Deconstructing MinBFT for Security and Verifiability

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http://wwwen.uni.lu/snt/research/critix

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Meet The Team

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CritiX

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Overall Story

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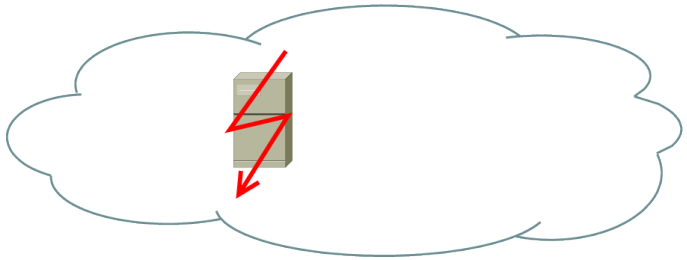
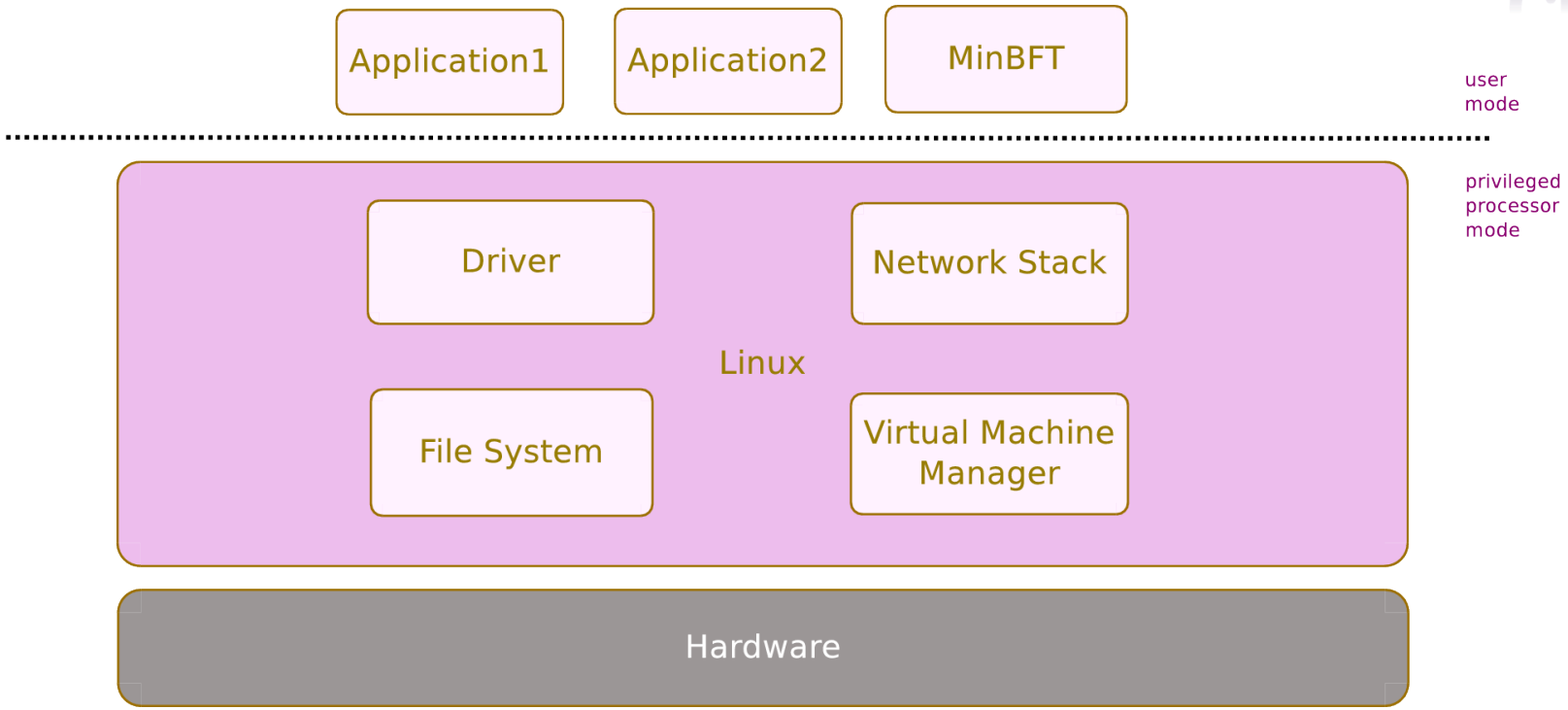
Resilience (fault-tolerance)



Security

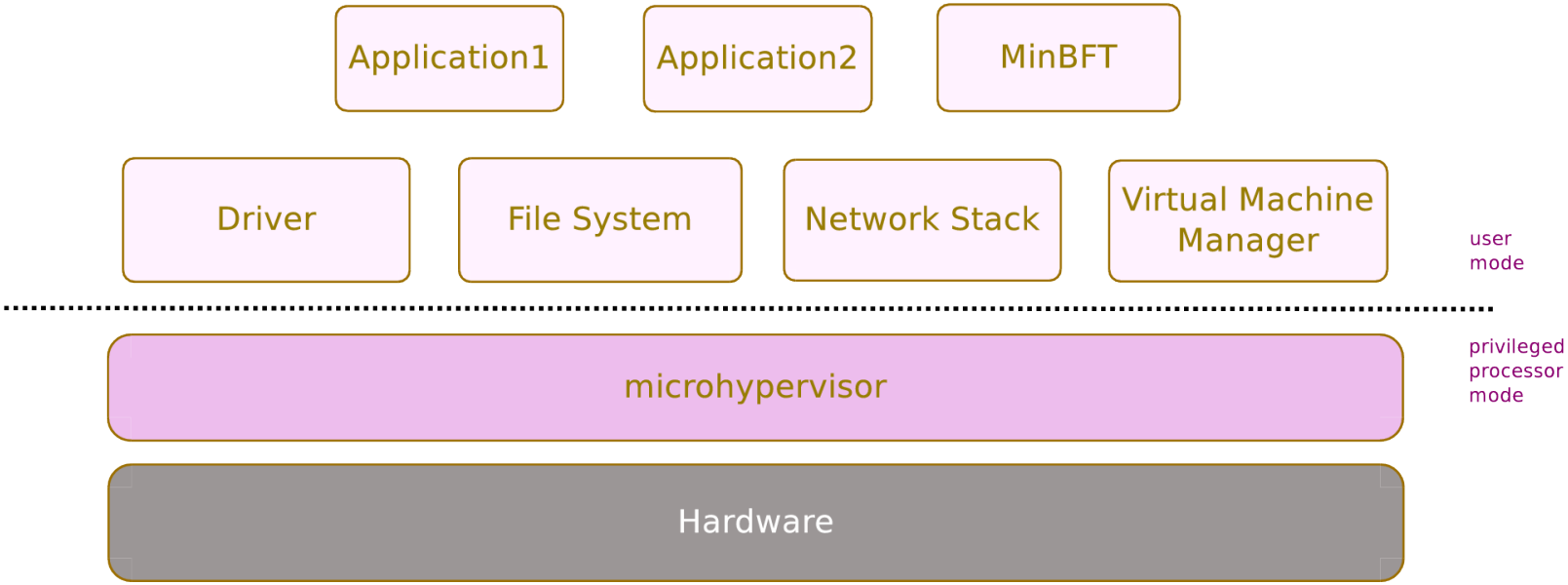
Formal Correctness

Overall Story



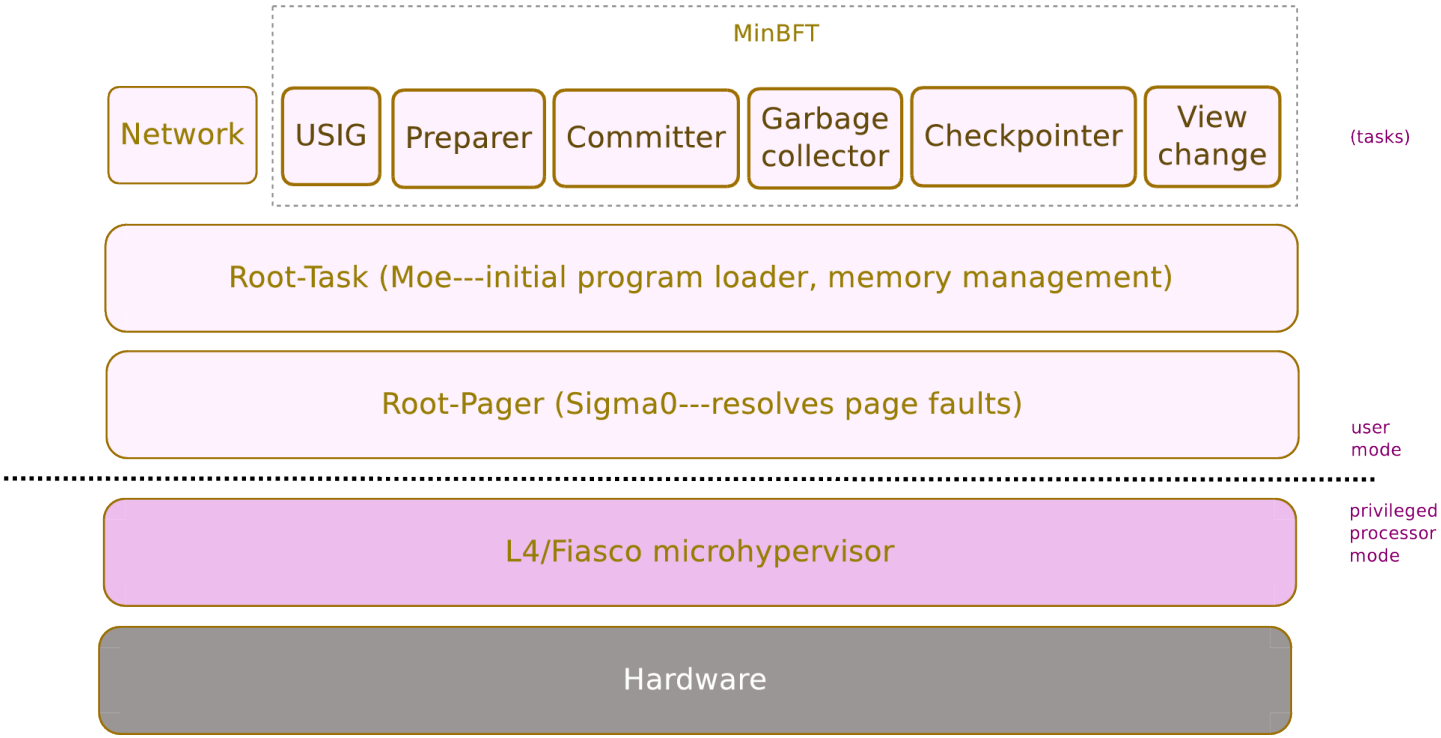
All services in the kernel

Overall Story



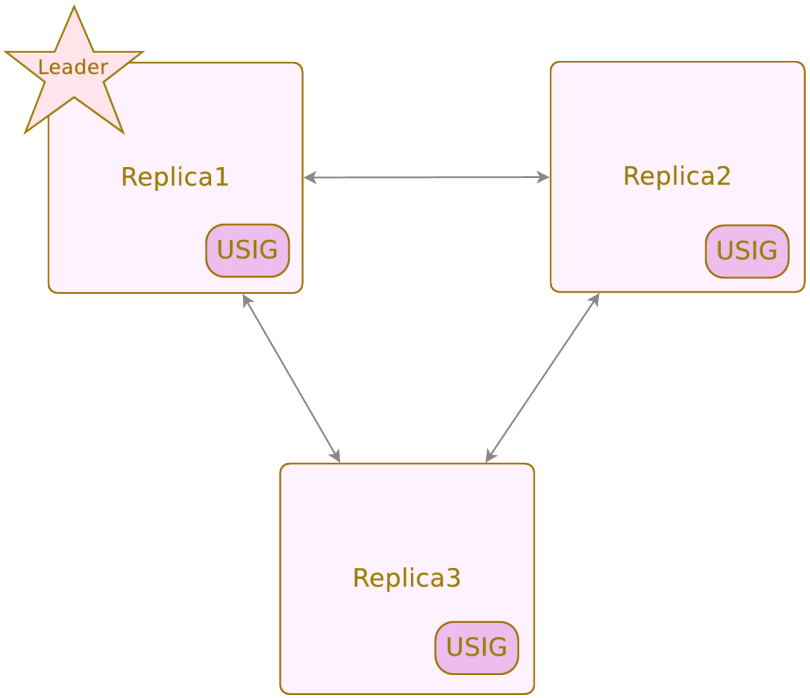
Only keep the bare minimum in the kernel

Overall Story



Build small/secure/verifiable components on top of Fiasco

MinBFT



Byzantine fault-tolerant protocol similar to PBFT

$2f + 1$ as opposed to $3f + 1$ in PBFT

Uses a trusted counter (USIG)

L4/Fiasco

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Only program that runs in privileged processor mode

Small: only has what cannot be implemented as the user level

Provides memory isolation

Selective trustworthiness (choose what to use at the user level)

L4/Fiasco

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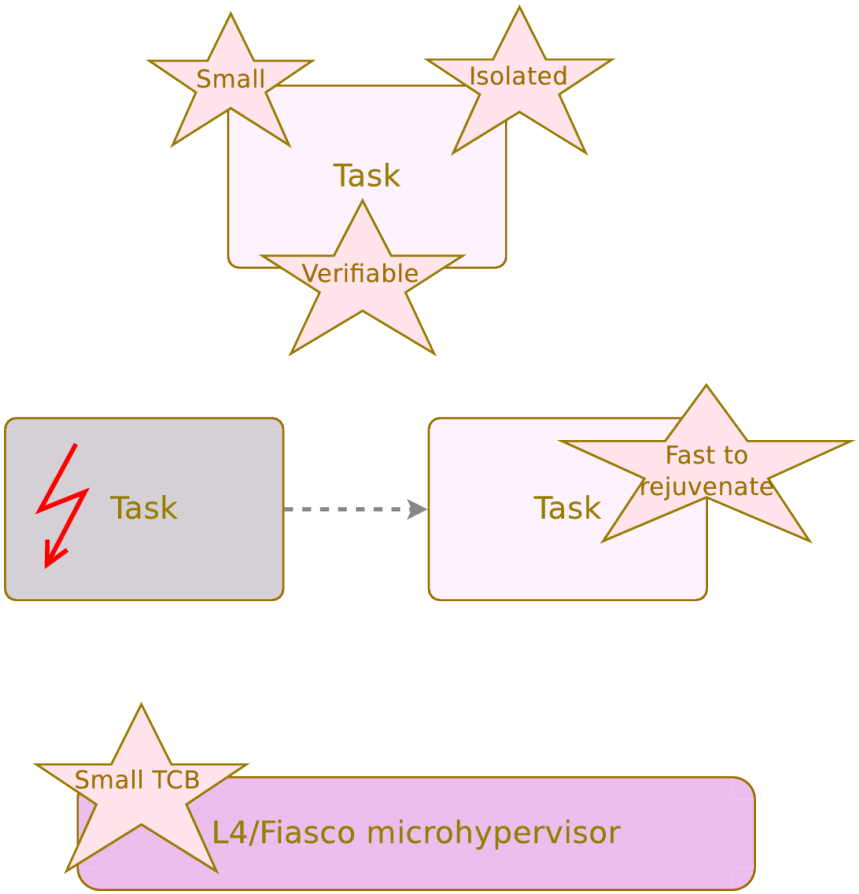
- Multi-processor support
- System calls using capabilities
- Communication through synchronized IPC calls
- L4RE (Runtime Environment) for application development

Designed for Security

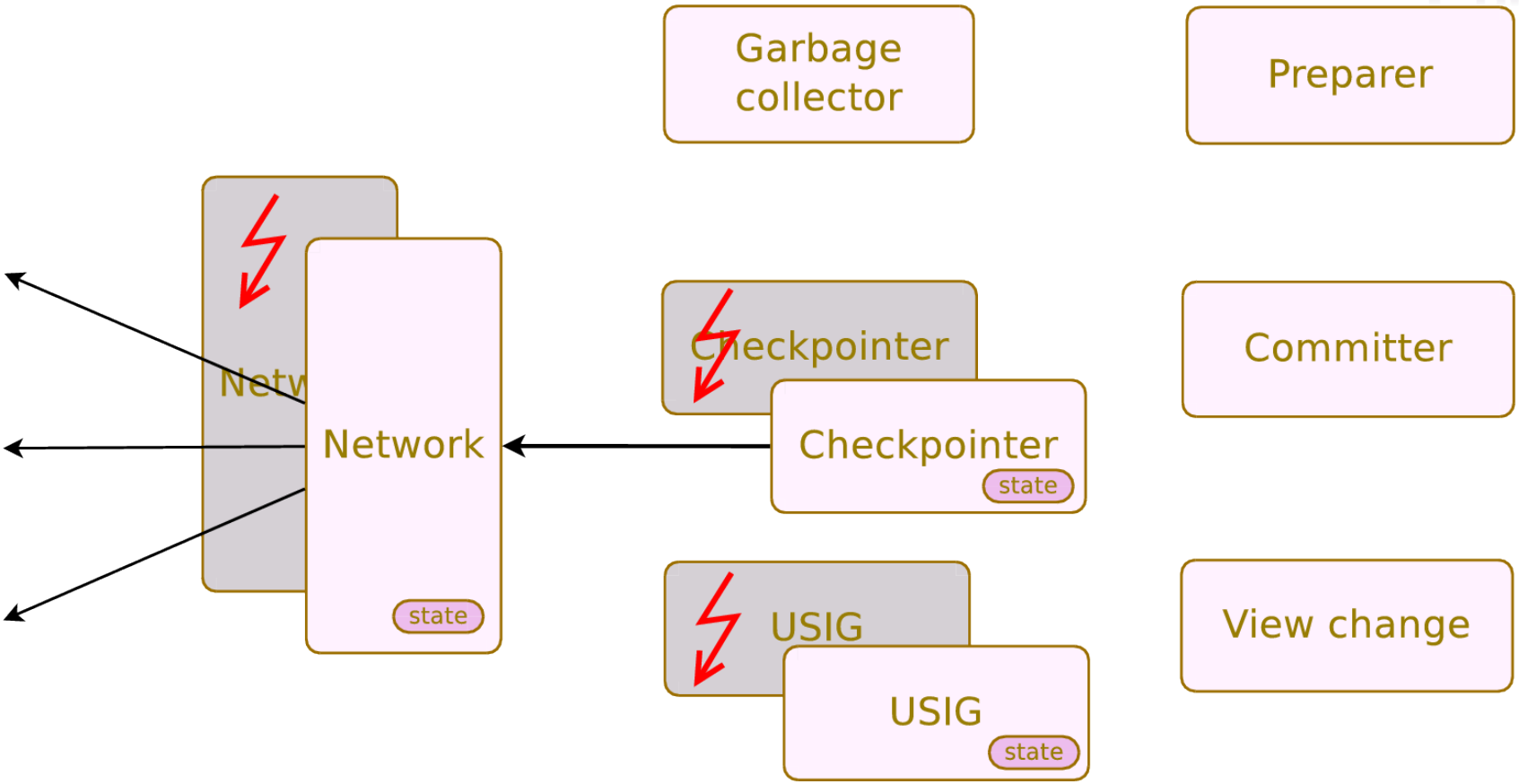


Small isolated verifiable components

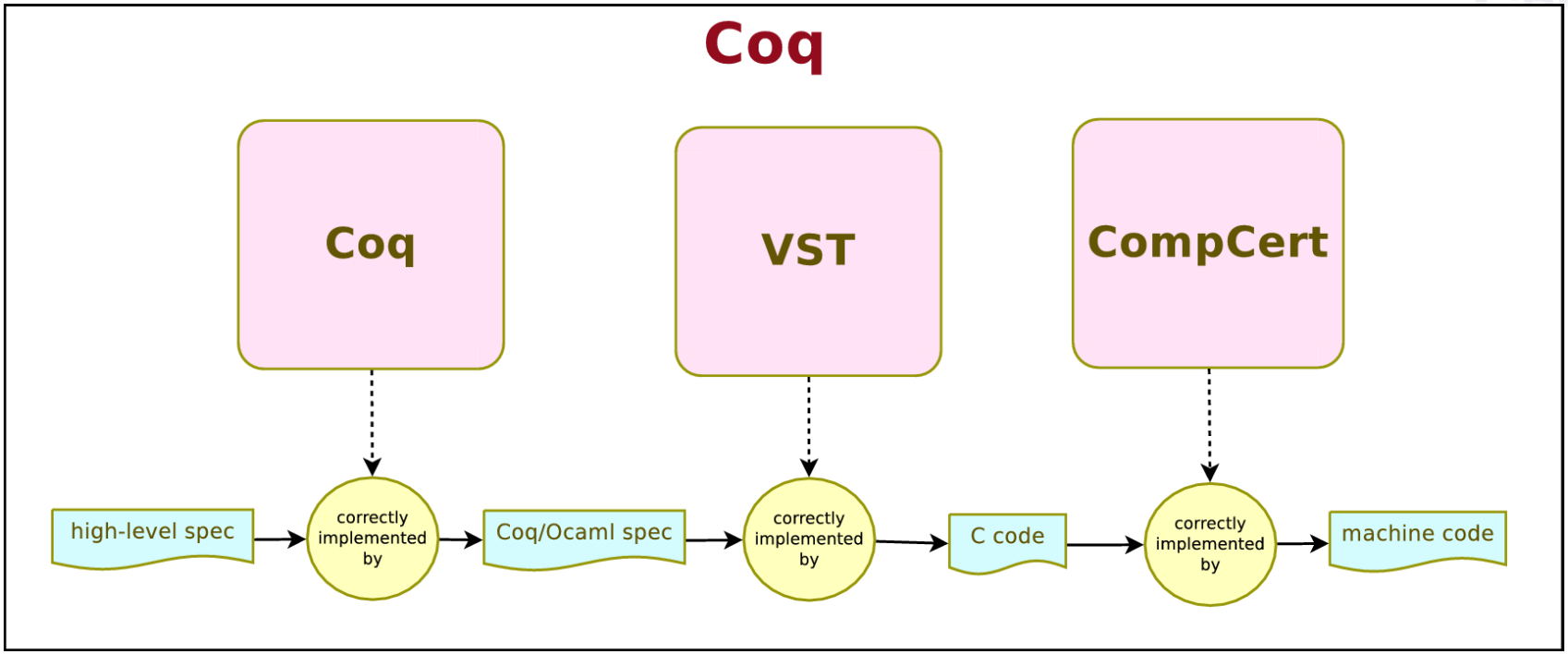
Easier/faster to restart
Selective rejuvenation

Small trusted base:
L4/Fiasco

Fast Recovery



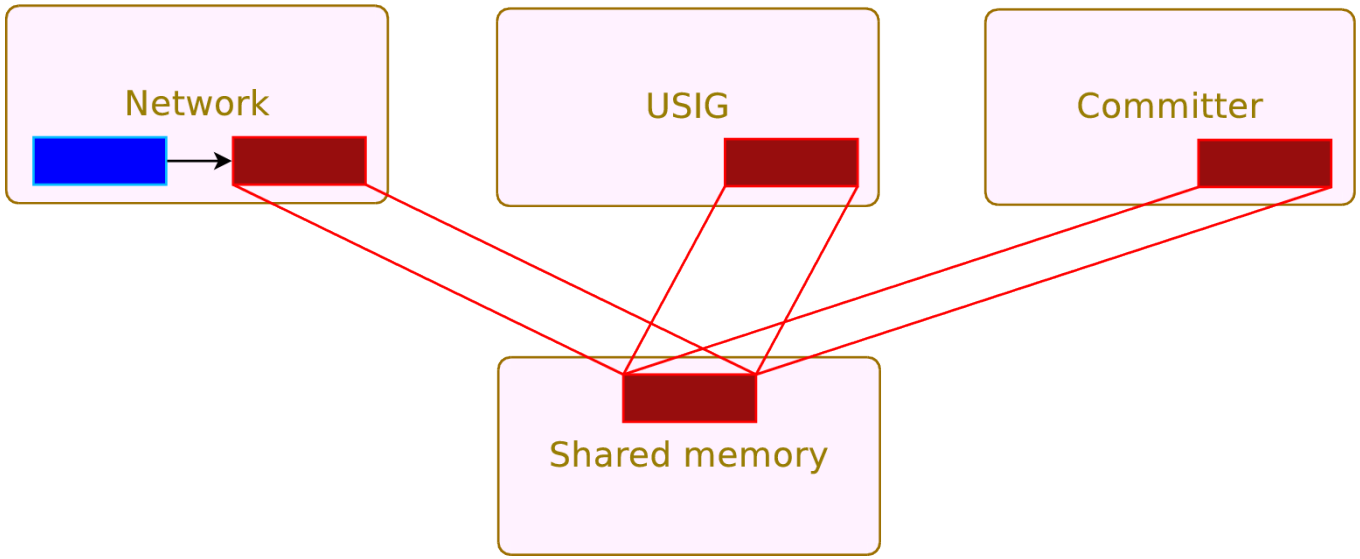
Verification



What guarantees do we get between VST & CompCert?

Implementation

E.g., shared message buffer



Progress so far

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Designing BFT tasks at the Fiasco level

Building and verifying a USIG C task

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Thank You!

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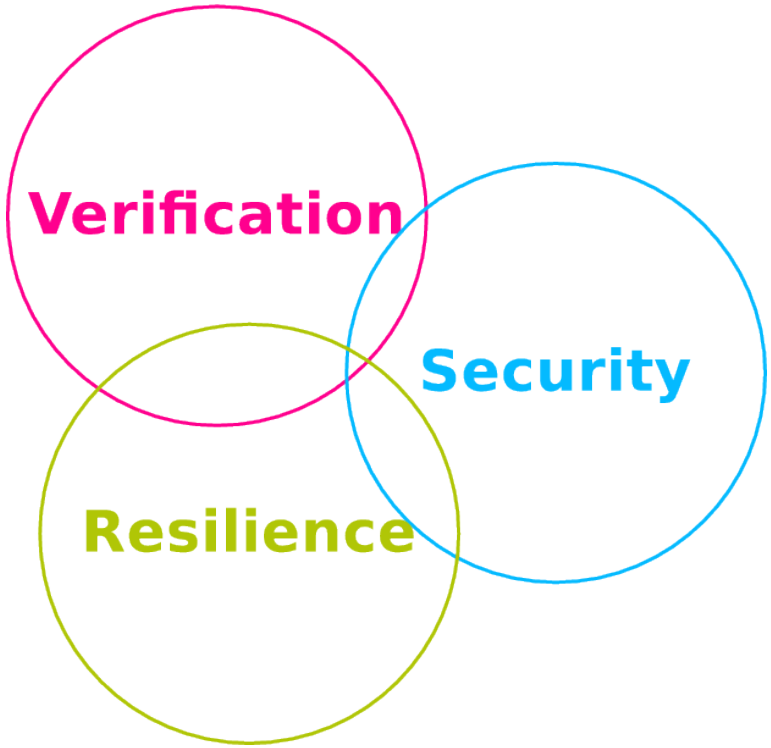

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