



**DW DORNERWORKS**

## seL4 Mainlining

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Experiences, challenges,  
and solutions

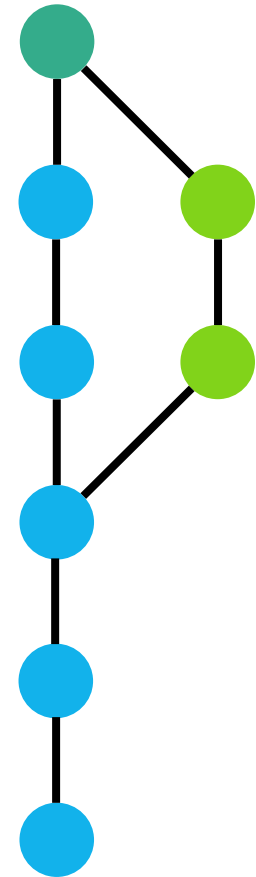
# Mainlining Discussion

- Progress and adoption of an open-source project is fueled by community contributions
- Goals
  - Give an experience report of contributing to seL4 source with a focus on successes, challenges, and current status
  - Foster discussion on:
    - Other experiences
    - Improving process



# Successes

- Upstreaming new platform support
  - Xilinx Zynq UltraScale+ MPSoC (Zcu102, Ultra96)
  - NXP i.MX8
  - Cubietruck (Allwinner A20)
- ARMv8 virtualization support
- 64-bit x86 virtualization support
- Other smaller features and bug fixes in both kernel-space and user-space

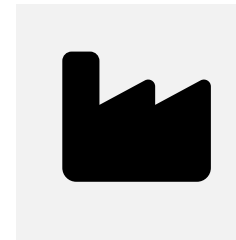




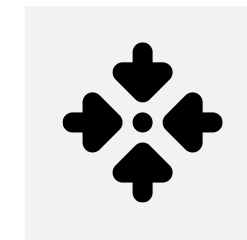


# Challenges

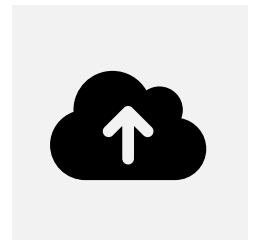
Our main challenges come about due to prohibitive processes and restrictions of the real world



Customers



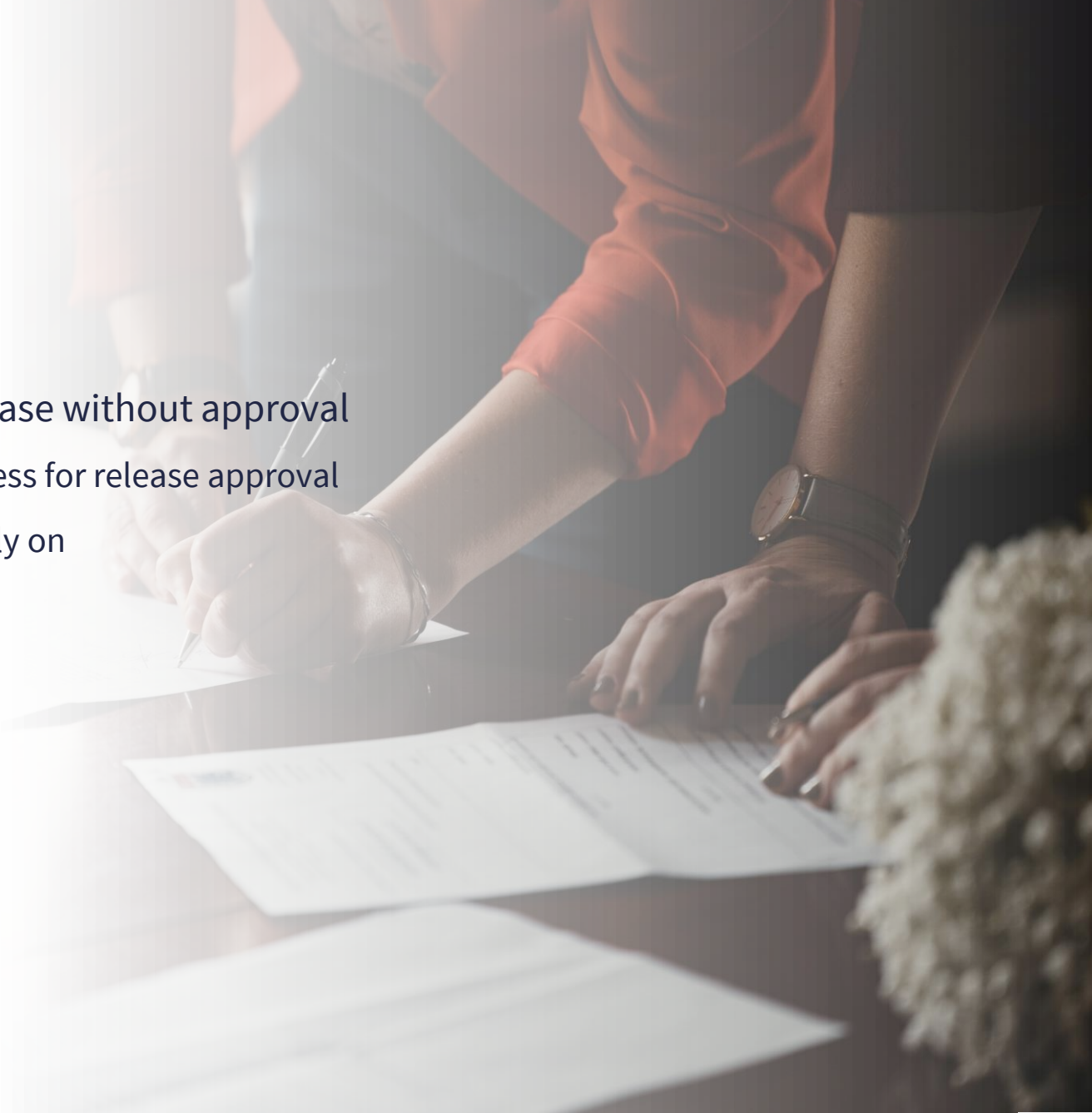
Internal



External

# Customer Challenges

- We are beholden to our customers
- Some customers default to export controlled or no release without approval
  - These cases require following the customer's specific process for release approval
    - Prohibits us from collaborating with the foundation early on
    - Can take months!
- Customer IP
  - Can limit the specific features we can release



# Internal Challenges

- Open sourcing is often our lowest priority for a project
- Tend to open @ completion of project instead of @ completion of each feature
  - Sometimes this makes more sense when we need to follow customer processes, but overall may make it more difficult
    - Further out of sync
    - Bigger patches
  - Fully completing a new feature before any discussion with community
- Not always adding new tests alongside new code

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# External Challenges

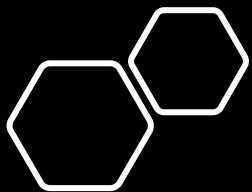
- Has been a lack in response time for PRs
  - This has gotten much better with the introduction of the Foundation
- Denials for dependent patches
  - Ex: zynqmp support in camkes-vm because SMC calls needed to be enabled
- RFCs falling off the radar



# Current state

- Due to the combination of all these challenges
  - DornerWorks has **~100 commits** that we want to open source, but are having trouble getting past roadblocks
    - Necessary to periodically rebase all these changes on top of mainline to stay up to date
  - Hoping to push RFCs forward and break up our commits into smaller, easily integrated patches
    - Does take some effort to do this
- Trying to improve our internal issues as I have most control over those
  - Some changes are hard to make without being more synchronized with the mainlines





# Discussion Ideas

- Thoughts on external improvements?
- Thoughts on how contributors can get involved with maintainers sooner?
  - Maybe baking RFC submission into contracts at the beginning of projects?
- Have others faced similar issues? Solved them?