seL4 Update

Foundation and TS R&D News

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seL4 Foundation Update

4th seL4 Summit: Munich, Oct'22

seL4 SUMMIT

MUNICH 2022

DornerWorks

Bronze sponsor

Horizon Robotics

Bronze sponsor

Xcalibyte

Bronze sponsor

Great success

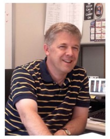
- In Munich, hosted by HENSOLDT Cyber
- 91 attendees
  - 70/70 in-person (38 members, 17 non-members, 7 hobbyists, 8 students)
  - 21 remote
- 2 keynotes, 14 talks, 6 talks+discussions, 3 experience reports, 3 overviews
  1 AMA, 1 Panel,4 BoFs, 6 training/tutorials
- 3 industry sponsors: DornerWorks, Horizon, Xcalibyte

5th seL4 Summit: Minneapolis, Sep’23

seL4 SUMMIT

MINNEAPOLIS 2023

- In Minneapolis, USA
- 19–21 Sep 2023
- High number of proposals received
- Preliminary program out about 22 May


Darren Cofer (co-chair)
Raytheon

Ihor Kuz (co-chair)
Kry10

Perry Alexander
U of Kansas

June Andronick
Proofcraft

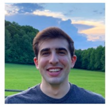
Todd Carpenter
Galois Inc

Alison Felizzi
Kry10

Axel Heider
Hensoldt Cyber

Gernot Heiser
UNSW

Lucy Parker
UNSW


Nick Spinale
Colias Group

Robbie VanVossen
Dornerworks

Martin (NCSC)
NCSC

News

After a year of upheaval and growth, now a year of consolidation

- seL4 Trademark – registered in US and China
- new members: NCSC, LatticeX, Google, SpacemiT, Autoware (and 3 departures)

Community support

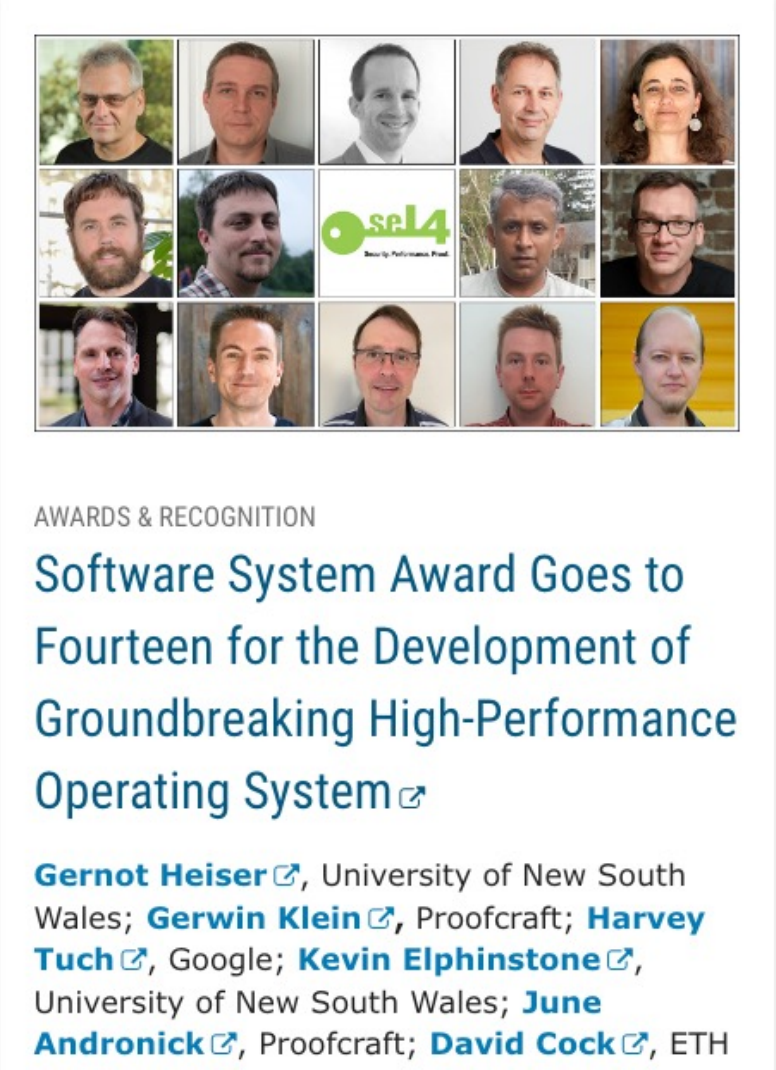
- overhaul of Endorsement scheme: only services
- strategic investment in community support, project seed funding

Technical progress

- new kernel fastpaths: Notification signalling and VM exceptions
- verification of MCS, AArch64 progressing
- on-going work on Rust support
- a number of new platforms supported

And the Most Exciting News is…

seL4 wins the 2022 ACM Software System Award



AWARDS & RECOGNITION

Software System Award Goes to Fourteen for the Development of Groundbreaking High-Performance Operating System

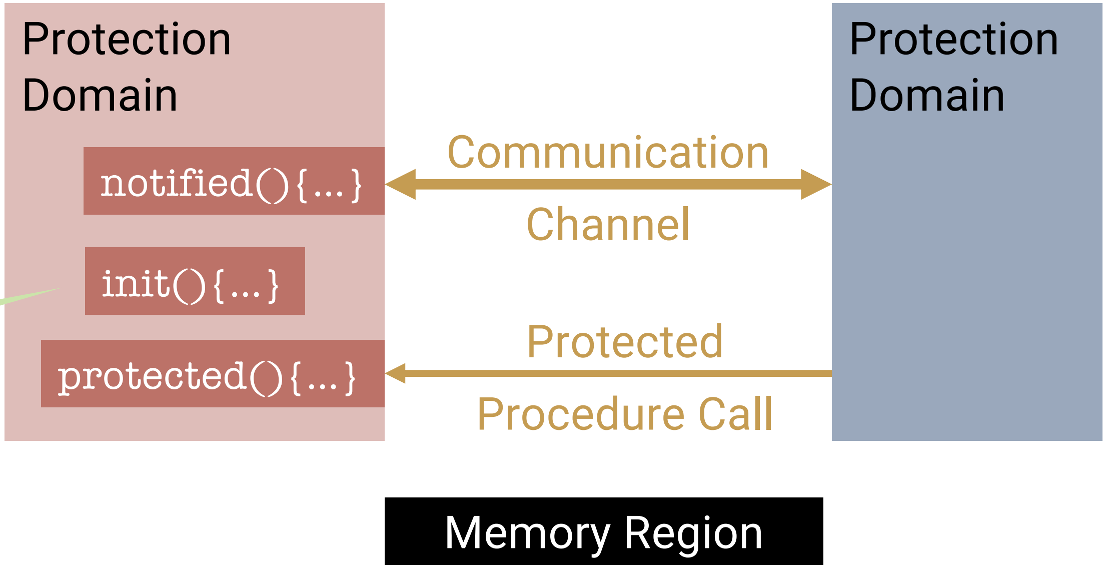
Gernot Heiser, University of New South Wales; **Gerwin Klein**, Proofcraft; **Harvey Tuch**, Google; **Kevin Elphinstone**, University of New South Wales; **June Andronick**, Proofcraft; **David Cock**, ETH

R&D at Trustworthy Systems

OS Framework: seL4 Core Platform

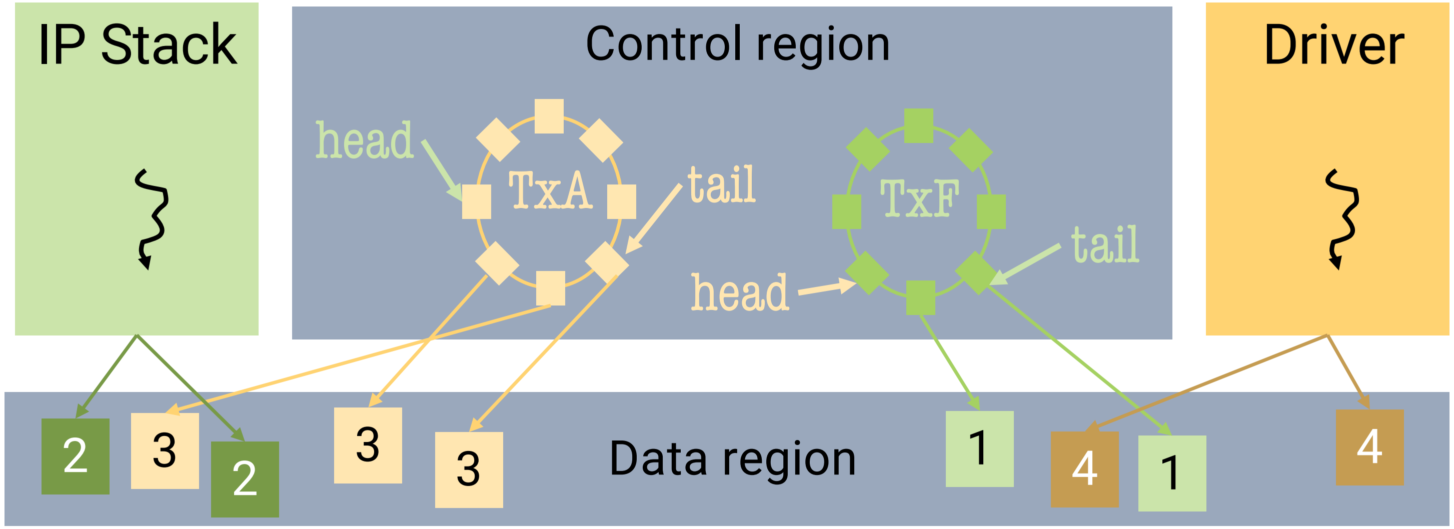
- Thin wrapper of seL4 abstractions
- Encourage "correct" use of seL4
- Software development kit eases development

Simple, event-driven programming model

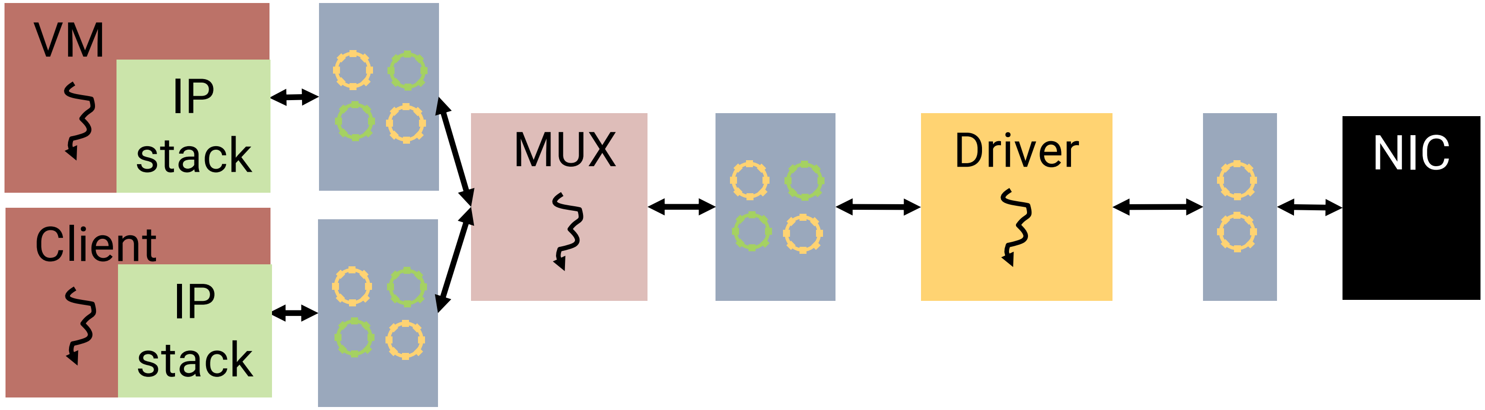


High-Performance I/O on seL4CP

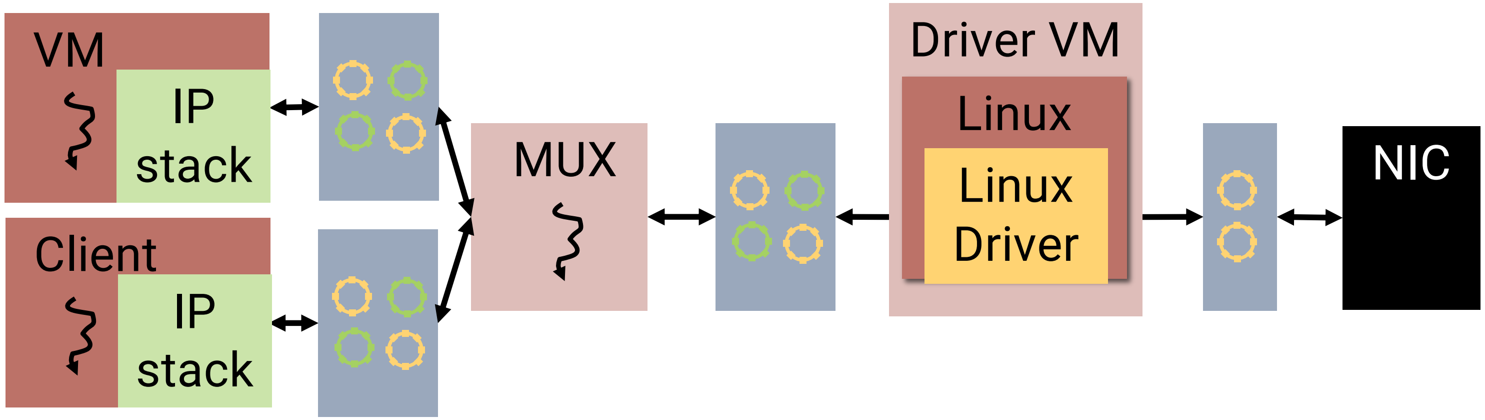
- Lightweight, highly modular design
- Simple, event-based, single-threaded drivers
- Asynchronous, zero-copy transport layer using lock-free, bounded SPSC queues



Device Sharing



Device Sharing with Legacy Re-Use



Comparison to Linux

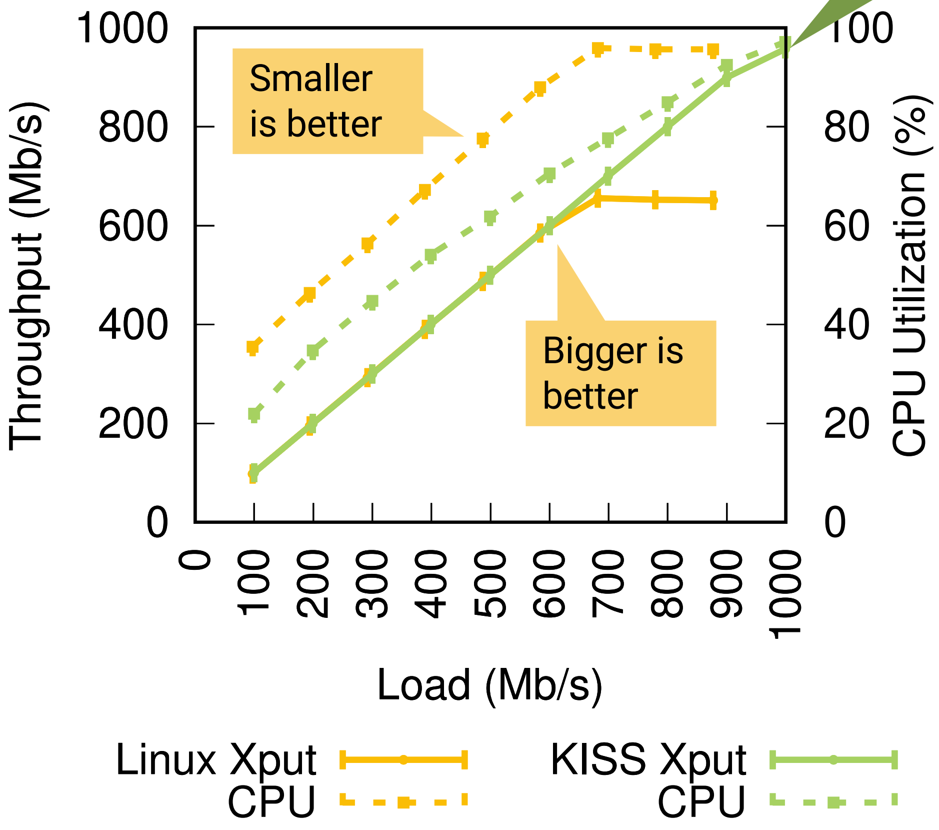
Linux:
- NW driver: 4k lines
- NW system total: 1M lines

seL4-based "KISS" design:
- NW driver: 700 lines
- MUX: 400 lines
- Copier: 200 lines
- IP stack: much simpler, client library
- shared NW system total: < 2,000 lines

Written by second-year student!

How About Performance?

Gigabit Ethernet



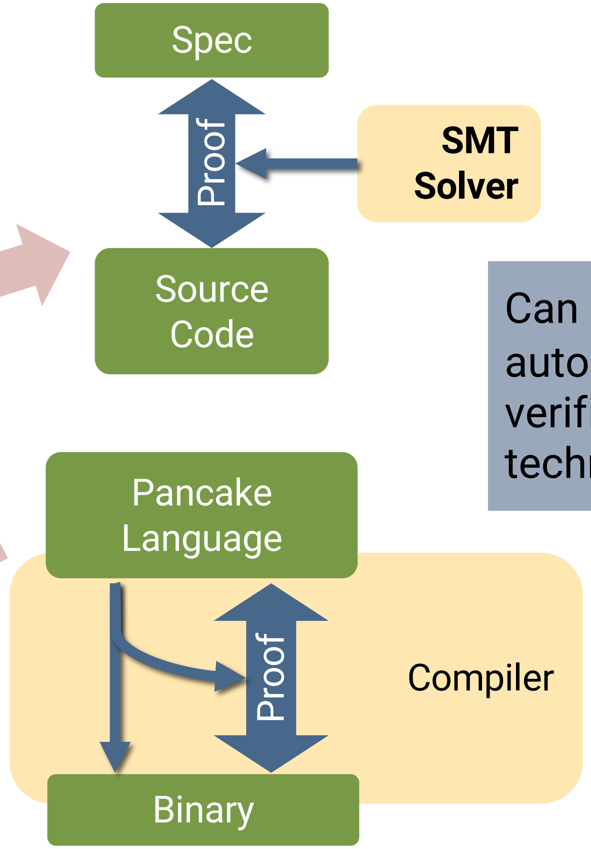
Simplicity wins!

How About Correctness?

KISS design:

- NW driver: 700 lines
- MUX: 400 lines
- Copier: 200 lines
- IP stack: much simpler, client library
- shared NW system total: < 2,000 lines

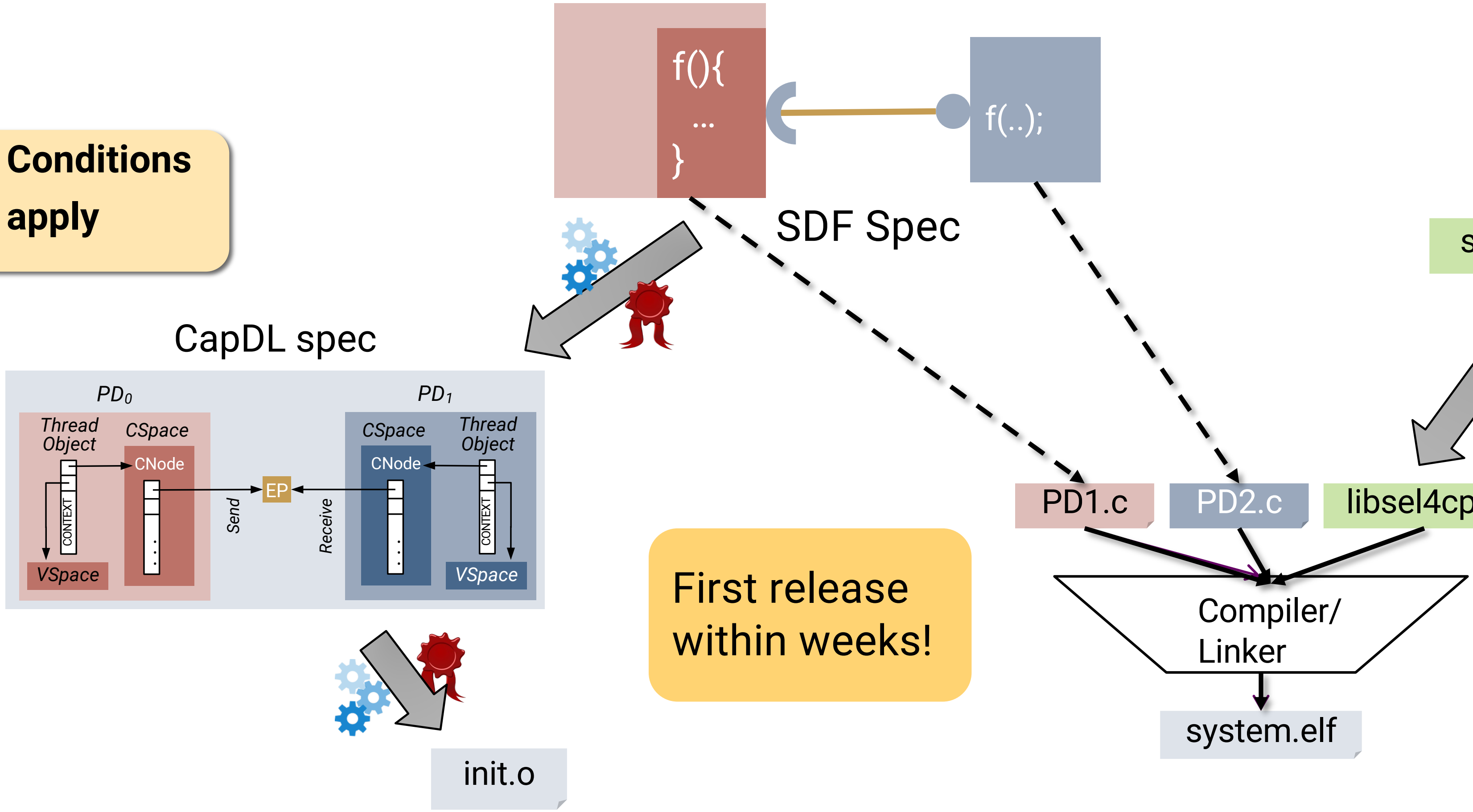
Simple, sequential, event-driven code



Can apply automated verification techniques!

seL4CP Verification

Conditions apply



First release within weeks!

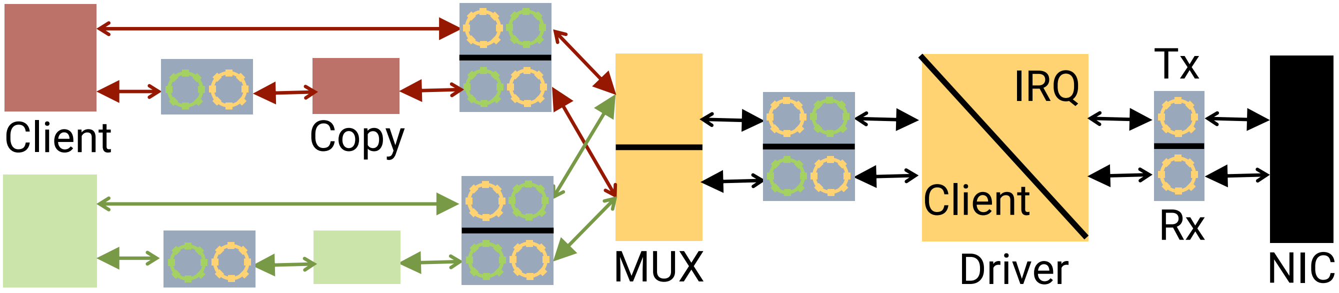
Plans for the (Near) Future

OS for IoT/cyberphysical systems, built on seL4CP+sDDF

Taking sDDF design principles to the complete OS:

- Fine-grained modularity, strong *separation of concerns*
- *Radical Simplicity*™: provide only the features needed
- Swappable, *use-case specific policy* (rather than universal policy)
- Performant
- Verifiable

- SMT solvers for components
- Model-checking for interactions



https://trustworthy.systems