ELCE 2018 Review

Tim Bird - Senior Staff Software Engineer

Frank Rowand - Senior Staff Software Engineer

Sony Electronics

Who Am I?

- Sr. Staff Software Engineer at Sony Electronics
- Architecture Group Chair of the CE Workgroup at the Linux Foundation
- Creator and organizer of Embedded Linux Conference (started in 2005)
  - Chair of the Program Committee
- Worked at Sony Electronics, Sony Corporate, and Sony Mobile for 15 years
- Member of Linux Foundation Technical Advisory Board
- Have been working with Linux for 26 years
- E-mail: tim.bird@sony.com

Who Am I?

- Sr. Staff Software Engineer at Sony Electronics
- Open Source Software (OSS) advocate and resource
- Linux kernel maintainer of device tree (one of two)
- Previously contributor to Linux PREEMPT-RT
- Early engineer at MontaVista, pioneering embedded Linux company
- Previously at Hewlett Packard
  - Linux
  - HP-UX
  - HP-RT
  - NeXTSTEP on PA-RISC
  - MPE

SONY

Agenda

- Embedded Linux Conference 2018 overview
- Detailed session reports
- Observations on some topic areas
- Automated Testing Summit mini-report
- Resources

SONY

ELCE Overview

Event overview

- “Hot” topic areas this time
- Sony involvement in ELCE
- Technical showcase

SONY

ELCE 2018 Overview

- Edinburgh, Scotland, October 22-24
- Co-located with Open Source Summit Europe and Open IOT Summit Europe
  - Lots of smaller events as well (Security summit, KVM forum, Linux Kernel Maintainers Summit, etc.)
- About 2000 attendees, 800 of which were there for ELCE
- Almost all ELCE sessions were recorded and are available on YouTube.
  - See https://elinux.org/ELC_Europe_2018_Presentations

SONY


ERNATIONAL
CENTRE


EDINBURGH INTERNATIONAL
CONFERENCE CENTRE

“Hot” topic areas this time

- Lots of different sessions:
  - 58 sessions and BOFS
- Hot topics:
  - Linux kernel driver and development issues (as usual)
    - Camera, Audio
  - Yocto Project
  - Realtime
  - Testing
  - Security
  - Networking
  - AI and deep learning (only 2 talks, but interesting new topic)

Topic Areas (partial list)

AI
Audio
Automotive
Blockchain
Bluetooth
Board Farm
BoF
Boot time
BPF
Buildroot
Containers
CVE process
Debian
Debugging
Deep learning
Devicetree
DMA
Driver Model
Drivers
eBPF
Gentoo
Graphics
I2C
Image builder / installer
Image sensors, Cameras
Industrial IO (IIO)
IoT
IoT data
IoT edge platform
LF project
Linux dev process
live patch
Networking
OpenCV
open firmware
Performance
Power Management
PWM
RISC-V
RTOS
Safety Critical
Security
SIL2LinuxMP
size reduction
Smart Speakers
Soundwire
Submitting patches
Test
Tools
Update Tools
User space driver
Video4Linux
Yocto
Zephyr

Sony Involvement

- Program Committee: Tim Bird, Frank Rowand
- Presentation: Frank Rowand, "BoF: Devicetree"
- Closing game: Tim Bird, Frank Rowand
- Technical Showcase:
  - Paul Jones (Sony Europe Limited)
  - Masayuki Yamamoto (Sony Semiconductor Solutions Corporation)
  - TV tuner CXD2880 SPI I/F support in DVB-API
  - (tuner card for Raspberry Pi)

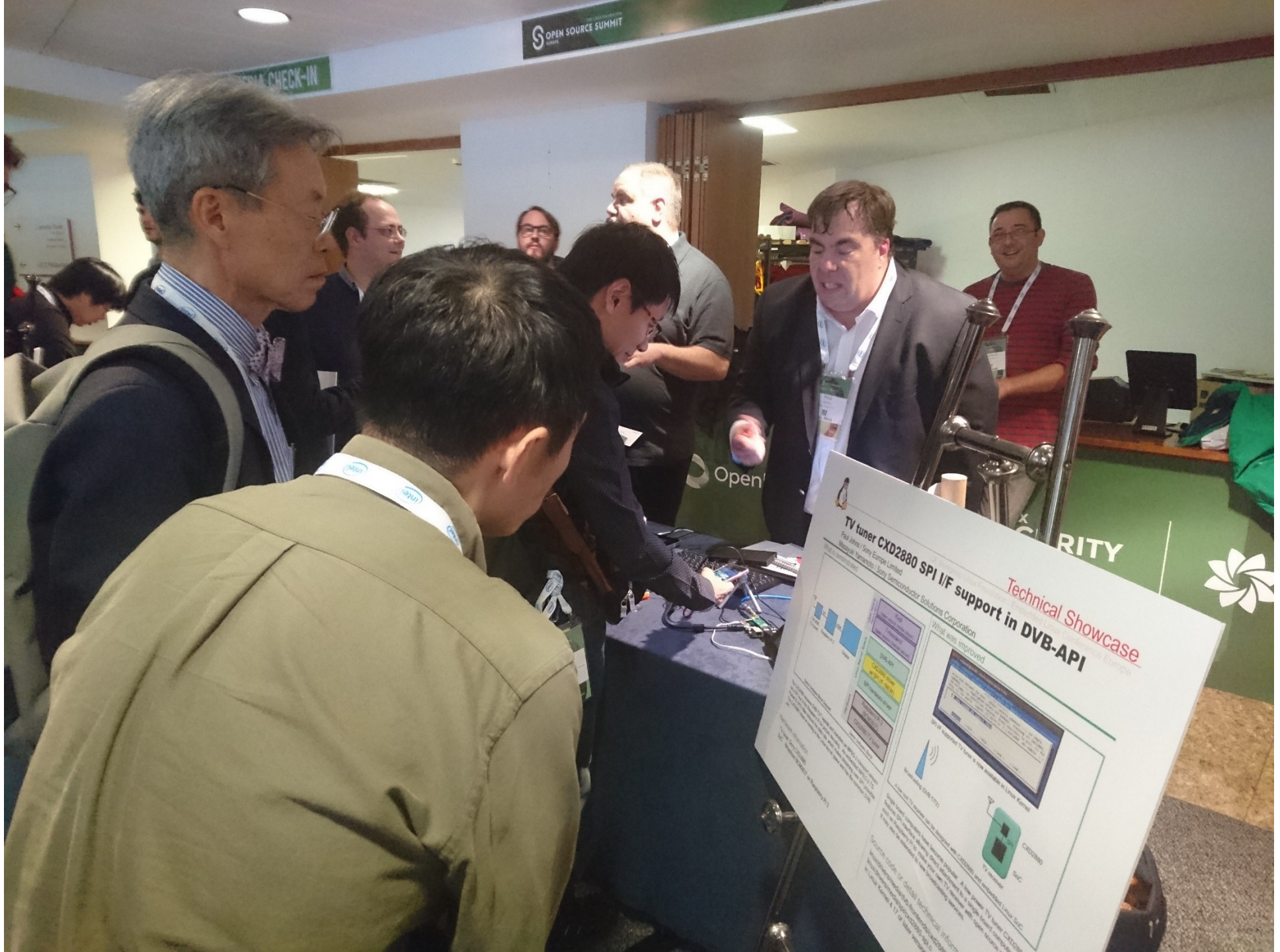
SONY

Sony Related Announcements at ELCE

- Sony Pictures Entertainment joins recently created Linux Foundation ASWF project
  - Academy Software Foundation
  - Focused on movie creation tools and technology

SONY

Technical Showcase


OPEN SOURCE SUMMIT
TV tuner CXD2880 SPI I/F support in DVB-API
Technical Showcase

SONY

SONY

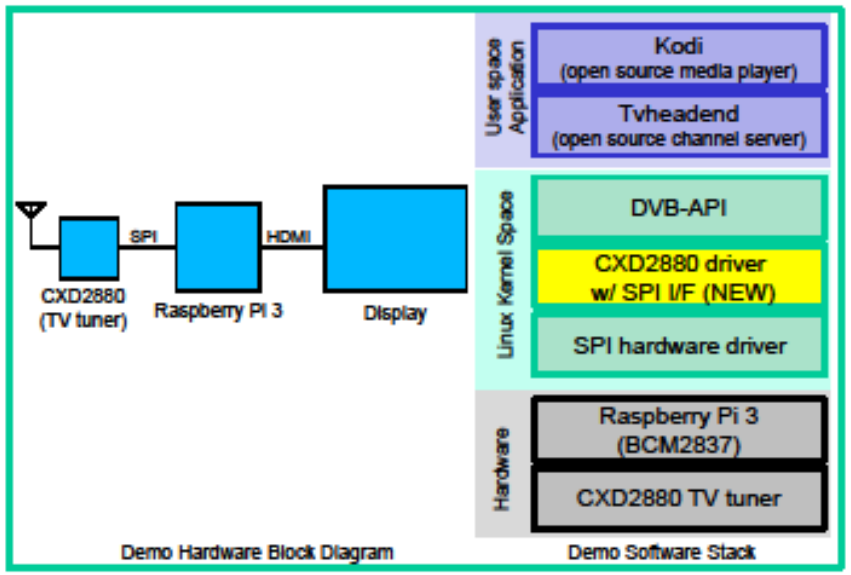
Technical Showcase

CE Workgroup Linux Foundation / Embedded Linux Conference Europe

TV tuner CXD2880 SPI I/F support in DVB-API

Paul Johns / Sony Europe Limited
Masayuki Yamamoto / Sony Semiconductor Solutions Corporation

What is demonstrated

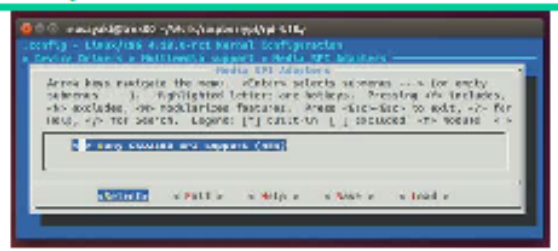


The CXD2880 receives DVB-T2/T signals and transfers an MPEG-2 transport stream via a SPI bus to the Raspberry Pi for picture decoding. An embedded MPEG-2 TS Packet ID (PID) filter reduces the data rate, which makes streaming over SPI possible. The CXD2880 driver is running in the Linux kernel space and has the common DVB API.

Hardware Information

TV tuner: Sony CXD2880
SoC: Broadcom BCM2837 on Raspberry Pi 3

What was improved



SPI I/F supported TV tuner is now available in Linux Kernel

A low cost TV receiver can be designed with CXD2880 and embedded Linux SoC.

Single board computers have become popular. A low power TV tuner CXD2880 features SPI interface allowing direct attachment to a single board computer such as Raspberry Pi to make your own TV receiver with open source software. It may also be extended to new broadcasting services.

Source code or detail technical information availability

linux/drivers/media/dvb-frontends/cxd2880/
linux/drivers/media/spi/cxd2880-spi.c
In Linux Kernel 4.17 or later versions

Tim’s session report

Sessions Tim Saw

- Monday Keynotes – Jon Corbet
- Debos – Ana Guerrero
- Testing primer – Jan Simon
- CVE tracking – David Reyna
- Embedded Update tools – Jan Lubbe
- Grabbing AV in a board farm – Krysztof Opasiak
- Gaining Maturity in Open Source – Carl-Eric Mols (Sony Mobile)
- Teaching your test framework to speak Lava – Tim Orling
- Real-time testing with Fuego – Hirotaka Motai
- Year 2038 – Arnd Bergmann
- Poky-tiny – Alejandro Hernandez
- Closing Game
- Notes about private meetings

Monday Keynotes – Jon Corbet

- Commentary on Meltdown and Spectre
  - From a kernel process perspective
- Discussion of long-term stable model
- BPF explanations
- Good comments on recent Code of Conduct issue
  - Is part of ongoing maturing of development community
  - Goal is to have fun

SONY

Debos – Ana Guerrero

- Debos = tool for creating Debian images
- Can create images for lots of different architectures
- Creates images from base platforms, and set of binary packages
- Uses “fakemachine” and qemu for architectures different than the host
  - Also, for regular users to get root permissions needed to build image
- Interesting system, with recipes for some common boards

SONY

Testing primer – Jan Simon

- Good overview of Fuego, ptest, Lava, kernelci, labgrid, r4d
- Useful because it shows the pros and cons for each system
  - From perspective of AGL testing
- Fuego pros and cons:
  - (pro) lots of pre-packaged tests
  - (pro) low requirements on target
  - (pro) includes results parsers
  - (con) requires local ssh access to board
  - (con) assumes board is already installed and running (no provisioning)
  - (con) doesn't support board scheduling
- Very handy as maintainer to get other’s perceptions of project

CVE tracking

- by David Reyna
- Presented issues with tracking CVEs and doing security response
- Introduced new tool “SRTool” (Security Response Tool)
  - address pain points and inefficiencies in CVE handling
  - implement best practices
- Automate CVE source updates and other aspects of CVE handling
- Use for guided triage of incoming CVE

Embedded Update tools – Jan Lubbe

- Decent discussion (BOF) about issues with embedded Linux update systems
- See discussion notes at:
  - https://gist.github.com/jluebbe/d27b2289208791f3805adf69a0dac482
- Top discussion items:
  - Migrating user data across system updates
  - Alternatives to A/B updates for constrained systems
  - Detecting a successful update
  - Delta updates for bandwidth-constrained devices
    - open-vcdiff, rsync, casync, etc.

Grabbing AV in a board farm – Krysztof Opasiak

- by Krysztof Opasiak
- Uses cheap ($30) video/wifi transfer board (commodity) to capture HDMI output from board
- In order to have video start on DUT, you have to spoof some HDMI values
  - MuxPi did this
  - Something to do with HDMI EDID? - screen resolution
- There's an open hardware board to do HDMI multi-video capture, but it's expensive ($430).
  - Would like to see it simplified (by some hardware guru, presumably)

Gaining Maturity in Open Source

SONY

- By Carl-Eric Mols (Sony Mobile)
- (Not an ELCE talk – no video recording or slides)
  - But can probably ask Carl-Eric for them
- Description of different levels of corporate handling of OSS
- There are lots of discrete areas of OSS handling
- Provided interesting case studies for a few areas
  - What is required for “minimal” handling
  - What is required for mature handling

SONY

Teaching your test framework to speak Lava

- by Tim Orling
- Interesting idea to instrument other test frameworks test output
- Add a small amount of code so that LAVA can detect:
  - testcase boundaries
  - results
  - measurements
- Goal is to push upstream, so common results parsing is possible
- Projects instrumented:
  - pytest, bats (bash automated testing system), ptest

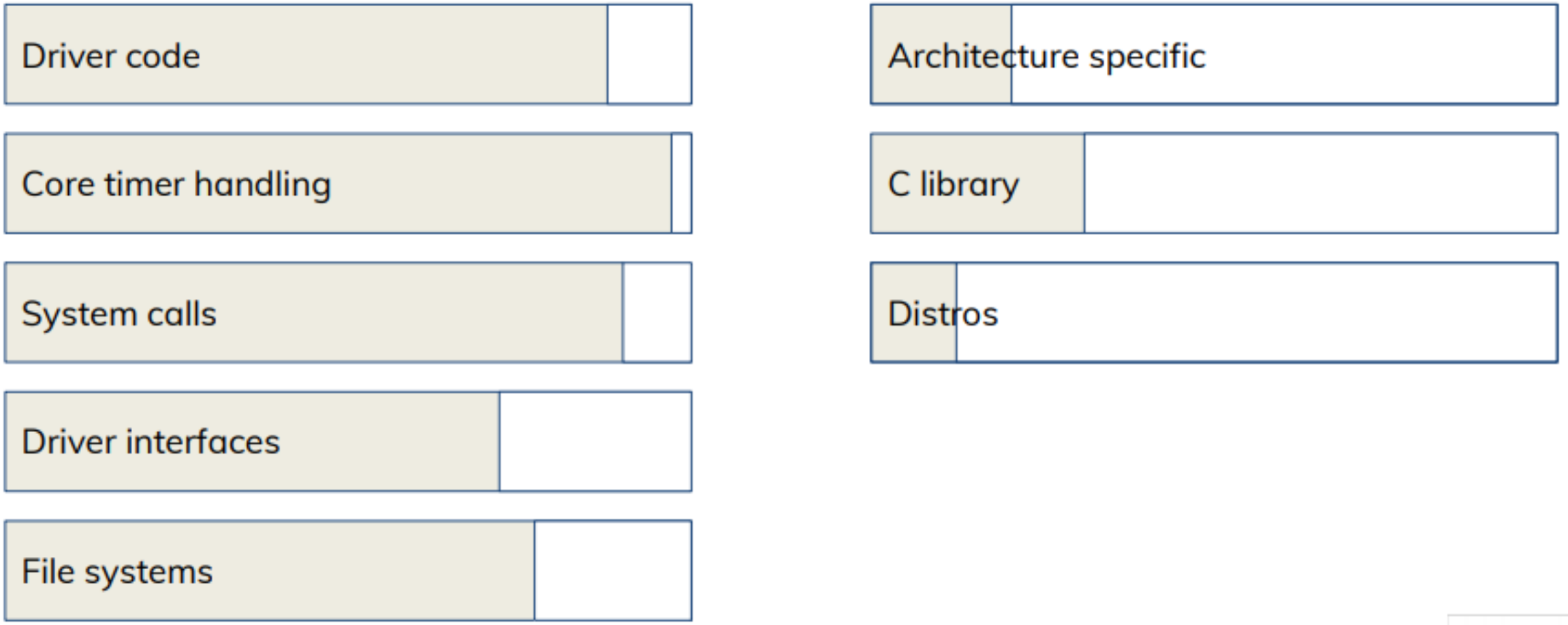
Real-time testing with Fuego – Hirotaka Motai

- by Hirotaka Motai
- Had a good overview diagram for Fuego (diagram)
- Added ftrace capture during cyclictest test.
- Easy to identify latency problem in graph of results.
- Made modifications to cyclictest for not exiting when breakout value was detected.
  - Will try to push upstream
  - But can send them to Fuego until they are accepted
- Used ftrace snapshot mode
- (Note to self) Would be a good candidate as a model for a generic Fuego monitoring feature.

Year 2038

- by Arnd Bergmann
- Review of status of year 2038 fixes in the kernel (and distros)
- Expect to finish kernel changes by mid-2019
- Still have lots of work left on distros (see next slide)

Progress bar, v4.19

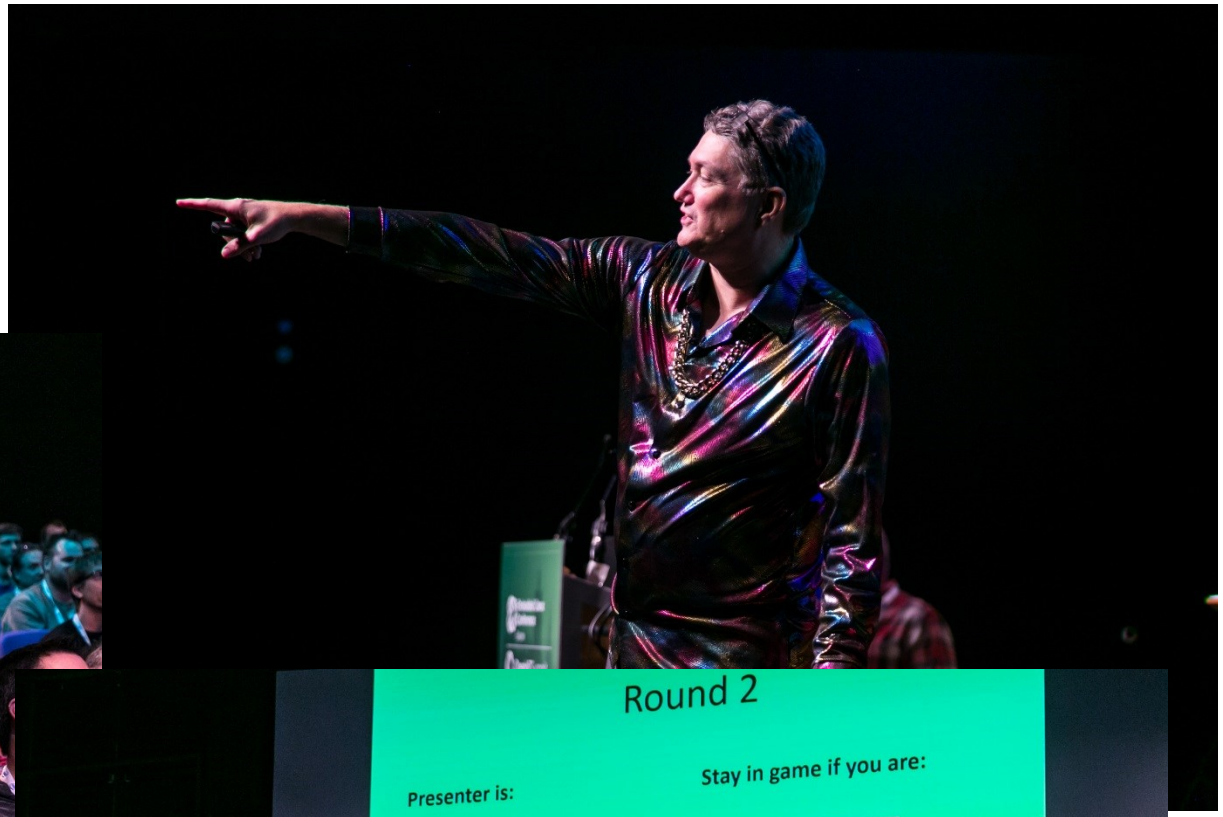


SONY

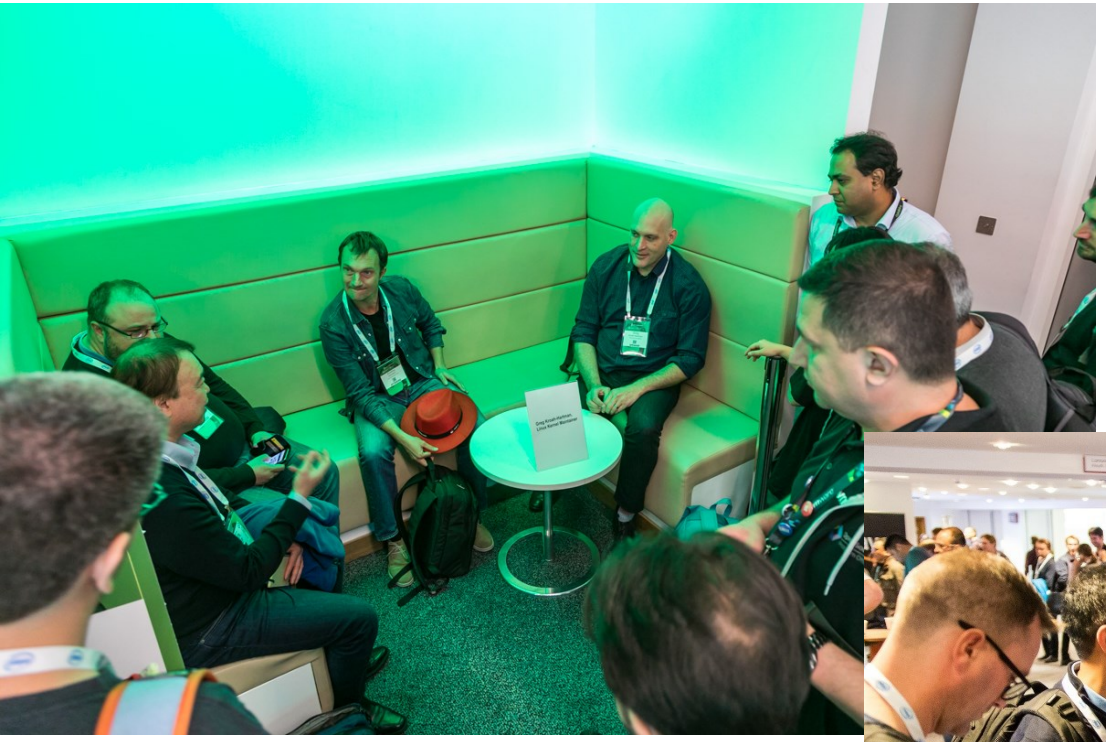
Using Poky-tiny to create your own tiny distro

- by Alejandro Hernandez
- Reviewed poky-tiny features and sizes
- Updated with information about poky-tiny (for 2018)
- How to use bootchart2
- Petalinux = Xilinx Linux distro with tools for their customers
- How to apply poky-tiny principles to create:
  - petalinux-image-minimal from petalinux-image-full
  - Going from:
    - 28MB system with 42 second boot time, to
    - 7MB system with 4 second boot time

Closing Game



“Hallway track” – private meetings



Notes about Private meetings

- Had lots of private meetings and hallway conversations
- Sony people: TV, HQ OSS, Sony Mobile, Tuner hardware developer
- Linux Foundation people:
  - Event staff (for future events)
  - Jim Zemlin (LF Executive Director)
- TAB members:
  - Greg Kroah-Hartman, Steve Rostedt, Olof Johansson
- Linux leaders:
  - James Bottomley, Geert Uytterhoeven, Peter Zilstra, David Woodhouse, Pavel Machek

Private meetings aka "Hallway Track"

We highly value the hallway track, but often do not explain it very well

- Some people spend the majority of their time in the hallway track
- Highly dependent on who is at conference
  - Kernel Maintainers Summit implies some key maintainers
  - ELCE (and ELC) implies embedded developers, partners, vendors
    - kernel, tools, bootloaders, firmware, hardware, etc -- highly technical
  - Plumbers implies broad representation of technical areas and projects
  - OSS (NA, Japan, Europe) tends to be higher level, business, sysadmin, etc

SONY

Private meetings aka "Hallway Track"

- Methods to determine who will be at conference
  - Conference reputation (list on previous slide)
  - Co-located conferences
  - Look at speakers on the schedule when it is announced
  - Watch project mail lists for announcements of mini-conferences, summits, etc
  - Personal communication

Private meetings aka "Hallway Track"

- You may be able to take advantage of the hallway track even if you are not attending the conference
  - Contact people well before the conference to schedule a meeting on a day before or after the conference
    - People often make travel plans well in advance of the conference
  - Arrange a nearby meeting during the conference
    - The Sony Semiconductor team that wrote the driver for the Raspberry pi TV tuner card arranged to meet the media subsystem maintainer in a coffee shop during OSS Japan
  - A few of the OSS Japan attendees may also attend a Japan Technical Jamboree that is often soon after OSS Japan

Frank’s session report

SONY

Gaining momentum

- Using Linux in safety critical systems
  - Nicholas Mcguire | Building Safe Systems with Linux
  - Lukas Bulwahn | Collaborate on Linux for Use in Safety-Critical Systems?
  - Anas Nashif | Developing Open-Source Software RTOS with Functional Safety in Mind
- Deep Learning / AI
  - Andrea Gallo | Deep Learning Neural Network Acceleration at the Edge
  - Wu Zhiwen (Alex Wu) | Deep Learning in OpenCV

New protocol and subsystem

- Vinod Koul | Introduction to SoundWire

Good Advice

- Marc Zyngier | Getting Your Patches in Mainline Linux: What Not To Do (and a Few Things You Could Try Instead)

SONY

A different perspective on data visualization

- Dawn Foster | Kernel Mailing List Collaboration

OSS Europe (not ELCE), but I always find that her data visualization techniques inspire my creativity.

I recommend following the link from her slides to her blog. And talks at previous Linux Foundation conferences.

SONY

Automated Testing Summit mini-report

SONY

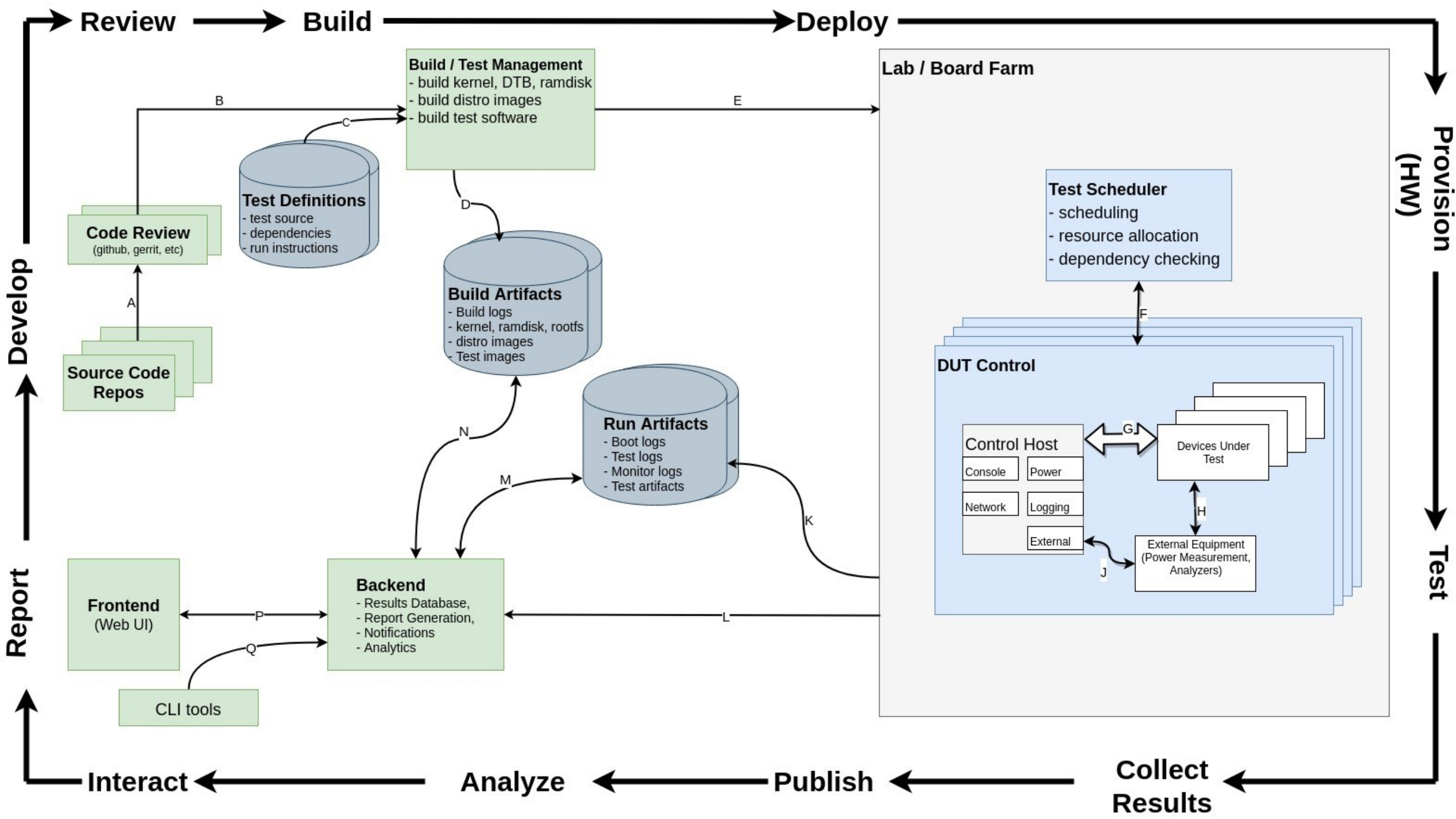
Automated Testing Summit 2018

- Private summit for Automated Testing system architects
  - https://elinux.org/Automated_Testing_Summit
- Organized by
  - Tim Bird (Sony, representing Fuego project)
  - Kevin Hilman (BayLibre, representing kernelCI project)
- About 40 attendees
- Test Stack Survey (preceding the summit)
  - see https://elinux.org/Test_Stack_Survey
  - Responses for 21 automated test systems (or major test efforts)

SONY

Agenda for summit

- Vision and problem definition
- Common glossary and diagram of Continuous Integration loop
- Specific stack parts:
  - Test definition
  - Build artifacts
  - Test Execution API
  - Run artifacts
    - Results format
    - Test log parser mechanisms
  - Board farm standards
- Wrap-up


Review
Build
Deploy
Provision (HW)
Test
Collect Results
Publish
Analyze
Interact
Report
Develop
Build / Test Management
- build kernel, DTB, ramdisk
- build distro images
- build test software
Test Definitions
- test source
- dependencies
- run instructions
Code Review
(github, gerrit, etc)
Source Code Repos
Build Artifacts
- Build logs
- kernel, ramdisk, rootfs
- distro images
- Test images
Run Artifacts
- Boot logs
- Test logs
- Monitor logs
- Test artifacts
Lab / Board Farm
Test Scheduler
- scheduling
- resource allocation
- dependency checking
DUT Control
Control Host
Console
Power
Network
Logging
External
Devices Under Test
External Equipment (Power Measurement, Analyzers)
Backend
- Results Database,
- Report Generation,
- Notifications
- Analytics
Frontend
(Web UI)
CLI tools
A
B
C
D
E
F
G
H
J
K
L
M
N
P
Q

Decisions and ongoing discussion

- Start with pdudaemon as first DUT control API consolidation point
- Continue to use automated-testing@yoctoproject.org as mail list for discussions
- Use elinux wiki for documents and standards
  - See https://elinux.org/Automated_Testing
- Arrange next face-to-face meetings at ELC Europe 2019 (Lyon France)
  - to include open sessions
- Minutes from ATS are available:
  - https://elinux.org/ATS_2018_Minutes

SONY

Resources

ELCE 2018 resources

- eLinux wiki – ELCE 2018 slides and videos
  - https://elinux.org/ELC_Europe_2018_Presentations
- eLinux wiki – ELCE 2018 Technical Showcase posters
  - https://elinux.org/ELC_Europe_2018_Presentations#Technical_Showcase_Posters
- LF playlist of ELCE 2018 (includes some keynotes not on wiki)
  - https://www.youtube.com/watch?v=f4dlFMxmYgo&list=PLbzoR-pLrL6qThA7SAbhVfuMbjZsJX1CY
- Previous ELC, ELCE, and Japan Jamborees
  - https://elinux.org/ELC_Presentations

Questions and Answers

SONY

Thanks!

SONY