Samba ARMed and Ready

Running an Active Directory DC on 2 Watts
Overview

- Introduction
- Hardware
  - Beagle Board
  - Alternatives
- Software
  - Ubuntu Linux
  - Samba
- Performance
About Myself

- Computational biology grad student
  - Protein design
- Wine Developer since 2005
  - Authentication
  - Networking
- Samba Team member since 2007
  - ID mapping / winbind
  - Embedded Samba
ARM Architecture

- 32bit RISC architecture
- Low-power, low-cost
- Widely used in consumer electronics
  - Smartphones/PDAs
  - Handheld gaming consoles
  - Routers / NAS boxes
Why Bother?

- Low power consumption
  - Keeps the power bill down
- Fan-less and Quiet
  - Office or home use
- Low unit cost
  - Active Directory server for < €150/$200
  - No license costs
- Mobile
Hardware
Hardware Used

- Beagle Board
- Powered USB hub
- USB ethernet controller
Beagle Board

- **Budget-friendly**
- **Easy to use**
- **Always-on**
- **Green IT**
- **Light-weight**
- **Extensible via USB**
Beagle Board

- 8cm x 8cm (3” x 3”)
- 128/256 MB RAM
- 500 mA / 5 V
- SD/MMC/SDIO slot
- Serial port
- **No** ethernet
Beagle Peripherals

- Powered USB hub
  - Supplies power to Beagle board
  - Provides additional USB ports
- USB Ethernet controller
  - USB2.0 interface (480 Mbit/s)
  - Provides 10/100 Mbit/s Ethernet
  - Fast enough for SOHO use
Alternatives

- Sheeva Plug
  - Faster processor, 512 MB RAM
  - Gigabit ethernet onboard
  - 3 A / 5 V

- Gumstix Overo
  - Similar to Beagle Board
  - Expansion card provides WiFi
  - 250 mA / 4 V
Software
Software Used

- Linux
  - Ubuntu 9.04 “Jaunty Jackalope”
- Samba
  - Samba4
- DNS server
  - ISC Bind
Ubuntu “Jaunty Jackalope”

- General Linux distribution
  - Thousands of software packages
  - Wide range of applications
- Supports ARM out of the box
  - No need to compile packages yourself
- No official Beagleboard kernel (yet)
  - Community kernels available
Ubuntu Setup

- Bootstrap on PC
  - rootstock script sets up root filesystem
  - Partition and format SD card
  - Copy kernel and filesystem to SD card
- Boot beagle
  - Configure networking
  - Update system

rootstock: https://launchpad.net/project-rootstock
Alternative Distributions

- Ångström
  - Special embedded distribution
  - Designed for handhelds and NAS boxes
  - Recommended by Texas Instruments
- Android
  - Special embedded distribution
  - Designed for mobile phones
- And many others...
- Opening Windows to a wider world for 17 years
- SMB/CIFS/SMB2 file services
- Current: 3.4.1, released 2009-09-01
- Providing NT4-style domain controller
- Member server in Active Directory domains
- Active Directory Domain Controller support
- Alpha 8 released June 19th 2009
- Active Directory components usable
- File / print services need work
Samba4 Setup

- Compile sources (tarball, git)
- Call ./setup/provision
  - Sets up databases
  - Creates related config files
- Set up DNS
  - Zone file created by provision
DNS

- Different per distribution
  - Ubuntu: Copy over files to /etc/bind/
- Problem: bind memory usage
- Alternatives
  - dnsmasq
  - Own implementation
Samba4 Demo

- Join Win2k3 member
- Join Samba 3 member
- Create user via MMC
- Enumerate users on Samba 3 member
Samba “Franky”

- Samba 3: File / print services
  - Tried and true
  - Grown code
- Samba 4: AD domain controller
  - Clean design
  - Focus on new technology
- Combine to get production-ready AD DC
  - “Best of”
  - Code name: Franky
Samba “Franky” Setup

- Grab sources from git://git.samba.org/samba.git
- Compile Samba 3 with
  --enable-developer=yes
  - Merged Samba 3 / Samba 4 build
  - pdb_ads glue code
- Provision Samba 4 as described
  - As domain controller
  - “server services = ldap, cldap, kdc”
Smba “Franky” Setup (cont.)

- Set up Samba 3
  - Different smb.conf file!
  - As domain controller
  - “passdb backend = pdb_ads”
- Setup DNS as described
Performance Data
## Power Consumption

<table>
<thead>
<tr>
<th>System</th>
<th>Idle (W)</th>
<th>Load (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMD Athlon64 3000+</td>
<td>75</td>
<td>105</td>
</tr>
<tr>
<td>Intel Core2 Quad</td>
<td>109</td>
<td>180</td>
</tr>
<tr>
<td>Mac Mini G4</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>ThinkPad R52</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td>Beagleboard</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>ShevaPlug</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>
## Benchmark Data

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>kinit - kdestroy</td>
<td>510</td>
<td>1430</td>
<td>100</td>
</tr>
<tr>
<td>join - leave</td>
<td>70</td>
<td>90</td>
<td>10</td>
</tr>
<tr>
<td>User add - delete</td>
<td>90</td>
<td>110</td>
<td>12</td>
</tr>
<tr>
<td>Group add - del</td>
<td>90</td>
<td>160</td>
<td>22</td>
</tr>
<tr>
<td>LDAP search indexed</td>
<td>70</td>
<td>120</td>
<td>40</td>
</tr>
<tr>
<td>LDAP search wildcard</td>
<td>200</td>
<td>340</td>
<td>100</td>
</tr>
<tr>
<td>LDAP search not indexed</td>
<td>220</td>
<td>360</td>
<td>100</td>
</tr>
</tbody>
</table>
Conclusions

- Suitable for small setups
  - Slow operations not done often
- Affordable Active Directory setup
- Some optimization might help
Possible Use Cases

- “Mobile Workgroup” servers
- Home office set-top box
- Couple with OpenChange for email appliance
- Replicating DC for branch offices
- ...

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Future Work

- Optimize for resource saving
- Facilitate DNS setup
- Web configuration frontend
Thank You

- Samba Team blog [http://news.samba.org/developers/](http://news.samba.org/developers/)