Booting over HTTP

Zoltan Arnold NAGY
zoltan@NetBSD.org

Eötvös Loránd University,
Budapest, Hungary
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Agenda

- Who am I?
- Google Summer of Code and NetBSD
- General overview
- Challenges
- Demo
- Questions and Answers

Who am I?

- BSc in CS (minor in math), working towards MSc
- Full-time software engineer, mostly Java EE
- Long time Linux user
- NetBSD developer since 1 Oct

Google Summer of Code and NetBSD

- Google's global program for student developers
- Main goal is to get them involved in doing open-source software
- NetBSD has been participating since the beginning (2005)
- ”Implementing HTTP support for libsa” has been selected

General overview

- The boot process:
  - use DHCP to get an IP and gateway address
  - use TFTP to load the NetBSD bootloader
  - the bootloader decides how to proceed
- Why do we need HTTP support?
  - corporate networks are usually heavily firewalled, yet HTTP is allowed
  - HTTP is very widespread, TFTP isn't so
- Requirements
  - Should be architecture agnostic
  - Internal APIs are available (libsa)
    - `netif_driver` for defining NIC drivers (probe, get, put, ...)
    - `fs_ops` for defining filesystem operations (read, write, ...)
- For amd64/i386, PXE is available, and had a `netif_driver` implementation
- Adding it to a new architecture is easy: just write the `netif_driver`!

Challenges

- The previous implementation was UDP only
  - The IP and UDP code wasn't separated → had to refactor most of the code
- Had to implement PXE's Universal Network Driver Interface (UNDI)
  - Very messy
  - Polling required
  - Almost direct access to the NIC's ringbuffer
- We needed a minimalistic TCP stack
  - Could have reused an existing BSD-licenced TCP stack, but they were too full-featured ;)
- HTTP is easy, base64 encoder needed a bit of magic

What we can, might do, can't do

- Can:
  - boot the kernel from an HTTP address
  - authenticate with HTTP basic auth
- In the future:
  - IPv6 support
  - DNS support
- Might do HTTPS support in the future

Demo

Questions and answers!