CTDB + Samba:
Scalable Network Storage For The Cloud

Storage Networking World Europe 2011

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Samba Team / SerNet

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Introduction

about:Samba

Since 1992:

- *The* open source SMB/CIFS/SMB2 file server
- high performance
- production proven and reliable
- used in many products/appliances
- Windows AD domain member
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- OpenSource/Linux centric company in Germany
- founded 1996
- today: 40-50 employees
- Samba department: 5 Samba core team members including the release manager
- Samba development and consulting as a service

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Around 2005/2006, it started...

Goal

Create a clustered NAS (CIFS/NFS):

- all-active
- available
- scalable
- good performance

SAMBA

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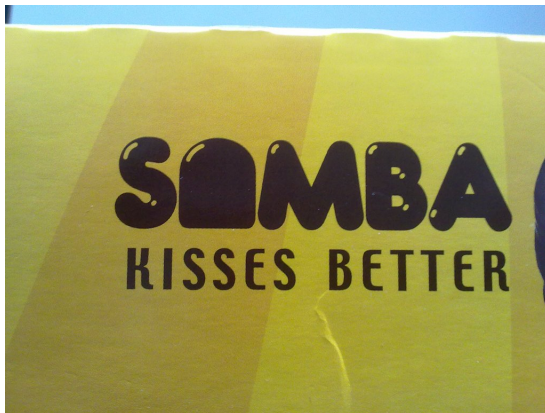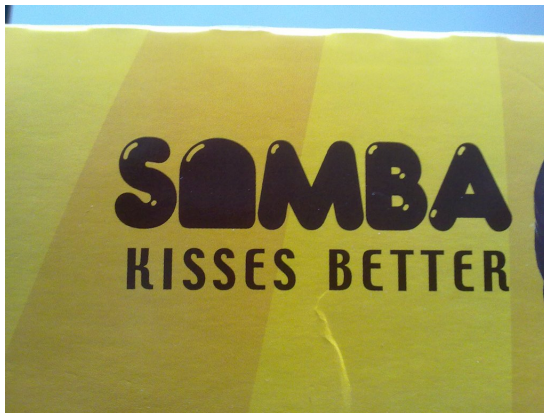
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Since 2007 ...

... with CTDB ☺

... with **CTDB** ☺

CTDB

Clustering Samba - Challenges And Chances

- ▶ **Prerequisite**: a distributed/clustered file system (POSIX)
- ▶ **Requirement:** No client changes! (*Windows*...)

- ▶ all-active ⇒ all nodes act as *one* CIFS server
- ▶ Samba's process model ⇒ clustering is imaginable
- ▶ IPC: messaging
- ▶ IPC: sessions, connections, open files, locks, ...
- ▶ Persistent data: secrets, registry, id-map, ...

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Clustering Samba - TDB

- all that stuff is stored in *TDB* databases
- TDB (trivial database):
  small, fast, key-value database with record locks and memory mapping
- ⇒ we essentially need: a clustered TDB implementation
  (plus messaging)
- available general purpose clustered databases not sufficient
  (performance, scalability)

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CTDB ...

- is a very special clustered database implementation (may lose data...)
- is an inter-node-IPC implementation for Samba (messaging)
- is also a simple cluster service management software
- makes Samba on a file system cluster appear as a single CIFS/SMB/SMB2 server
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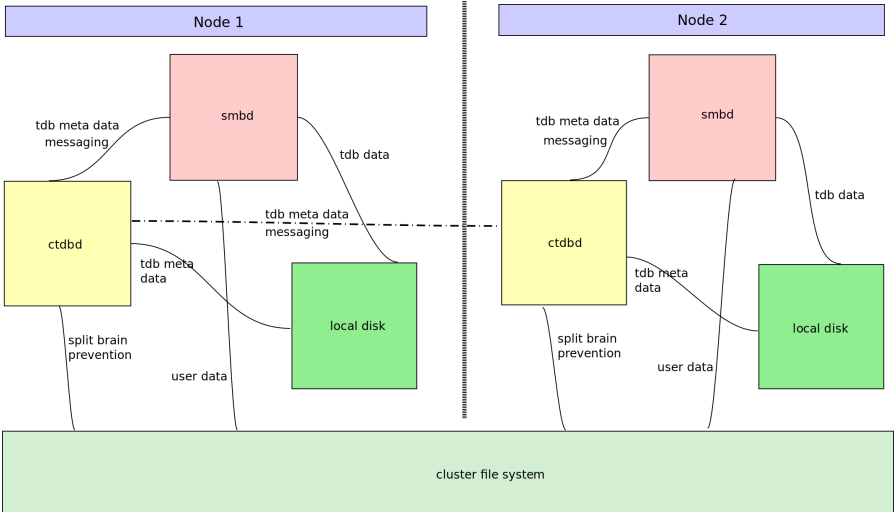
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How CTDB Works

CTDB - History

- first prototypes: 2006 (Volker Lendecke, Andrew Tridgell)
- first usable version: 2007 (non-persistent DBs only)
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Cluster Filesystems

- GPFS
- GFS2
- OCFS2
- GlusterFS
- Ceph (soon)
- ...

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Recent And Current Projects

Recent Improvements

- vacuuming
- persistent transactions
- samba persistent db performance tuning
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- CTDB client library (`libctdb`)
- read-only record copies (ongoing)
- smb 2.0: durable handles
- smb 2.1: multi-credit, resilient handles, leasing, ...
- smb 2.2: multi-channel, persistent handles, RDMA, cluster features

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- Microsoft embraces CIFS clustering
- client changes: much of the failover logic in the client
- multi-channel (client side channel bonding)
- SMB direct (SMB over RDMA): infiniband transport etc
- intended to replace NFS and SAN use cases
- preview docs and OS images available

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Management and Integration

CTDB as cluster manager

- manages services (samba/winbind/nfs/apache/...): start/stop/monitor
- pluggable extensible event script architecture (`/etc/ctdb/events.d/`)
- handles IP (re)allocation on public network: fail-over/fail-back
- tickles clients to reconnect in case of fail-over

- When this was created, Linux cluster stack did not have all-active.
- But nowadays, pacemaker is getting more popular in distributions.
- All of the above CTDB features are optional.

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Integrating CTDB and Samba

Two choices:

Independently of Linux cluster stack

- ▶ CTDB manages samba
- ▶ CTDB manages winbindd
- ▶ CTDB manges public IP addresses

As managed resources

- ▶ CTDB does not manage samba, winbind nor public IPs
- ▶ CTDB only provides clustered TDB services
- ▶ Linux cluster suite (pacemaker) manages CTDB and Samba and Winbind
- ▶ Resource dependency: Cluster FS $\Rightarrow$ CTDB $\Rightarrow$ winbindd $\Rightarrow$ samba

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- Red Hat

- SuSE

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- ▶ Red Hat
  - ▸ starts using pacemaker
  - ▸ currently (RHEL 6) CTDB is run as system service managing Samba, not as a cluster resource
  - ▸ Samba+CTDB+GFS howto (on wiki.samba.org)
  - ▸ RHEL 7 will use pacemaker

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Thank you very much!