Creating real-time audio appliances with Debian GNU/Linux

Latest update: May 30th 2018.

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How to create real-time audio appliances with Debian GNU/Linux
https://github.com/64studio/lac-2018

Who we are!

- Daniel James and Free Ekanayaka started 64 Studio Ltd in 2005
- 64 Studio GNU/Linux distribution released in 2006
- Chris Obbard joined in 2008, with ‘work experience’
- Client work on custom GNU/Linux distributions
- Lots of work on in-house software tools

What do we do?

- Create custom GNU/Linux Distributions for media projects
- Usually AMD64 PC, ARM dev-board or custom board
- Embedded Linux development: custom board drivers, board support
- Board bring-up & hardware design: sound-cards, audio amplifiers
- Maintain minimal Linux base distros
- Future IoT prototypes: WiFi, Bluetooth etc
- Our own products: PiDeck, Plegger

Why create your own distro?

- ARM boards are supplied with *general-purpose* distros to evaluate systems
- ... but they contain a lot of useless software & bloat!
- Support for Raspberry Pi 3B/3B+, Compute Modules, Zero etc
- Support for BeagleBone (thanks HörTech gGmbH!)
- Future support for Allwinner (Orange Pi, Banana Pi etc. linux-sunxi)
- Concentrate on the important part... Your project!

What is a GNU/Linux Distribution?

- A collection of software packages
- But also a collection of like-minded developers
- Each distribution has different common goals
- Some goals may be financial, others social
- Debian/Ubuntu uses dpkg/apt
- Red Hat/Fedora uses rpm/yum

Yocto & Buildroot

- Tools to create totally custom GNU/Linux Distributions for embedded
- Fancy *menuconfig* interface
- All packages are re-compiled on your machine each time changes are made
- Industry-standard software, lots of supported boards
- No simple update facility, flash memory has to be over-written
- Can generate some very nice minimal images!
- Not always suitable for our needs, though...

But we need middle-ground!

- Most ARM boards now have a lot of CPU & very low audio latency, so we don't need a teeny-tiny system
- Start from a known-base and add packages (distro in ~0.5hr)
- Clients & ourselves already used to Debian/Ubuntu
- Package manager, loads of extra software & easy updates
- Great community, many tutorials, easy getting started
- We can trade off some bogomips for this...

Debian Advantages

- Widely used by individuals and companies (DistroWatch 3rd)
- Stability is maintained by passionate users
- Remarkable package QA & mailing list support
- Over 51,000 different pieces of multi-arch Free Software
- No one company leading the development & very free
- Signed packages: apt update || apt install firefox

Debian Disadvantages

- Only caters for systemd with glibc
- Designed with desktop/server use in mind, not embedded
- Conservative of very new versions of packages & technologies
- Limited paid security support
- Slow release cycle (not always bad!)

Platform Development Kit (PDK)

- Software created by Progeny Linux Systems in 2005
- Distributions are built up of modular “components”
- Pull ready-tested components from us
- Packages may come from multiple sources
- Integrated GIT Version Control
- Originally created APT repos & ISO images
- Now also creates fully-custom images for ARM boards!

Installation

- We recommend you install PDK on a Debian Stretch VM
- We use DigitalOcean 2 vCPU, 4GB RAM ($40/mo)
- Follow instructions:-
  - https://github.com/64studio/lac-2018/

Workshop: Pideck

- A fun project with serious real-time performance
- DJ'ing is latency-sensitive and a good test case
- Buffers of 3ms are possible on 'pocket money' hardware: #realtime4all
- Follow instructions:-
  - https://github.com/64studio/lac-2018/

Questions!

Please open Github issues for feedback!

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