Genode on the PinePhone
on track to real-world usability
FOSDEM 2024

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1. What happened so far?

2. Enjoyable user-developer interplay

3. Power management via pluggable drivers

4. Goa SDK

5. What’s next?
1. What happened so far?
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5. What's next?
Background

- **2003** Vision of a truly trustworthy operating system
  - least privilege ★ capability-based ★ microkernel ★ virtualization

- **2006** First prototype

- **2008** Bootstrapped company Genode Labs in Dresden/Germany
  - contract work ★ dual licensing ★ support

- **2018** First version of Genode-based Sculpt OS for PCs

- **2021** First baby steps of Sculpt OS on the PinePhone
Genode-based Sculpt OS

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Recap of last year

Quick walk through the UI
1. What happened so far?

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5. What's next?
Interplay between user and OS developer

User → Developer

feedback

Developer → System image

install

System image → User

publish
Interplay between user and OS developer

User

Developer

System image

feedback

install

publish

Trust? Regression? Effort?

Labour? Build time? Hosting costs?
Interplay between user and OS developer

- User
  - Instant rollback
  - Transparency
  - Matter of seconds

- Developer
  - 5-20 sec test cycle (laptop)
  - 3 min (incremental)
  - 30 min (full release)
  - 16 MiB
  - Integrity-protected

- System image
- feedback
- install
- publish

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System update live demo
Outline

1. What happened so far?

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5. What’s next?
Traditional layered architecture

- Application Processor
- System-Control Processor
- Trustzone secure world
- User space
- Kernel
- Display server
- Mbox
- Shm
- PMIC
- Voltages
- Battery
- Power button
- Input driver
- Display driver
- RSB driver
- CCU driver
- ATF
- System-Control Processor
- Load
- Genode on the PinePhone on track to real-world usability
Genode’s component architecture

Power draw ≈ 2.5 W
Genode’s component architecture

Power draw ≈ 1 W
Live sleeping demo
1. What happened so far?

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5. What’s next?
Developer concerns

- Importing
- Patching
- Development
- Integration
- Testing
- Debugging
- Packaging
- Publishing

Tools:
- git
- svn
- tar archives
- zip archives

- make
- autoconf
- cmake
- qmake
- cargo
- config?
- dependencies?
- test env?

- versioning
- assembling
- archiving
- signing
Goa - goal, but reached a little bit sooner

$ goa import
$ goa run
$ goa export
$ goa publish

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Goa live demo
Linphone as a sophisticated showcase

Sculpt OS Base System

Linphone App

Linphone Daemon

Dynamic chroot

Touch keyboard

GPU driver

Audio driver

SNTP

Dynamic chroot

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What’s next?

Today

- Telephony, VoiP
- Mobile data, Wifi
- Package management, system update
- Web browser
- SDK
  - *Qt5*, *Lomiri*, *SDL*, *OpenGL*, *C++*, *Rust*

Road map 2024

Focus on usability

SMS

Pluggable audio driver

Encrypted user profiles

Worthwhile directions?

Community interests?

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Road map 2024
- Focus on usability
- SMS
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Road map 2024
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- SMS
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Worthwhile directions?
Community interests?
Thank you

Genode OS Framework
https://genode.org

Sculpt OS download and manual
https://genode.org/download/sculpt

Genodians.org community blog
https://genodians.org

Goa software development kit
https://github.com/genodelabs/goa

Genode Labs GmbH
https://www.genode-labs.com