Some challenges for the plumbing community

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We're doing great

Linux is everywhere

The code is advancing quickly

Our community is healthy
Boring
If we have problems...

...they are high quality problems
Security
Stuxnet
Stuxnet

RSA
The bad guys are out there

They are:
- motivated
- capable
- well funded
It's not script kiddies anymore
It's not just about money anymore

lives are at stake.
We're on the front line
We are plumbers!

Our pipes cannot leak.
Is your code secure?

Who reviews it?
What sort of testing do you do?
What are your plans for dealing with vulnerabilities?
Is your infrastructure secure?

Who has access to the systems?
Who can change files?
Are security updates being applied?
What is your plan in case of a breach?
Are your processes secure?

Who can commit code?
What do they know about that code's provenance?
Who can sign releases?
Can you detect tampering?
Be careful out there
Plumbers need good tools!
Computers can be really good at finding bugs
Lockdep
Valgrind
Fault injection
Sparse
Smatch
...

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But we could use more!
Plumbers need good tools!

...and they need to actually use them
Hardware
Hardware complexity

...leads to software complexity

Asymmetric multiprocessing!

Thus:

- Memory management concerns
- Exposing independent processors to user space
- Complex power management
Complex interfaces

Example: V4L2 media controller interface
Control over our hardware

Life is relatively good
but it could get better (or worse)
Influence over hardware

Are the manufacturers listening to us?
Linux-based devices are great

Hackable Linux-based devices are even better

But...
How can we be more involved in the conception and design of those devices in the first place?
Linux only
Linux only

All the world is a...
VAX
Linux only

All the world is a...
  ∀AX
SunOS box
Linux only

All the world is a...

☑ VAX
☑ SunOS box

Eight-bit pseudocolor frame buffer
Linux only

All the world is a...
  VAX
  SunOS box
  Eight-bit pseudocolor frame buffer
  32-bit little-endian CPU
Linux only

All the world is a...

VAX
SunOS box
Eight-bit pseudocolor frame buffer
32-bit little-endian CPU
POSIX-compatible OS

...

Linux box?
Once upon a time

We depended heavily on portability
Three years ago

The DRM tree deemphasized BSD support

This hurt BSD, but...
Three years ago

The DRM tree deemphasized BSD support

This hurt BSD, but...
  ...would we rather do without kernel mode setting?
Linux-only may be inevitable

...but let's try not to forget our roots
The platform problem
The platform problem

Code you control

Black-box platform
Examples

The kernel's ARM subtree
XFree86
Opportunistic suspend
Asynchronous I/O
...

The costs

Duplicated code
Inefficient solutions
Bugs
The cost: lost opportunities

With a wider view we get:
  More comprehensive solutions to problems
  Better abstractions
  More eyes on the code
  More well-rounded developers
Examples

mac80211
Examples

PowerTop
Examples

Bufferbloat
Unified memory management
GPU API
Holistic power management
Control groups
...

“Kernel cgroups only go so far. To provide the user-visible semantics that we want, we are forced to implement a large amount of control code in user space.”
In summary

We have built a free operating system
In summary

There are no immutable platforms
LPC is an ideal setting in which to address the platform problem.
Let's do it!

(Questions?)