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Request For Comments: XXX Transarc
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Conventions for Names in the Service Directory in the AFS Distributed File System

Status of This Memo

This memo proposes a standard for the Internet community.
Distribution of this memo is unlimited.

Summary

File systems today allow file and name space sharing between independent administrations. Because applications may wish to collaborate in providing services to the aggregate users of those file systems, conventions for such collaboration need to be specified. In particular, applications may wish to communicate by performing file system operations between file system installations in addition to, or instead of, other forms of network-based communication such as datagram exchange or RPC. The conventions that allow this sort of communication therefore take the form of specifications of files that exist in well-known locations in a given file system. In AFS[1] , a product of Transarc Corporation, these conventions specify the files that exist under the reserved pathname **/afs/*cellname*/service** .

1. Introduction

This memo proposes conventions by which processes may communicate with many independent file system installations via a protected name space.

In order for computer-based processes to communicate, they must agree on conventions on which their communication can be based. Such conventions already exist on many levels, many of which are mentioned in the OSI layer model [ISO-7498] or the various adaptations to that model such as the DoD Internet adaptation [RFC-905, RFC-982, RFC-994, RFC-1006, RFC-1085, RFC-1138]. This memo proposes fully analogous conventions for applications that wish to run above the distributed file system layer as provided by AFS (a product of Transarc Corporation) [JHH88a, JHH88b, MLK88].

Such conventions are unusual, for distributed file systems historically do not address problems beyond those of a single installation. Rather, they are generally concerned with improving computer-based sharing within a given site.

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[1] AFS is a trademark of Transarc Corporation.

AFS has two properties that are particularly helpful in establishing these conventions:

(1) any cache manager (on a client machine) may in principle interact with any server, whether the cache manager and server are in the same administrative domain or not; and

(2) every file has a distinguished, global name, in which a fully-qualified domain name locates the administrative domain in which that name is to be interpreted.

These conventions are descendants of those outlined in the ITC's original technical report [ERZ88]. That document gives additional information about other aspects of inter-domain communication; this document concentrates on the conventions for specific files in the service directory.

2. File name space conventions

2.1. Ground rules

All names in this document will be the fully-qualified global names. Shortcut names are usually available, but must not be used for inter-cell communication, and are explicitly not part of these conventions.

Every file name in AFS begins with the string ''/afs/'', followed by a fully-qualified domain name that has been mapped to lower-case alphabetics. Thus, even administrations that ordinarily spell their domain names in upper case (e.g. ''CS.CMU.EDU'') or mixed case (e.g. ''Stanford.EDU'') have file names starting with the lower-cased versions of those names (''/afs/cs.cmu.edu/'', ''/afs/stanford.edu/''). Within this document, this prefix will be referred to as ''/afs/*cellname*/'', where *cellname* is the lower-cased name of the AFS installation--the cell name for the AFS installation.

Cell administrators are generally free to structure their individual file systems (i.e., everything below ''/afs/*cellname/*'') as they see fit. However, there is one name whose use is reserved: the **service** directory, named ''/afs/*cellname/*service/''. If a site provides such a directory, it is promising to export certain internal information in a standardized fashion. Furthermore, all directories and files within a cell's *service* subtree must reside within that cell.

All names under the /afs/*cellname*/service directory are to be seen as targets for conventions, even names in subdirectories. That is, names in subdirectories (recursively) of the service directory are subject to convention just as are the names directly in the service directory itself: the name /afs/*cellname*/service/etc/thud is as subject to convention as is the name /afs/*cellname*/service/thud. The file name README is reserved at all levels of the hierarchy to be a human-readable file containing, usually, a table of contents for the rest of the information in that subtree and pointers to any related important information stored elsewhere in a site's AFS tree. Generally, a README file in the directory is viewed as containing the information about a directory that a human browser should understand first about that directory.

The conventions for names within a cell’s service directory are exactly analogous to the conventions for other protocols: the meanings of the telnet IAC codes [RFC-854], the commands used for file transfer [RFC-959] or SMTP mail transfer [RFC-821], or the names of header fields in Internet text messages [RFC-822]. The conventions are necessary for an exactly analogous reason: so that independent AFS cells that wish to cooperate may do so.

2.2. Extensibility

Section 3 below enumerates a limited set of known names that may be used in a cell’s service directory or subdirectories. As the requirements for further cooperation dictate, additional names may be standardized. To provide some measure of safety to the name selections made by private agreement, standard names will never begin with the string ‘‘x-’’.

Private agreements may be made from time to time between sets of cell administrations as to new names to use in a cell’s service directory. Such names must not conflict with the uses of standardized names. Because additional service names may be standardized, a standardized name use may preempt the use of the same name by private agreement. However, names beginning with ‘‘x-’’ will never be standardized, so cooperating cells may wish to use such names in private agreements without the possibility of being preempted by a new standard.

2.3 Security

Directories under a cell’s service directory may have arbitrary AFS access lists imposed on them, which may or may not include ‘‘System:AnyUser’’. These naming conventions apply to files not visible to the general public, as well as to those files that are generally made available. (Without this provision, violations of the conventions might violate intra-cell operations.)

If a file or directory under a given cell’s service directory is not usable by System:AnyUser, it will appear to applications authenticated in a different cell as though the given cell’s service is simply not exported. For example, if a given cell’s /afs/*cellname*/service/etc directory does not allow ‘‘System:AnyUser rl’’ access, applications not authenticated in that cell will be unable to use any files or directories that the administration for *cellname* happens to have placed there.

3. Contents of the service directory

The following directories and files under a cell’s /afs/*cellname*/service/ directory are reserved for the uses stated. These directories are not required to be present, but if they are present, they indicate that the cell is providing the corresponding service or services.

3.1. Table of Contents for the service directory

The following names are specified, and are described in more detail in subsequent sections of this document.

README	Human-readable directory description
etc	Publish simple, pre-existing configuration files simply
mailqs	AMDS queue location
configuration	Configuration attribute/value information
printing	Printing services
wp	White Pages listing all accounts

3.2. The /afs/*cellname*/service/README file

This is a plain ASCII, human-readable file containing a guide to the interesting attributes of the given cell. Since it is an instance of a README file (as described earlier as a name reserved at all directory levels under /afs/*cellname*/service), it should contain information that should be understood by a human browsing through a file system before attempting to understand further information in this directory and child directories. If this file exists, it could contain a guide to what is in the site's /afs/*cellname*/service directory, as well as mentioning file names of other important information within a cell's file space that may not actually be housed under the /afs/*cellname*/service directory.

This file replaces and generalizes the former /afs/*cellname*/service/systypes file, which listed the legal values for the special @*sys* filename token.

3.3. The /afs/*cellname*/service/etc directory

This directory provides a simple mechanism by which a cell may publish easily-determined information about itself. At present, four names are reserved in this directory: **passwd, group**, **CellServDB.export**, and **CellServDB.local**.

3.3.1. The files /afs/*cellname*/service/etc/passwd and /afs/*cellname*/service/etc/group

The file /afs/*cellname*/service/etc/passwd, if it exists, is a copy of the ordinary Unix™[2] passwd(5) file listing the accounts in the cell. The file /afs/*cellname*/service/etc/group, if it exists, is a copy of the Unix™ group(5) file listing the group names and members for that cell.

Programs such as ls(1) may look at these files to perform translations of file system attributes. Thus, if the string name associated with gid 4 has to be determined for cell *cellname*, the answer may be found in ‘‘/afs/*cellname*/service/etc/group’’. The /afs/*cellname*/service/etc/passwd file is referenced only if the given cell does not provide a White Pages service.

[2] Unix is a registered trademark of AT&T.

Administrators are free to clear or overwrite the field carrying encoded password information in this passwd(5) file, since this file is never used for authentication purposes.

3.3.2. The file /afs/*cellname*/service/etc/CellServDB.export

The file /afs/*cellname*/service/etc/CellServDB.export allows *cellname* to export its knowledge of other operational, public AFS cells. In general, this file may be copied to /usr/vice/etc/CellServDB on each workstation connected to a given cell, so that workstations may connect to any available AFS cell.[3]

In the **transarc.com** cell, a reasonably central facility operated by Transarc Corporation, the published CellServDB.export file (/afs/transarc.com/service/etc/CellServDB.export) contains information about all public cells known by Transarc Corporation. Other cell administrations may wish periodically to monitor this file for updates.

3.3.3. The file /afs/*cellname*/service/etc/CellServDB.local

This file allows *cellname* to export up-to-date VLDB-location information about itself. That is, cells may publish their up-to-date VLDB-location information via this file.

3.4. The /afs/*cellname*/service/mailqs directory

This directory is tightly coupled to the Andrew Message Delivery System installation for a given cell. If this directory exists, it implies that *cellname* runs the full Andrew Message Delivery System (AMDS) and obeys all the AMDS conventions. Sites not running AMDS must not have a directory named /afs/cellname/service/mailqs/, as its existence implies (to software running even in other cells) a promise to provide AMDS service. More information about AMDS may be found in the corresponding Andrew documentation, published via the MIT X Consortium's X.V11R4 release [X90]. In brief, the promise to provide AMDS service means that mail that uses *cellname* as the destination mail domain name--e.g. *localname@cellname*--may be handled via AFS; that *localname* may be interpreted via the White Pages exported by *cellname*; and that mail delivery may be accomplished by storing files as the resultant White Pages entry dictates, either by storing a new file in a user's mailbox directory or by enqueueing mail in one of the global mail delivery queues for *cellname*.

Not only does this directory, by its existence, signal that *cellname* runs AMDS, but the directory houses the global mail delivery queues for the given cell. These global mail queues may be any name starting with either the string ‘‘q’’ (for ordinary queues) or ‘‘sq’’ (for slow-service, back-burner queues).

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[3] If a cell administration wishes to maintain private cells that its users should be able to reach, but which should not be generally advertised, the VLDB-location information about those cells should be placed in /usr/vice/etc/CellServDB on its workstations but not published in service/etc/CellServDB.export.

3.5. The /afs/*cellname*/service/configuration directory

This directory allows *cellname* to export various facts about itself. At present, two names are reserved in this directory: **AMS-Server** and **Postmaster**.

The /afs/*cellname*/service/configuration/AMS-Server file, if it exists, contains many attribute/value pairs specifying, for example, the roots of the ‘‘public folder trees’’ as defined with the Andrew Message System (AMS) [AMS90, JR87, NSB88]. The presence of this file is a promise that the field values that it gives are a truthful representation of the attributes of *cellname*. Names for these attributes are given in the AMS documentation; in brief, they are tabulated here:

LocalBboardRoot ExternalBboardRoot OfficialBboardRoot OldLocalBboardRoot OldExternalBboardRoot OldOfficialBboardRoot DefaultMSPath RequiredSubsFile ChangedSubsFile MessagesBugAddress WelcomeMailFile EliStartupFile AMS_OnlyMail AMS_ValidateDestHosts AMS_HardHostValidationErrors AMS_DeliveryViaDomainMXAddress AMS_DeliveryViaDomainAddress AMS_DeliveryViaGethostbyname AMS_DeliveryViaHostTable AMS_UUCPSupported AMS_GecosHacks AMS_UsersAreGrownups AMS_UsersHandleFormatting AMS_WPValidation AMS_PasswdValidation AMS_AliasesValidation AMS_LocalDatabaseValidation AMS_NameSeparator AMS_UseridPlusWorks AMS_ValidDomainSuffixes AMS_ValidDomainRelays AMS_PrinterNamesInSpoolDirectories AMS_PrintSpoolDirectories AMS_PrinterNamesInPrintcap AMS_NamedValidPrinters OutgoingName PostmasterTitle MailboxName PostmasterName PostmasterMailbox WPIUpdateReqAddr Organization NNTPhost NNTPuser AMS_ViceQueueLifetime AMS_ExtraViceQueueLifetime AMS_ViceQueueLifetimeCap PostmasterAddress

The /afs/*cellname*/service/configuration/Postmaster file, if it exists, contains the mailing address that can be used in reaching somebody responsible for *cellname* as an AFS cell.

3.6. The /afs/*cellname*/service/printing directory

It is planned that this directory act as an interface to the printing services available in a given cell. This name is currently reserved by a project currently under way at Academic Services at Carnegie Mellon for their development of such services; the contact is Joseph Jackson, jj1h+@andrew.cmu.edu .

3.7. The /afs/*cellname*/service/wp directory

This directory is the home for the given cell’s White Pages database files, should it wish to support this facility. The root file of the White Pages structure is named /afs/*cellname*/service/wp/wp . Considerable further information on the White Pages is published with the X.V11R4 release of the X tape [WP90a, WP90b].

4. Current status

(This section would be deleted from a real, recommended document. It exists for informational purposes here.)

At present (27 February 1990), not all cells adhere to these conventions, but some are in use by programs that can in principle run anywhere. This section describes some of those variances and some of those uses.

4.1. Pre-existing commitments

Transarc Corporation has agreed to provide, in /afs/transarc.com/service/CellServDB, a file on which sites may base their own /usr/vice/etc/CellServDB files.

Currently, much of AMS automatically uses the following files in /afs/cellname/service:

    wp
    mailqs
    configuration/AMS-Server

in the way described in Section 3. AMS is currently widely deployed; changes to these conventions would have to be phased in over a very long period.

4.2. Changes to prior conventions

/afs/*cellname*/service/CellServDB was moved to /afs/*cellname*/service/etc/CellServDB.export.

/afs/*cellname*/service/CellServDB.local was moved to /afs/*cellname*/service/etc/CellServDB.local

/afs/*cellname*/service/CellServDBs, the directory containing CellServDB files from other cells, was deleted before being implemented.

4.3. Extra things currently kept by various cells

service/CellServDB currently exists (not moved to service/etc/CellServDB.export) for cells andrew.cmu.edu, athena.mit.edu, ece.cmu.edu, ri.osf.org, transarc.com. Because Transarc has announced that /afs/transarc.com/service/CellServDB is a path name to a global list of publicly-accessible cells, Transarc will probably make a symbolic link from that name to /afs/transarc.com/service/etc/CellServDB.export .

service/CellServDB.local currently exists (not moved to service/etc/CellServDB.local) for cells andrew.cmu.edu, cs.cmu.edu, and ece.cmu.edu. (Other cells have not yet created a CellServDB.local file at all.)

andrew.cmu.edu keeps extra directories ‘‘admin’’, ‘‘butler’’, ‘‘mnt’’, ‘‘net’’, and ‘‘motd’’. Its printing directory contains directories adm and fonts in addition to the ones mentioned, but cross-cell printing support is not well developed yet.

athena.mit.edu keeps many BACKUP_LIST* files, many CellServDB* files, several sys-type directories decmips_30, rt_r3, and vax_43, two binary-program links aklog and reconcile, directories ‘‘attic’’ and ‘‘partitions’’, and a file ‘‘owl.xbm’’.

cs.cmu.edu keeps extra directories ‘‘ams_test’’ and ‘‘wp_old’’; it keeps an extra file etc/groups-afs .

net.mit.edu keeps sys-type directories rt_r3 and vax_43, as well as binary-program links aklog and klog.

psy.cmu.edu keeps etc/groups-afs, etc/groups-afs.BAK, etc/passwd.BAK. Its service/wp directory has more files than simply a B-tree (service/wp/wp.old and service/wp/wp.saved), and somebody is going to be surprised when its root node splits when it reaches 40,000 bytes.

ri.osf.org keeps service/#CellServDB.osf.org# and service/CellServDB.osf.org .

sipb.mit.edu keeps sys-type directories decmips_30, rt_r3, and vax_43; old versions decmips_30.old, rt_r3.old, and vax_43.old; a binary-program link aklog; and a partitions directory.

testers.athena.mit.edu keeps a ‘‘partitions’’ directory.

transarc.com keeps all sorts of CellServDB.*cellname* files that CFE believes should be moved into a CellServDBs directory; it also keeps a CellServDB˜ backup file, a ThisCell file, and a wt.config file.

Nobody currently provides a ‘‘service/servers’’ directory. Perhaps it should be nuked.

Apparently MIT has come up with its own local conventions about what goes in the service directory; we’ll have to accommodate them somehow.

5. Review Process

This document assumes the existence of a body that may approve both these conventions and subsequent amendments. For the time being, I believe that the entire set of AFS cell administrators should collaborate in providing recommendations on these conventions, but that it will be the responsibility of Transarc Corporation to approve both conventions and their amendments and extensions in a timely fashion. (Of course, private extensions, such as are described in Section 2.2, need not obtain any official approval.) In the future, Transarc Corporation may assign its responsibility for monitoring and approving these conventions to the Internet Activity Board or to some other appropriate agency.

6. Summary

This document motivates and describes a set of file-naming conventions to be used by cooperating AFS cell administrations.

7. References

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Security Considerations

In this memo, security issues have been mentioned only in passing. Cell administrations must themselves review the security considerations involved in making any given cell service available. For instance, cells may not wish to install a publicly-readable passwd(5) file in /afs/*cellname*/service/etc/passwd if they do not wish their account names to be known. Similarly, cells may or may not wish to install a publicly-readable White Pages in /afs/*cellname*/service/etc/wp for similar reasons, realizing the tradeoffs involved.

In general, cell administrations must review for themselves what accesses should be granted to all files and directories maintained in their cell, not solely those files and directories maintained under the /afs/*cellname*/service/ name.

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