



secureendpoints

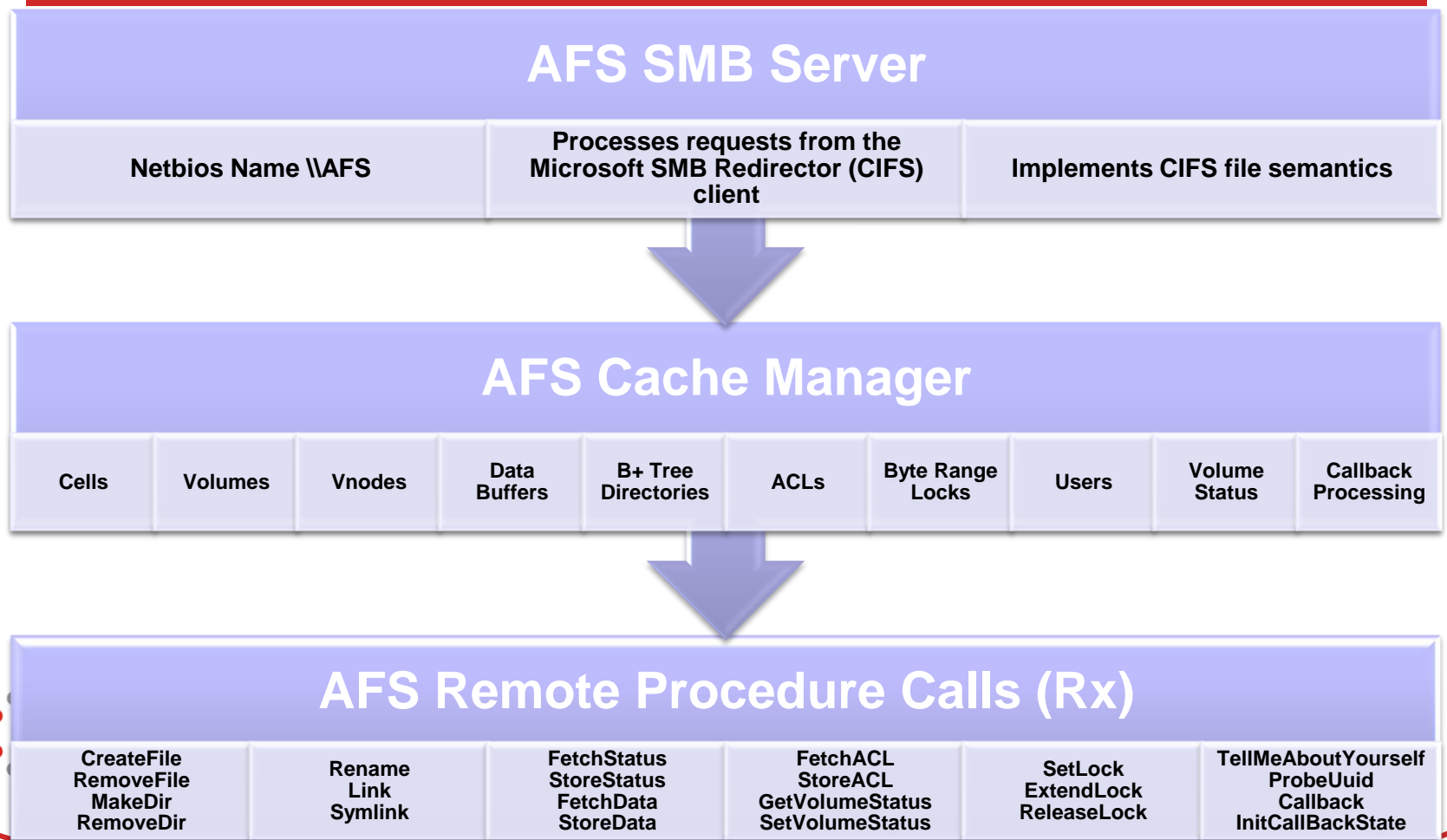
An Architectural Overview of the Native Windows OpenAFS Client

Jeffrey Altman &
Peter Scott
(Kernel Drivers)

The AFS Cache Manager SMB Server

- The Windows AFS Cache Manager is not implemented via the native Windows File System interfaces
- Instead it implements an SMB File Sharing Server published locally on the client machine as Netbios Name “AFS”

High Level Overview of the existing OpenAFS Client Service



Challenges Posed By SMB

- SMB Redirector establishes a virtual circuit for each logon session
 - Authentication
 - File Handles
 - Lock Allocations
- No network adapter; No ability to establish a connection
- SMB timeout (30 to 60 seconds) is enforced on each request
- SMB clients respond to timeout errors by destroying the virtual circuit

Internationalization Limits of Existing Client

- Microsoft Windows NT and above use Unicode for all character strings
- AFS SMB Server implementation only supports the 8-bit OEM Code Pages.
 - CP437 in the United States
 - CP850 in Western Europe

Limitations of CP437

- CP437 has a series of international characters, mainly values 128 to 175 (80H to AFh). However, it lacks many characters important to several Western languages:
 - It lacks many characters for [Spanish](#) (Á, Í, Ó, Ú), [French](#), (À, Â, È, Ê, Ë, Ì, Î, Ï, Ò, Ô, Œ, œ, Ù, Û), and [Portuguese](#) (Ã, ã, Õ, õ).
 - It has [umlauts](#) for [German](#) (Ä, ä, Ö, ö, Ü, ü), but [sharp S](#) (ß) must be represented with the [beta](#) symbol (β).
 - It has Scandinavian Æ, æ, Å, å, but lacks Ø and ø (character number 237, empty set, may be used as a surrogate, but is not properly displayed within a word).
 - Along with the [cent](#) (¢), [pound sterling](#) (£) and [yen/yuan](#) (¥) currency symbols, it has a couple of European currency symbols, for the [florin](#) (f, Netherlands) and the [peseta](#) (Pts, Spain).
- Non-Western languages cannot be represented at all

Unicode vs Storing Roaming Profiles in AFS

- Roaming Profiles copy folders from remote storage to local disk during login
- During the session, files are created on local disk using Unicode UTF16
- At logout, the folders are copied back to remote storage
- If a filename cannot be translated from UTF16 to CP437, the profile is not copied back

AFS Stores Octet Strings

What will we do?

- Store unaltered Unicode names within AFS using UTF8 encoding
- Use normalized composite Unicode names for pattern matching

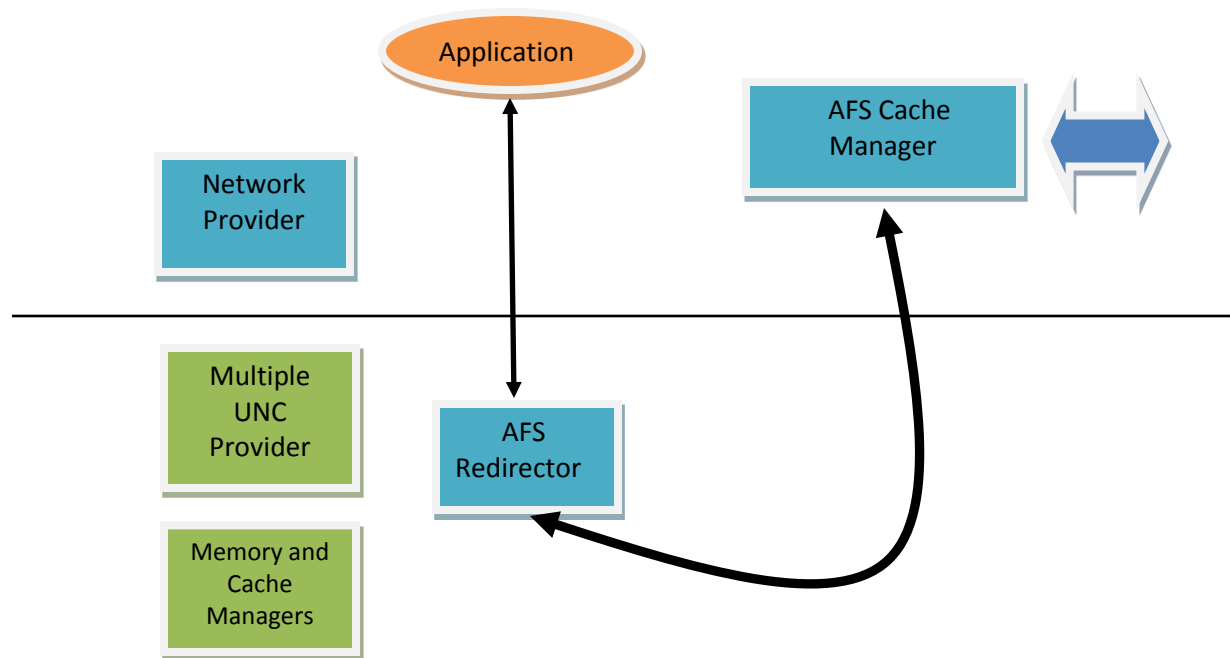
What about the existing CP437 names within AFS?

- If the name is valid UTF8, the name will be treated as UTF8
- Otherwise, we will attempt to treat it as CP437 and convert it to Unicode

Native File System Requirements

- Must support XP SP2 and above on 32-bit and 64-bit platforms
- Must preserve [\Afs](#) file system access
- Must preserve existing pioctl interface
- Separate @sys name lists for 32-bit and 64-bit processes

If no SMB Server, how will it work?



Implementation Details

- Each AFS Volume is managed by Windows as a separate volume object
- Only meta data is copied between the user and kernel layers
- Data buffers will be shared between the two layers directly from the paging file
- Windows Memory Manager and Cache Manager integration permits the AFS Cache Manager to apply callback data directly

Status Report

- Unicode Conversion – In Testing
 - will roll into 1.5.50 before Redirector is finished
- Metadata Browsing – Done
- Network Provider (Drive Letters) - Done
- Read Data – Done
- Final Delivery – End of Year 2008

Questions?

- Answers ...