the Contribution is added by the Contributor, such addition of the Contribution causes such combination to be covered by the Licensed Patents. The patent license shall not apply to any other combinations which include the Contribution. No hardware per se is licensed hereunder.

c) Recipient understands that although each Contributor grants the licenses to its Contributions set forth herein, no assurances are provided by any Contributor that the Program does not infringe the patent or other intellectual property rights of any other entity. Each Contributor disclaims any liability to Recipient for claims brought by any other entity based on infringement of intellectual property rights or otherwise. As a condition to exercising the rights and licenses granted hereunder, each Recipient hereby assumes sole responsibility to secure any other intellectual property rights needed, if any. For example, if a third party patent license is required to allow Recipient to distribute the Program, it is Recipient's responsibility to acquire that license before distributing the Program.

d) Each Contributor represents that to its knowledge it has sufficient copyright rights in its Contribution, if any, to grant the copyright license set forth in this Agreement.

### 3. REQUIREMENTS

A Contributor may choose to distribute the Program in object code form under its own license agreement, provided that:

a) it complies with the terms and conditions of this Agreement; and

b) its license agreement:

i) effectively disclaims on behalf of all Contributors all warranties and conditions, express and implied, including warranties or conditions of title and non-infringement, and implied warranties or conditions of merchantability and fitness for a particular purpose;

ii) effectively excludes on behalf of all Contributors all liability for damages, including direct, indirect, special, incidental and consequential damages, such as lost profits;

iii) states that any provisions which differ from this Agreement are offered by that Contributor alone and not by any other party; and

iv) states that source code for the Program is available from such Contributor, and informs licensees how to obtain it in a reasonable manner on or through a medium customarily used for software exchange.

When the Program is made available in source code form:

a) it must be made available under this Agreement; and

b) a copy of this Agreement must be included with each copy of the Program.

Contributors may not remove or alter any copyright notices contained within the Program.

Each Contributor must identify itself as the originator of its Contribution, if any, in a manner that reasonably allows subsequent Recipients to identify the originator of the Contribution.

### 4. COMMERCIAL DISTRIBUTION

Commercial distributors of software may accept certain responsibilities with respect to end users, business partners and the like. While this license is intended to facilitate the commercial use of the Program, the Contributor who includes the Program in a commercial product offering should do so in a manner which does not create potential liability for other Contributors. Therefore, if a Contributor includes the Program in a commercial product offering, such Contributor ("Commercial Contributor") hereby agrees to defend and indemnify every other Contributor ("Indemnified Contributor") against any losses, damages and costs (collectively "Losses") arising from claims, lawsuits and other legal actions brought by a third party against the Indemnified Contributor to the extent caused by the acts or omissions of such Commercial Contributor in connection with its distribution of the Program in a commercial product offering. The obligations in this section do not apply to any claims or Losses relating to any actual or alleged intellectual

property infringement. In order to qualify, an Indemnified Contributor must: a) promptly notify the Commercial Contributor in writing of such claim, and b) allow the Commercial Contributor to control, and cooperate with the Commercial Contributor in, the defense and any related settlement negotiations. The Indemnified Contributor may participate in any such claim at its own expense.

For example, a Contributor might include the Program in a commercial product offering, Product X. That Contributor is then a Commercial Contributor. If that Commercial Contributor then makes performance claims, or offers warranties related to Product X, those performance claims and warranties are such Commercial Contributor's responsibility alone. Under this section, the Commercial Contributor would have to defend claims against the other Contributors related to those performance claims and warranties, and if a court requires any other Contributor to pay any damages as a result, the Commercial Contributor must pay those damages.

#### 5. NO WARRANTY

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, THE PROGRAM IS PROVIDED ON AN "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, EITHER EXPRESS OR IMPLIED INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OR CONDITIONS OF TITLE, NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Each Recipient is solely responsible for determining the appropriateness of using and distributing the Program and assumes all risks associated with its exercise of rights under this Agreement, including but not limited to the risks and costs of program errors, compliance with applicable laws, damage to or loss of data, programs or equipment, and unavailability or interruption of operations.

#### 6. DISCLAIMER OF LIABILITY

EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, NEITHER RECIPIENT NOR ANY CONTRIBUTORS SHALL HAVE ANY LIABILITY FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING WITHOUT LIMITATION LOST PROFITS), HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OR DISTRIBUTION OF THE PROGRAM OR THE EXERCISE OF ANY RIGHTS GRANTED HEREUNDER, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

#### 7. GENERAL

If any provision of this Agreement is invalid or unenforceable under applicable law, it shall not affect the validity or enforceability of the remainder of the terms of this Agreement, and without further action by the parties hereto, such provision shall be reformed to the minimum extent necessary to make such provision valid and enforceable. If Recipient institutes patent litigation against a Contributor with respect to a patent applicable to software (including a cross-claim or counterclaim in a lawsuit), then any patent licenses granted by that Contributor to such Recipient under this Agreement shall terminate as of the date such litigation is filed. In addition, if Recipient institutes patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Program itself (excluding combinations of the Program with other software or hardware) infringes such Recipient's patent(s), then such Recipient's rights granted under Section 2(b) shall terminate as of the date such litigation is filed.

All Recipient's rights under this Agreement shall terminate if it fails to comply with any of the material terms or conditions of this Agreement and does not cure such failure in a reasonable period of time after becoming aware of such noncompliance. If all Recipient's rights under this Agreement terminate, Recipient agrees to cease use and distribution of the Program as soon as reasonably practicable. However, Recipient's obligations under this Agreement and any licenses granted by Recipient relating to the Program shall continue and survive.

Everyone is permitted to copy and distribute copies of this Agreement, but in order to avoid inconsistency the Agreement is copyrighted and may only be modified in the following manner. The Agreement Steward reserves the right to publish new versions (including revisions) of this Agreement from time to time. No one other than the Agreement Steward has the right to modify this Agreement. IBM is the initial Agreement Steward. IBM may assign the responsibility to serve as the Agreement Steward to a

suitable separate entity. Each new version of the Agreement will be given a distinguishing version number. The Program (including Contributions) may always be distributed subject to the version of the Agreement under which it was received. In addition, after a new version of the Agreement is published, Contributor may elect to distribute the Program (including its Contributions) under the new version. Except as expressly stated in Sections 2(a) and 2(b) above, Recipient receives no rights or licenses to the intellectual property of any Contributor under this Agreement, whether expressly, by implication, estoppel or otherwise. All rights in the Program not expressly granted under this Agreement are reserved.

This Agreement is governed by the laws of the State of New York and the intellectual property laws of the United States of America. No party to this Agreement will bring a legal action under this Agreement more than one year after the cause of action arose. Each party waives its rights to a jury trial in any resulting litigation.

Source code for JUnit is available.

## Vendor

Sun Microsystems, Inc.

## Third-Party Software Program

Java Development Kit (JDK) including Java Runtime Environment  
(also known as Java JAVATM 2 SOFTWARE DEVELOPMENT KIT or "J2SDK")

## Proprietary Notices

Copyright 2005 Sun Microsystems, Inc.,

## License Text

Sun Microsystems, Inc

Binary Code License Agreement

SUN MICROSYSTEMS, INC. ("SUN") IS WILLING TO LICENSE THE SOFTWARE IDENTIFIED BELOW TO YOU ONLY UPON THE CONDITION THAT YOU ACCEPT ALL OF THE TERMS CONTAINED IN THIS BINARY CODE LICENSE AGREEMENT AND SUPPLEMENTAL LICENSE TERMS (COLLECTIVELY "AGREEMENT"). PLEASE READ THE AGREEMENT CAREFULLY. BY DOWNLOADING OR INSTALLING THIS SOFTWARE, YOU ACCEPT THE TERMS OF THE AGREEMENT. INDICATE ACCEPTANCE BY SELECTING THE "ACCEPT" BUTTON AT THE BOTTOM OF THE AGREEMENT. IF YOU ARE NOT WILLING TO BE BOUND BY ALL THE TERMS, SELECT THE "DECLINE" BUTTON AT THE BOTTOM OF THE AGREEMENT AND THE DOWNLOAD OR INSTALL PROCESS WILL NOT CONTINUE.

1. \_\_\_\_\_ DEFINITIONS. "Software" means the identified above in binary form, any other machine readable materials (including, but not limited to, libraries, source files, header files, and data files), any updates or error corrections provided by Sun, and any user manuals, programming guides and other documentation provided to you by Sun under this Agreement. "Programs" mean Java applets and applications intended to run on the Java 2 Platform Standard Edition (J2SE platform) platform on Java-enabled general purpose desktop computers and servers.

2. \_\_\_\_\_ LICENSE TO USE. Subject to the terms and conditions of this Agreement, including, but not limited to the Java Technology Restrictions of the Supplemental License Terms, Sun grants you a non-exclusive, non-transferable, limited license without license fees to reproduce and use internally Software complete and unmodified for the sole purpose of running Programs. Additional licenses for developers and/or publishers are granted in the Supplemental License Terms.

3. \_\_\_\_\_ RESTRICTIONS. Software is confidential and copyrighted. Title to Software and all associated intellectual property rights is retained by Sun and/or its licensors. Unless enforcement is prohibited by applicable law, you may not modify,

decompile, or reverse engineer Software. You acknowledge that Licensed Software is not designed or intended for use in the design, construction, operation or maintenance of any nuclear facility. Sun Microsystems, Inc. disclaims any express or implied warranty of fitness for such uses. No right, title or interest in or to any trademark, service mark, logo or trade name of Sun or its licensors is granted under this Agreement. Additional restrictions for developers and/or publishers licenses are set forth in the Supplemental License Terms.

4. \_\_\_\_\_ LIMITED WARRANTY. Sun warrants to you that for a period of ninety (90) days from the date of purchase, as evidenced by a copy of the receipt, the media on which Software is furnished (if any) will be free of defects in materials and workmanship under normal use. Except for the foregoing, Software is provided "AS IS". Your exclusive remedy and Sun's entire liability under this limited warranty will be at Sun's option to replace Software media or refund the fee paid for Software. Any implied warranties on the Software are limited to 90 days. Some states do not allow limitations on duration of an implied warranty, so the above may not apply to you. This limited warranty gives you specific legal rights. You may have others, which vary from state to state.

5. \_\_\_\_\_ DISCLAIMER OF WARRANTY. DISCLAIMER OF WARRANTY. UNLESS SPECIFIED IN THIS AGREEMENT, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT THESE DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

6. \_\_\_\_\_ LIMITATION OF LIABILITY. TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL SUN OR ITS LICENSORS BE LIABLE FOR ANY LOST REVENUE, PROFIT OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE SOFTWARE, EVEN IF SUN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. In no event will Sun's liability to you, whether in contract, tort (including negligence), or otherwise, exceed the amount paid by you for Software under this Agreement. The foregoing limitations will apply even if the above stated warranty fails of its essential purpose. Some states do not allow the exclusion of incidental or consequential damages, so some of the terms above may not be applicable to you.

7. \_\_\_\_\_ TERMINATION. This Agreement is effective until terminated. You may terminate this Agreement at any time by destroying all copies of Software. This Agreement will terminate immediately without notice from Sun if you fail to comply with any provision of this Agreement. Either party may terminate this Agreement immediately should any Software become, or in either party's opinion be likely to become, the subject of a claim of infringement of any intellectual property right. Upon Termination, you must destroy all copies of Software.

8. \_\_\_\_\_ EXPORT REGULATIONS. All Software and technical data delivered under this Agreement are subject to US export control laws and may be subject to export or import regulations in other countries. You agree to comply strictly with all such laws and regulations and acknowledge that you have the responsibility to obtain such licenses to export, re-export, or import as may be required after delivery to you.

9. \_\_\_\_\_ TRADEMARKS AND LOGOS. You acknowledge and agree as between you and Sun that Sun owns the SUN, SOLARIS, JAVA, JINI, FORTE, and iPLANET trademarks and all SUN, SOLARIS, JAVA, JINI, FORTE, and iPLANET-related trademarks, service marks, logos and other brand designations ("Sun Marks"), and you agree to comply with the Sun Trademark and Logo Usage Requirements currently located at <http://www.sun.com/policies/trademarks>. Any use you make of the Sun Marks inures to Sun's benefit.

10. \_\_\_\_\_ U.S. GOVERNMENT RESTRICTED RIGHTS. If Software is being acquired by or on behalf of the U.S. Government or by a U.S. Government prime contractor or subcontractor (at any tier), then the Government's rights in Software and accompanying documentation will be only as set forth in this Agreement; this is in accordance with 48 CFR 227.7201 through 227.7202-4 (for Department of Defense (DOD) acquisitions) and with 48 CFR 2.101 and 12.212 (for non-DOD acquisitions).

11. \_\_\_\_\_ GOVERNING LAW. Any action related to this Agreement will be governed by California law and controlling U.S. federal law. No choice of law rules of any jurisdiction will apply.

12. \_\_\_\_\_ SEVERABILITY. If any provision of this Agreement is held to be unenforceable, this Agreement will remain in effect with the provision omitted, unless omission would frustrate the intent of the parties, in which case this Agreement will immediately terminate.

13. \_\_\_\_\_ INTEGRATION. This Agreement is the entire agreement between you and Sun relating to its subject matter. It supersedes all prior or contemporaneous oral or written communications, proposals, representations and warranties and prevails over any conflicting or additional terms of any quote, order, acknowledgment, or other communication between the parties relating to its subject matter during the term of this Agreement. No modification of this Agreement will be binding, unless in writing and signed by an authorized representative of each party.

#### SUPPLEMENTAL LICENSE TERMS

These Supplemental License Terms add to or modify the terms of the Binary Code License Agreement. Capitalized terms not defined in these Supplemental Terms shall have the same meanings ascribed to them in the Binary Code License Agreement. These Supplemental Terms shall supersede any inconsistent or conflicting terms in the Binary Code License Agreement, or in any license contained within the Software.

A. \_\_\_\_\_ Software Internal Use and Development License Grant. Subject to the terms and conditions of this Agreement and restrictions and exceptions set forth in the Software "README" file, including, but not limited to the Java Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce internally and use internally the Software complete and unmodified for the purpose of designing, developing, and testing your Programs.

B. \_\_\_\_\_ License to Distribute Software. Subject to the terms and conditions of this Agreement and restrictions and exceptions set forth in the Software README file, including, but not limited to the Java Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce and distribute the Software, provided that (i) you distribute the Software complete and unmodified and only bundled as part of, and for the sole purpose of running, your Programs, (ii) the Programs add significant and primary functionality to the Software, (iii) you do not distribute additional software intended to replace any component(s) of the Software, (iv) you do not remove or alter any proprietary legends or notices contained in the Software, (v) you only distribute the Software subject to a license agreement that protects Sun's interests consistent with the terms contained in this Agreement, and (vi) you agree to defend and indemnify Sun and its licensors from and against any damages, costs, liabilities, settlement amounts and/or expenses (including attorneys' fees) incurred in connection with any claim, lawsuit or action by any third party that arises or results from the use or distribution of any and all Programs and/or Software.

C. \_\_\_\_\_ Java Technology Restrictions. You may not create, modify, or change the behavior of, or authorize your licensees to create, modify, or change the behavior of, classes, interfaces, or subpackages that are in any way identified as "java", "javax", "sun" or similar convention as specified by Sun in any naming convention designation.

D. \_\_\_\_\_ Source Code. Software may contain source code that, unless expressly licensed for other purposes, is provided solely for reference purposes pursuant to the terms of this Agreement. Source code may not be redistributed unless expressly provided for in this Agreement.

E. \_\_\_\_\_ Third Party Code. Additional copyright notices and license terms applicable to portions of the Software are set forth in the THIRDPARTYLICENSEREADME.txt file. In addition to any terms and conditions of any third party open-source/freeware license identified in the THIRDPARTYLICENSEREADME.txt file, the disclaimer of warranty and limitation of liability provisions in paragraphs 5 and 6 of the Binary Code License Agreement shall apply to all Software in this distribution.

For inquiries please contact: Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, California 95054, U.S.A. (LFI#141623/Form ID#011801)

## Vendor

Boris Fomitchev

## Third-Party Software Program

STLport

## Proprietary Notices

Copyright 1999,2000 Boris Fomitchev

## License Text

### License Agreement

Boris Fomitchev grants Licensee a non-exclusive, non-transferable, royalty-free license to use STLport and its documentation without fee.

By downloading, using, or copying STLport or any portion thereof, Licensee agrees to abide by the intellectual property laws and all other applicable laws of the United States of America, and to all of the terms and conditions of this Agreement.

Licensee shall maintain the following copyright and permission notices on STLport sources and its documentation unchanged :

Copyright 1999,2000 Boris Fomitchev

This material is provided "as is", with absolutely no warranty expressed or implied. Any use is at your own risk.

Permission to use or copy this software for any purpose is hereby granted without fee, provided the above notices are retained on all copies. Permission to modify the code and to distribute modified code is granted, provided the above notices are retained, and a notice that the code was modified is included with the above copyright notice.

The Licensee may distribute binaries compiled with STLport (whether original or modified) without any royalties or restrictions.

The Licensee may distribute original or modified STLport sources, provided that:

· \_\_\_\_\_ The conditions indicated in the above permission notice are met;

· \_\_\_\_\_ The following copyright notices are retained when present, and conditions provided in accompanying permission notices are met :

Copyright 1994 Hewlett-Packard Company

Copyright 1996,97 Silicon Graphics Computer Systems, Inc.

Copyright 1997 Moscow Center for SPARC Technology.

Permission to use, copy, modify, distribute and sell this software and its documentation for any purpose is hereby granted without fee, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation. Hewlett-Packard Company makes no representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

Permission to use, copy, modify, distribute and sell this software and its documentation for any purpose is hereby granted without fee, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation. Silicon Graphics makes no representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

Permission to use, copy, modify, distribute and sell this software and its documentation for any purpose is hereby granted without fee, provided that the above copyright notice appear in all copies and that both that copyright notice and this permission notice appear in supporting documentation. Moscow Center for SPARC Technology makes no

representations about the suitability of this software for any purpose. It is provided "as is" without express or implied warranty.

## Vendor

Philip Hazel

## Third-Party Software Program

Perl Compatible Regular Expressions

## Proprietary Notices

Regular expression support is provided by the PCRE library package, which is open source software, written by Philip Hazel, and copyright by the University of Cambridge, England. The ftp site for the source is <ftp://ftp.csx.ac.uk/pub/software/programming/pcre/>

## License Text

### PCRE LICENCE

PCRE is a library of functions to support regular expressions whose syntax and semantics are as close as possible to those of the Perl 5 language.

Written by: Philip Hazel <ph10@cam.ac.uk>

University of Cambridge Computing Service,  
Cambridge, England. Phone: +44 1223 334714.

Copyright (c) 1997-2003 University of Cambridge

Permission is granted to anyone to use this software for any purpose on any computer system, and to redistribute it freely, subject to the following restrictions:

1. This software is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

2. The origin of this software must not be misrepresented, either by explicit claim or by omission. In practice, this means that if you use PCRE in software that you distribute to others, commercially or

otherwise, you must put a sentence like this

Regular expression support is provided by the PCRE library package, which is open source software, written by Philip Hazel, and copyright by the University of Cambridge, England, somewhere reasonably visible in your documentation and in any relevant files or online help data or similar. A reference to the ftp site for the source, that is, to

<ftp://ftp.csx.cam.ac.uk/pub/software/programming/pcre/>

should also be given in the documentation. However, this condition is not intended to apply to whole chains of software. If package A includes PCRE, it must acknowledge it, but if package B is software that includes package A, the condition is not imposed on package B (unless it uses PCRE independently).

3. Altered versions must be plainly marked as such, and must not be misrepresented as being the original software.

4. If PCRE is embedded in any software that is released under the GNU General Purpose Licence (GPL), or Lesser General Purpose Licence (LGPL), then the terms of that licence shall supersede any condition above with which it is incompatible.

The documentation for PCRE, supplied in the "doc" directory, is distributed under the same terms as the software itself.

End

## Vendor

JDOM Project



## Third-Party Software Program

JDOM

### Proprietary Notices

Copyright (C) 2000-2004 Jason Hunter & Brett McLaughlin. All rights reserved.

### License Text

```
/*--
$id: LICENSE.txt,v 1.11 2004/02/06 09:32:57 jhunter Exp $
Copyright (C) 2000-2004 Jason Hunter & Brett McLaughlin. All rights reserved.
Redistribution and use in source and binary forms, with or without modification, are
permitted provided that the following conditions are met:
1. Redistributions of source code must retain the above copyright notice, this list of
conditions, and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of
conditions, and the disclaimer that follows these conditions in the documentation and/or
other materials provided with the distribution.
3. The name "JDOM" must not be used to endorse or promote products derived from this
software without prior written permission. For written permission, please contact
<request_AT_jdom_DOT_org>.
4. Products derived from this software may not be called "JDOM", nor may "JDOM" appear
in their name, without prior written permission from the JDOM Project Management
<request_AT_jdom_DOT_org>.
In addition, we request (but do not require) that you include in the end-user
documentation provided with the redistribution and/or in the software itself an
acknowledgement equivalent to the following:
"This product includes software developed by the JDOM Project http://www.jdom.org/."
Alternatively, the acknowledgment may be graphical using the logos available at
http://www.jdom.org/images/logos.
THIS SOFTWARE IS PROVIDED ``AS IS" AND ANY EXPRESSED OR IMPLIED
WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF
MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.
IN NO EVENT SHALL THE JDOM AUTHORS OR THE PROJECT CONTRIBUTORS BE
LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR
CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF
SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS
INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER
IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR
OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF
ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
This software consists of voluntary contributions made by many individuals on behalf of
the JDOM Project and was originally created by Jason Hunter
<jhunter_AT_jdom_DOT_org> and Brett McLaughlin <brett_AT_jdom_DOT_org>. For
more information on the JDOM Project, please see <http://www.jdom.org/>.
/
```

### Vendor

Daniel Stenberg

## Third-Party Software Program

Curl/LibCurl

## Proprietary Notices

Copyright (c) 1996 - 2004, Daniel Stenberg, <daniel@haxx.se>. All rights reserved.

## License Text

The curl license

COPYRIGHT AND PERMISSION NOTICE

Copyright (c) 1996 - 2004, Daniel Stenberg, <daniel@haxx.se>.

All rights reserved.

Permission to use, copy, modify, and distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR

IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,

FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OF THIRD PARTY RIGHTS. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM,

DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Except as contained in this notice, the name of a copyright holder shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization of the copyright holder.

## Vendor

Apache Software Foundation

## Third-Party Software Programs

Tomcat

## Proprietary Notices

Portions of this program contain components from the Apache Software Foundation. These components are made available under the Apache License 2.0, a copy of which is provided herein.

## License Text

Apache License

Version 2.0, January 2004

<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

(a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

(b) You must cause any modified files to carry prominent notices stating that You changed the files; and

(c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

(d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices

contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. **Submission of Contributions.** Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions.

Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. **Trademarks.** This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. **Disclaimer of Warranty.** Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. **Limitation of Liability.** In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. **Accepting Warranty or Additional Liability.** While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at <http://www.apache.org/licenses/LICENSE-2.0> Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

## Vendor

Apache Software Foundation

## Third-Party Software Programs

Apache Struts

## Proprietary Notices

Portions of this program contain components from the Apache Software Foundation. These components are made available under the Apache License 2.0, a copy of which is provided herein.

## License Text

Apache License

Version 2.0, January 2004

<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by

an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

(a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

(b) You must cause any modified files to carry prominent notices stating that You changed the files; and

(c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

(d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions.

Notwithstanding the above, nothing herein shall supersede or modify the terms of any

separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at <http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

## Vendor

Apache Software Foundation

## Third-Party Software Programs

obj

## Proprietary Notices

Portions of this program contain components from the Apache Software Foundation. These components are made available under the Apache License 2.0, a copy of which is provided herein.

## License Text

Apache License

Version 2.0, January 2004

<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

### 1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.



3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

(a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

(b) You must cause any modified files to carry prominent notices stating that You changed the files; and

(c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and  
(d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You

for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at

<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

## Vendor

Apache Software Foundation

## Third-Party Software Programs

Log4j

## Proprietary Notices

Portions of this program contain components from the Apache Software Foundation. These components are made available under the Apache License 2.0, a copy of which is provided herein.

## License Text

Apache License

Version 2.0, January 2004

<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or

management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

(a) You must give any other recipients of the Work or Derivative Works a copy of this License; and

(b) You must cause any modified files to carry prominent notices stating that You changed the files; and

(c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and  
 (d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. **Submission of Contributions.** Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. **Trademarks.** This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. **Disclaimer of Warranty.** Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. **Limitation of Liability.** In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. **Accepting Warranty or Additional Liability.** While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[ ]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for

the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at

<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

## Vendor

Apache Software Foundation

## Third-Party Software Programs

Axis

## Proprietary Notices

Portions of this program contain components from the Apache Software Foundation. These components are made available under the Apache License 2.0, a copy of which is provided herein.

## License Text

Apache License

Version 2.0, January 2004

<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain

separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

- (a) You must give any other recipients of the Work or Derivative Works a copy of this License; and
- (b) You must cause any modified files to carry prominent notices stating that You changed the files; and
- (c) You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and
- (d) If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. **Submission of Contributions.** Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions. Notwithstanding the above, nothing herein shall supersede or modify the terms of any separate license agreement you may have executed with Licensor regarding such Contributions.

6. **Trademarks.** This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. **Disclaimer of Warranty.** Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. **Limitation of Liability.** In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. **Accepting Warranty or Additional Liability.** While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work.

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License"); you may not use this file except in compliance with the License. You may obtain a copy of the License at

<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software distributed under the License is distributed on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied. See the License for the specific language governing permissions and limitations under the License.

## Vendor

Douglas C. Schmidt and his research group at Washington University and University of California, Irvine and Vanderbilt University

## Third-Party Software Program

ACE (The Adaptive Communication Environment)

## Proprietary Notices

“ACE(TM) is copyrighted by Douglas C. Schmidt and his research group at Washington University, University of California, Irvine, and Vanderbilt University Copyright (c) 1993-2003, all rights reserved.”

## License Text

Copyright and Licensing Information for ACE(TM), TAO(TM), CIAO(TM), and CoSMIC(TM) ACE(TM), TAO(TM), CIAO(TM), and CoSMIC(TM) (henceforth referred to as "DOC software") are copyrighted by Douglas C. Schmidt and his research group at Washington University, University of California, Irvine, and Vanderbilt University, Copyright (c) 1993-2004, all rights reserved. Since DOC software is open-source, free software, you are free to use, modify, copy, and distribute--perpetually and irrevocably--the DOC software source code and object code produced from the source, as well as copy and distribute modified versions of this software. You must, however, include this copyright statement along with code built using DOC software.

You can use DOC software in proprietary software and are under no obligation to redistribute any of your source code that is built using DOC software. Note, however, that you may not do anything to the DOC software code, such as copyrighting it yourself or claiming authorship of the DOC software code, that will prevent DOC software from being distributed freely using an open-source development model. You needn't inform anyone that you're using DOC software in your software, though we encourage you to let us know so we can promote your project in the DOC software success stories..

DOC software is provided as is with no warranties of any kind, including the warranties of design, merchantability, and fitness for a particular purpose, noninfringement, or arising from a course of dealing, usage or trade practice. Moreover, DOC software is provided with no support and without any obligation on the part of Washington University, UC Irvine, Vanderbilt University, their employees, or students to assist in its use, correction, modification, or enhancement. A number of companies around the world provide commercial support for DOC software, however. DOC software is Y2K-compliant, as long as the underlying OS platform is Y2K-compliant.

Washington University, UC Irvine, Vanderbilt University, their employees, and students shall have no liability with respect to the infringement of copyrights, trade secrets or any patents by DOC software or any part thereof. Moreover, in no event will Washington University, UC Irvine, or Vanderbilt University, their employees, or students be liable for any lost revenue or profits or other special, indirect and consequential damages.

The ACE, TAO, CIAO, and CoSMIC web sites are maintained by the DOC Group at the Institute for Software Integrated Systems (ISIS) and the Center for Distributed Object Computing of Washington University, St. Louis for the development of open-source software as part of the open-source software community. By submitting comments, suggestions, code, code snippets, techniques (including that of usage), and algorithms, submitters acknowledge that they have the right to do so, that any such submissions are given freely and unreservedly, and that they waive any claims to copyright or ownership. In addition, submitters acknowledge that any such submission might become part of the copyright maintained on the overall body of code, which comprises the DOC software. By making a submission, submitter agree to these terms. Furthermore, submitters acknowledge that the incorporation or modification of such submissions is entirely at the discretion of the moderators of the open-source DOC software projects or their designees. The names ACE(TM), TAO(TM), CIAO(TM), CoSMIC(TM), Washington University, UC Irvine, and Vanderbilt University, may not be used to endorse or promote products or services derived from this source without express written permission from Washington University, UC Irvine, or Vanderbilt University. Further, products or services derived from this source may not be called ACE(TM), TAO(TM), CIAO(TM), or CoSMIC(TM) nor



may the name Washington University, UC Irvine, or Vanderbilt University appear in their names, without express written permission from Washington University, UC Irvine, and Vanderbilt University.

If you have any suggestions, additions, comments, or questions, please let me know.

Douglas C. Schmidt

## Vendor

Apache Software Foundation

## Third-Party Software Program

Xerces C++

## Proprietary Notices

Portions of this program contain components from the Apache Software Foundation. These components are made available under the Apache License 2.0, a copy of which is provided herein.

## License Text

Apache License, Version 2.0

Apache License

Version 2.0, January 2004

<http://www.apache.org/licenses/>

TERMS AND CONDITIONS FOR USE, REPRODUCTION, AND DISTRIBUTION

1. Definitions.

"License" shall mean the terms and conditions for use, reproduction, and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. For the purposes of this definition, "control" means (i) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (ii) ownership of fifty percent (50%) or more of the outstanding shares, or (iii) beneficial ownership of such entity.

"You" (or "Your") shall mean an individual or Legal Entity exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications, including but not limited to software source code, documentation source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or Object form, made available under the License, as indicated by a copyright notice that is included in or attached to the work (an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object form, that is based on (or derived from) the Work and for which the editorial revisions, annotations, elaborations, or other modifications represent, as a whole, an original work of authorship. For the purposes of this License, Derivative Works shall not include works that remain separable from, or merely link (or bind by name) to the interfaces of, the Work and Derivative Works thereof.

"Contribution" shall mean any work of authorship, including the original version of the Work and any modifications or additions to that Work or Derivative Works thereof, that is intentionally submitted to Licensor for inclusion in the Work by the copyright owner or by an individual or Legal Entity authorized to submit on behalf of the copyright owner. For

the purposes of this definition, "submitted" means any form of electronic, verbal, or written communication sent to the Licensor or its representatives, including but not limited to communication on electronic mailing lists, source code control systems, and issue tracking systems that are managed by, or on behalf of, the Licensor for the purpose of discussing and improving the Work, but excluding communication that is conspicuously marked or otherwise designated in writing by the copyright owner as "Not a Contribution."

"Contributor" shall mean Licensor and any individual or Legal Entity on behalf of whom a Contribution has been received by Licensor and subsequently incorporated within the Work.

2. Grant of Copyright License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable copyright license to reproduce, prepare Derivative Works of, publicly display, publicly perform, sublicense, and distribute the Work and such Derivative Works in Source or Object form.

3. Grant of Patent License. Subject to the terms and conditions of this License, each Contributor hereby grants to You a perpetual, worldwide, non-exclusive, no-charge, royalty-free, irrevocable (except as stated in this section) patent license to make, have made, use, offer to sell, sell, import, and otherwise transfer the Work, where such license applies only to those patent claims licensable by such Contributor that are necessarily infringed by their Contribution(s) alone or by combination of their Contribution(s) with the Work to which such Contribution(s) was submitted. If You institute patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Work or a Contribution incorporated within the Work constitutes direct or contributory patent infringement, then any patent licenses granted to You under this License for that Work shall terminate as of the date such litigation is filed.

4. Redistribution. You may reproduce and distribute copies of the Work or Derivative Works thereof in any medium, with or without modifications, and in Source or Object form, provided that You meet the following conditions:

- a. \_\_\_\_\_ You must give any other recipients of the Work or Derivative Works a copy of this License; and
- b. \_\_\_\_\_ You must cause any modified files to carry prominent notices stating that You changed the files; and
- c. \_\_\_\_\_ You must retain, in the Source form of any Derivative Works that You distribute, all copyright, patent, trademark, and attribution notices from the Source form of the Work, excluding those notices that do not pertain to any part of the Derivative Works; and

d. \_\_\_\_\_ If the Work includes a "NOTICE" text file as part of its distribution, then any Derivative Works that You distribute must include a readable copy of the attribution notices contained within such NOTICE file, excluding those notices that do not pertain to any part of the Derivative Works, in at least one of the following places: within a NOTICE text file distributed as part of the Derivative Works; within the Source form or documentation, if provided along with the Derivative Works; or, within a display generated by the Derivative Works, if and wherever such third-party notices normally appear. The contents of the NOTICE file are for informational purposes only and do not modify the License. You may add Your own attribution notices within Derivative Works that You distribute, alongside or as an addendum to the NOTICE text from the Work, provided that such additional attribution notices cannot be construed as modifying the License.

You may add Your own copyright statement to Your modifications and may provide additional or different license terms and conditions for use, reproduction, or distribution of Your modifications, or for any such Derivative Works as a whole, provided Your use, reproduction, and distribution of the Work otherwise complies with the conditions stated in this License.

5. Submission of Contributions. Unless You explicitly state otherwise, any Contribution intentionally submitted for inclusion in the Work by You to the Licensor shall be under the terms and conditions of this License, without any additional terms or conditions.

Notwithstanding the above, nothing herein shall supersede or modify the terms of any

separate license agreement you may have executed with Licensor regarding such Contributions.

6. Trademarks. This License does not grant permission to use the trade names, trademarks, service marks, or product names of the Licensor, except as required for reasonable and customary use in describing the origin of the Work and reproducing the content of the NOTICE file.

7. Disclaimer of Warranty. Unless required by applicable law or agreed to in writing, Licensor provides the Work (and each Contributor provides its Contributions) on an "AS IS" BASIS, WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied, including, without limitation, any warranties or conditions of TITLE, NON-INFRINGEMENT, MERCHANTABILITY, or FITNESS FOR A PARTICULAR PURPOSE. You are solely responsible for determining the appropriateness of using or redistributing the Work and assume any risks associated with Your exercise of permissions under this License.

8. Limitation of Liability. In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall any Contributor be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of this License or out of the use or inability to use the Work (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

9. Accepting Warranty or Additional Liability. While redistributing the Work or Derivative Works thereof, You may choose to offer, and charge a fee for, acceptance of support, warranty, indemnity, or other liability obligations and/or rights consistent with this License. However, in accepting such obligations, You may act only on Your own behalf and on Your sole responsibility, not on behalf of any other Contributor, and only if You agree to indemnify, defend, and hold each Contributor harmless for any liability incurred by, or claims asserted against, such Contributor by reason of your accepting any such warranty or additional liability.

END OF TERMS AND CONDITIONS

APPENDIX: How to apply the Apache License to your work

To apply the Apache License to your work, attach the following boilerplate notice, with the fields enclosed by brackets "[ ]" replaced with your own identifying information. (Don't include the brackets!) The text should be enclosed in the appropriate comment syntax for the file format. We also recommend that a file or class name and description of purpose be included on the same "printed page" as the copyright notice for easier identification within third-party archives.

Copyright [yyyy] [name of copyright owner]

Licensed under the Apache License, Version 2.0 (the "License");

you may not use this file except in compliance with the License.

You may obtain a copy of the License at

<http://www.apache.org/licenses/LICENSE-2.0>

Unless required by applicable law or agreed to in writing, software

distributed under the License is distributed on an "AS IS" BASIS,

WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.

See the License for the specific language governing permissions and

limitations under the License.

## Vendor

IBM

## Third-Party Software Program

ICU

## Proprietary Notices

Copyright (c) 1995-2003 International Business Machines Corporation and others  
All rights reserved.

## License Text

ICU License - ICU 1.8.1 and later

COPYRIGHT AND PERMISSION NOTICE

Copyright (c) 1995-2003 International Business Machines Corporation and others  
All rights reserved.

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, provided that the above copyright notice(s) and this permission notice appear in all copies of the Software and that both the above copyright notice(s) and this permission notice appear in supporting documentation.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OF THIRD PARTY RIGHTS. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR HOLDERS INCLUDED IN THIS NOTICE BE LIABLE FOR ANY CLAIM, OR ANY SPECIAL

INDIRECT OR CONSEQUENTIAL DAMAGES, OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT,

NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

Except as contained in this notice, the name of a copyright holder shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization of the copyright holder.

-----  
All trademarks and registered trademarks mentioned herein are the property of their respective owners.

## Vendor

Jacorb.org

Note: This product uses JacORB version 2.2 with modification; some newer files/fixes from the official JacORB source repository have been pulled in and integrated into this jar distribution. The source for this JacORB 2.2 variation is available upon request; please contact support@veritas.com and ask for the JacORB 2.2 Veritas source.

## Third-Party Software Program

JacORB

## Proprietary Notices

None

## License Text

GNU LIBRARY GENERAL PUBLIC LICENSE  
Version 2, June 1991

Copyright (C) 1991 Free Software Foundation, Inc. 675 Mass Ave, Cambridge, MA 02139, USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Library General Public License, applies to some specially designated Free Software Foundation software, and to any other libraries whose authors decide to use it. You can use it for your libraries, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such. Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free

libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

#### GNU LIBRARY GENERAL PUBLIC LICENSE TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions: a) The modified work must itself be a software library. b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change. c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License. d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful. (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it. Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit

modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things: a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.) b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution. c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place. d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy. For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things: a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above. b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by



court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library. If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Library General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

#### NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY

HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found. Copyright (C) <year> <name of author>

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Library General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Library General Public License for more details. You should have received a copy of the GNU Library General Public License along with this library; if not, write to the Free Software Foundation, Inc., 675 Mass Ave, Cambridge, MA 02139, USA.

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990 Ty Coon, President of Vice

That's all there is to it!

## Vendor

The OpenSSL Project

## Third-Party Software Program

OpenSSL

## Proprietary Notices

Copyright (c) 1998-2003 The OpenSSL Project. All rights reserved.

## License Text

License

This is a copy of the current LICENSE file inside the CVS repository.

LICENSE ISSUES

=====

The OpenSSL toolkit stays under a dual license, i.e. both the conditions of the OpenSSL License and the original SSLeay license apply to the toolkit.

See below for the actual license texts. Actually both licenses are BSD-style Open Source licenses. In case of any license issues related to OpenSSL

please contact openssl-core@openssl.org.

OpenSSL License

-----

Copyright (c) 1998-2003 The OpenSSL Project. All rights reserved.

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions

are met:

1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
3. All advertising materials mentioning features or use of this software must display the following acknowledgment:

"This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit. (<http://www.openssl.org/>)"

4. The names "OpenSSL Toolkit" and "OpenSSL Project" must not be used to endorse or promote products derived from this software without prior written permission. For written permission, please contact [openssl-core@openssl.org](mailto:openssl-core@openssl.org).

5. Products derived from this software may not be called "OpenSSL" nor may "OpenSSL" appear in their names without prior written permission of the OpenSSL Project.

6. Redistributions of any form whatsoever must retain the following acknowledgment:

"This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (<http://www.openssl.org/>)"

THIS SOFTWARE IS PROVIDED BY THE OpenSSL PROJECT ``AS IS'' AND ANY EXPRESSED OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE OpenSSL PROJECT OR ITS CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

=====  
 This product includes cryptographic software written by Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com)).  
 This product includes software written by Tim Hudson ([tjh@cryptsoft.com](mailto:tjh@cryptsoft.com)).  
 /

Original SSLeay License

-----  
 /\* Copyright (C) 1995-1998 Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com))

All rights reserved.

This package is an SSL implementation written by Eric Young ([ey@cryptsoft.com](mailto:ey@cryptsoft.com)). The implementation was written so as to conform with Netscapes SSL.

This library is free for commercial and non-commercial use as long as the following conditions are adhered to. The following conditions apply to all code found in this distribution, be it the RC4, RSA, lhash, DES, etc., code; not just the SSL code. The SSL documentation included with this distribution is covered by the same copyright terms except that the holder is Tim Hudson ([tjh@cryptsoft.com](mailto:tjh@cryptsoft.com)).

Copyright remains Eric Young's, and as such any Copyright notices in the code are not to be removed. If this package is used in a product, Eric Young should be given attribution as the author of the parts of the library used. This can be in the form of a textual message at program startup or in documentation (online or textual) provided with the package. Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

1. Redistributions of source code must retain the copyright notice, this list of conditions and the following disclaimer.
2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

3. All advertising materials mentioning features or use of this software must display the following acknowledgement:

"This product includes cryptographic software written by Eric Young (eay@cryptsoft.com)"

The word 'cryptographic' can be left out if the routines from the library being used are not cryptographic related :-).

4. If you include any Windows specific code (or a derivative thereof) from the apps directory (application code) you must include an acknowledgement:

"This product includes software written by Tim Hudson (tjh@cryptsoft.com)"  
 THIS SOFTWARE IS PROVIDED BY ERIC YOUNG ``AS IS'' AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

The licence and distribution terms for any publically available version or derivative of this code cannot be changed. i.e. this code cannot simply be copied and put under another distribution licence [including the GNU Public Licence.]

## Vendor

Perl.org

## Third-Party Software Program

Perl

## Proprietary Notices

Copyright (C) 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, by Larry Wall and others  
 All rights reserved."

## License Text

### Preamble

The intent of this document is to state the conditions under which a Package may be copied, such that the Copyright Holder maintains some semblance of artistic control over the development of the package, while giving the users of the package the right to use and distribute the Package in a more-or-less customary fashion, plus the right to make reasonable modifications.

### Definitions

"Package" refers to the collection of files distributed by the Copyright Holder, and derivatives of that collection of files created through textual modification.

"Standard Version" refers to such a Package if it has not been modified, or has been modified in accordance with the wishes of the Copyright Holder as specified below.

"Copyright Holder" is whoever is named in the copyright or copyrights for the package.

"You" is you, if you're thinking about copying or distributing this Package.

"Reasonable copying fee" is whatever you can justify on the basis of media cost, duplication charges, time of people involved, and so on. (You will not be required to justify it to the Copyright Holder, but only to the computing community at large as a market that must bear the fee.)

"Freely Available" means that no fee is charged for the item itself, though there may be fees involved in handling the item. It also means that recipients of the item may redistribute it under the same conditions they received it.

1. \_\_\_\_\_ You may make and give away verbatim copies of the source form of the Standard Version of this Package without restriction, provided that you duplicate all of the original copyright notices and associated disclaimers.
2. \_\_\_\_\_ You may apply bug fixes, portability fixes and other modifications derived from the Public Domain or from the Copyright Holder. A Package modified in such a way shall still be considered the Standard Version.
3. \_\_\_\_\_ You may otherwise modify your copy of this Package in any way, provided that you insert a prominent notice in each changed file stating how and when you changed that file, and provided that you do at least ONE of the following:
  - a. \_\_\_\_\_ place your modifications in the Public Domain or otherwise make them Freely Available, such as by posting said modifications to Usenet or an equivalent medium, or placing the modifications on a major archive site such as uunet.uu.net, or by allowing the Copyright Holder to include your modifications in the Standard Version of the Package.
  - b. \_\_\_\_\_ use the modified Package only within your corporation or organization.
  - c. \_\_\_\_\_ rename any non-standard executables so the names do not conflict with standard executables, which must also be provided, and provide a separate manual page for each non-standard executable that clearly documents how it differs from the Standard Version.
  - d. \_\_\_\_\_ make other distribution arrangements with the Copyright Holder.
4. \_\_\_\_\_ You may distribute the programs of this Package in object code or executable form, provided that you do at least ONE of the following:
  - a. \_\_\_\_\_ distribute a Standard Version of the executables and library files, together with instructions (in the manual page or equivalent) on where to get the Standard Version.
  - b. \_\_\_\_\_ accompany the distribution with the machine-readable source of the Package with your modifications.
  - c. \_\_\_\_\_ give non-standard executables non-standard names, and clearly document the differences in manual pages (or equivalent), together with instructions on where to get the Standard Version.
  - d. \_\_\_\_\_ make other distribution arrangements with the Copyright Holder.
5. \_\_\_\_\_ You may charge a reasonable copying fee for any distribution of this Package. You may charge any fee you choose for support of this Package. You may not charge a fee for this Package itself. However, you may distribute this Package in aggregate with other (possibly commercial) programs as part of a larger (possibly commercial) software distribution provided that you do not advertise this Package as a product of your own. You may embed this Package's interpreter within an executable of yours (by linking); this shall be construed as a mere form of aggregation, provided that the complete Standard Version of the interpreter is so embedded.
6. \_\_\_\_\_ The scripts and library files supplied as input to or produced as output from the programs of this Package do not automatically fall under the copyright of this Package, but belong to whomever generated them, and may be sold commercially, and may be aggregated with this Package. If such scripts or library files are aggregated with this Package via the so-called "undump" or "unexec" methods of producing a binary executable image, then distribution of such an image shall neither be construed as a distribution of this Package nor shall it fall under the restrictions of Paragraphs 3 and 4, provided that you do not represent such an executable image as a Standard Version of this Package.
7. \_\_\_\_\_ C subroutines (or comparably compiled subroutines in other languages) supplied by you and linked into this Package in order to emulate subroutines and variables of the language defined by this Package shall not be considered part of this Package, but are the equivalent of input as in Paragraph 6, provided these subroutines do

not change the language in any way that would cause it to fail the regression tests for the language.

8. \_\_\_\_\_ Aggregation of this Package with a commercial distribution is always permitted provided that the use of this Package is embedded; that is, when no overt attempt is made to make this Package's interfaces visible to the end user of the commercial distribution. Such use shall not be construed as a distribution of this Package.

9. \_\_\_\_\_ The name of the Copyright Holder may not be used to endorse or promote products derived from this software without specific prior written permission.

10. \_\_\_\_\_ THIS PACKAGE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The End

## Vendor

Sun Microsystems, Inc.

## Third-Party Software Program

JAVATM 2 SOFTWARE DEVELOPMENT KIT or "J2SDK", Standard Edition

## Proprietary Notices

Copyright 2005 Sun Microsystems, Inc.,

## License Text

Sun Microsystems, Inc. Binary Code License Agreement for the JAVATM 2 SOFTWARE DEVELOPMENT KIT (J2SDK), STANDARD EDITION, VERSION 1.4.2\_X  
SUN MICROSYSTEMS, INC. ("SUN") IS WILLING TO LICENSE THE SOFTWARE IDENTIFIED BELOW TO YOU ONLY UPON THE CONDITION THAT YOU ACCEPT ALL OF THE TERMS CONTAINED IN THIS BINARY CODE LICENSE AGREEMENT AND SUPPLEMENTAL LICENSE TERMS (COLLECTIVELY "AGREEMENT"). PLEASE READ THE AGREEMENT CAREFULLY. BY DOWNLOADING OR INSTALLING THIS SOFTWARE, YOU ACCEPT THE TERMS OF THE AGREEMENT. INDICATE ACCEPTANCE BY SELECTING THE "ACCEPT" BUTTON AT THE BOTTOM OF THE AGREEMENT. IF YOU ARE NOT WILLING TO BE BOUND BY ALL THE TERMS, SELECT THE "DECLINE" BUTTON AT THE BOTTOM OF THE AGREEMENT AND THE DOWNLOAD OR INSTALL PROCESS WILL NOT CONTINUE.

1. DEFINITIONS. "Software" means the identified above in binary form, any other machine readable materials (including, but not limited to, libraries, source files, header files, and data files), any updates or error corrections provided by Sun, and any user manuals, programming guides and other documentation provided to you by Sun under this Agreement. "Programs" mean Java applets and applications intended to run on the Java 2 Platform, Standard Edition (J2SETM platform) platform on Java-enabled general purpose desktop computers and servers.

2. LICENSE TO USE. Subject to the terms and conditions of this Agreement, including, but not limited to the Java Technology Restrictions of the Supplemental License Terms, Sun grants you a non-exclusive, non-transferable, limited license without license fee to reproduce and use internally Software complete and unmodified for the sole purpose of running Programs. Additional licenses for developers and/or publishers are granted in the Supplemental License Terms.

3. RESTRICTIONS. Software is confidential and copyrighted. Title to Software and all associated intellectual property rights is retained by Sun and/or its licensors. Unless enforcement is prohibited by applicable law, you may not modify, decompile, or reverse engineer Software. You acknowledge that Licensed Software is not designed or intended

for use in the design, construction, operation or maintenance of any nuclear facility. Sun Microsystems, Inc. disclaims any express or implied warranty of fitness for such uses. No right, title or interest in or to any trademark, service mark, logo or trade name of Sun or its licensors is granted under this Agreement. Additional restrictions for developers and/or publishers licenses are set forth in the Supplemental License Terms.

4. LIMITED WARRANTY. Sun warrants to you that for a period of ninety (90) days from the date of purchase, as evidenced by a copy of the receipt, the media on which Software is furnished (if any) will be free of defects in materials and workmanship under normal use. Except for the foregoing, Software is provided "AS IS". Your exclusive remedy and Sun's entire liability under this limited warranty will be at Sun's option to replace Software media or refund the fee paid for Software. Any implied warranties on the Software are limited to 90 days. Some states do not allow limitations on duration of an implied warranty, so the above may not apply to you. This limited warranty gives you specific legal rights. You may have others, which vary from state to state.

5. DISCLAIMER OF WARRANTY. UNLESS SPECIFIED IN THIS AGREEMENT, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT THESE DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

6. LIMITATION OF LIABILITY. TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL SUN OR ITS LICENSORS BE LIABLE FOR ANY LOST REVENUE, PROFIT OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE SOFTWARE, EVEN IF SUN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. In no event will Sun's liability to you, whether in contract, tort (including negligence), or otherwise, exceed the amount paid by you for Software under this Agreement. The foregoing limitations will apply even if the above stated warranty fails of its essential purpose. Some states do not allow the exclusion of incidental or consequential damages, so some of the terms above may not be applicable to you.

7. SOFTWARE UPDATES FROM SUN. You acknowledge that at your request or consent optional features of the Software may download, install, and execute applets, applications, software extensions, and updated versions of the Software from Sun ("Software Updates"), which may require you to accept updated terms and conditions for installation. If additional terms and conditions are not presented on installation, the Software Updates will be considered part of the Software and subject to the terms and conditions of the Agreement.

8. SOFTWARE FROM SOURCES OTHER THAN SUN. You acknowledge that, by your use of optional features of the Software and/or by requesting services that require use of the optional features of the Software, the Software may automatically download, install, and execute software applications from sources other than Sun ("Other Software"). Sun makes no representation of a relationship of any kind to licensors of Other Software. TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL SUN OR ITS LICENSORS BE LIABLE FOR ANY LOST REVENUE, PROFIT OR DATA, OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES, HOWEVER CAUSED REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF OR RELATED TO THE USE OF OR INABILITY TO USE OTHER SOFTWARE, EVEN IF SUN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Some states do not allow the exclusion of incidental or consequential damages, so some of the terms above may not be applicable to you.

9. TERMINATION. This Agreement is effective until terminated. You may terminate this Agreement at any time by destroying all copies of Software. This Agreement will terminate immediately without notice from Sun if you fail to comply with any provision of this Agreement. Either party may terminate this Agreement immediately should any Software become, or in either party's opinion be likely to become, the subject of a claim of infringement of any intellectual property right. Upon Termination, you must destroy all copies of Software.

10. EXPORT REGULATIONS. All Software and technical data delivered under this Agreement are subject to U.S. export control laws and may be subject to export or import regulations in other countries. You agree to comply strictly with all such laws and regulations and acknowledge that you have the responsibility to obtain such licenses to export, re-export, or import as may be required after delivery to you.

11. TRADEMARKS AND LOGOS. You acknowledge and agree as between you and Sun that Sun owns the SUN, SOLARIS, JAVA, JINI, FORTE, and iPLANET trademarks and all SUN, SOLARIS, JAVA, JINI, FORTE, and iPLANET-related trademarks, service marks, logos and other brand designations ("Sun Marks"), and you agree to comply with the Sun Trademark and Logo Usage Requirements currently located at <http://www.sun.com/policies/trademarks>. Any use you make of the Sun Marks inures to Sun's benefit.

12. U.S. GOVERNMENT RESTRICTED RIGHTS. If Software is being acquired by or on behalf of the U.S. Government or by a U.S. Government prime contractor or subcontractor (at any tier), then the Government's rights in Software and accompanying documentation will be only as set forth in this Agreement; this is in accordance with 48 CFR 227.7201 through 227.7202-4 (for Department of Defense (DOD) acquisitions) and with 48 CFR 2.101 and 2.212 (for non-DOD acquisitions).

13. GOVERNING LAW. Any action related to this Agreement will be governed by California law and controlling U.S. federal law. No choice of law rule of any jurisdiction will apply.

14. SEVERABILITY. If any provision of this Agreement is held to be unenforceable, this Agreement will remain in effect with the provision omitted, unless omission would frustrate the intent of the parties, in which case this Agreement will immediately terminate.

15. INTEGRATION. This Agreement is the entire agreement between you and Sun relating to its subject matter. It supersedes all prior or contemporaneous oral or written communications, proposals, representations and warranties and prevails over any conflicting or additional terms of any quote, order, acknowledgment, or other communication between the parties relating to its subject matter during the term of this Agreement. No modification of this Agreement will be binding, unless in writing and signed by an authorized representative of each party.

#### SUPPLEMENTAL LICENSE TERMS

These Supplemental License Terms add to or modify the terms of the Binary Code License Agreement. Capitalized terms not defined in these Supplemental Terms shall have the same meanings ascribed to them in the Binary Code License Agreement. These Supplemental Terms shall supersede any inconsistent or conflicting terms in the Binary Code License Agreement, or in any license contained within the Software.

A. Software Internal Use and Development License Grant. Subject to the terms and conditions of this Agreement, including, but not limited to the Java

Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce internally and use internally the Software complete and unmodified (unless otherwise specified in the applicable README file) for the purpose of designing, developing, and testing your Programs.

B. License to Distribute Software. Subject to the terms and conditions of this Agreement, including, but not limited to the Java Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce and distribute the Software, provided that (i) you distribute the Software complete and unmodified (unless otherwise specified in the applicable README file) and only bundled as part of, and for the sole purpose of running, your Programs, (ii) the Programs add significant and primary functionality to the Software, (iii) you do not distribute additional software intended to replace any component(s) of the Software (unless otherwise specified in the applicable README file), (iv) you do not remove or alter any proprietary legends or notices contained in the Software, (v) you only distribute the Software subject to a license agreement that protects Sun's interests consistent with the terms contained in this Agreement, and (vi) you agree to defend and indemnify Sun and its licensors from and against any damages, costs, liabilities, settlement amounts and/or expenses (including attorneys' fees) incurred in connection with any claim, lawsuit



or action by any third party that arises or results from the use or distribution of any and all Programs and/or Software.

C. License to Distribute Redistributables. Subject to the terms and conditions of this Agreement, including but not limited to the Java Technology Restrictions of these Supplemental Terms, Sun grants you a non-exclusive, non-transferable, limited license without fees to reproduce and distribute those files specifically identified as redistributable in the Software "README" file ("Redistributables") provided that: (i) you distribute the Redistributables complete and unmodified (unless otherwise specified in the applicable README file), and only bundled as part of Programs, (ii) you do not distribute additional software intended to supersede any component(s) of the Redistributables (unless otherwise specified in the applicable README file), (iii) you do not remove or alter any proprietary legends or notices contained in or on the Redistributables, (iv) you only distribute the Redistributables pursuant to a license agreement that protects Sun's interests consistent with the terms contained in the Agreement, (v) you agree to defend and indemnify Sun and its licensors from and against any damages, costs, liabilities, settlement amounts and/or expenses (including attorneys' fees) incurred in connection with any claim, lawsuit or action by any third party that arises or results from the use or distribution of any and all Programs and/or Software.

D. Java Technology Restrictions. You may not modify the Java Platform Interface ("JPI", identified as classes contained within the "java" package or any subpackages of the "java" package), by creating additional classes within the JPI or otherwise causing the addition to or modification of the classes in the JPI. In the event that you create an additional class and associated API(s) which (i) extends the functionality of the Java platform, and (ii) is exposed to third party software developers for the purpose of developing additional software which invokes such additional API, you must promptly publish broadly an accurate specification for such API for free use by all developers. You may not create, or authorize your licensee(s) to create, additional classes, interfaces, or subpackages that are in any way identified as "java", "javax", "sun" or similar convention as specified by Sun in any naming convention designation.

E. Distribution by Publishers. This section pertains to your distribution of the Software with your printed book or magazine (as those terms are commonly used in the industry) relating to Java technology ("Publication"). Subject to and conditioned upon your compliance with the restrictions and obligations contained in the Agreement, in addition to the license granted in Paragraph 1 above, Sun hereby grants to you a non-exclusive, non-transferable limited right to reproduce complete and unmodified copies of the Software on electronic media (the "Media") for the sole purpose of inclusion and distribution with your Publication(s), subject to the following terms: (i) You may not distribute the Software on a stand-alone basis; it must be distributed with your Publication(s); (ii) You are responsible for downloading the Software from the applicable Sun website; (iii) You must refer to the Software as Java™ 2 Software Development Kit, Standard Edition, Version 1.4.2; (iv) The Software must be reproduced in its entirety and without any modification whatsoever (including, without limitation, the Binary Code License and Supplemental License Terms accompanying the Software and proprietary rights notices contained in the Software); (v) The Media label shall include the following information: Copyright 2003, Sun Microsystems, Inc. All rights reserved. Use is subject to license terms. Sun, Sun Microsystems, the Sun logo, Solaris, Java, the Java Coffee Cup logo, J2SE, and all trademarks and logos based on Java are trademarks or registered trademarks of Sun Microsystems, Inc. in the U.S. and other countries. This information must be placed on the Media label in such a manner as to only apply to the Sun Software; (vi) You must clearly identify the Software as Sun's product on the Media holder or Media label, and you may not state or imply that Sun is responsible for any third-party software contained on the Media; (vii) You may not include any third party software on the Media which is intended to be a replacement or substitute for the Software; (viii) You shall indemnify Sun for all damages arising from your failure to comply with the requirements of this Agreement. In addition, you shall defend, at your expense, any and all claims brought against Sun by third parties, and shall pay all damages awarded by a court of competent jurisdiction, or such settlement amount negotiated by you, arising out of or in connection with your use, reproduction or distribution of the Software and/or the

Publication. Your obligation to provide indemnification under this section shall arise provided that Sun: (i) provides you prompt notice of the claim; (ii) gives you sole control of the defense and settlement of the claim; (iii) provides you, at your expense, with all available information, assistance and authority to defend; and (iv) has not compromised or settled such claim without your prior written consent; and (ix) You shall provide Sun with a written notice for each Publication; such notice shall include the following information: (1) title of Publication, (2) author(s), (3) date of Publication, and (4) ISBN or ISSN numbers. Such notice shall be sent to Sun Microsystems, Inc., 4150 Network Circle, M/S USCA12-110, Santa Clara, California 95054, U.S.A., Attention: Contracts Administration.

F. Source Code. Software may contain source code that, unless expressly licensed for other purposes, is provided solely for reference purposes pursuant to the terms of this Agreement. Source code may not be redistributed unless expressly provided for in this Agreement.

G. Third Party Code. Additional copyright notices and license terms applicable to portions of the Software are set forth in the THIRDPARTYLICENSEREADME.txt file. In addition to any terms and conditions of any third party open source/freeware license identified in the THIRDPARTYLICENSEREADME.txt file, the disclaimer of warranty and limitation of liability provisions in paragraphs 5 and 6 of the Binary Code License Agreement shall apply to all Software in this distribution.

For inquiries please contact: Sun Microsystems, Inc., 4150 Network Circle, Santa Clara, California 95054, U.S.A. (LFI#141496/Form ID#011801)

## Vendor

Douglas C. Schmidt and his research group at Washington University and University of California, Irvine.

## Third-Party Software Program

TAO

## Proprietary Notices

"TAO(TM) is copyrighted by Douglas C. Schmidt and his research group at Washington University, University of California, Irvine, and Vanderbilt University Copyright (c) 1993-2003, all rights reserved."

## License Text

Copyright and Licensing Information for ACE(TM), TAO(TM), CIAO(TM), and CoSMIC(TM) ACE(TM), TAO(TM), CIAO(TM), and CoSMIC(TM) (henceforth referred to as "DOC software") are copyrighted by Douglas C. Schmidt and his research group at Washington University, University of California, Irvine, and Vanderbilt University. Copyright (c) 1993-2005, all rights reserved. Since DOC software is open-source, free software, you are free to use, modify, copy, and distribute--perpetually and irrevocably--the DOC software source code and object code produced from the source, as well as copy and distribute modified versions of this software. You must, however, include this copyright statement along with code built using DOC software.

You can use DOC software in proprietary software and are under no obligation to redistribute any of your source code that is built using DOC software. Note, however, that you may not do anything to the DOC software code, such as copyrighting it yourself or claiming authorship of the DOC software code, that will prevent DOC software from being distributed freely using an open-source development model. You needn't inform anyone that you're using DOC software in your software, though we encourage you to let us know so we can promote your project in the DOC software success stories.

DOC software is provided as is with no warranties of any kind, including the warranties of design, merchantability, and fitness for a particular purpose, noninfringement, or arising

from a course of dealing, usage or trade practice. Moreover, DOC software is provided with no support and without any obligation on the part of Washington University, UC Irvine, Vanderbilt University, their employees, or students to assist in its use, correction, modification, or enhancement. A number of companies around the world provide commercial support for DOC software, however. DOC software is Y2K-compliant, as long as the underlying OS platform is Y2K-compliant.

Washington University, UC Irvine, Vanderbilt University, their employees, and students shall have no liability with respect to the infringement of copyrights, trade secrets or any patents by DOC software or any part thereof. Moreover, in no event will Washington University, UC Irvine, or Vanderbilt University, their employees, or students be liable for any lost revenue or profits or other special, indirect and consequential damages.

The ACE, TAO, CIAO, and CoSMIC web sites are maintained by the DOC Group at the Institute for Software Integrated Systems (ISIS) and the Center for Distributed Object Computing of Washington University, St. Louis for the development of open-source software as part of the open-source software community. By submitting comments, suggestions, code, code snippets, techniques (including that of usage), and algorithms, submitters acknowledge that they have the right to do so, that any such submissions are given freely and unreservedly, and that they waive any claims to copyright or ownership. In addition, submitters acknowledge that any such submission might become part of the copyright maintained on the overall body of code, which comprises the DOC software. By making a submission, submitter agree to these terms. Furthermore, submitters acknowledge that the incorporation or modification of such submissions is entirely at the discretion of the moderators of the open-source DOC software projects or their designees. The names ACE(TM), TAO(TM), CIAO(TM), CoSMIC(TM), Washington University, UC Irvine, and Vanderbilt University, may not be used to endorse or promote products or services derived from this source without express written permission from Washington University, UC Irvine, or Vanderbilt University. Further, products or services derived from this source may not be called ACE(TM), TAO(TM), CIAO(TM), or CoSMIC(TM) nor may the name Washington University, UC Irvine, or Vanderbilt University appear in their names, without express written permission from Washington University, UC Irvine, and Vanderbilt University.

If you have any suggestions, additions, comments, or questions, please let me know.  
Douglas C. Schmidt

