Debian on Network Attached Storage Devices

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- Explain why Network Attached Storage devices (NAS) are an interesting target for Debian
- Explain the mechanisms we implemented so Debian can be installed on them
- Share lessons learned
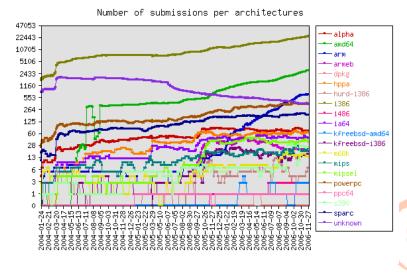- Mention some web resources and answer questions

- For most people, a Network Attached Storage device (NAS) is an external hard drive on steroids
- For geeks, a NAS is a complete computer
  - CPU
  - RAM
  - Ethernet
  - Storage
- NAS and other consumer devices are easy to obtain

2006: ARM rose from seventh to third in nine months

Number of submissions per architectures

Supported devices

- Linksys NSLU2

- GLAN Tank
- Intel SS4000-E
- Thecus N2100

- D-Link DNS-323
- HP Media Vault mv2120
- Kurobox Pro
- QNAP TS-109, TS-209, TS-409

- OpenRD
- QNAP TS-119, TS-219P and TS-419P
- SheevaPlug, GuruPlug

- A working SSH client (openssh, putty)
- An Internet connection
- No serial console, no JTAG, etc
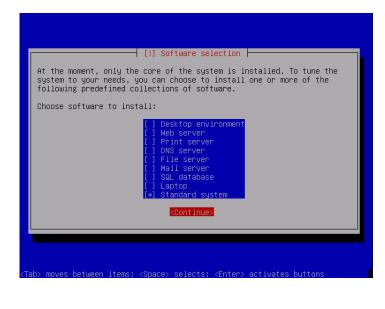- No manual instructions

The general approach

- We provide a 'firmware' image that really is debian-installer
- We use network configuration from the existing system to start SSH
- Users can do a normal installation via SSH
- At the end, a Debian kernel and ramdisk will be written to flash or a bootable image to disk
- Philosophy: don't touch boot loader or config if possible; and don't require manual steps

Installer

┌──────────┤ [!] Software selection ├──────────┐

At the moment, only the core of the system is installed. To tune the
system to your needs, you can choose to install one or more of the
following predefined collections of software.

Choose software to install:

```
    [ ] Desktop environment
    [ ] Web server
    [ ] Print server
    [ ] DNS server
    [ ] File server
    [ ] Mail server
    [ ] SQL database
    [ ] Laptop
    [*] Standard system
```

        <Continue>

<Tab> moves between items; <Space> selects; <Enter> activates buttons

- Reads values from an existing system or firmware
- Preseeds debian-installer so SSH will be started
- Parses Unix tree, reads value from flash, etc
- Nowadays most devices default to DHCP

Tools - flash-kernel

- Writes kernel and ramdisk to flash or creates bootable image on disk
- Supports 25 devices – easy to extend
- ramdisk (initramfs) hook: to set root device since many NAS devices boot with `root=/dev/ram`

Problems

- Incomplete network configuration (e.g. missing DNS)
- Users assume different network configuration
- Doesn't boot with more than one disk
- Non-working kernel or ramdisk flashed
- "doesn't boot" – no idea why

Lessons learned

- Users like cheap (100 USD/EUR) consumer devices to play with
- Users will make mistakes with manual installation instructions, even if they are very clear
- Documentation is key

The future

- Put OpenWRT/OE in flash and start Debian with kexec
- Add a SSH server to the Debian ramdisk
- Support installations to MTD flash
- Port Debian to more devices

More information

- debian-installer
  - `http://debian.org/devel/debian-installer/`
- Debian on Marvell Orion and Kirkwood
  - `http://www.cyrius.com/debian/orion/`
  - `http://www.cyrius.com/debian/kirkwood/`