Scale-Out File Server and SMB
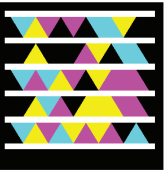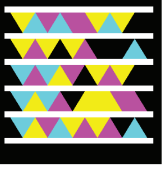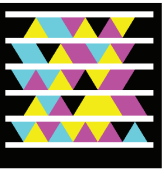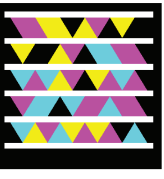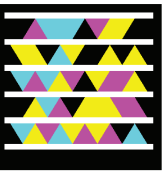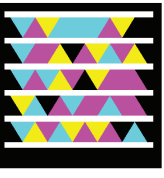
Scale-Out File Server for Application Data

A Scale-Out File Server lets you store server application data (such as Hyper-V virtual machine files) on file shares and obtain a similar level of reliability, availability, manageability, and high performance as you would expect from a storage area network. All file shares are online on all nodes simultaneously. File shares associated with this type of clustered file server are called scale-out file shares.

Failover Cluster

Hyper-V in a Failover Cluster

Virtual Machine

Virtual Machines

VHDs Stored on SMB File Shares

Servers Running Hyper-V

Hyper-V Failover Cluster

File Server Cluster

Scale-Out File Server

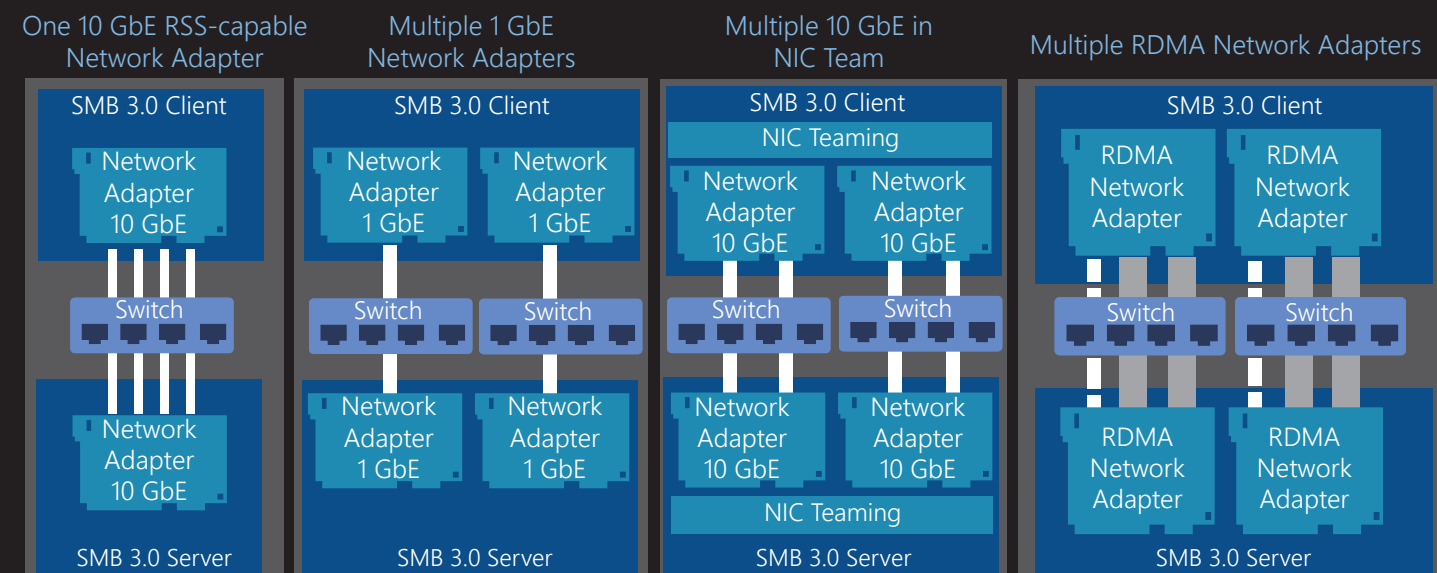SMB file shares are continuously available to store VHDs. File shares are accessible on all cluster nodes (active/active).

Clustered File Servers

SMB File Shares for Application Storage | SMB File Shares for Application Storage

Cluster Shared Volumes

Tiered Storage Spaces

SSD | SSD

Disks

Physical Disks from Shared SAS JBODs

SSD | SSD | SSD | SSD

Server Message Block (SMB 3.0)

SMB Direct delivers scalable, fast, and efficient storage access. You can also benefit from fast data transfers and network fault tolerance using SMB Multichannel. SMB Multichannel and SMB Direct improves network communications between your Hyper-V server cluster and your File Server cluster. It also improves internode communications within your File Server cluster. Windows Server 2012 R2 uses version 3.0 of the SMB protocol.
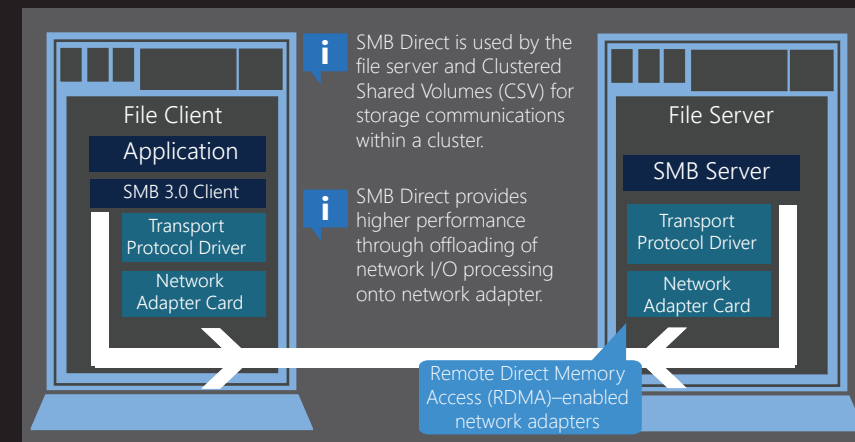
SMB Multichannel

SMB Multichannel capability enables bandwidth aggregation and failover across multiple network adapters to provide aggregated throughput and resiliency to network failures.

One 10 GbE RSS-capable Network Adapter

SMB 3.0 Client

Network Adapter 10 GbE

Switch

Network Adapter 10 GbE

SMB 3.0 Server

Multiple 1 GbE Network Adapters

SMB 3.0 Client

Network Adapter 1 GbE | Network Adapter 1 GbE

Switch | Switch

Network Adapter 1 GbE | Network Adapter 1 GbE

SMB 3.0 Server

Multiple 10 GbE in NIC Team

SMB 3.0 Client

NIC Teaming

Network Adapter 10 GbE | Network Adapter 10 GbE

Switch | Switch

Network Adapter 10 GbE | Network Adapter 10 GbE

NIC Teaming

SMB 3.0 Server

Multiple RDMA Network Adapters

SMB 3.0 Client

RDMA Network Adapter | RDMA Network Adapter

Switch | Switch

RDMA Network Adapter | RDMA Network Adapter
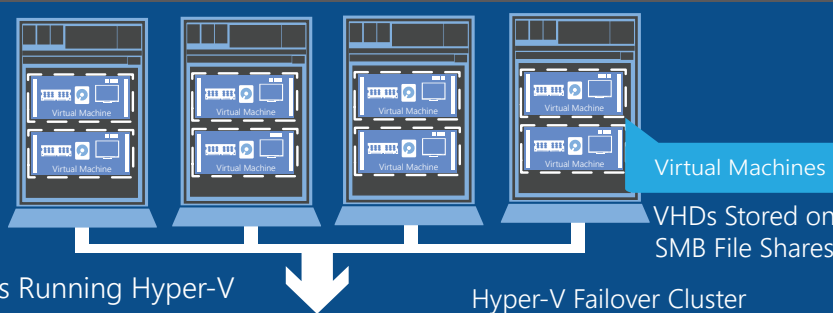
SMB 3.0 Server

SMB Direct

SMB Direct delivers improved and enhanced network performance. SMB Direct supports the use of network adapters that have remote direct memory access (RDMA) capability. Network adapters that have RDMA can function at full speed with very low latency, while using less CPU.

File Client

Application

SMB 3.0 Client

Transport Protocol Driver

Network Adapter Card

i SMB Direct is used by the file server and Clustered Shared Volumes (CSV) for storage communications within a cluster.

i SMB Direct provides higher performance through offloading of network I/O processing onto network adapter.

File Server

SMB Server

Transport Protocol Driver

Network Adapter Card

Remote Direct Memory Access (RDMA)–enabled network adapters

SMB Transparent Failover

SMB Transparent Failover supports server application workloads that require the connection to the storage infrastructure to be continuously available. The SMB file server and client work togeather to make failover of file server cluster nodes transparent to applications—for all file operations, and for both planned cluster resource moves and unplanned node failures.