

Facing the Challenges of Updating Complex Systems

Putting it all together

FOSDEM 2018, Enrico Jörns, Pengutronix e.K.



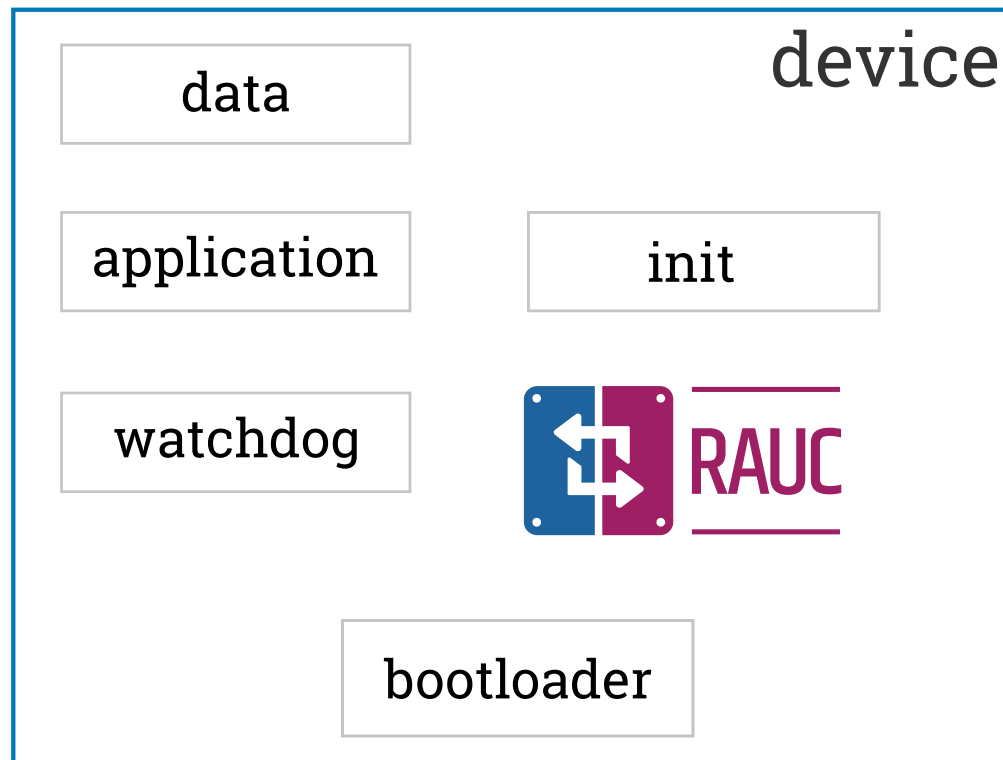
About Me

- Enrico Jörns
- Embedded Software Engineer
-  **Pengutronix.**
- RAUC update framework co-maintainer

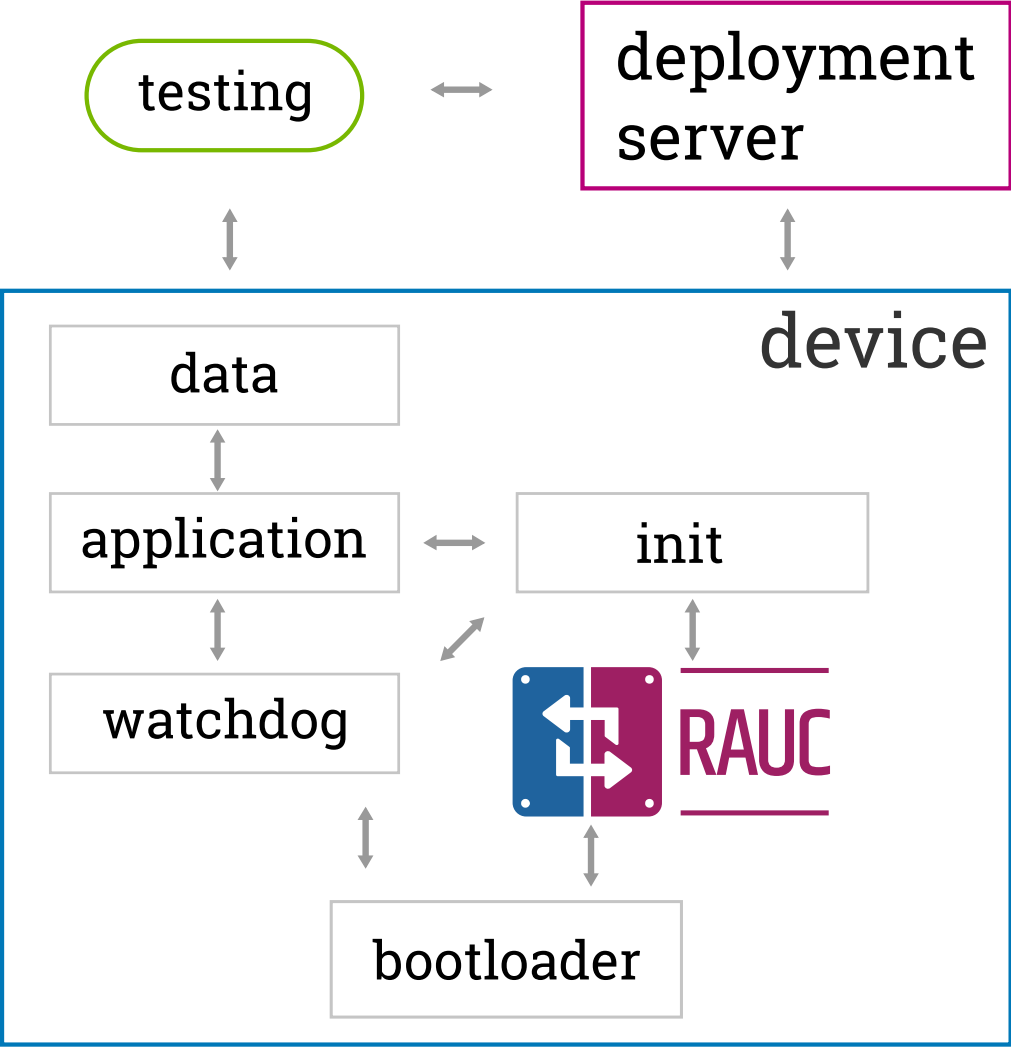


Motivation

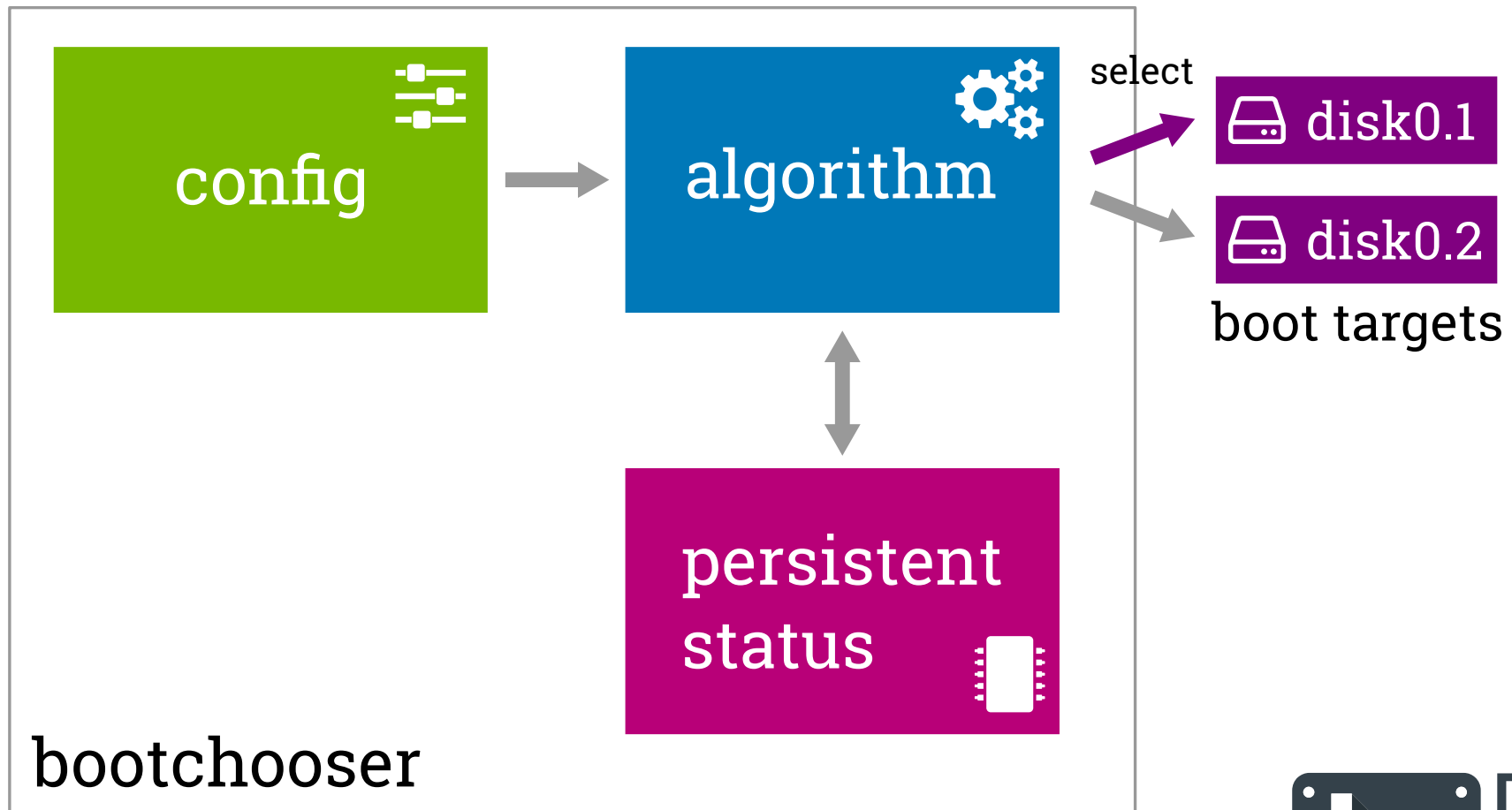
Updating is a solved topic!..?



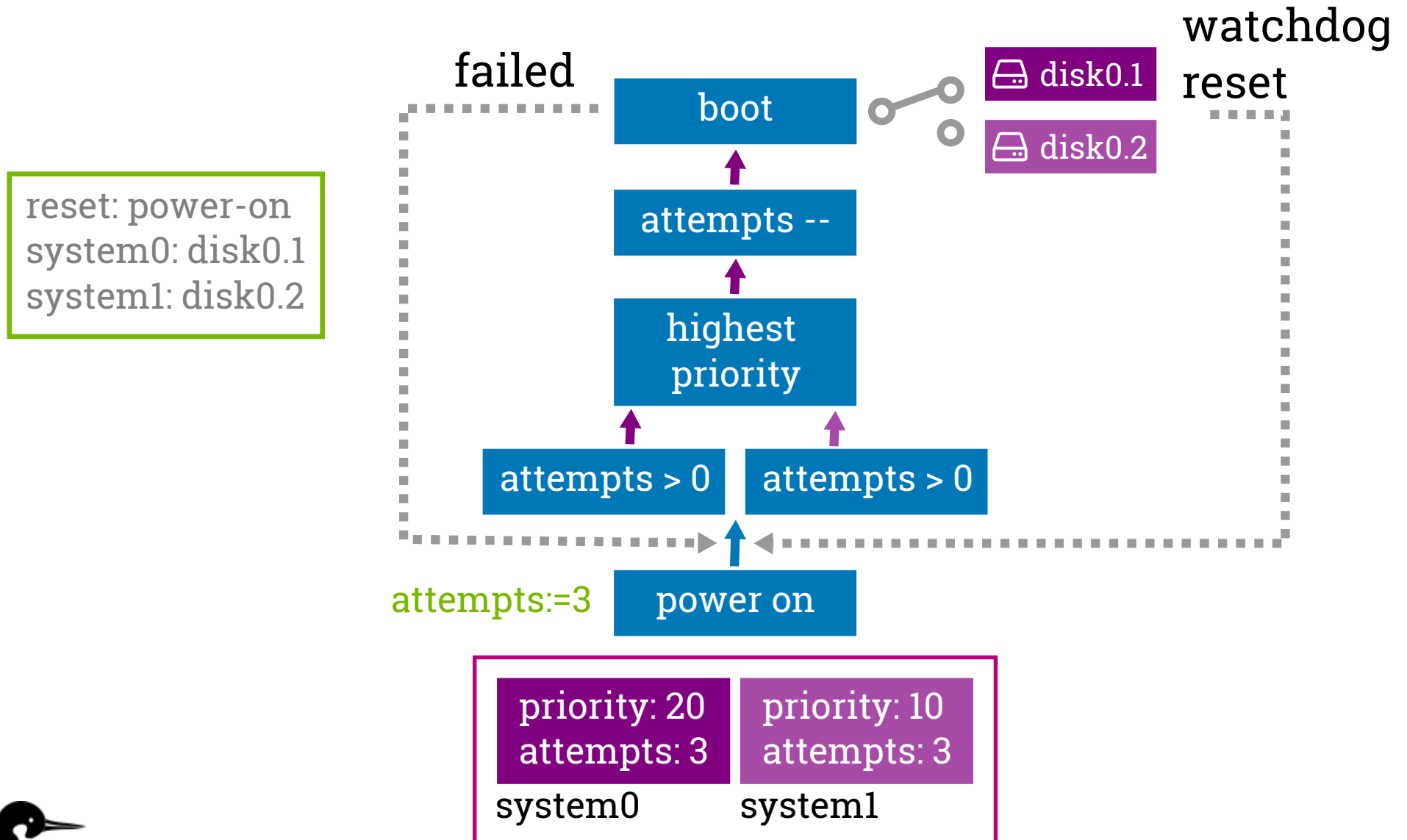
Motivation



Bootloader Support – Barebox



Bootchooser Framework



X86 – Pure UEFI Boot

BootNext 0001

BootOrder 0001,0002

BootEntries

0001 HD(1,GPT,<UUID-1>/File(KernelA),rootfs=....

0002 HD(1,GPT,<UUID-2>/File(KernelA),rootfs=....

kernel A

rootfs A

system A

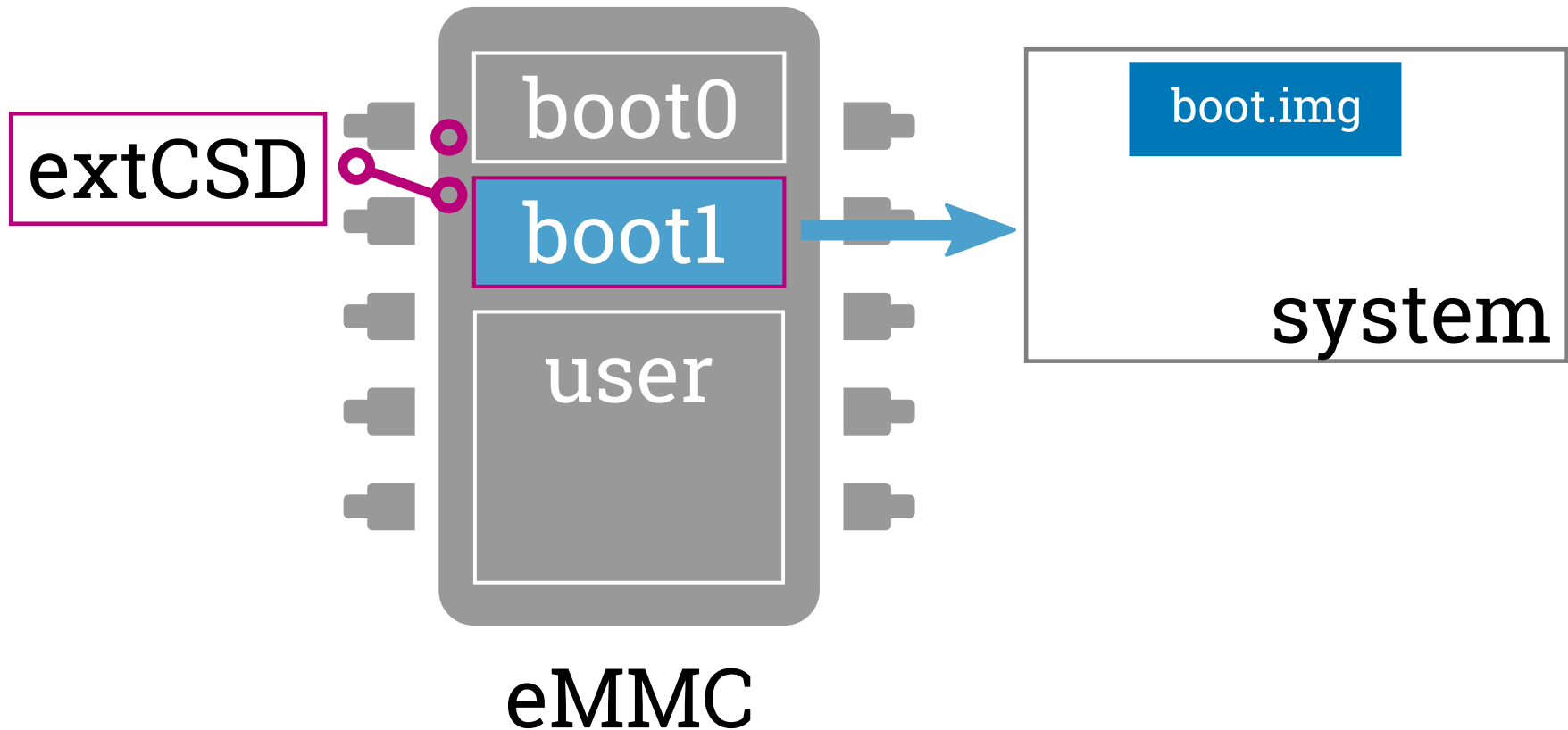
kernel B

rootfs B

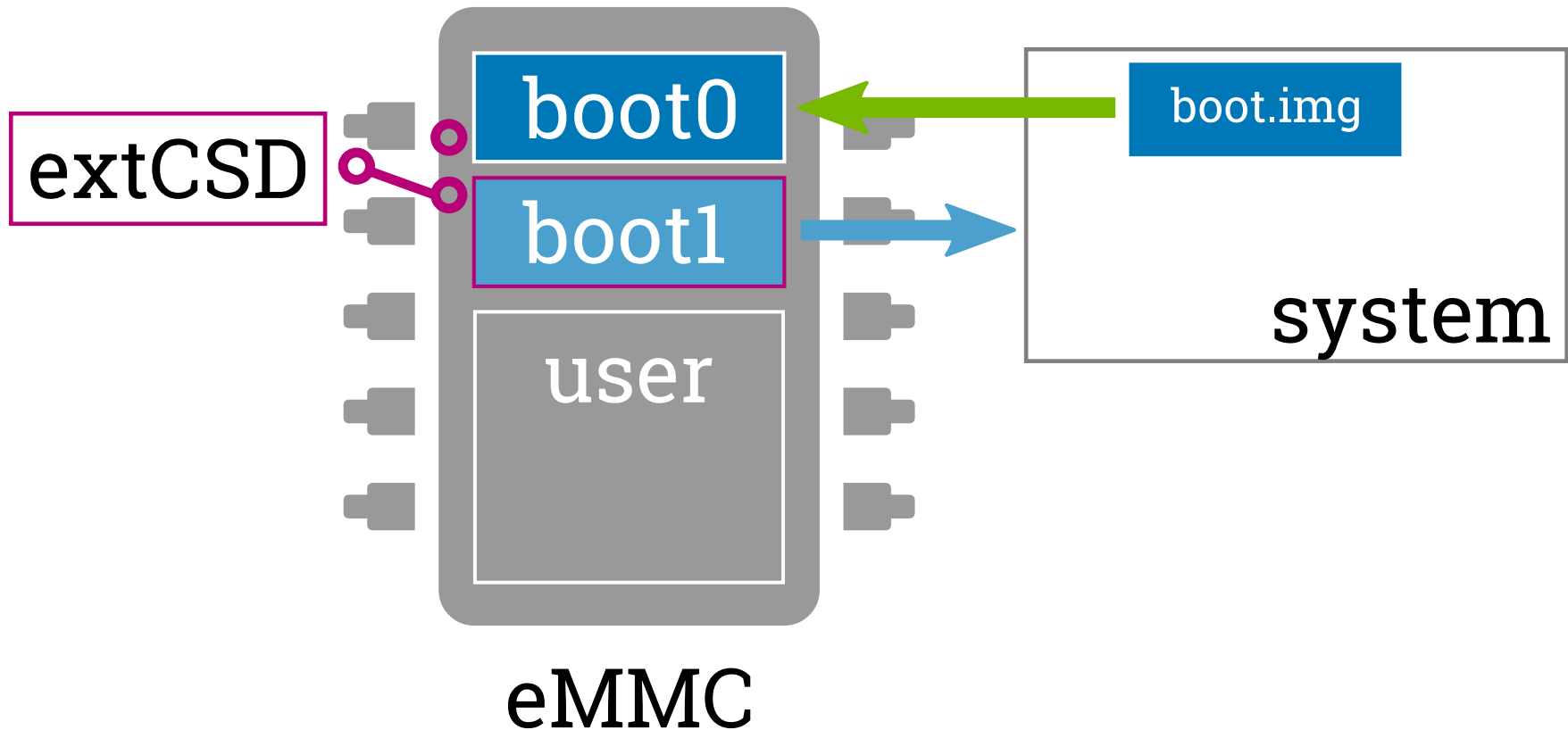
system B



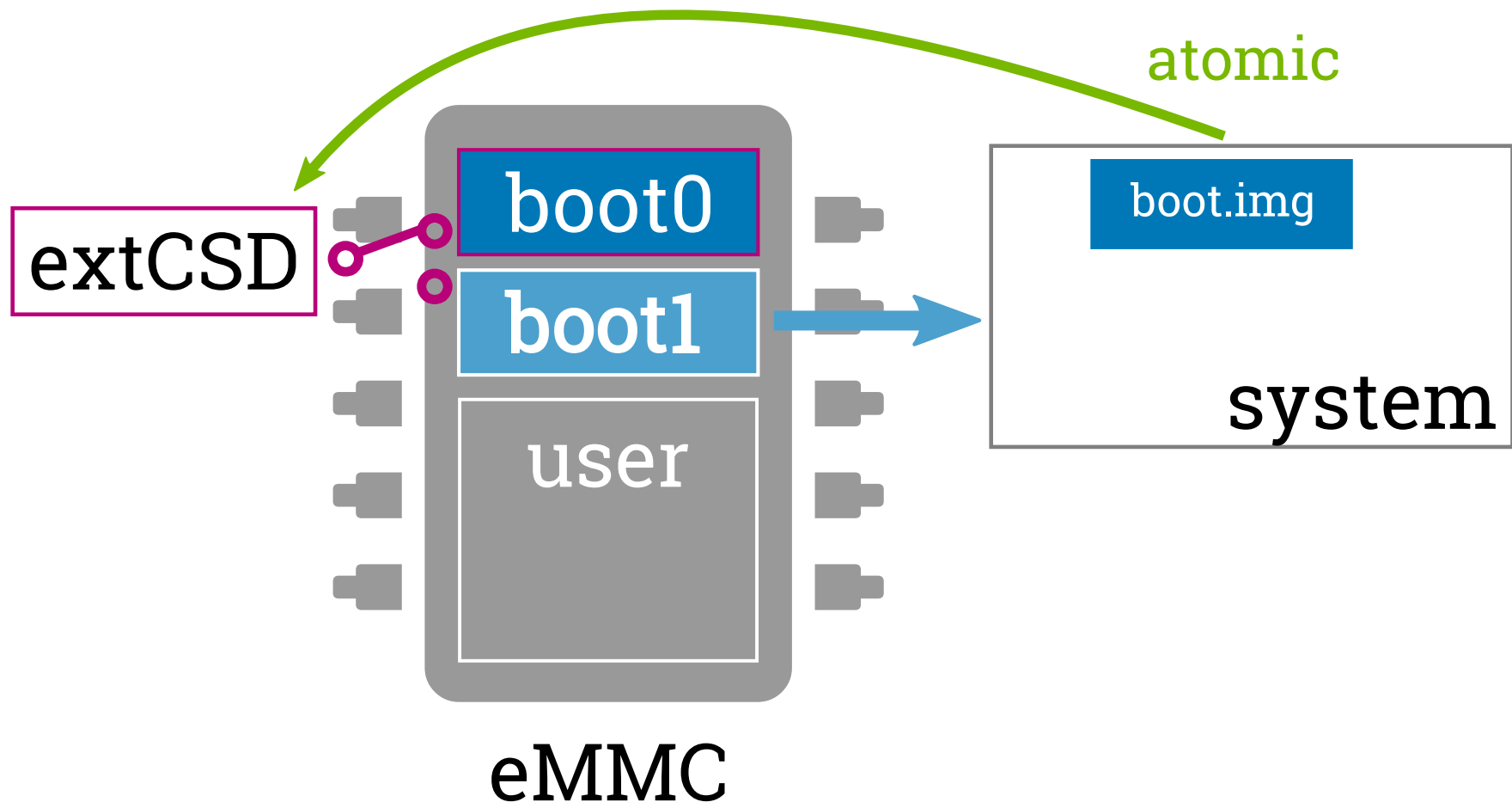
Updating The Bootloader?



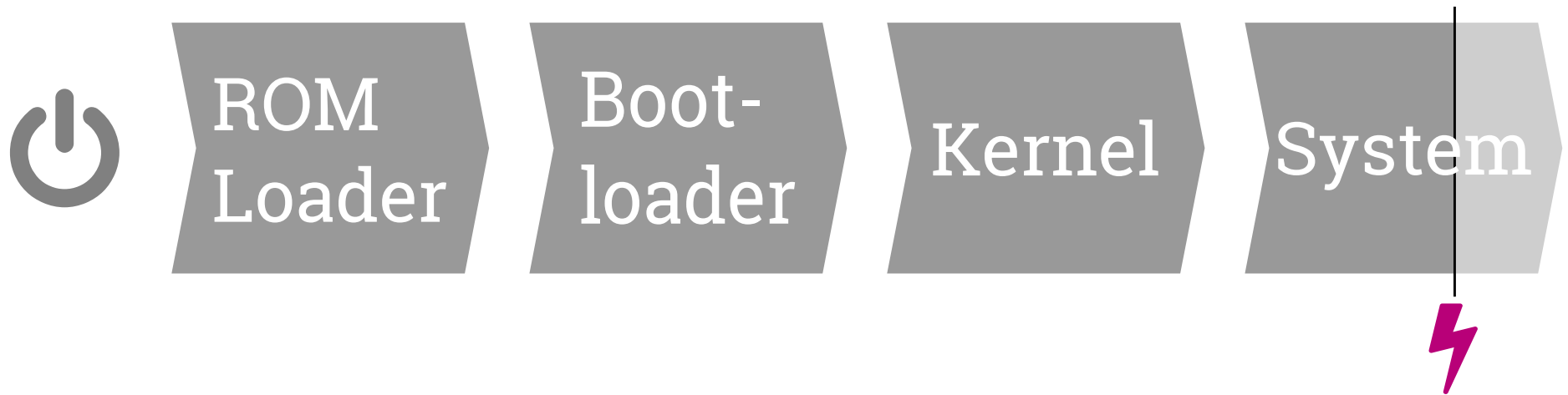
Updating The Bootloader?



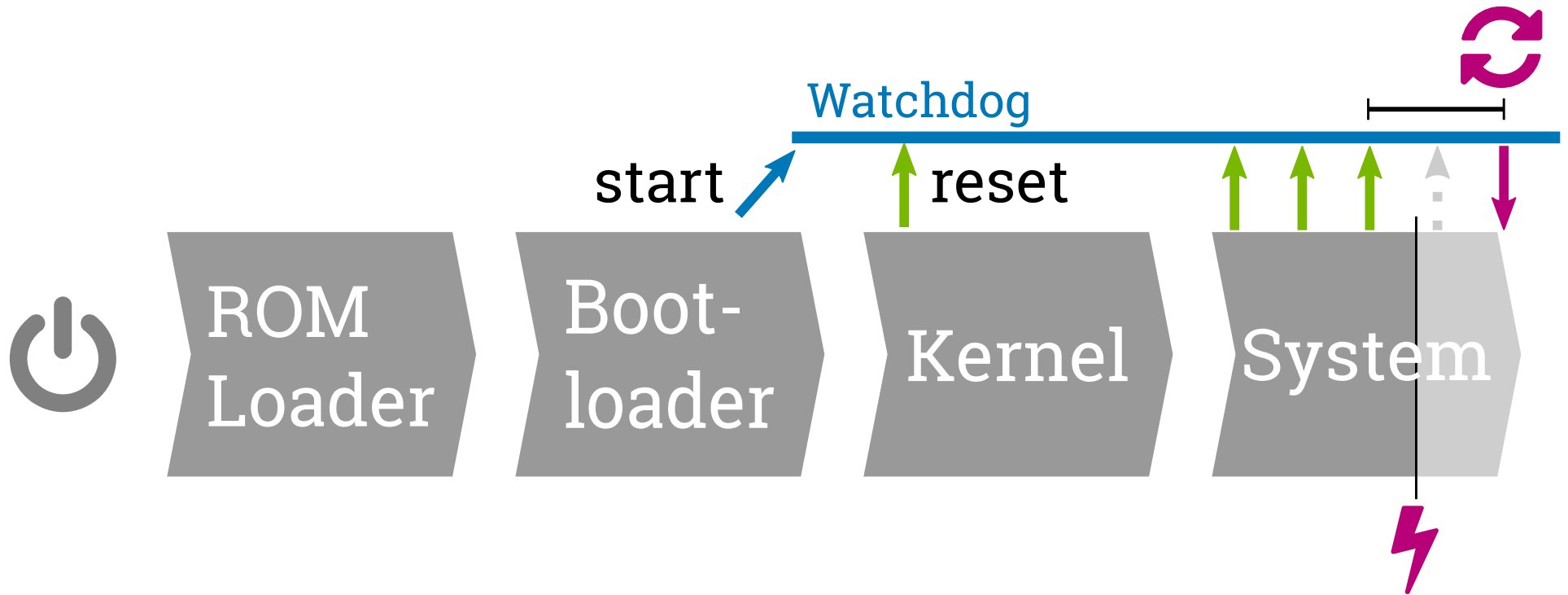
Updating The Bootloader?



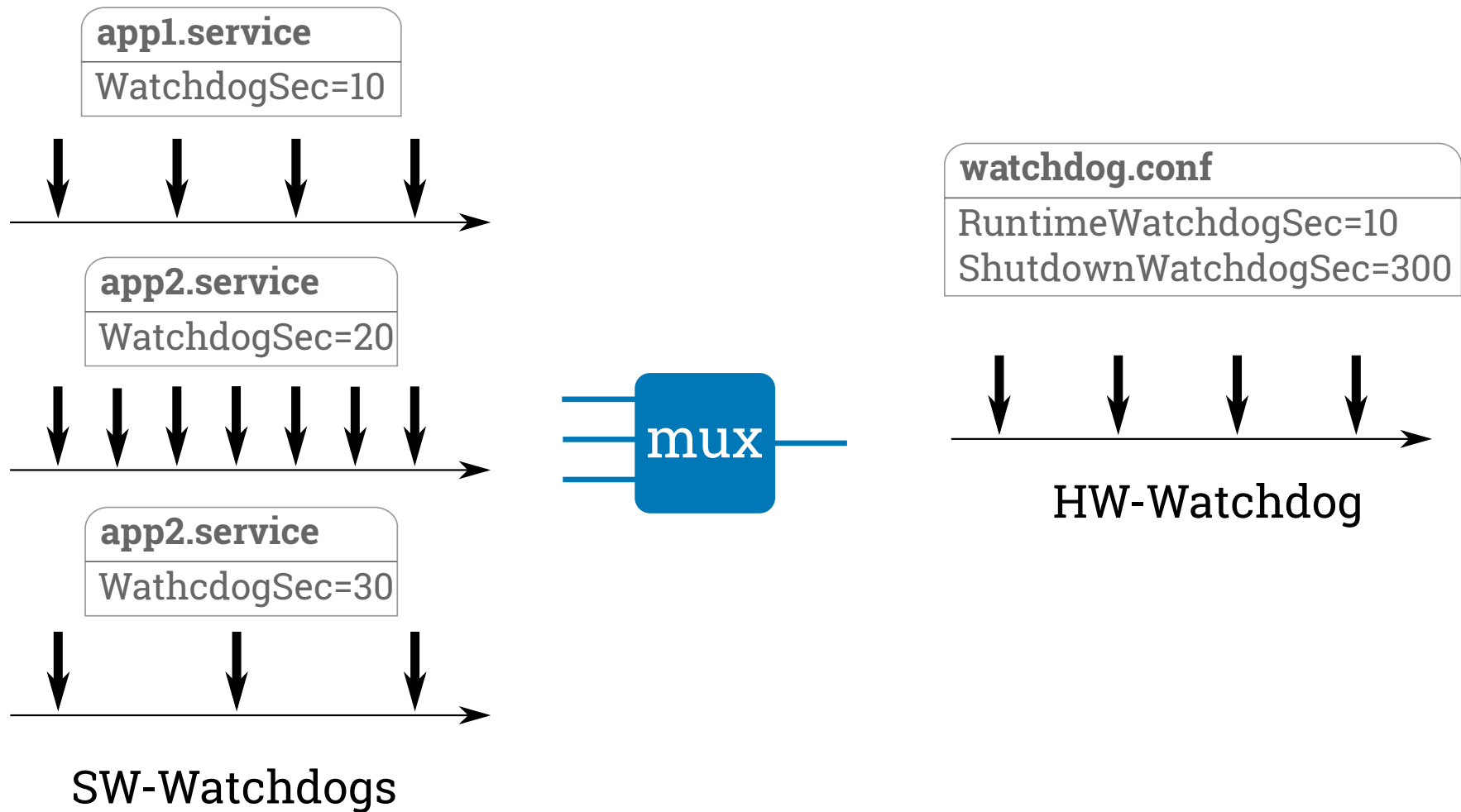
Detecting Freezes – Watchdogs!



Detecting Freezes – Watchdogs!



systemd – Watchdog Multiplexer



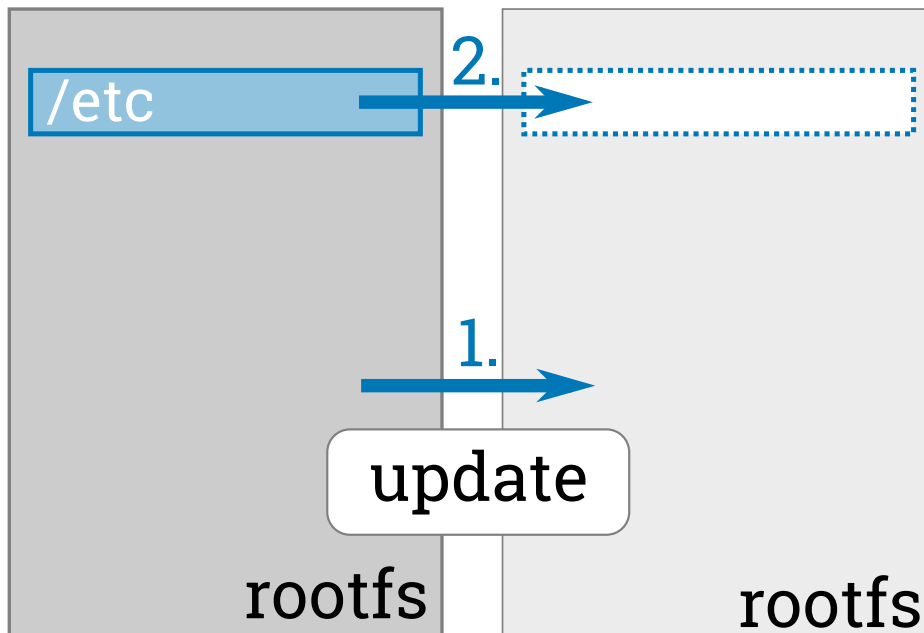
systemd

- Central control and overview!
- Service Failure Configuration
 - Restart
 - RestartSec
 - ...
- Watchdog Multiplexer
- /system-update
 - bootstrapping config / data



Data Storage / Migration

Data in rootfs

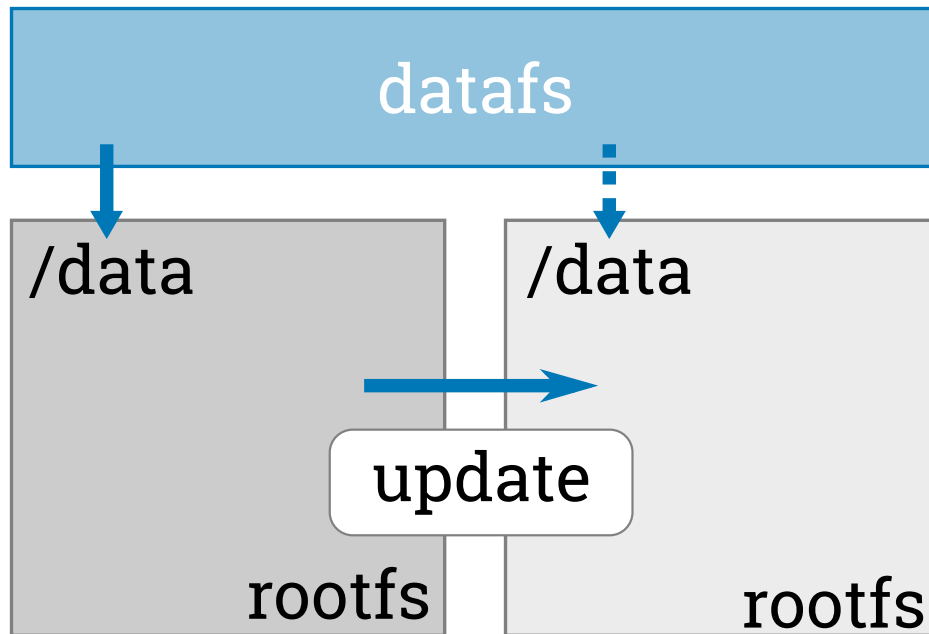


- copy by updater!
- migration: simple
- fallback: old data!



Data Storage / Migration

Data in separate slot

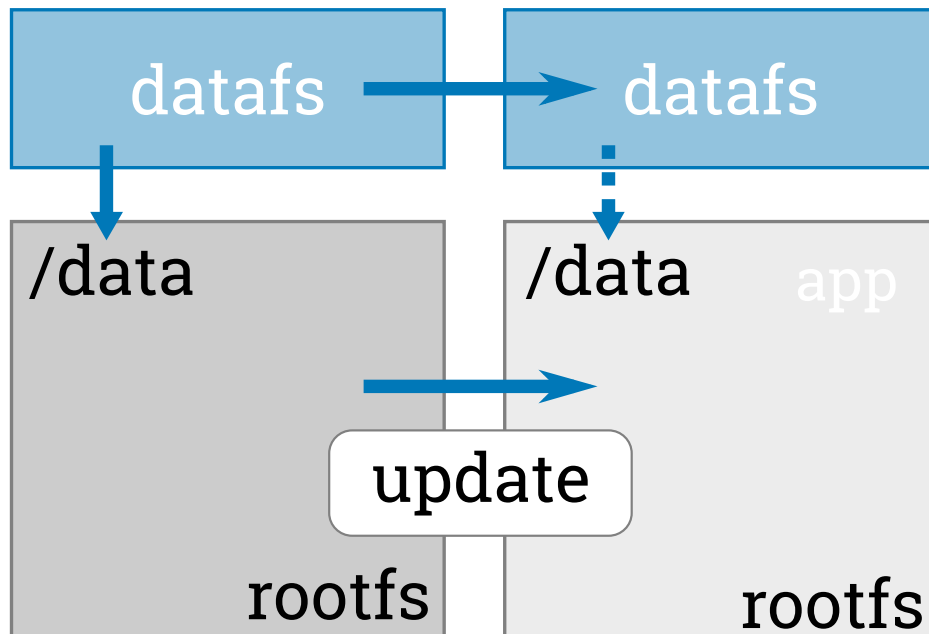


- no copying
- mount to /data
- migration: simple
- fallback: tricky!



Data Storage / Migration

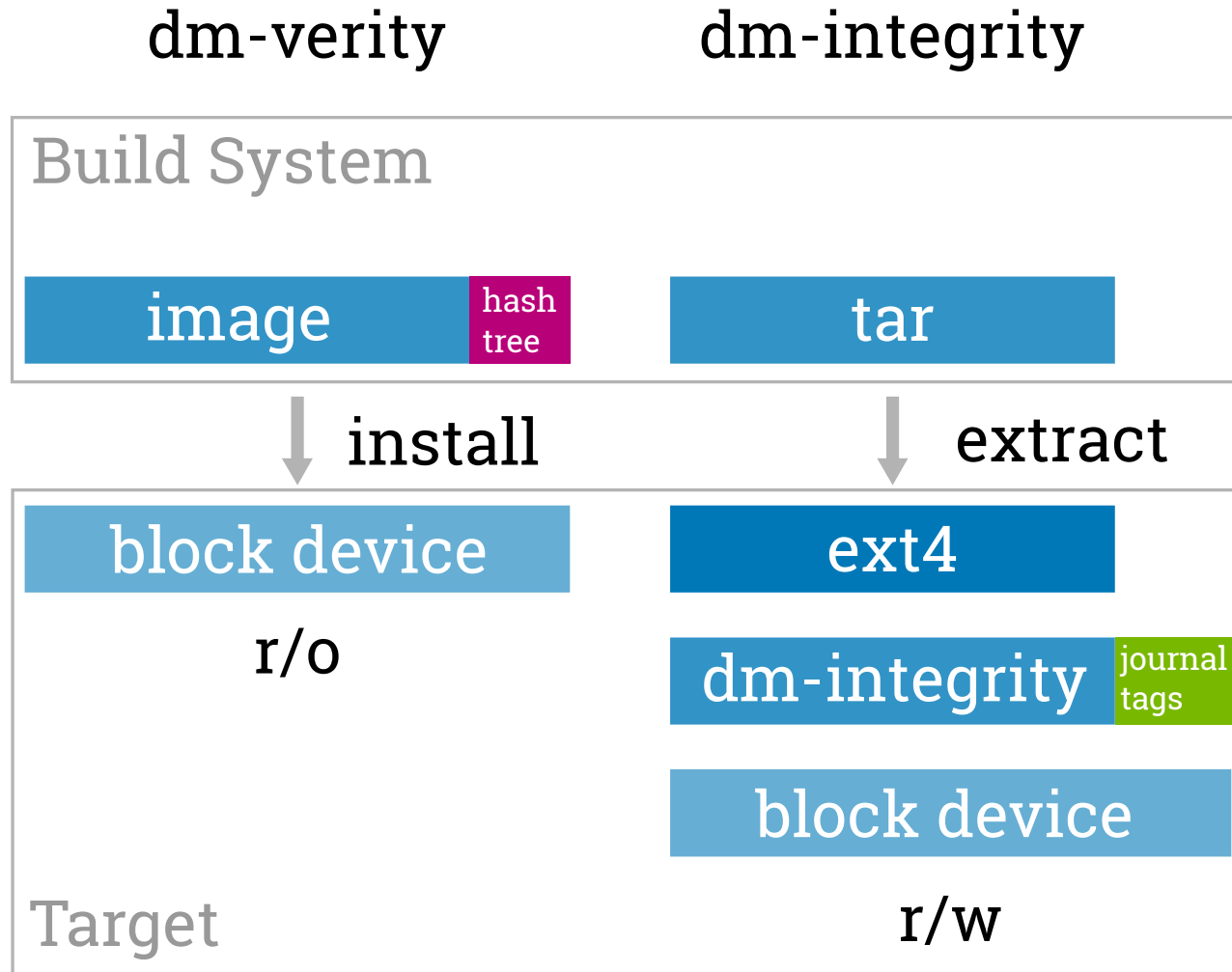
Data in two separate slots



- copying by updater
- migration by application
- mounting: tricky
- fallback: old data!



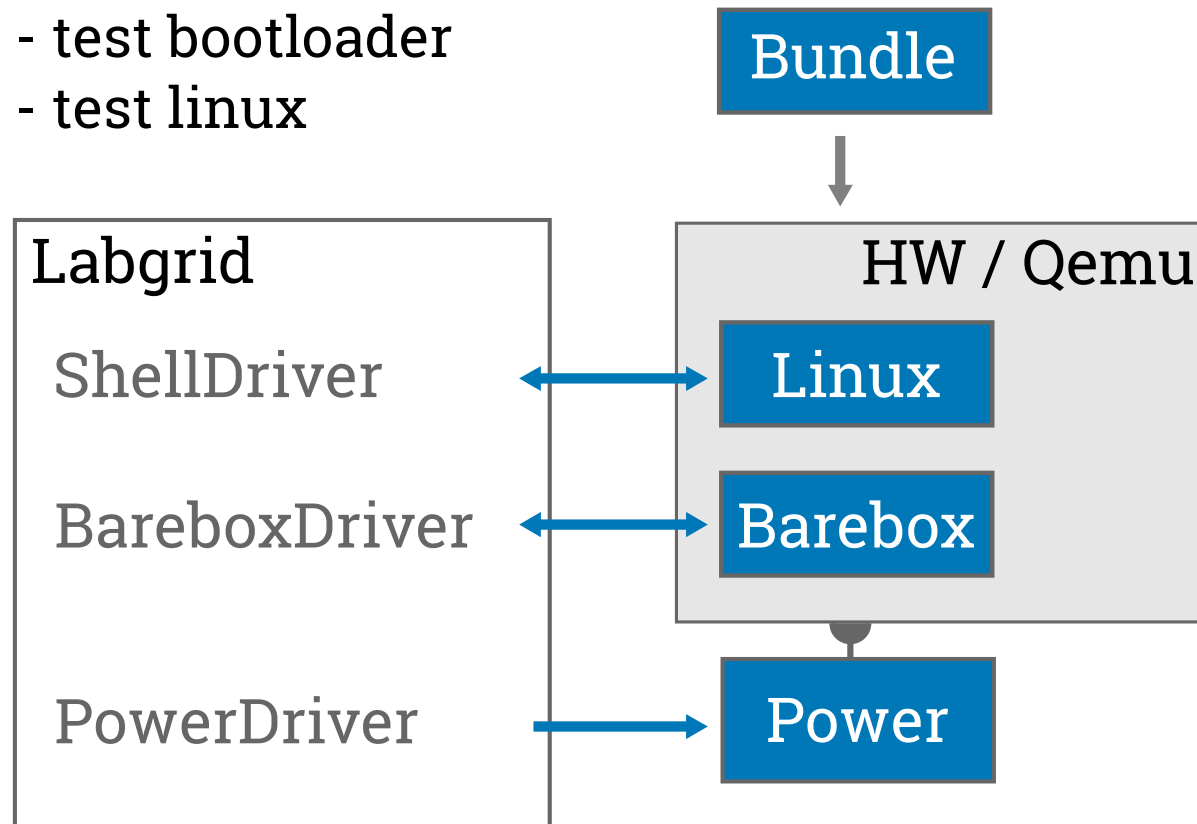
Updating and Trusted Boot



Testing Updates – Labgrid

update-test.py

- provide update
- trigger install
- power cycle
- test bootloader
- test linux



casync

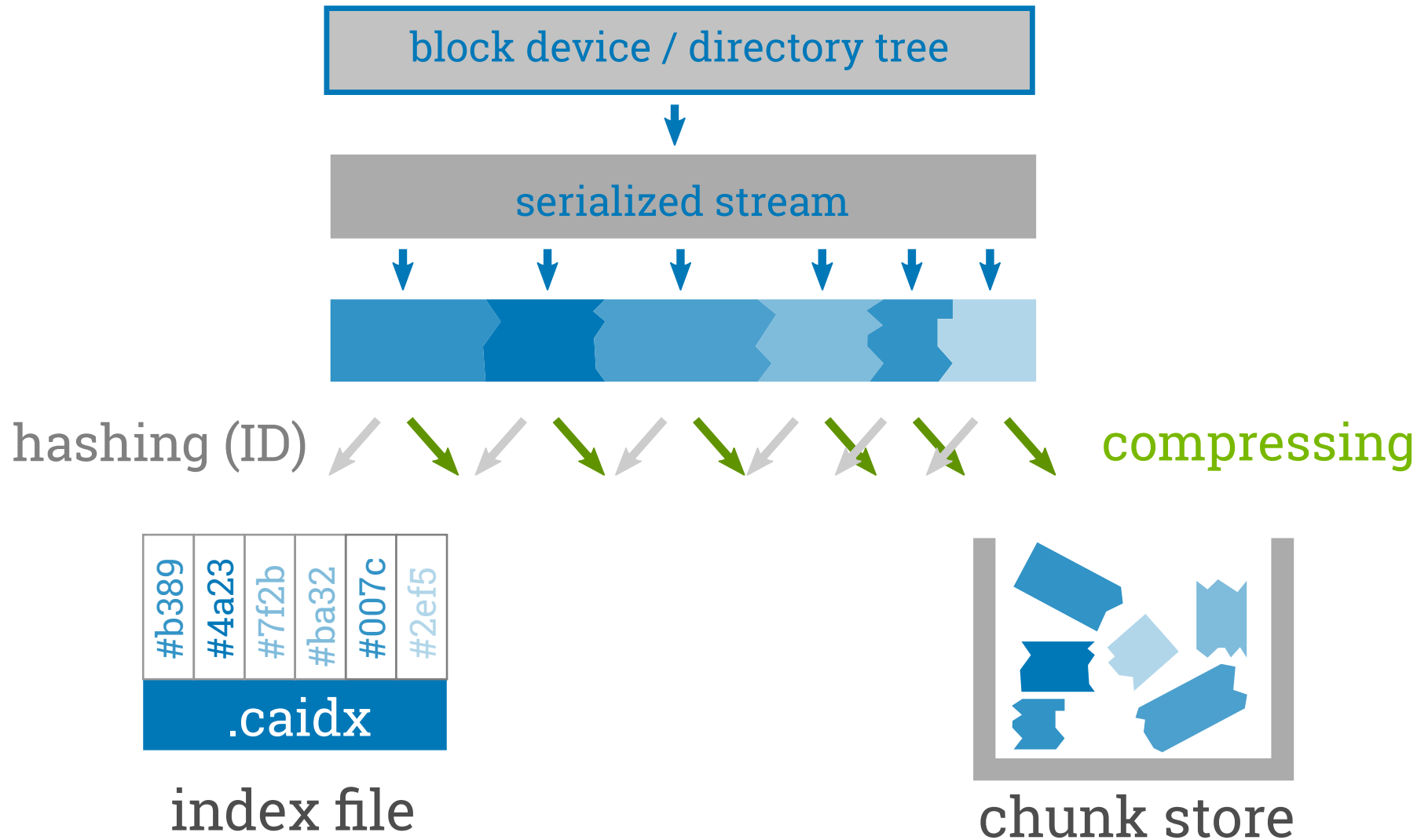
- Image updates over Network
 - Too large (slow connection)
 - Temporary storage required
- delta updates
- not reinvent the wheel

“casync (content-addressable synchronisation) is a Linux software utility designed to distribute frequently-updated file system images over the Internet.”

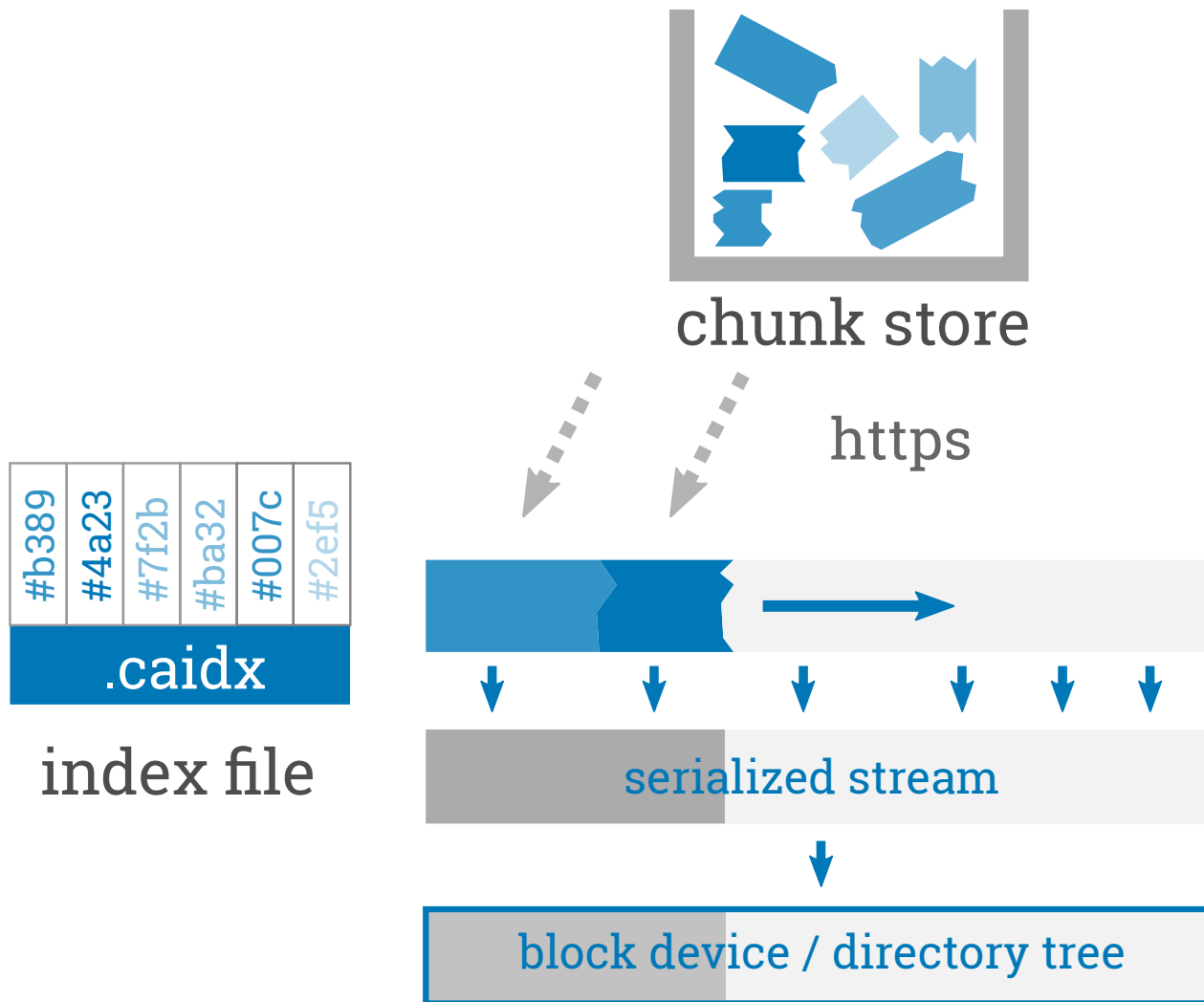
[Wikipedia]



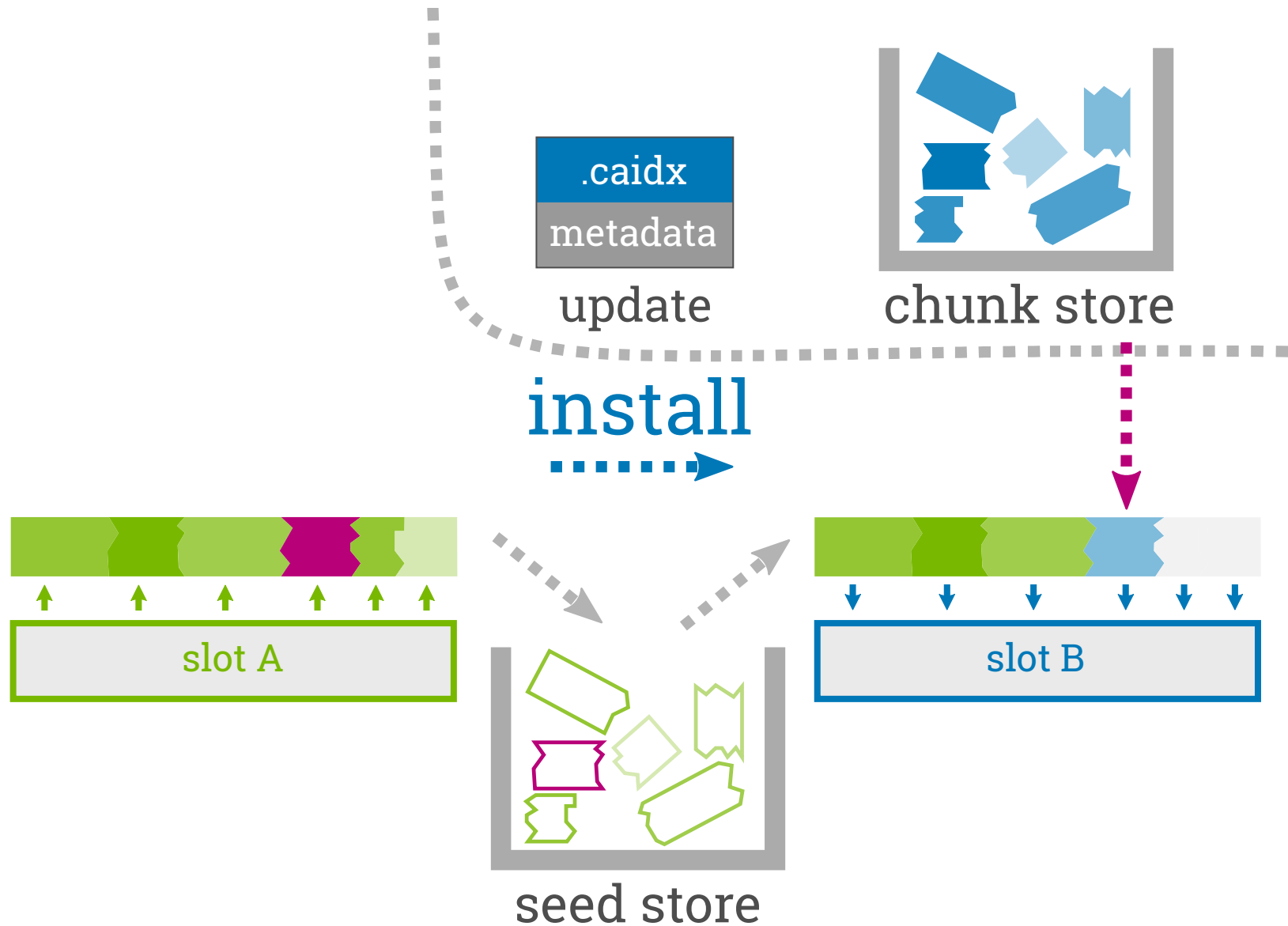
casync – Chunking



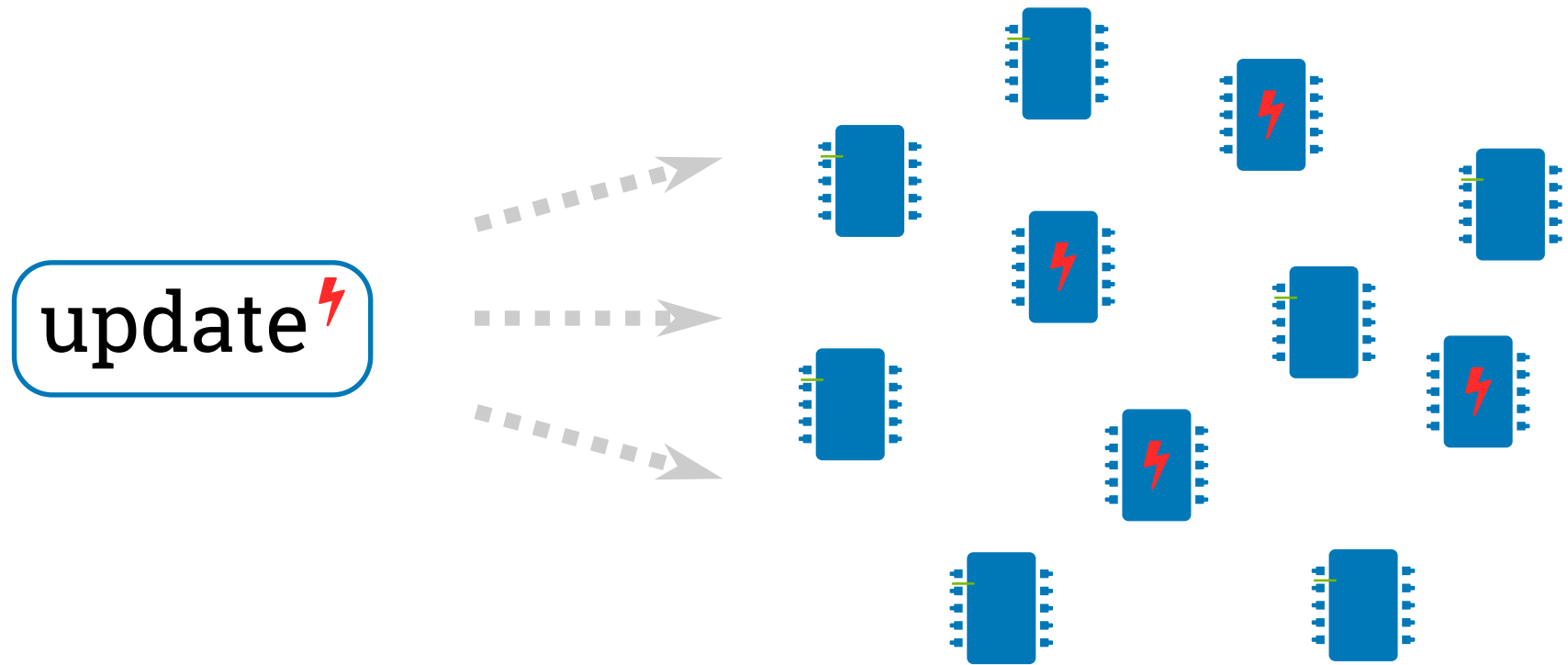
casync – Extracting



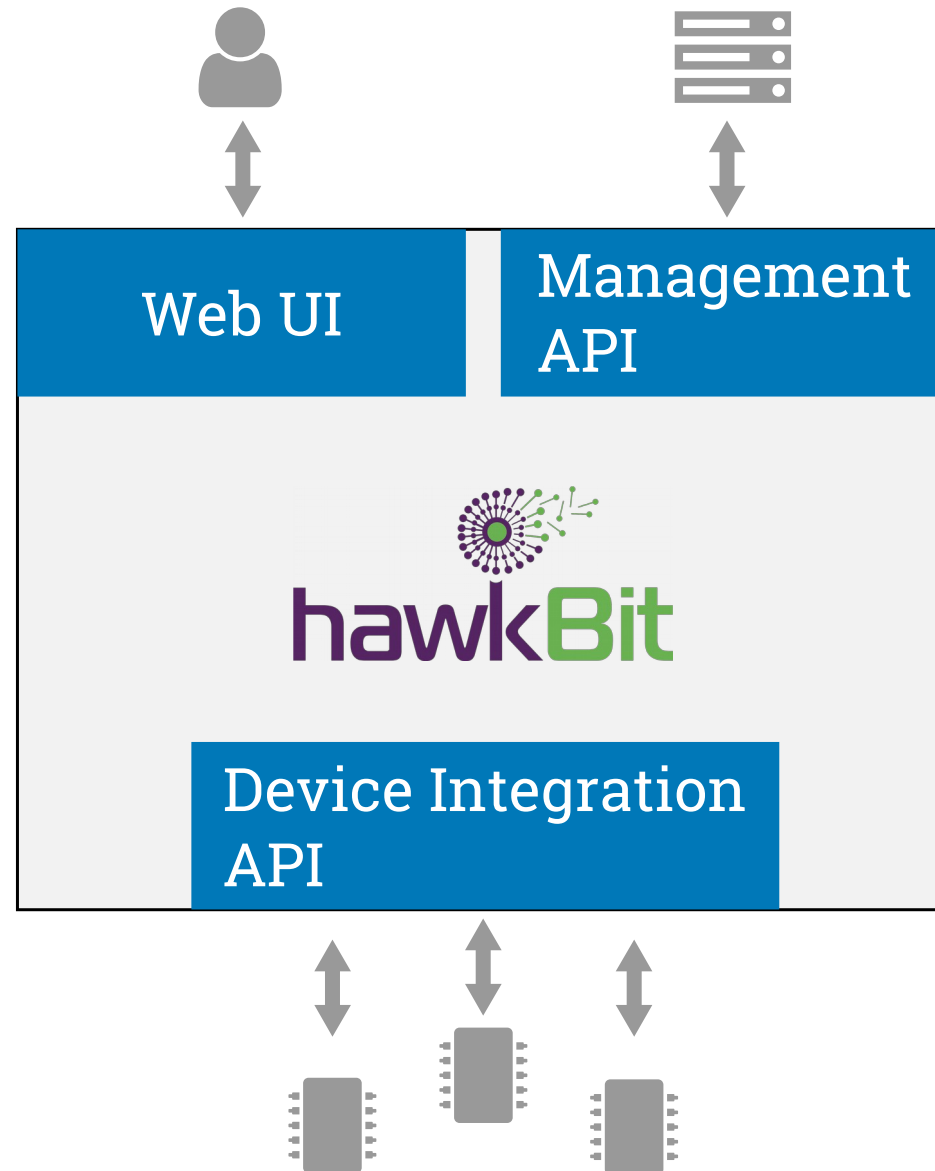
casync – RAUC



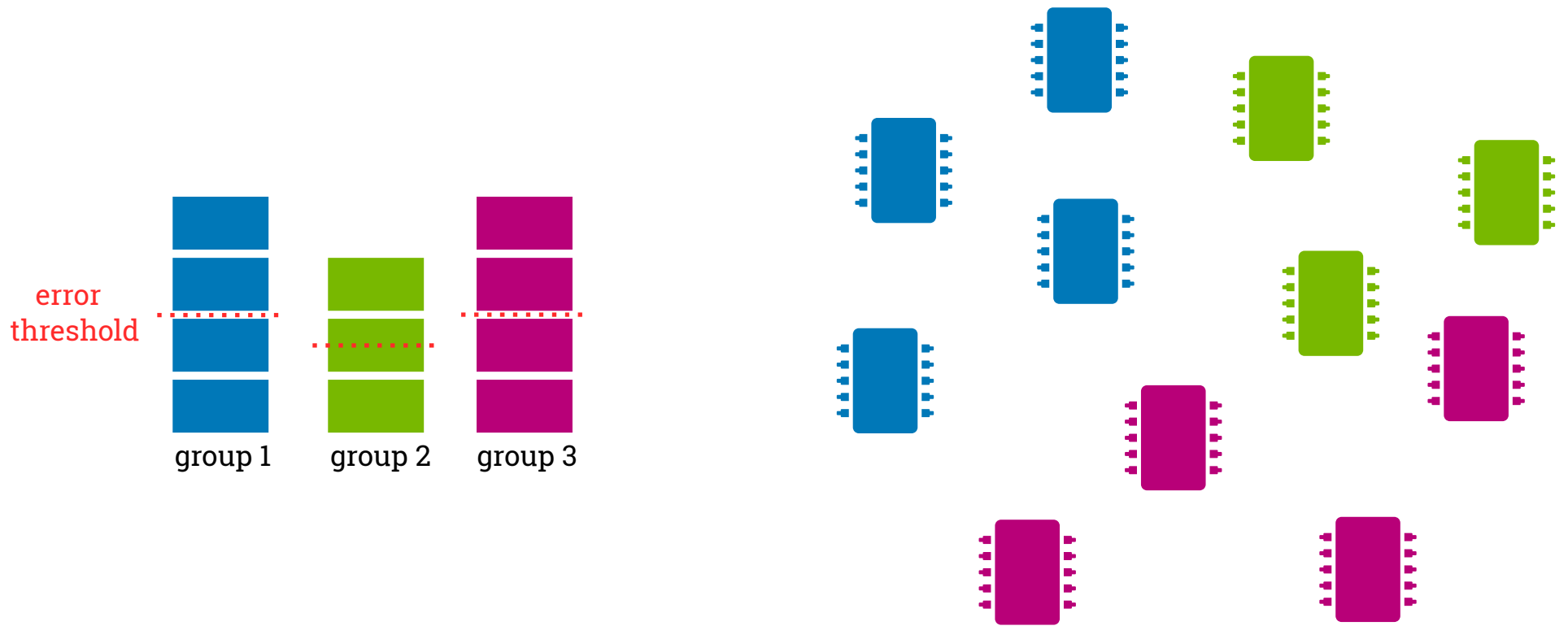
Field Deployment



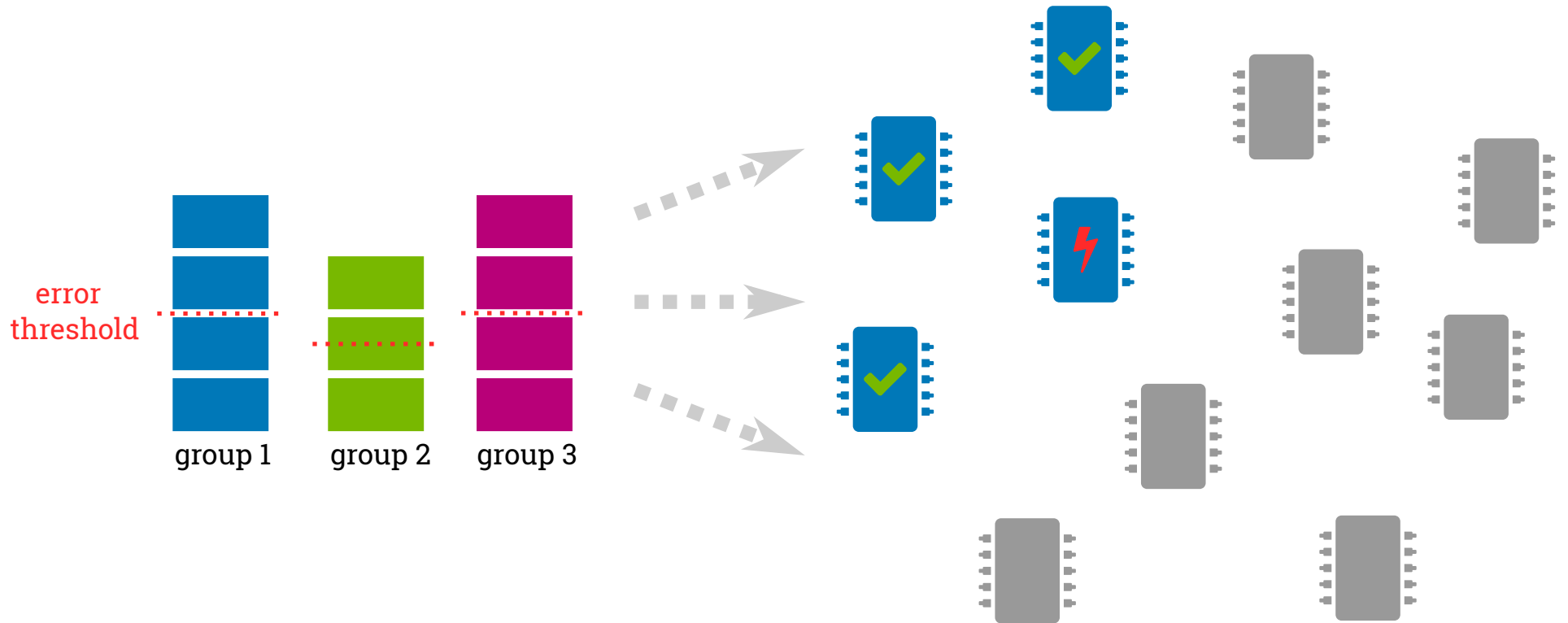
HawkBit – Deployment Server



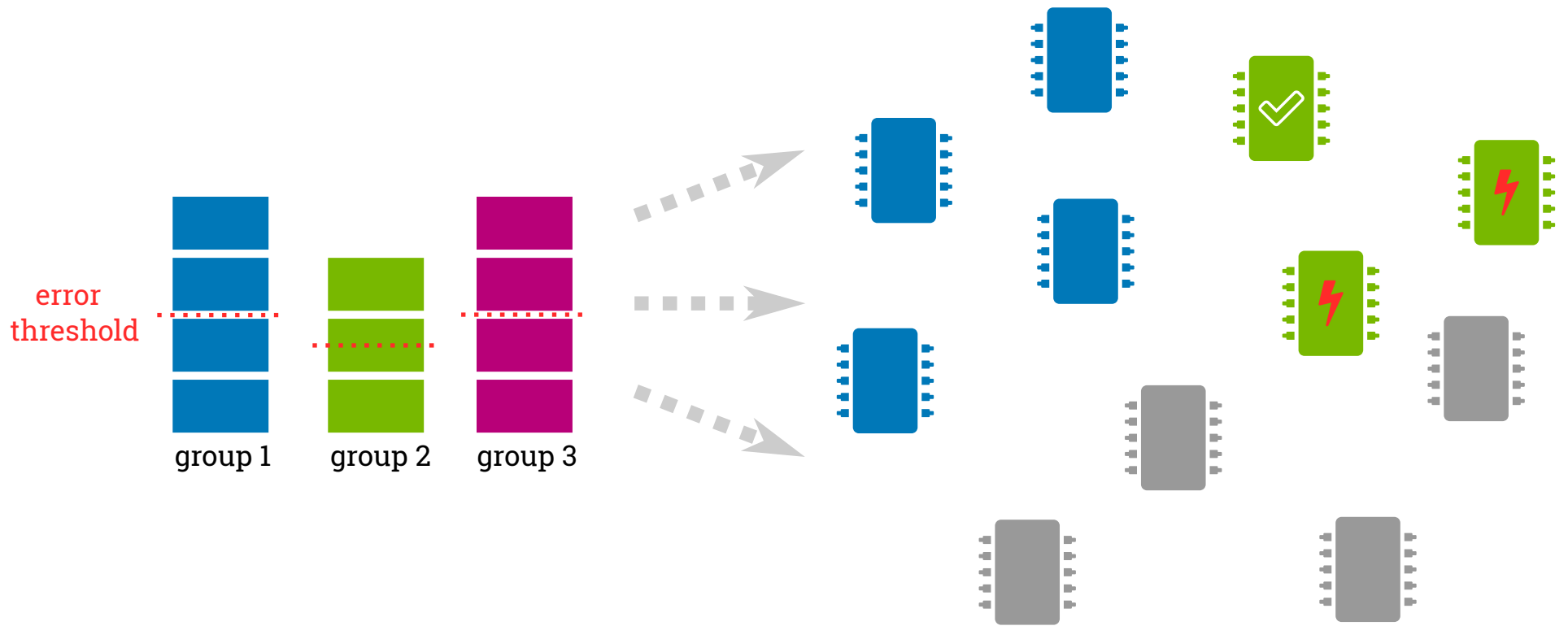
Field Deployment – HawkBit



Field Deployment – HawkBit



Field Deployment – HawkBit



stop!



Conclusion

- Update Frameworks cannot provide full solutions
- Not just stacking components
- Fine-grained configuration
- Updating is highly use-case specific



Questions?



Links

- github.com/rauc
- rauc.readthedocs.io
- github.com/systemd/casync
- github.com/labgrid-project/labgrid
- github.com/eclipse/hawkbit

