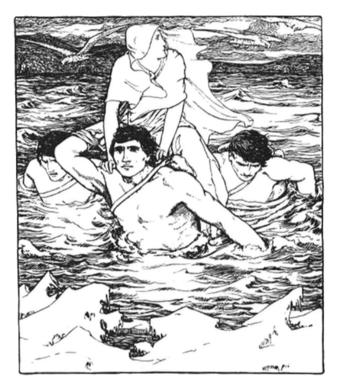
This page intentionally includes a pointless message



## Samba on Gluster



### The Things We Do For Love

GBPISTOPBER R. Deptel Samba Team

JOSE A. RIVERA Just Edjoy the Ride

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# Introduction

#### Samba/XP – May 2013



Me

Author
Storage Architect
Network Engineer
SMB Know-It-All
Samba Team Member (since '98)
Incurable Idealist

A ruminant mammal (Geekus geekus) with long legs, humped shoulders, and broadly palmated antlers.



# The Other Guy

Swimming in the deep end of the SMB cesspool since 2008.



# **Figure 1**



The opinions expressed are my own and not necessarily those of my employer, my spouse, my childrenz, the dog, or "the Voices".



### You





### Where are we going?



"Metadata" and "Semantics"







Gluster Basics



🌍 Gluster 🧡 Samba



Questions

(and answers, if I have any)



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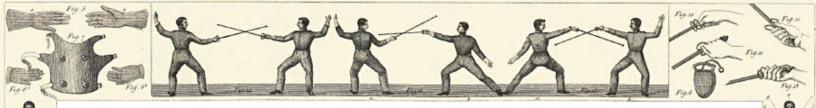
# What's in a Name? A Rose by Any Other Name Would Wither and Die

-- Alan Swann (Peter O'Toole), My Favorite Year





What's in a Name?



Metadata: Data about Data

Things like:

Path Names and inode numbers
Timestamps

Permissions/Access Controls
File size and Quota

Metadata identifies files, provides current state, sets limits, etc.





### Semantics: The Meaning

 Context and rules for interpreting metadata
 Enforcement of set limits
 Reasonable assurance of correctness

Semantic rules, such as access controls and quota limits, must be enforced by the **Operating System and File System**.







### Samba is a Semantic Translator

Client Samba File System Server

There and back again...

- The client expects Windows semantics from the server.
- Samba expects POSIX semantics from the file system.

Samba must translate from Windows to POSIX and back again.





The Pieces Must Fit

If Samba does not properly handle SMB protocol, we call it a bug and expect trouble.

If the file system does not properly handle the POSIX calls made by Samba, we also expect trouble.





What's in a Name?

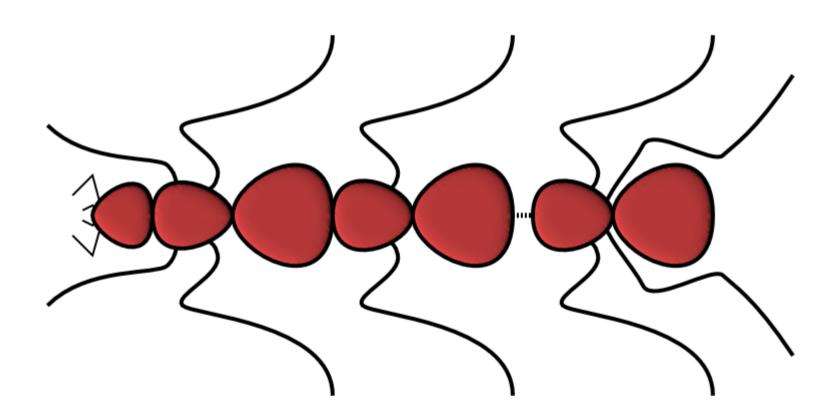


If you're looking for dragons, you'll find them in the semantics.

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### The Samba VFS layer

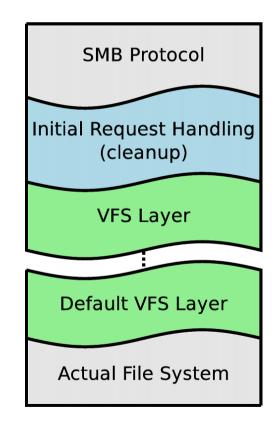




# The Samba VFS Layer

Samba is Built in Layers (conceptually)

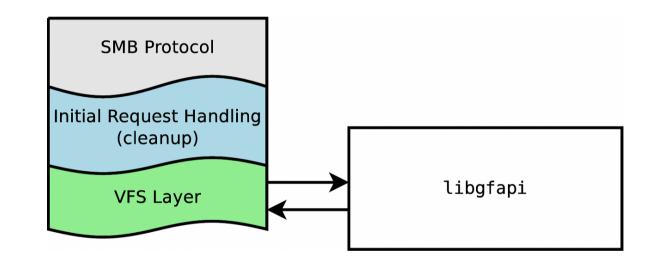
- SMB messages are received and parsed
- (Non-FS commands are handled elsewhere)
- 🗑 Call the VFS layer
- The final VFS module talks to the File System
  - Migher VFS layers may bypass lower layers







### If there's no real File System, we can bypass the lower VFS layers



### All VFS calls must be implemented (possibly returning ENOTSUP) to avoid errors.





### Samba is Flexible

The VFS layer allows us to adapt Samba to the behaviors of the underlying file system.

Bypass limitations Work around bugs Take advantage of features Tune for speed ...and more. amba/XP – May 2013 20



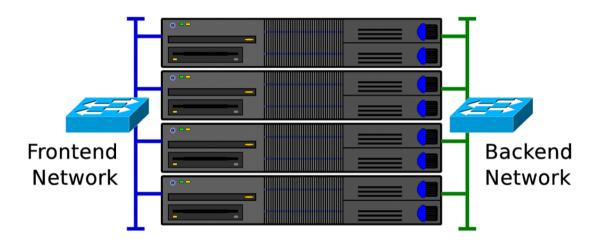
# Getting to Know Gluster

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### **Gluster is a Distributed File System**



Each node provides storage "Bricks"
 Each Brick is actually a directory
 Bricks are bound together as "Volumes"
 Volumes are distributed and/or replicated
 Made available via "Access Methods"
 SMB (Samba) is one such Access Method





Gluster can be FUSE Mounted

Just another access method Client may be local or remote • Local to the Gluster server node • Remote on any networked client node Samba runs on the FUSE mount (until recently)

The Gluster server daemon provides a FUSE interface, used for local or remote access to Gluster volumes.



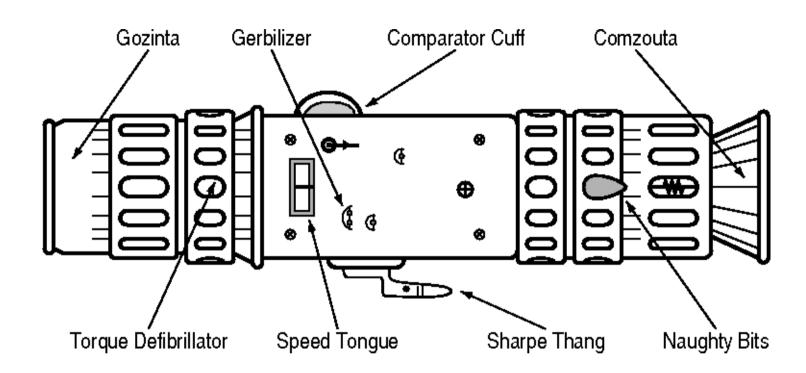
# Samba and Gluster and FUSE

(oh my)









# Now we put the pieces together and see how well they fit.





"Samba is a semantic translation machine" —We said that already

Main Samba translates from Windows to POSIX and back again Samba expects POSIX behaviors: Q Read/Write Coherency OSIX byte-range locking support Samba also wants extra FS features: Extended Attributes
 "POSIX" ACLs Q RichACLs (would be nice)



# Samba/Gluster/FUSE

### Gluster

... is adaptable, and cool.

- Can add support for SMB-specific features: Windows ACLs?
  - WINDOWS ACLS?
    OpLocks and Loase
  - OpLocks and Leases?
  - Windows timestamps?

"Translators" stack like Samba VFS modules



There are possibilities to explore here.



# Samba/Gluster/FUSE

### FUSE

...presents a problem.

- 🕞 A generic mount point
- No way to enable/disable per-accessmethod features

FUSE provides a single standard interface, but effectively locks away Gluster internals.

What's a coder to do?



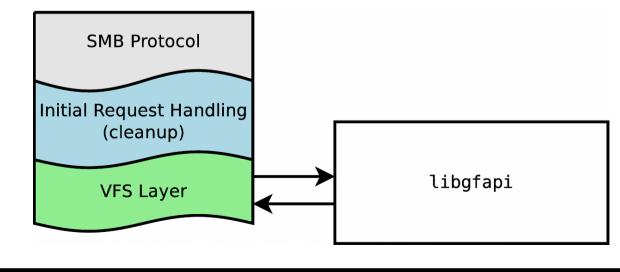




### vfs\_glusterfs

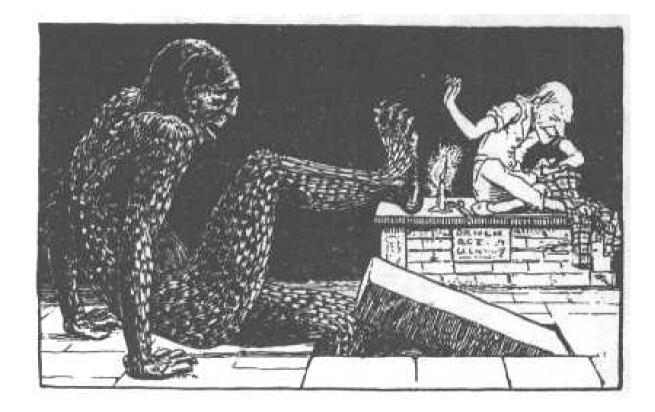
New code, recently submitted Similar to the Ceph VFS

Writing the first draft VFS module took less than a week. (Credit not mine.)





### Enter CTDB





### CTDB Basics

### CTDB offers three basic services:

Distributed Metadata Database
 Node Failure Detection/Recovery
 IP Address (Service) Failover

CTDB allows multiple Samba servers to operate synchronously, over the same file system.



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## CTDB Basics

### CTDB Forms a Samba Cluster

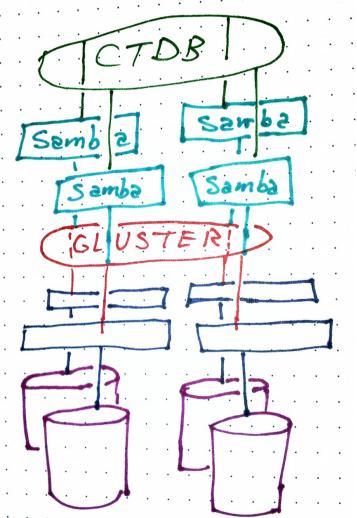
Separate from the underlying cluster

May duplicate some activities

Messaging

🧼 Heartbeat

Flexible configuration





## What We Fornd







### POSIX Byte Range Locking



"To be blunt, unless your cluster filesystem is called GPFS, locking is probably completely broken and should be avoided."

- From Samba-Technical, 29-Mar-2013

FIXED: F\_GETLK return value bug.





# What we Found

### Cache Coherency



Stock config fails ping\_pong.



Caching occurs in multiple locations in Gluster.



Starting off caching seems to solve the problem, but performance suffers.



SMB has strict locking and consistency requirements.





### **CTDB** Node Banning

Under Heavy Load, CTDB permanently bans a running node.

🔆 Recently discovered.

May be related to a known (and fixed) bug in the version of CTDB we are testing.

Will re-test with a newer CTDB version.









## Slow Directory Lookups

Samba must do extra work to detect and avoid name collisions. WiNdoWs IS cAse-INsensiTive POSIX is case-sensitive

FUSE calls to getdents(2) were taking a very long time, and there were a lot of calls to getdents(2).

FIXED: ...by using vfs\_gluster.











