



Kernel Architecture File System

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Introduction:

Network File System (NFS) protocols are initially developed by SUN Micro Systems and IBM. NFS are end user friendly because of remote system file sharing and friendly authorization. Many File Systems in Linux is possible because of open source code, so everyone have equal chance to develop, make it efficient and compatible for their work. At present there is more then 20 different file systems. The developing file systems can handle huge number of large files competing with time and varies operating system features. Some of the most frequently used file systems, which are present in the market are discussed here briefly.

Those file systems are : EXT2, EXT3, EXT4, ReiserFS, GFS, GPFS, JFS, NSS, NTFS, FAT32, NWFS, OCFS2, PMS, VFS, VxFS and XFS.

EXT 2/3/4 :

EXT2 + Journals = EXT3

EXT3 + POSIX extended file access + htrees = EXT4

EXT4 + EXT3 + extents = ReiserFS

Journalling : Journalling is a type of filesystem that handle a log of recent meta-data. Journaling reduces time spent on recovering a filesystem. It is applicable even when we have group of cluster nodes. This meta-data Journalling widely used in Linux. Specially in ReiserFS, XFS, JFS, ext3 and GFS.

EXT2 most popular file system. EXT2 stands for 'second extended file system'. It replaced Minix file system. Positive point is data lose protection negative is Ext2 doesn't have journalling so it breaks easily.

EXT3 is basically ext2 plus a journal. Fast & robust. You can switch between ext2 and ext3. EXT3 take care about metadata. So you never lose a file.

EXT4 is under development, included in version 2.6.19 of the Linux kernel. Prespace allocation without size limit. Btree can handle 32000 subdirectories. Journalling features improved, faster file checking.

ReiserFS :

Designed and developed by Hans Reiser. It is the default file system in SUSE Linux distributions. ReiserFS developed to avoid the limitations of EXT2 and EXT3 filesystems. Efficient in using disk space, that is why it has become an attractive file system to serve workload on web.

ReiserFS is something completely different. It performs better in extreme conditions (heavy load, thousands of files in a directory etc.). If you want performance and to look cool, go for ReiserFS. If you are dual booting, you will not be able to access files on a Reiser partition from Windows. If you want to play safe and have access to your Linux files from Windows, go for Ext. If you want to write to your Linux partition from Windows, you need Ext2. From Linux point of view, you have a choice between Ext3 and Reiser. From Windows point of view you have the writable and easily breaking Ext2 or the read-only Ext3.

FAT32 : This is one of the most popular file system in Windows desktop world and file system in flash RAM devices (digital cameras, USB memory sticks, etc.). It is simple and works well with portable devices. But It has no built in security access control.

GFS : Journalled, POSIX access controls & Useful in small clusters (up to 16 machines). Filesystem from RedHat.

GPFS : Similar to GFS , Useful to share large files in huge clusters. Video editing and Hierarchical Storage Management are the extra features. File system from IBM.

JFS : File system used by IBM in AIX and OS/2. Easy data transfer and copes with workloads.

NSS : File System from Novell included in SUSE. Good for LAN with it's excelent file sharing environment.

NTFS : Windows file system, basically developed from Novell NetWare 2.x ACL model. Closely related to NSS and NWFS. Good for LAN systems, metadata handling.

NWFS : Fastest file system but it is not journalled. NWFS customers are encouraged to upgrade to NSS.

OCFS2 : Oracle Cluster file system v2. Good performance in Database clusters (First Symmetrical Parallel Cluster File System). More or less suitable for shared Storage Area Networks.

PolyServe Matrix Server : One of the best Parallel Cluster File System (better then GFS, GPFS, OCFS2 etc.). Good option when parallel cluster file system scaling is needed.

VxFS : Veritas File System is popular on Unix. Quite useful in data migration from Unix to Linux. Recently cluster version of VxFS interduced in Linux.

XFS : File system from SGI (Irix) Supports large cluster files. Included in major Linux distributions. Useful for Video and multimedia files handling. It supports Data Migration inside Hierarchical Storage Management interfaces.

SGI also offers a closed source cluster parallel version of XFS called cXFS which like cVxFS is an asymmetrical model. It has the unique feature, however, that it's slave nodes can run on Unix, Linux and Windows, making it a cross platform file system. Its master node must run on SGI hardware.

References:

1. Advanced Linux Course

<http://www.linux.org/lessons/advanced/x1254.html>

2. Wikipedia Ext2/3/4 & ReiserFS

<http://nl.wikipedia.org/wiki>

3. Linux NFS Overview

<http://nfs.sourceforge.net/>

4. Red Hat manuals - Network File System (NFS)

<http://www.redhat.com/docs/manuals/linux/RHL-9-Manual/ref-guide/ch-nfs.html>

5. Linux NFS-HOWTO

<http://nfs.sourceforge.net/nfs-howto/>