Network File System (NFS)

The Network File System (NFS) is a [client](http://searchenterprisedesktop.techtarget.com/definition/client)/[server](http://whatis.techtarget.com/definition/server) [application](http://searchsoftwarequality.techtarget.com/definition/application) that lets a computer user view and optionally store and update [files](http://searchexchange.techtarget.com/definition/file) on a remote computer as though they were on the user's own computer. The NFS [protocol](http://searchnetworking.techtarget.com/definition/protocol) is one of several [distributed file system](http://searchwindowsserver.techtarget.com/definition/distributed-file-system-DFS) standards for [network-attached storage (NAS)](http://searchstorage.techtarget.com/definition/network-attached-storage).

NFS allows the user or system administrator to mount (designate as accessible) all or a portion of a file system on a server. The portion of the file system that is [mounted](http://whatis.techtarget.com/definition/mount) can be accessed by clients with whatever privileges are assigned to each file (read-only or read-write). NFS uses Remote Procedure Calls ([RPC](http://searchsoa.techtarget.com/definition/Remote-Procedure-Call)) to route requests between clients and servers.

NFS was originally developed by Sun Microsystems in the 1980's and is now managed by the Internet Engineering Task Force (IETF). NFSv4.1 (RFC-5661) was ratified in January 2010 to improve [scalability](http://searchdatacenter.techtarget.com/definition/scalability) by adding support for parallel access across distributed servers. Network File Sytem versions 2 and 3 allows the User Datagram Protocol ([UDP](http://searchsoa.techtarget.com/definition/UDP)) running over an [IP network](http://searchunifiedcommunications.techtarget.com/definition/Internet-Protocol) to provide [stateless](http://whatis.techtarget.com/definition/stateless) network connections between clients and server, but NFSv4 requires use of the Transmission Control Protocol ([TCP](http://searchnetworking.techtarget.com/definition/TCP)).

## How NFS Works

Currently, there are three versions of NFS. NFS version 2 (NFSv2) is older and widely supported. NFS version 3 (NFSv3) supports safe asynchronous writes and is more robust at error handling than NFSv2; it also supports 64-bit file sizes and offsets, allowing clients to access more than 2Gb of file data.

NFS version 4 (NFSv4) works through firewalls and on the Internet, no longer requires an rpcbind service, supports ACLs, and utilizes stateful operations. Red Hat Enterprise Linux 6 supports NFSv2, NFSv3, and NFSv4 clients. When mounting a file system via NFS, Red Hat Enterprise Linux uses NFSv4 by default, if the server supports it.

All versions of NFS can use Transmission Control Protocol (TCP) running over an IP network, with NFSv4 requiring it. NFSv2 and NFSv3 can use the User Datagram Protocol (UDP) running over an IP network to provide a stateless network connection between the client and server.

When using NFSv2 or NFSv3 with UDP, the stateless UDP connection (under normal conditions) has less protocol overhead than TCP. This can translate into better performance on very clean, non-congested networks. However, because UDP is stateless, if the server goes down unexpectedly, UDP clients continue to saturate the network with requests for the server. In addition, when a frame is lost with UDP, the entire RPC request must be retransmitted; with TCP, only the lost frame needs to be resent. For these reasons, TCP is the preferred protocol when connecting to an NFS server.