webboot

The LinuxBoot way of multi distro ISO booting

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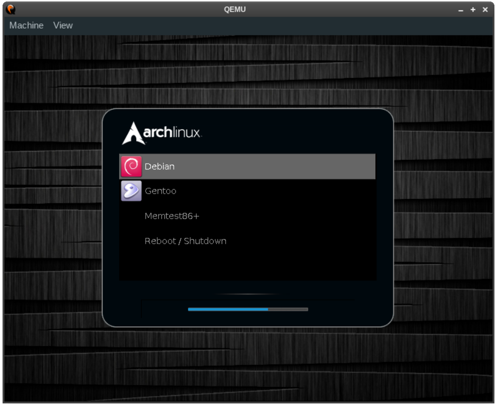
Agenda

- Bootloaders
- What is webboot?
- Use-cases, Challenges, History
- Running From USB Storage

Bootloaders

Common Bootloader: GRUB

A bootloader *is an application that loads and executes another application.*



- sometimes multiple stages (loaders) due to architecture
- target application may rely on a specific protocol
- often configurable via files or customizable at build time
- can offer an interactive menu, e.g. for switching OSs

image source: https://github.com/hartwork/grub2-theme-preview

Drivers, Parsers, Loaders

Drivers

- talk to hardware, e.g., graphics output
- abstract concepts, e.g., file systems
- may be provided by environment, such as UEFI DXE or Linux

Parsers

- understand data formats
- translate raw data to a usable form
- for configuration files and binaries

Loaders

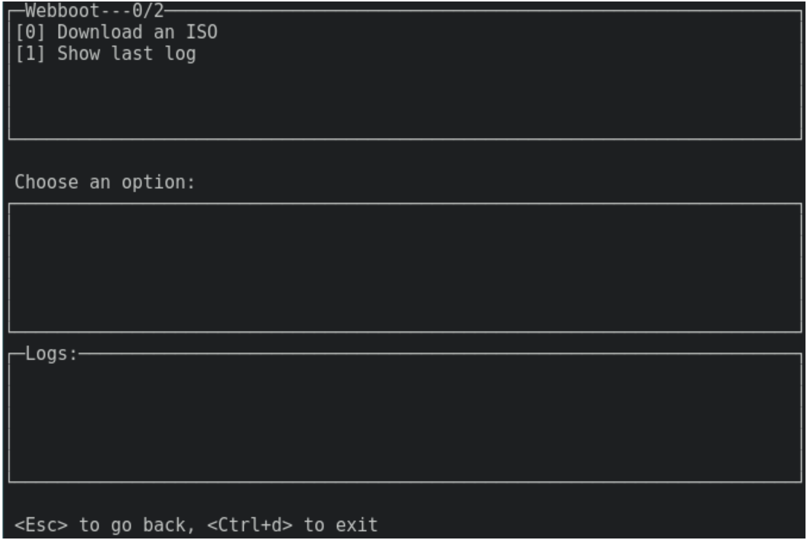
- potentially pick up configuration
- load application to memory
- place additional data in memory and/or registers

Eventually, tell the platform (“CPU”) to execute from a specific memory address.

What is webboot?

webboot

webboot is a bootloader for distro images from the network, written in Go



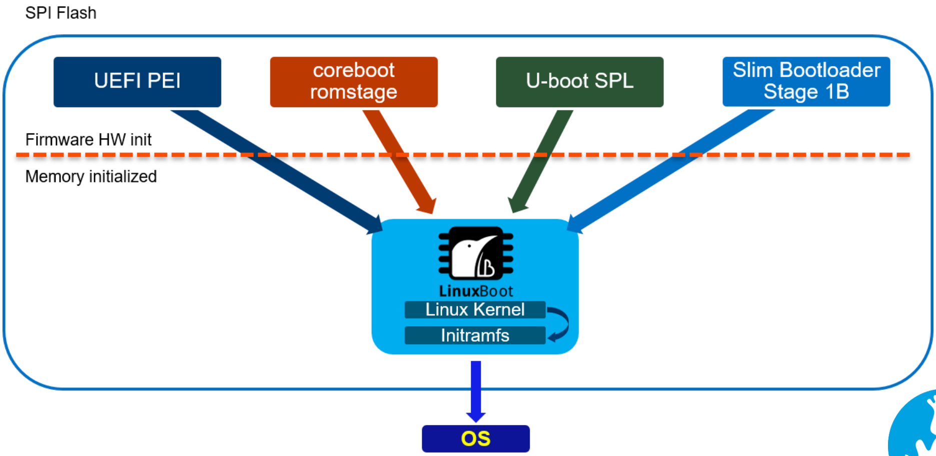
```
┌Webboot---0/2──────────────────────────────────────┐
│[0] Download an ISO                                │
│[1] Show last log                                  │
│                                                   │
└───────────────────────────────────────────────────┘

 Choose an option:
┌───────────────────────────────────────────────────┐
│                                                   │
└───────────────────────────────────────────────────┘
┌Logs:──────────────────────────────────────────────┐
│                                                   │
└───────────────────────────────────────────────────┘

 <Esc> to go back, <Ctrl+d> to exit
```

LinuxBoot Integration

webboot is built as a Linux application into an initramfs



Use-cases, Challenges, History

Why webboot?

There are many purposes for webboot, including:

- burner laptop; like Tails, but use *any* distro
- try things out without installation
- volatile systems, such as CI runners
- development and testing
- system recovery and diagnostics

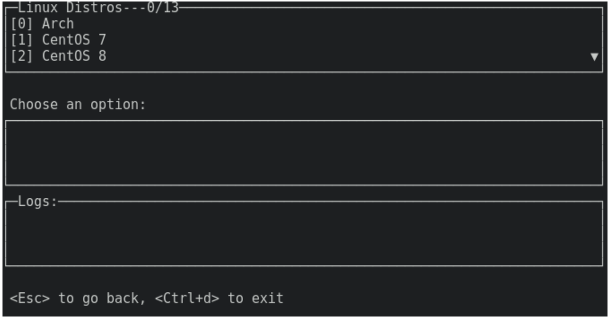
How it started - how it’s going

webboot was started and further developed by interns at Google

before: CLI

```
dhclient -ipv6=false
webboot tinycore
```

after: TUI



```
┌Linux Distros---0/13──────────────────────────────
[0] Arch
[1] CentOS 7
[2] CentOS 8                                      ▼

Choose an option:

┌Logs:─────────────────────────────────────────────

<Esc> to go back, <Ctrl+d> to exit
```

By now, ISOs are cached instead of downloading every single time, which is just slow and not necessary if storage is available.

pmem is nice, but

https://docs.pmem.io/persistent-memory/getting-started-guide/creating-development-environments/virtualization/qemu

- first concept with `pmem` driver (persistent aka non-volatile memory)
    - requires *contiguous* memory, problematic across devices
    - requires target distro to include pmem driver, not always available
    - PMEM *must* be less than RAM so the system has memory to work with

```
qemu-system-x86_64 \
  -machine q35 -m 4G -serial stdio \
  -object rng-random,filename=/dev/urandom,id=rng0 \
  -device virtio-rng-pci,rng=rng0 \
  -netdev user,id=network0 -device rtl8139,netdev=network0 \
  -kernel $KERNEL -initrd $INITRD \
  -append "console=ttyS0 vga=786 memmap=$PMEM_OFFSET!$PMEM_SIZE"
```

Running From USB Storage

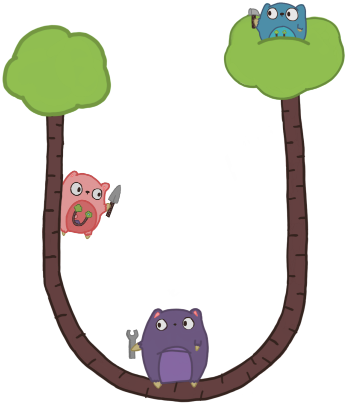
Build initramfs with u-root

u-root is an initramfs cpio generator written in Go, including BusyBox-like tooling and commands like `cat`.

building

From the webboot source directory:

```
export GO111MODULE=off
go get github.com/u-root/u-root
go run .
```



Legacy BIOS (MBR, UEFI CSM)

With syslinux, you can use webboot from a USB stick.

1. Build u-root with webboot as an additional command
2. Write a Volume Boot Record (VBR) to the stick
3. Write a Master Boot Record (MBR) to it
4. Mark the first partition as bootable
5. Copy the example syslinux config file, Linux kernel, and u-root initcpio

See the README at github.com/u-root/webboot for details.

Thanks! :)