



# Software Product Description

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PRODUCT NAME: Tru64 UNIX Logical Storage Manager Version 5.1

SPD 51.24.07

## DESCRIPTION

Compaq Tru64™ UNIX Logical Storage Manager (LSM) is a cluster-integrated, host-based solution for storage management and a layered product for Tru64 UNIX systems. LSM reduces downtime using RAID technology to create redundancy, reconstructs data from a failed disk, and allows you to change your storage configuration without taking the system down.

LSM provides the following features:

- Data spanning across physical disks (concatenation) allows the creation of large file systems that span multiple disks.
- Data mirroring or shadowing (RAID 1) mirrors critical data to protect against loss of data and/or to improve I/O performance, including support for root file system and swap space mirroring.
- Data striping (RAID 0) improves I/O performance by interleaving data across multiple disks.
- Combined mirroring of a striped set (RAID 0+1) protects data while improving system performance.
- RAID 5 provides data redundancy through the use of parity that reconstructs data in the event of a disk failure. RAID 5 logging also prevents the corruption of recovered data by logging new data writes before committing them to the storage array.
- Comprehensive online management functions include:
  - Add/remove disks to and from LSM control
  - Create/change concatenated, mirrored, RAID 5, and/or striped configurations
  - Access mirrored data after multiple disk failures, if at least one copy of the data is available
  - Monitor performance
  - Migrate data for disk repair or load balancing
  - Detach a mirror for backup with minimal interruption
  - Backup and restore utilities for LSM configuration records
- Hot sparing automatically relocates mirrored and RAID 5 objects to a spare disk after an I/O failure. You can designate those disks to use as spares or let the system find free space.
- LSM is cluster integrated so that LSM operations continue despite the loss of cluster members — as long as the cluster itself continues to operate and a physical path to the storage is available. LSM manages the shared storage in a cluster as a single system, so that LSM disk groups can be used by all cluster members and the LSM configuration can be changed by any member.

LSM is supported in a TruCluster™ Server cluster with the following restrictions:

- LSM volumes cannot be used within the cluster\_root domain.
- LSM volumes cannot be used for the boot or swap partitions of individual members.
- LSM cannot be used to mirror a quorum disk or any partitions on that disk.
- LSM RAID 5 volumes are not supported in clusters.
- UNIX File System (UFS) partitions, Advanced File System (AdvFS) storage domains, and existing pre-Version 5.1 LSM volumes can be migrated to LSM volumes.
- Dirty Region Logging significantly speeds resynchronization of volumes by updating only those mirrored regions that changed during the failure.
- Multiple management interfaces are provided:
  - **Command line interface** consists of a set of basic, but powerful shell-level commands that require input from the user. Many of these commands require a thorough understanding of LSM concepts and existing volume configuration.
  - **voidiskadm menu interface** provides easy-to-use menus with prompting to do disk and disk group operations.

- **Storage Administrator** Graphical User Interface (GUI) is a Java-based graphical interface that simplifies the management of LSM volumes and deftly handles the management of larger storage configurations. An object tree displays the hierarchical relationship between LSM objects, and the Command Launcher displays a list of tasks that you can perform on LSM objects.
- **Visual Administrator** GUI is a Motif based graphical interface that provides an intuitive approach to volume management. Using color, icons, windows, and pop-up menus, it portrays the system volume configuration and volume I/O activities and allows you to use mouse-based operations to do online storage management, reconfiguration, and performance monitoring and tuning. Storage Administrator offers much of the same functionality and scales better.

LSM functionally resides below the local file system layer and above the device driver layer and transparently supports data managed by:

- The UNIX File System (UFS)
- The Advanced File System (AdvFS)
- Other applications that use UNIX physical disk partition devices (bdevsw/cdevsw interface)

A device entry is created for each volume that provides the read/write data interface and the policies for managing data in the volume.

### Configuration Limits

The following definitions and limits define the maximum configuration supported by LSM:

- Maximum of 8189 volumes per system with three volumes reserved for system use and two volumes reserved for the root and swap volumes.
- Maximum of 32 plexes per volume. A *plex* is a mirror (or copy) of data; nonmirrored volumes have one plex and mirrored volumes may have 2 to 32 plexes.
- Maximum of 8189 plexes per system.
- Maximum of 8192 subdisks per plex. A *subdisk* is a basic unit of disk space allocation for logical volumes representing a contiguous disk space.
- Maximum volume size of 1 TB.
- There is no limit to disks per disk group or system. Disks are organized into disk groups. A *disk group* is a named collection of disks that share the same management database. *Volumes* are created within a disk group and are restricted to using disks within that disk group, so volumes cannot span multiple disk groups.

Hardware RAID devices are supported as standard disks. Each RAID device logical unit is viewed as a physical disk.

### HARDWARE REQUIREMENTS

LSM Version 5.1 operates on any supported Alpha CPU with Tru64 UNIX Version 5.1 or later. There are no restrictions on the disk devices supported beyond the valid configurations defined in the Tru64 UNIX operating system Software Product Description (SPD 70.70.xx).

#### Memory Requirements

LSM requires a minimum of 64MB of main memory. If you are going to use Storage Administrator along with LSM, Compaq recommends 96 MB of main memory.

### SOFTWARE REQUIREMENTS

#### Operating System

LSM Version 5.1 requires Tru64 UNIX operating system Version 5.1 or later.

Storage Administrator requires that Java Version 1.1.7B be installed on the system. The Java subsets are provided on the Tru64 UNIX operating system CD-ROMs.

Visual Administrator requires that Motif be installed on the system.

#### Migration Tools

Migration tools are provided to migrate:

- Tru64 UNIX partition devices to LSM volumes.
- Tru64 UNIX Version 4.0 Block Change Logging (BCL) to Version 5.1 Dirty Region Logging (DRL).

### OPTIONAL SOFTWARE

- The **Advanced File System Utilities** extend the high availability and flexibility of the Advanced File System. The Advanced File System Utilities provide a GUI to simplify management tasks and utilities to dynamically resize file systems, defragment files, balance the percentage of space used on volumes, and clone filesets. The Advanced File System Utilities is a separately licensed software product for Tru64 UNIX. See SPD 44.52.12 for more information.
- **TruCluster Server** Version 5.1 provides highly available and scalable solutions for users in mission-critical environments. It delivers easier, more sophisticated UNIX clustering capabilities by adding a fully clustered shared file system to the rich functionality already found in the Compaq cluster products. Because TruCluster Server appears as a single system, it requires less effort to manage an entire cluster than separate systems, significantly reducing your management costs.
- By combining the advantages of symmetric multiprocessing, distributed computing, and fault resilience, a cluster running TruCluster Server offers its users high availability while providing scalability beyond the limits of a single system. TruCluster Server also significantly reduces, but does not eliminate, the impact of

hardware and software failures. See SPD 70.79.04 for more information.

- **Performance Manager** for Tru64 UNIX is a management application that centralizes the monitoring of UNIX system performance information for a network of systems. A single instance of Performance Manager for Tru64 UNIX can monitor resources for many systems and alert the administrator when problems arise. Performance Manager is a separately licensed software product for Tru64 UNIX. See SPD 46.97.xx for more information.

## SOFTWARE LICENSING

Basic LSM functionality, including disk spanning and concatenation, is licensed with the Tru64 UNIX operating system. Additional features, including disk striping (RAID 0), mirroring (RAID 1), RAID 5, and the graphical user interfaces, are available under a separate license. For more information about Compaq's licensing terms and policies, contact your local Compaq office or your Compaq authorized reseller.

## LICENSE MANAGEMENT FACILITY SUPPORT

This software product supports the Tru64 UNIX License Management Facility. License units for this product are allocated on an Unlimited System Use basis. For more information on the License Management Facility, see the Tru64 UNIX operating system Software Product Description (SPD 70.70.xx).

## GROWTH CONSIDERATIONS

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

## DISTRIBUTION MEDIA

This product is distributed with the Tru64 UNIX operating system CD-ROM. A software license is required to use this product.

## SOFTWARE WARRANTY

This software is provided by Compaq with a 90-day conformance warranty in accordance with the Compaq warranty terms applicable to the license purchase.

## ORDERING INFORMATION

LSM Software Licenses: QL-2GVA\*-AA  
 Software Product Services: QT-2GVA\*-\*  
 Software Documentation: AA-Q3NC\*-TE

## SOFTWARE PRODUCT SERVICES

A variety of service options are available from Compaq. For more information, contact your local Compaq office or your Compaq authorized reseller.

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