Paranoid Stateful Lambda

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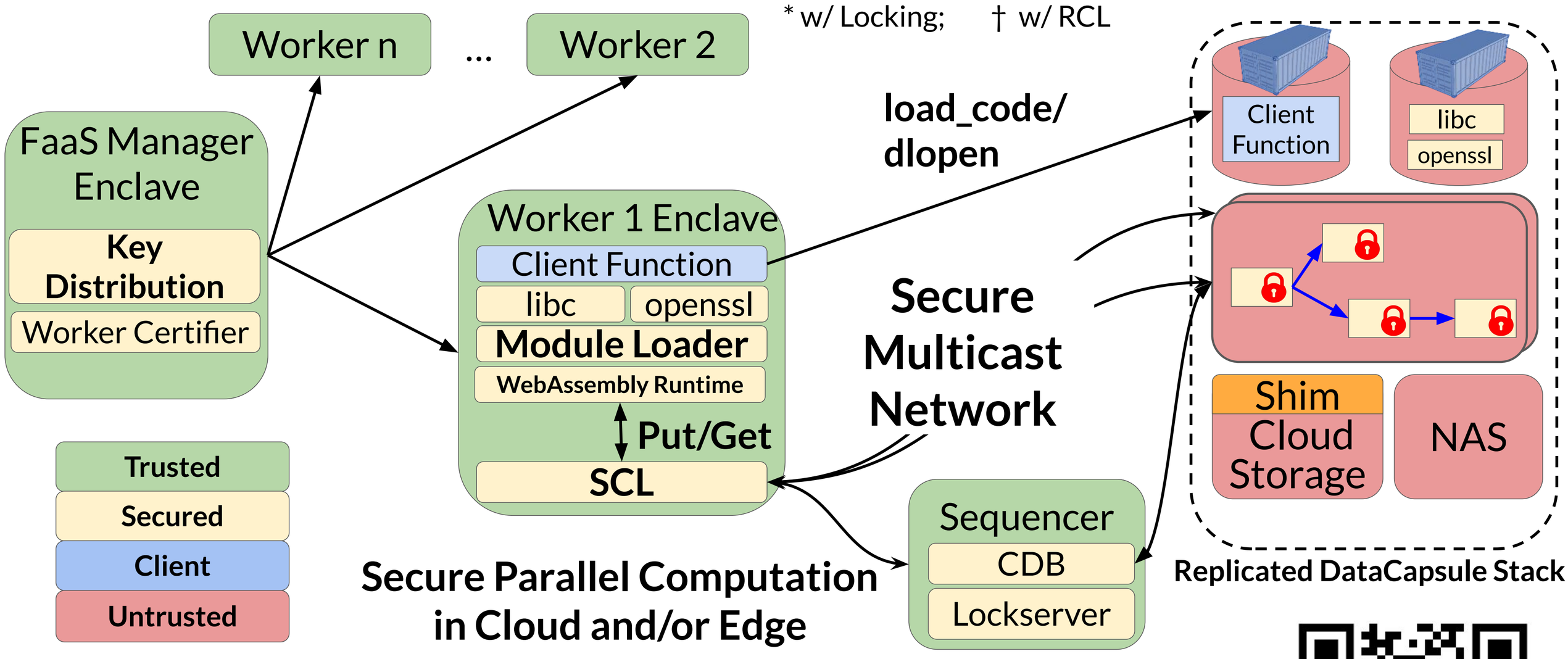
Research Question

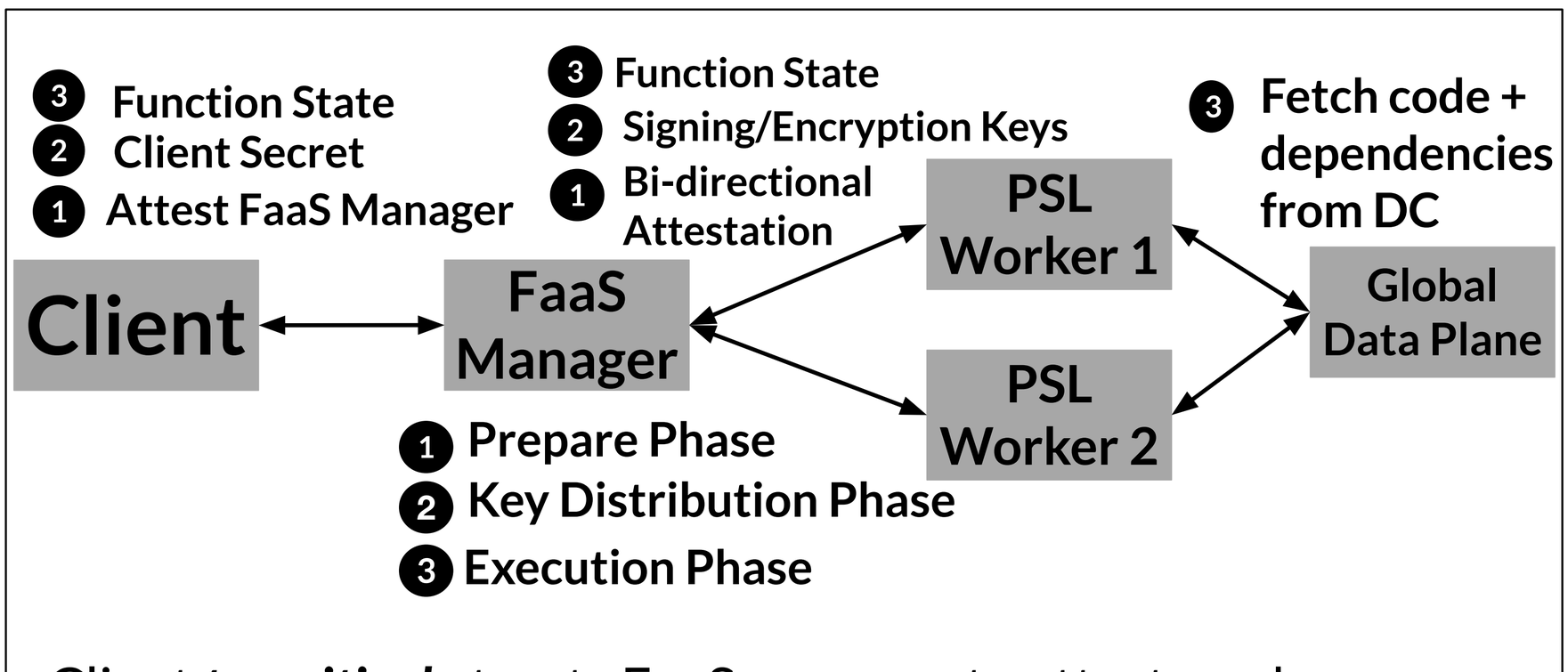
How do we build an end-to-end solution for **secure stateful** Function-as-a-Service platform using Trusted Execution Environments (TEE)?

Domains: (1) Enhanced security for cloud, (2) Execution and storage on the edge

Properties	Cloud-burst	Faasm	CCF	**PSL**
Compute Security	❌	SFI	TEE	TEE
Storage Security	❌	❌	✅	✅
Runtime	Python	WAMR	C++/JS	WAVM
Consistency	Causal	Eventual*	RSM	Eventual†

* w/ Locking; † w/ RCL





Client ***transitively*** trusts FaaS manager to attest workers.
Code + dependencies sent as DataCapsule IDs

Open Questions

- How to attest to dynamically linked binaries?
- How to handle Sequencer crashes?

Secure Concurrency Layer

- Eventual Consistency + Release Consistent Locking
- **Safety:** Durability guaranteed by writing to quorum of DataCapsules.
- **Liveness:** CDB with Sync Reports.