Open Source Embedded Cloud Storage

Kai Blin
SAMBA Team
Outline

- Intro
- Design
- Implementation
- Conclusions
Intro

- About myself
- Defining “private storage cloud”
- Embedded cloud storage trade-offs
About myself

- M.Sc. in computational biology
- Microbiology grad student
- Open Source developer
- Samba Team member
Defining “Private Cloud Storage”

The Cloud

Third Party

- Someone else’s hardware
- Pay for actually required use
- Need to trust third party

Private Cloud

Internal

- Your own hardware
- Pay for estimated peak usage
- Data privacy easier
Embedded Cloud Storage Trade-Offs

- Low power consumption
- Living room compatible
- Extensible

- Low performance
- Low disk space
Design

- Goals
- Non-goals
- Hardware Requirements
- Hardware Options
- Software Requirements
- Open Source Cluster File Systems
- Distribution Choices
Goals

- Cheap storage
- Gadgetable
- Easily expandable
- Low power consumption
- Low noise
- Keeping data for home entertainment or SOHO
Non-Goals

- Blazingly fast
- Petabyte capacity
Hardware Requirements

- Fast storage access
- Fast networking
- Lots of RAM
- Lots of CPU power
Hardware Options

- BeagleBoard
- BeagleBoard xM
- Hawkboard
- Sheevaplug
- Guruplug
BeagleBoard

- OMAP3530 @ 720MHz
- 256MB RAM
- USB host port
- USB OTG port
- **NO** ethernet

Source: BeagleBoard System Reference Manual Rev C4, Page 1
BeagleBoard xM

- DM3730 @ 1GHz
- 512MB RAM
- 4 USB host ports
- USB OTG port
- 10/100 Mbit ethernet

Source: http://www.flickr.com/photos/jadon/4628635196/sizes/o/in/photostream/
Hawkboard

- OMAP-L138 @ 450 MHz
- 128MB RAM
- USB host port
- USB OTG port
- 10/100 ethernet
- SATA

Source: Hawkboard User’s Manual, Page 1
Sheevaplug

- ARM Kirkwood @ 1.2GHz
- 512MB RAM
- USB host port
- 10/100/1000 ethernet
- (some models with eSATA)

Source: http://newit.co.uk/shop/proddetail.php?prod=Sheevaplug
Guruplug (Server Plus)

- ARM Krikwood @ 1 GHz
- 512MB RAM
- 2 USB host ports
- 2 10/100/1000 ethernet
- eSATA

Software Requirements

- Open Source platform
- Easy to customize
- POSIXy file system semantics
- Multi-Platform access to data
Open Source Cluster Filesystems

- Ceph
- Global File System (GFS)
- Gluster
- Lustre
- Moose File System (MooseFS)
- Oracle Cluster File System (OCFS)
- Parallel Virtual File System (PVFS)
Distribution Choices

- Ångström
  - Focus on GUI-based embedded systems
  - Powerful toolchain
- Ubuntu
  - Widely-used system
  - ARM support focused on netbooks
- Debian
  - Supports older ARM architectures
Implementation

- Hardware used
- Software used
- Cluster layout
- Cluster configuration
- CTDB configuration
- Samba Configuration

Implementation details might still change, get the updated slides after the conference.
Hardware Used

- Hawkboard
  - SATA-capable
  - 100Mbit ethernet
  - 128MB RAM

- Beagleboard xM
  - USB only
  - 100Mbit ethernet
  - 512MB RAM
Software Used

- Ångström Linux and Ubuntu Linux
- Ceph, MooseFS and PVFS tested
- CTDB
- Samba 3.6 pCIFS
Cluster Layout

client

node

node
Cluster Configuration

- Both nodes as object storage devices
- BeagleBoard xM runs other required services
- Both nodes run CTDB
- Both nodes run cluster-aware Samba 3.6
- Laptop as CIFS client
CTDB Configuration

- Disable recovery locks (potentially dangerous)
- Set up public interfaces with takeover
- Allow CTDB to manage Samba
- Set up DNS round robin
Compile Samba with cluster support

Set clustering = yes

Set idmap backend = tdb2

Turn off mmap support

Normal Samba configuration otherwise
Conclusions

- Performance data
- Viability
- Questions & Answers
Benchmarks

☐ To be done
Power Consumption

☐ To be done
Viability

☐ To be done
Thank you for your attention

Questions?
Links

- Samba: http://samba.org
- CTDB: http://ctdb.samba.org
- Ceph: http://ceph.newdream.net
- Ångström: http://angstrom-distribution.org
- BeagleBoard: http://beagleboard.org
- Hawkboard: http://hawkboard.org