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# AFS Backups

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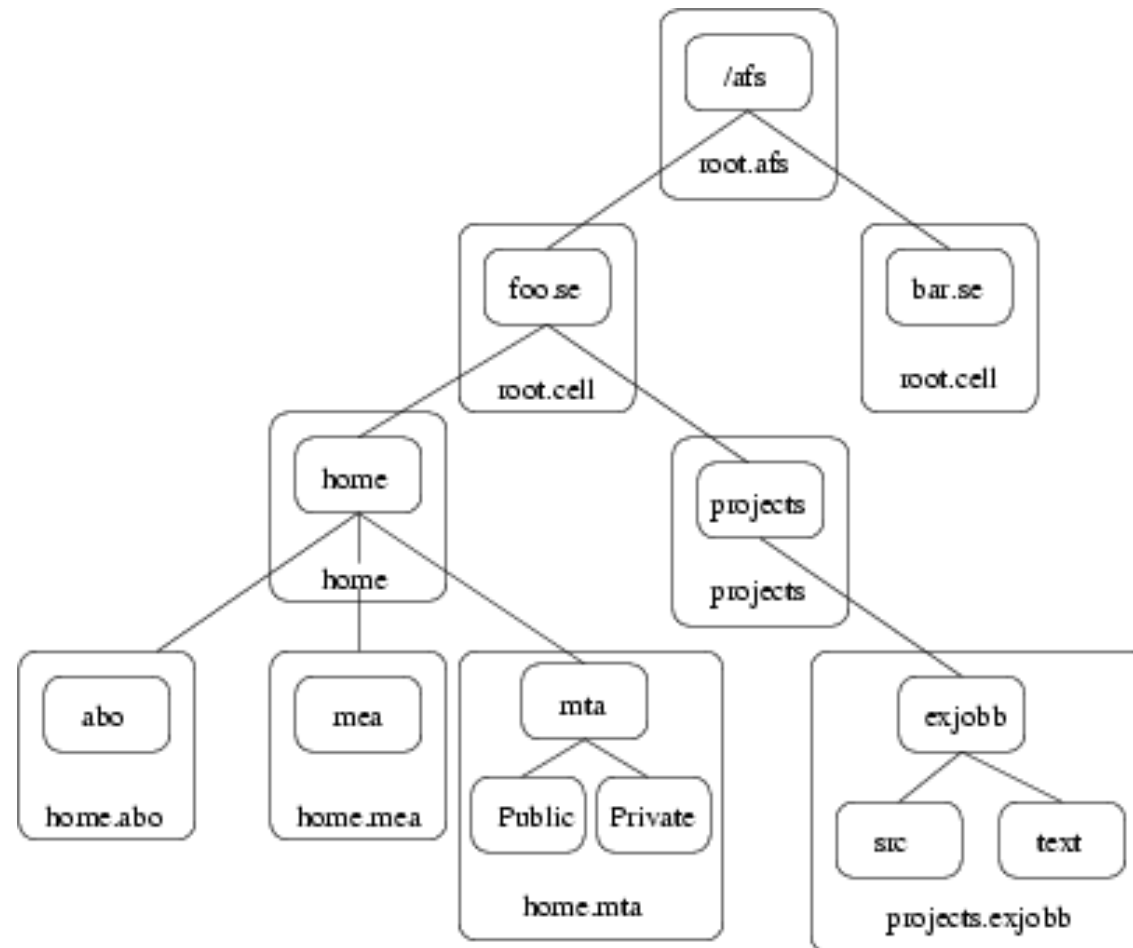
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# AFS Structure



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# Types of backups



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- Backups are taken for two distinct reasons
  - Crash recovery – when a disk or server crashes, the latest data needs to be restored
  - Retrieval of old data – if a file has been accidentally removed or overwritten, it may need to be restored from an older backup
- Backups in AFS can be taken in two different modes
  - Volume backups
  - File level backups

# Backup volumes

- OldFiles makes restoration of data on a users behalf fairly unnecessary.
  - A snapshot of each volume as it was during the last backup is kept on the fileserver.
  - The user can go into this volume and restore files if they are accidentally removed.
  - This eases the load on backup administrators a lot.



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# Volume backups

- Uses the AFS dump protocol
  - Same as for volume transfers between file servers
- Has two modes
  - Full - includes all data in the volume
  - Incremental – taken against a full, or another incremental



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# Volume backups



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- Dumps include
  - Directory structure
  - File data
  - File system metadata, such as quota and ACLs
- A dump becomes a single file on the dump client, which can then be stored to secondary storage.

# File level backups



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- Uses the file system client to access file data.
- Stores files to the backup system in the same way as local backups.
- Does not automatically include file system metadata, which must be archived separately.
- Is often done by mounting each volume in a separate area of the file system and then backing up all files in that volume w/o traversing mount points.

# Method comparison



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- Volume backups
  - + The way AFS was designed to be backed up.
  - + Includes all metadata
  - Can waste space because pruning is done on volume basis
  - Must restore an entire volume to restore a file
- File level backups
  - + Can save space, if your backup system is intelligent
  - + Can restore single files
  - Cannot use standard tools
  - Must archive metadata separately
  - Depends on the file system client



# AFS backup software



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- OpenAFS (and Transarc AFS) comes with a backup toolkit which include
  - Backup db run on the AFS database servers
  - Tape control software run on the tape server
  - Backup command client used to initiate backups
- It is a fairly competent backup system, but it is difficult to automate.

# ITE Backup example



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- At the IT-Department at KTH we have a IBM Tivoli Storage Management System (TSM)
- We use volume backups
  - Using vos dump we write the volume to a file on the backup server
  - This file is then inserted into TSM as an archived file.
  - We only use TSM for storage and bypass all of TSMs automatic pruning.

# ITE Backup example



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- Some characteristics of our backups
  - Full backups are taken every 60 days – if needed
  - Incrementals are taken against these full backups – if needed
  - If the sum of all incrementals are larger than a new full would be, then a full is taken
- Cleaning
  - Always keep the latest two fulls.
  - Always keep the latest 30 incrementals
  - After that, time is divided into ranges of exponentially increasing size
  - The newest full in each range is kept
  - Gives one full 2, 4, 8, 16... months old

# AFS with amanda



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- Cornell University has developed a toolkit for integrating AFS backups with the Amanda backup software.
- It uses volume level backups and stores the volumes to an Amanda server

# File level backups



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- Stanford is one AFS-user I know does file level backups.
- I don't know enough about these to have anything to say.
- Perhaps someone in the audience does?

# References



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- The OpenAFS backup software is introduced in the AFS Administrators Guide and Reference available at <http://www.openafs.org/>
- KTH's afs-tsm is available at <ftp://ftp.e.kth.se/pub/tsm/afs-tsm/>
- Cornell's afs-amanda is available at <ftp://ftp.ccmr.cornell.edu/pub/amanda-afs/>

# Questions, comments, rants?



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