Genode OS on the PinePhone
FOSDEM 2023

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Outline

1. Background
2. Smartphones today
3. Genode on the Phone
4. Where we are, where we go

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Genode Labs

Background

- Self-funded company in Dresden / Germany
- Highly *secure operating-system technology*
- Idea in 2003, prototype in 2006, company founded in 2008

Team

- Tight-knit group of 10 people
- Open-source community
- Genodians.org (`https://genodians.org`)

Business model

- Commercial licensing and support
- Contracted research and open-source development

Genode Operating System Framework

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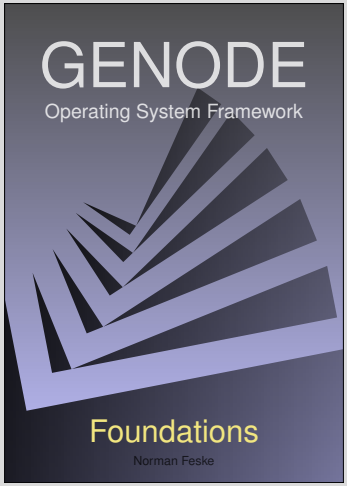
- Construction kit for special-purpose operating systems
- Designed for mixed criticality and dependability
- **Attack surface reduced by 99%**
- Scales from embedded systems to general-purpose computing
- Integration of existing OSes (virtualization)
- Hundreds of ready-to-use components

The Book “Genode Foundations”



https://genode.org/documentation/genode-foundations-22-05.pdf

Genode-based Sculpt OS

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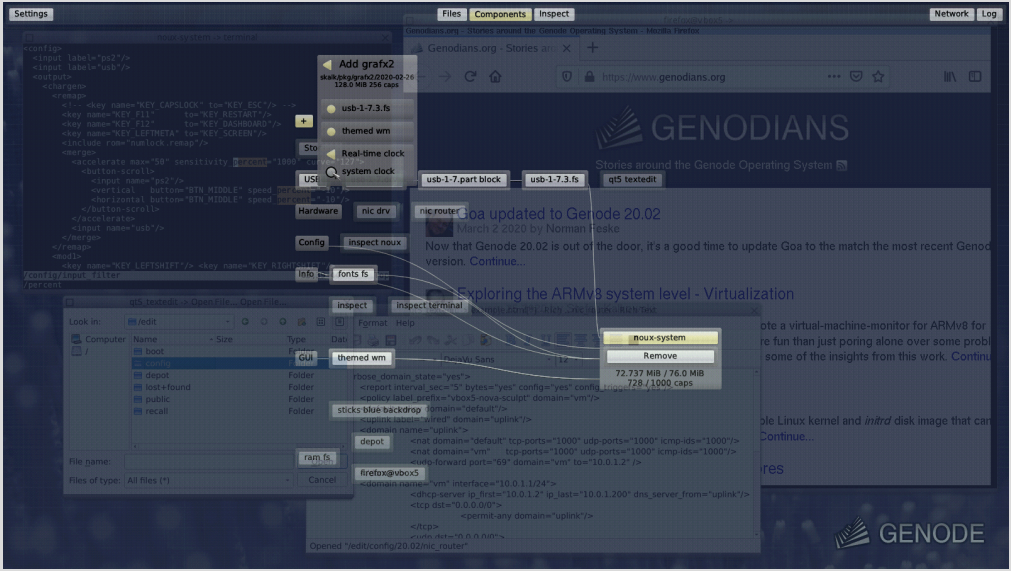

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Smartphones today

Dependency from smartphones is omnipresent.

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Smartphones need constant medication.

Curation of Apps, Security updates, Follow fashion

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Two corporations dominate.

Prospects

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2. Enjoying the utility value of smartphones

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   - Dependability → *no changes without user consent*
   - Dignity → *respect user attention, no Ads, no tracking*
   - Privacy of communications
   - Protection of personal data

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   - Dependability → *no changes without user consent*
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4. Sustainability → *environmental footprint, learned skills*

Open Hardware?

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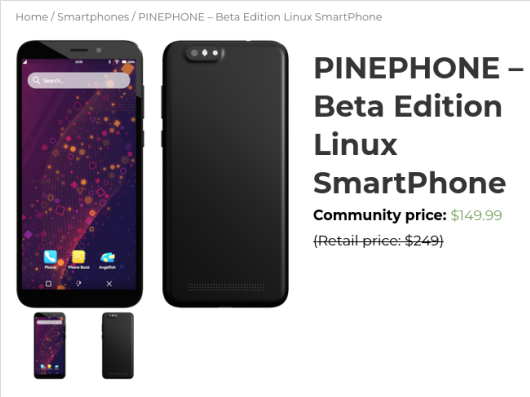
Pinephone by Pine64

- Open-Source-friendly
  (public documentation, schematics)
- Targeting the Linux community
  (mainline kernel, diverse distributions)
- Well-understood 64-bit ARM SoC
- Readily available
  `https://www.pine64.org`



Open Source is not enough

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Complexity defeats autonomy.

Linux distributions are impossible to assess.
We need to be faithful in an incomprehensible software stack.

No cure for security-update treadmill in sight.

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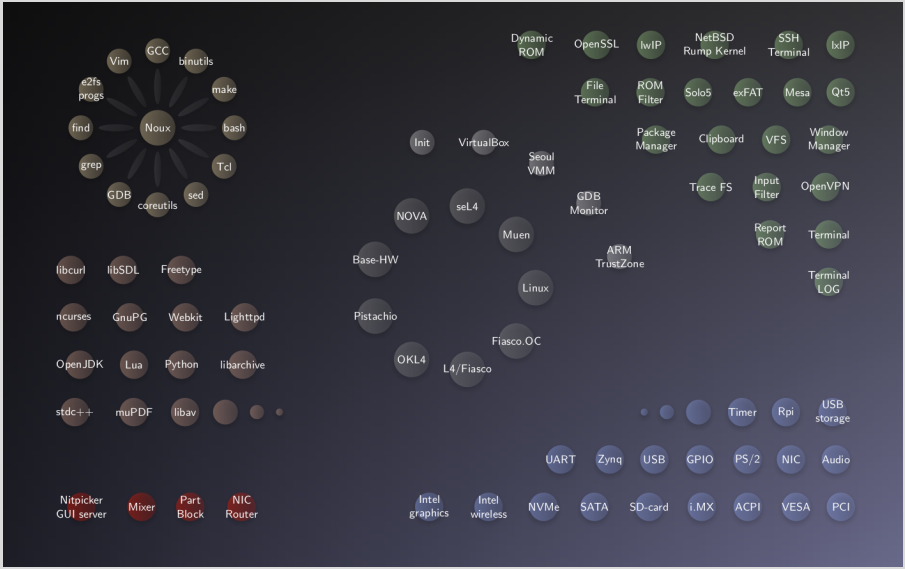
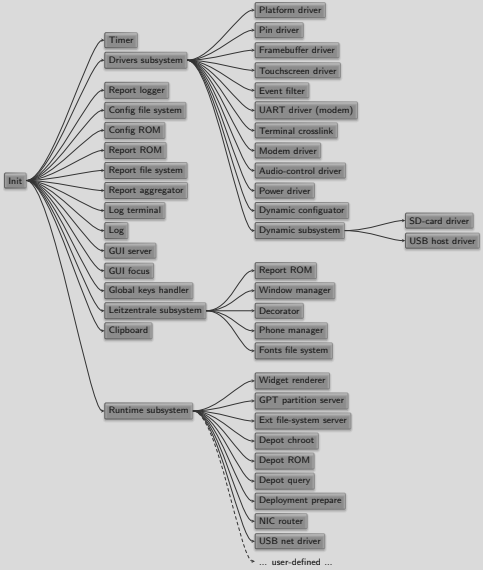


Component-based mobile OS



Mobile user interface

Appliance role

Rich functionality

Mobile user interface

Appliance role

- Clear relation to physical features
- Ultimate control
- Dependability
- Low complexity, low friction
- Fixed function, foster familiarity

Rich functionality

- Expandable
- Rich user experience, great variety
- Updateable, customizable
- High complexity
- Provided by 3rd parties
- May not be trustworthy

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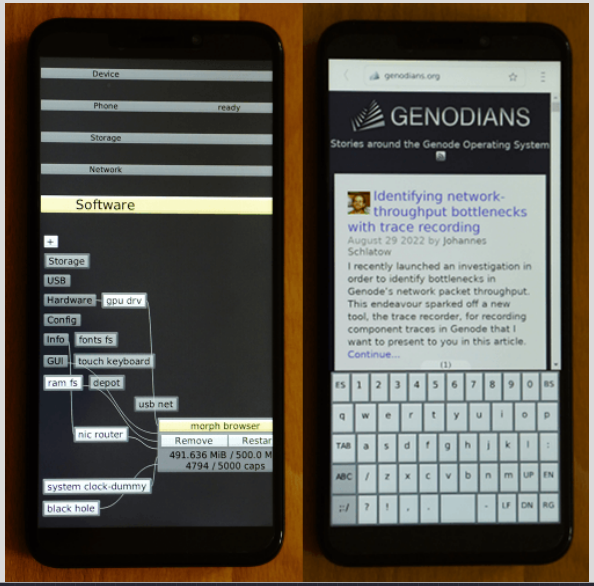
Chasing a compromise between contradicting goals?

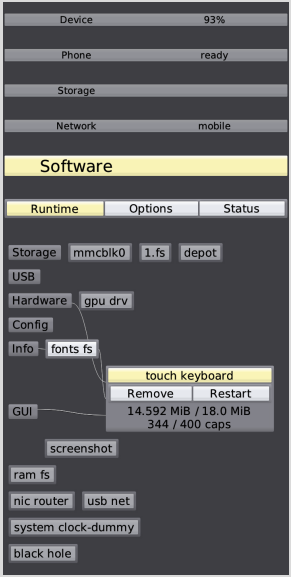
Mobile user interface - Split design



Mobile user interface - Home screen

Mobile user interface - Phone section

Mobile user interface - Software section



Mobile user interface

Live Demo

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Eating our own dog food

Today

- Telephony
- Mobile data connectivity
- Package management, system update
- Device controls
  battery, brightness, volume, mic
- Chromium-based Morph web browser
- Support for POSIX, OpenGL, Qt5

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Immediate steps

- Completion of core phone functionality
- Performance, responsiveness
- Power efficiency, prolonged standby
- Encrypted storage, WireGuard VPN

Later this year

- GPS, Open-Street-Maps client
- Application SDK

First system image for the PinePhone

`https://genodians.org`

Thank you

Genode OS Framework

https://genode.org

Genodians.org community blog

https://genodians.org

Genode Labs GmbH

https://www.genode-labs.com