UnionFS

From Wikipedia, the free encyclopedia

Unionfs is a filesystem service for Linux, FreeBSD and NetBSD which implements a union mount for other file systems. It allows files and directories of separate file systems, known as branches, to be transparently overlaid, forming a single coherent file system. Contents of directories which have the same path within the merged branches will be seen together in a single merged directory, within the new, virtual filesystem.

When mounting branches, the priority of one branch over the other is specified. So when both branches contain a file with the same name, one gets priority over the other.

The different branches may be either read-only and read-write file systems, so that writes to the virtual, merged copy are directed to a specific real file system. This allows a file system to appear as writable, but without actually allowing writes to change the file system, also known as copy-on-write. This may be desirable when the media is physically read-only, such as in the case of Live CDs.

Unionfs was originally developed by Professor Erez Zadok and his team at Stony Brook University. [1][2][3]

Unionfs	
Developer	Open Source Community
Full name	Unification File System
Features	
File system permissions	POSIX
Transparent compression	No
Transparent encryption	No (but can be provided at the block device level)
Other	
Supported operating systems	Linux, FreeBSD and NetBSD

Contents

- 1 Uses
- 2 Other implementations
- 3 References
- 4 External links

Uses

In Knoppix, a union between the file system on the CD-ROM or DVD and a file system contained in an image file called knoppix.img (knoppix-data.img for Knoppix 7) on a writable drive (such as a USB memory stick) can be made, where the writable drive has priority over the read-only filesystem. This allows the user to change any of the files on the system, with the new file stored in the image and transparently used instead of the one on the CD. [4]

Unionfs can also be used to create a single common template for a number of file systems, or for security reasons. It is sometimes used as an ad hoc snapshotting system.

Docker uses Unionfs to layer Docker images. As actions are done to a base image, layers are created and documented, such that each layer fully describes how to recreate an action. This strategy enables Docker's lightweight images, as only layer updates need to be propagated (compared to full VMs, for example).[5]

Other implementations

Unionfs for Linux has two versions. Version 1.x is a standalone one that can be built as a module. Version 2.x is a newer, redesigned, and reimplemented one. Version 2.x is the smallest union file system implementation for Linux, it is heavily tested and inspected by many kernel developers, and it is more efficient.

aufs is an alternative version of unionfs.[6]

overlayfs written by Miklos Szeredi has been used in OpenWRT and considered by Ubuntu and has been merged into the mainline Linux kernel on 26 October 2014 [7] after many years of development and discussion[8] for version 3.18 of the kernel.

unionfs-fuse (http://podgorny.cz/unionfs-fuse) is an independent project, implemented as a user space filesystem program, instead of a kernel module or patch. Like Unionfs, it supports copy-on-write and read-only or read-write branches.

Plan 9 from Bell Labs operating system uses union mounts extensively to build custom namespaces per user or processes.

Union mounts have also been available in BSD since at least 1995.[9]

The GNU Hurd has an implementation of Unionfs.[10] As of January 2008, it works, but results in a read-only mount-point.

mhddfs works like Unionfs but permits balancing files over drives with the most free space available. It is implemented as a user space filesystem.

Sun Microsystems introduced the first implementation of a stacked, layered file system with copy-on-write, whiteouts (hiding files in lower layers from higher layers), etc. as the Translucent File Service in SunOS 3, circa 1986.[11]

JailbreakMe 3.0, a tool for jailbreaking iOS devices released in July 2011, uses unionfs techniques to speed up the installation process of the operating system modification.[12]

UbuntuLTSP, the Linux Terminal Server Project implementation for Ubuntu, uses Unionfs when PXE booting thin or thick clients.[13]

References

■ C. P. Wright et al. (2004). "Versatility and Unix Semantics in a Fan-Out Unification File System (http://www.fsl.cs.sunysb.edu/docs/unionfs-tr/unionfs.pdf) (pdf)." (Discusses Unionfs implementations and semantics.)

1. Wright, Charles P.; Zadok, Erez (December 2004). "Kernel Korner: Unionfs: Bringing Filesystems Together" (http://dl.acm.org/citation.cfm?id=1044970.1044978). Linux J. 2004 (128): 8-. ISSN 1075-3583 (https://www.worldcat.org/issn/1075-3583).
2. "Git server of File systems and Storage Lab, CS Department, Stony Brook University" (http://git.fsl.cs.sunysb.edu/). git.fsl.cs.sunysb.edu. Retrieved 2015-06-02. "Project: unionfs-3.9.y.git; Owner: Erez Zadok"
3. "File systems and Storage Lab" (http://www.fsl.cs.sunysb.edu/). www.fsl.cs.sunysb.edu. Retrieved 2015-06-02. "Lab Coordinator and Principal Investigator: Prof. Erez Zadok"
4. Persistent disk image section on knoppix wiki (http://knoppix.net/w/index.php?title=Live_CD_Tips&oldid=9423)
5. http://docs.docker.com/introduction/understanding-docker/#how-does-a-docker-image-work
6. "aufs Homepage" (http://aufs.sourceforge.net). Retrieved 27 April 2012.
7. "Merge commit for overlayfs" (https://git.kernel.org/cgit/linux/kernel/git/torvalds/linux.git/commit/?id=d1e14f1d63eb15ebe97d1a8544ddc143486b0204).
8. "Debating overlayfs" (https://lwn.net/Articles/447650/). Retrieved 14 May 2014.
9. "USENIX 1995 Technical Conference Proceedings" (http://www.usenix.org/publications/library/proceedings/neworl/). 16-20 January 1995. Retrieved 7 March 2012.
10. https://www.gnu.org/software/hurd/hurd/translator/unionfs.html
11. Sun/Release 3.0. vol. 1. Interleaf Technical Publishing. 1988. pp. 15-1-18, 16-1-19.
12. Waisybabu (19 June 2011). "Comex Working On Faster Jailbreaking Process for JailbreakMe 3.0; iPad 2 Jailbreak Coming Soon!" (http://www.redmondpie.com/comex-working-on-faster-jailbreaking-process-for-jailbreakme-3.0-ipad-2-jailbreak-coming-soon/). Redmond Pie. Retrieved 24 September 2011.
13. alkisg (2010-12-24). "UbuntuLTSP/LTSPWithoutNFS" (https://help.ubuntu.com/community/UbuntuLTSP/LTSPWithoutNFS).

External links

- Official Unionfs home page (http://unionfs.filesystems.org/)
- unionfs-fuse (http://podgorny.cz/unionfs-fuse) FUSE-based alternative implementation of Unionfs
- aufs (http://aufs.sourceforge.net/) is an alternative union file system for Linux.
- FunionFS (http://funionfs.apiou.org/) (Another advanced FUSE based implementation of Unionfs with log, control...)
- Kernel Korner - Unionfs: Bringing Filesystems Together (http://www.linuxjournal.com/article/7714) - article from LinuxJournal (http://www.linuxjournal.com)
- The new implementation of union fs for FreeBSD (http://people.freebsd.org/~daichi/unionfs/)
- On implementation of a union fs (http://www.am-utils.org/docs/zen/zen.html)
- LUFS-based unionfs (http://alumnus.caltech.edu/~muresan/projects/lufs_unionfs.html)
- Linux Implementations (http://vserver.13thfloor.at/TBVFS/index.php?page=Linux+Implementations) - excellent write-up on history of union file systems for Linux
- The Translucent File Service (white paper), David Hendricks, Sun Microsystems (gzip PostScript) (ftp://ftp.sra.co.jp/pub/doc/nfs/tfs.ps.gz)
- mhddfs (http://svn.uvw.ru/mhddfs/trunk/README)
- mini_fo: overlay filesystem (rw) for read-only rootfs

(http://www.denx.de/wiki/DULG/OverlayFileSystems)
- FreeBSD mount_union man page (http://www.freebsd.org/cgi/man.cgi?query=mount_unionfs&sektion=8&apropos=0&manpath=FreeBSD+9.0-RELEASE+and+Ports:)

Retrieved from "https://en.wikipedia.org/w/index.php?title=UnionFS&oldid=665235074"

Categories: Free special purpose file systems │ Linux kernel-supported file systems │ Union file systems

---

- This page was last modified on 2 June 2015, at 21:21.
- Text is available under the Creative Commons Attribution-ShareAlike License; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.