



# VMware VMFS

High-performance cluster file system for storage virtualization

## AT A GLANCE

VMware® Virtual Machine File System (VMFS) is a high-performance cluster file system that provides storage virtualization optimized for virtual machines. Each virtual machine is encapsulated in a small set of files and VMFS is the default storage system for these files on physical SCSI disks and partitions.

## BENEFITS

- Greatly simplify virtual machine provisioning and administration by efficiently storing the entire virtual machine state in a central location.
- Run multiple instances of ESX Server to access the same virtual machine storage concurrently.
- Support virtualization-based distributed infrastructure services using VMware VirtualCenter, VMware VMotion™, VMware DRS and VMware HA.

## How Is VMware VMFS Used in the Enterprise?

VMware VMFS a prerequisite for building the dynamic, automated and self-optimizing data center. VMware VMFS enables virtualization-based distributed services including:

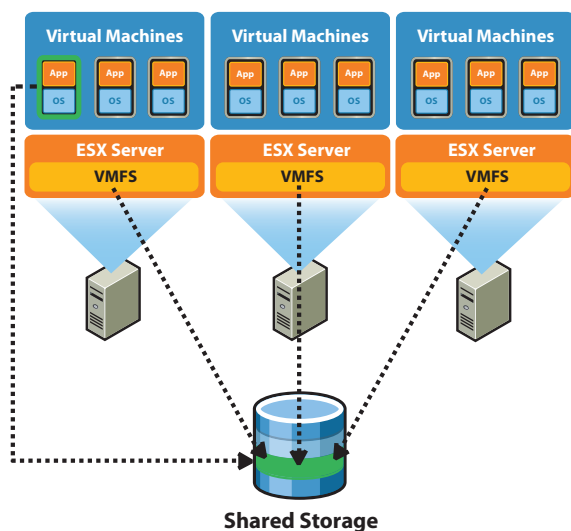
- **Distributed resource optimization.** VMFS allows multiple instances of ESX Server to access the same virtual machine storage, and as a result, virtual machines can be dynamically and automatically migrated between instances of ESX Server enabling:
  - » Dynamic allocation of resources in resource pools
  - » Live migration of running virtual machines among different servers
- **High Availability.** VMware VMFS handles on-disk locks and SCSI reservations enabling:
  - » Virtual machine clustering with Microsoft® Clustering Services.
  - » Automatic restart of virtual machines on different physical servers.
- **Efficient off-host backup.** VMware VMFS allows a proxy server to backup a snapshot of a virtual machine while the virtual machine is simultaneously reading and writing to its storage.

## How Does VMware VMFS Work?

VMware VMFS is optimized, rigorously tested and certified for a wide range of Fibre Channel and iSCSI SAN equipment. VMFS efficiently stores the entire virtual machine state in a central location and can be created in advance, enabling instant provisioning of virtual machines, without relying on a storage administrator.

Conventional file systems allow only one server to have read-write access to the same file at a given time. In contrast, VMFS is a cluster file system that leverages shared storage to allow multiple instances of ESX Server to read and write to the same storage, concurrently. VMFS provides on-disk locking to ensure that a virtual machine is not powered on by multiple installations of ESX Server at the same time. Should a server fail, the on-disk lock for each virtual machine is released to allow the virtual machine to be restarted on other physical servers.

The cluster file system enables innovative and unique virtualization-based distributed infrastructure services such as live migration of running virtual machines from one physical server to another, automatic restart of a failed virtual machine on a separate physical server, and clustering virtual machines across different physical server.



VMware VMFS virtualizes storage enabling high availability and resource management for virtual machines.

## KEY FEATURES

- Cluster file system. Enable virtualization-based distributed infrastructure services by storing virtual machine files on shared storage as Fibre Channel and iSCSI SAN .
  - » **Shared data file system.** Enable multiple installations of ESX Server to read and write from the same storage location concurrently.
  - » **Online insertion or deletion of nodes.** Add or delete an ESX Server from a VMFS volume without pausing or halting the processing of other instances of ESX Server.
  - » **On-disk disk file locking.** Ensure that the same virtual machine is not powered on by multiple servers at the same time
- **Performance and scalability**
  - » **Optimized for virtual machine I/O.** Store and access the entire virtual machine state efficiently from a centralized location with virtual disk performance close to native SCSI.
  - » **New – Adaptive block sizing.** Uses large block sizes favored by virtual disk I/O. Use sub-block allocator for small files and directories.
  - » **New – Dynamic increase of VMFS volume size.** Create new virtual machines without relying on a storage administrator. Adaptive block sizing and addressing for growing files allows to increase a VMFS volume on the fly.
  - » **New – Increased number of ESX Server per VMFS volume.** Connect up to 32 ESX Servers to a single VMFS volume.
  - » **New – Extended block size and file limits.** Run even the most data intensive production applications such as databases, ERP and CRM in virtual machines
    - Maximum virtual disk size: 2 TB
    - Maximum file size: 2 TB max
    - Block size: 1MB to 8MB
  - » **New – Caching.** Benefits form enhanced VMFS performance with volume, device, object and buffer caching.
- **Interoperability**
  - » **Certification.** Use VMFS with a wide range of Fibre Channel and iSCSI SAN equipment. VMFS is optimized, rigorously tested and certified for these storage systems.
  - » **Idealized SCSI compliant virtual disks.** Use virtual disk files that appear to the virtual machine as a mounted SCSI device. Virtual disks hide all intermittent SAN errors from the operating system, allowing even operating systems not certified for SAN to run inside a virtual machine.
- **Manageability**
  - » **LUN discovery and management.** Simplify storage management with automatic discovery of LUNs in the shared storage and mapping of those LUNs to a VMFS volume.
  - » **New – File directories.** Enable easy virtual machine administration with file directories. All files for a virtual machine are stored in a separate directory.
  - » **Direct pass through of virtual machine data.** Ensure correct application behavior and data integrity for applications running in virtual machines. VMware VMFS preserves the internal file system semantics of the operating system running inside the virtual machine.
  - » **New – Unified hierarchical namespace.** Manage all available physical disks, logical volumes and VMware VMFS volumes with a consistent namespace that eliminates potential conflicts.
- **High Availability**
  - » **New – Virtual machine snapshots.** Increase application availability while reducing backup windows using virtual machine snapshots. Create a point-in-time copy of virtual machine data that can be used for testing, backup, and recovery operations,
  - » **New – Hot add virtual disk.** Add virtual disk to a running virtual machine to increase available resources or for backup.

- » **New – Distributed journaling.** Recover virtual machines faster and more reliably in the event of server failure.

## How Can I Purchase VMware VMFS?

- VMware VMFS is included in VMware Infrastructure 3 Starter, Standard and Enterprise.
- The version of VMFS included in VMware Infrastructure 3 Starter can be used on local storage only and does not include cluster file system, since SAN storage connectivity is not included in VMware Infrastructure 3 Starter.
- VMware VMFS is not available for purchase as a stand-alone product

## Product Specifications and System Requirements

VMware VMFS requires VMware ESX Server. For supported storage systems and system requirements refer to the VMware Infrastructure SAN Configuration Guide located at [http://www.vmware.com/support/pubs/vi\\_pubs.html](http://www.vmware.com/support/pubs/vi_pubs.html).