Securing Hyperledger Supply Chain Apps

Rebecca Aspler
Director, Product Management

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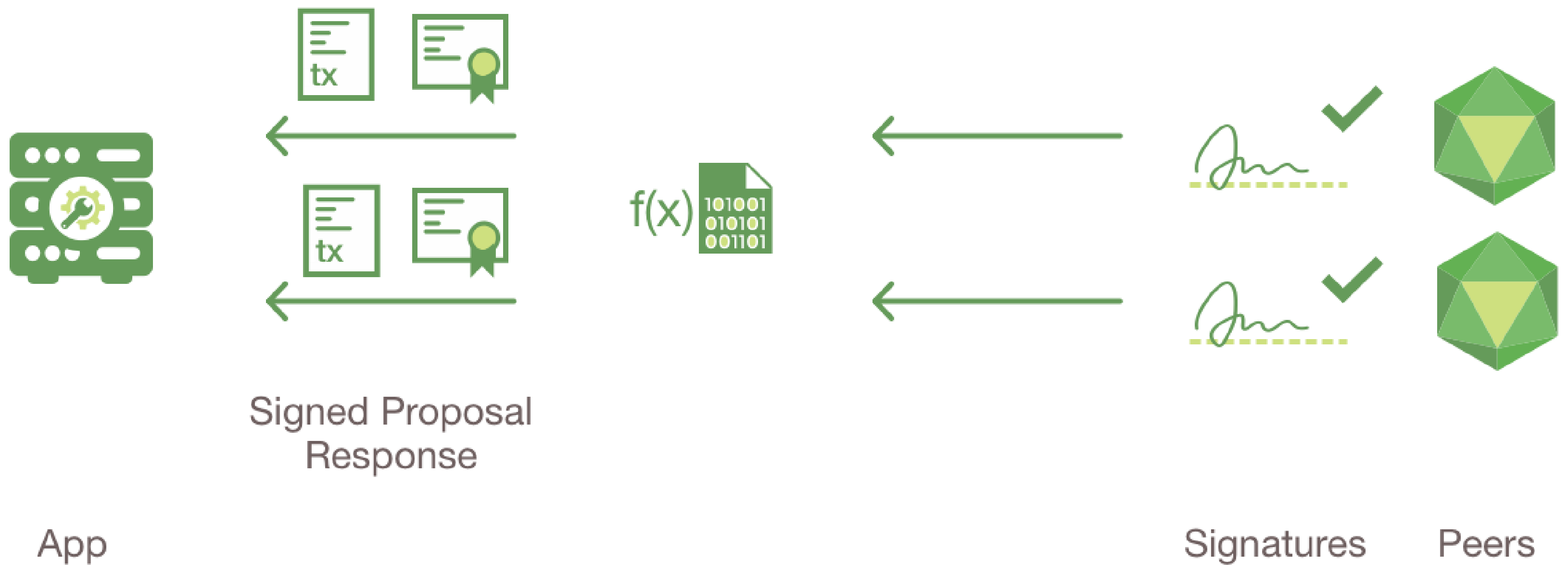
(MATH OVER MATTER)

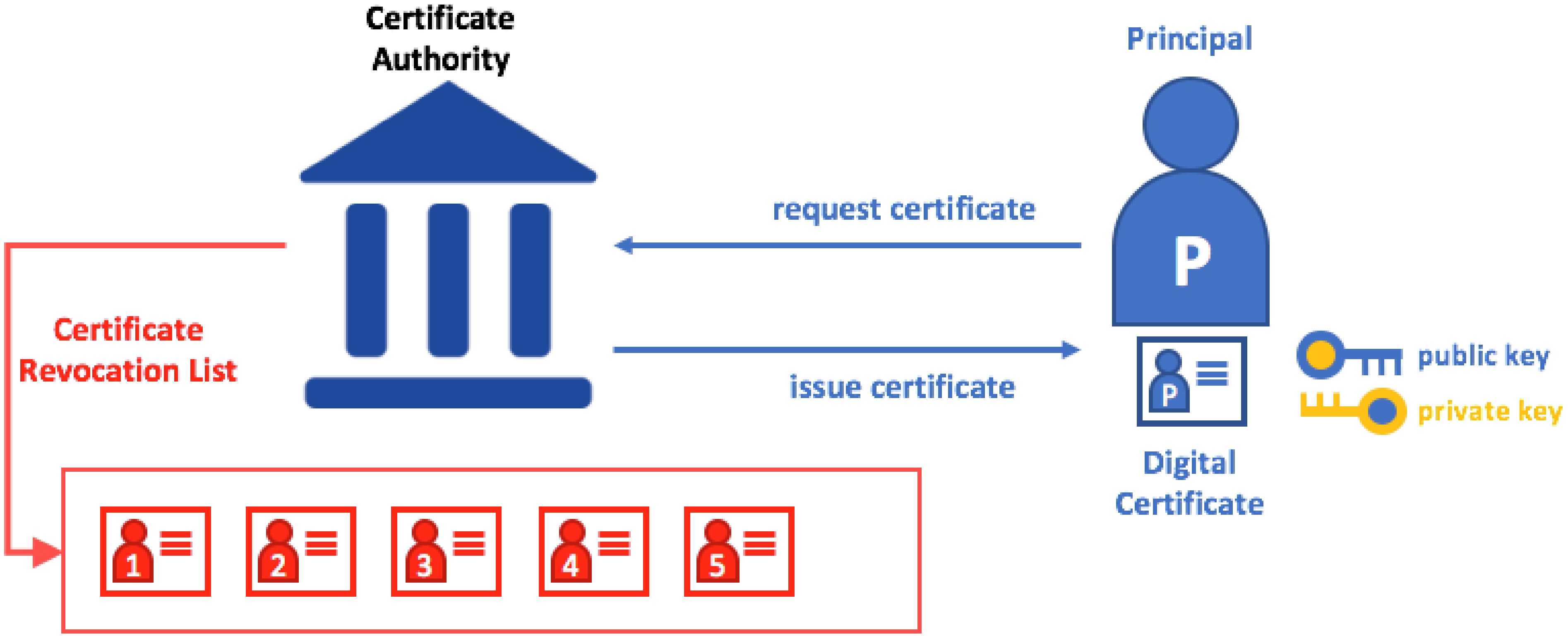
Hyperledger Fabric Security

Transaction Flow

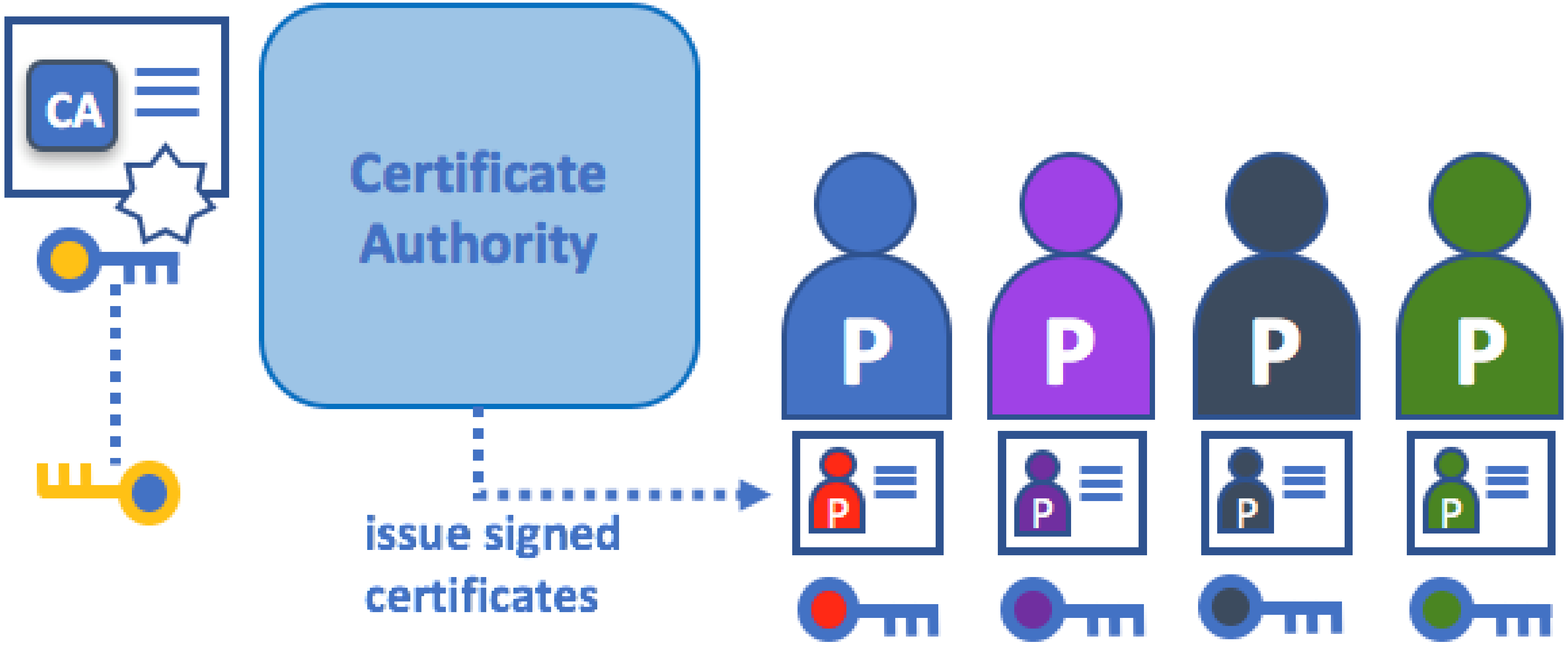
- An application leveraging a supported SDK (Node, Java, Python) utilizes one of the available API's to generate a transaction proposal.
- The proposal is a request to invoke a chain-code function with certain input parameters, with the intent of reading and/or updating the ledger.
- The SDK takes the user's cryptographic credentials to produce a unique signature for this transaction proposal.



Authentication, Public keys, and Private Keys

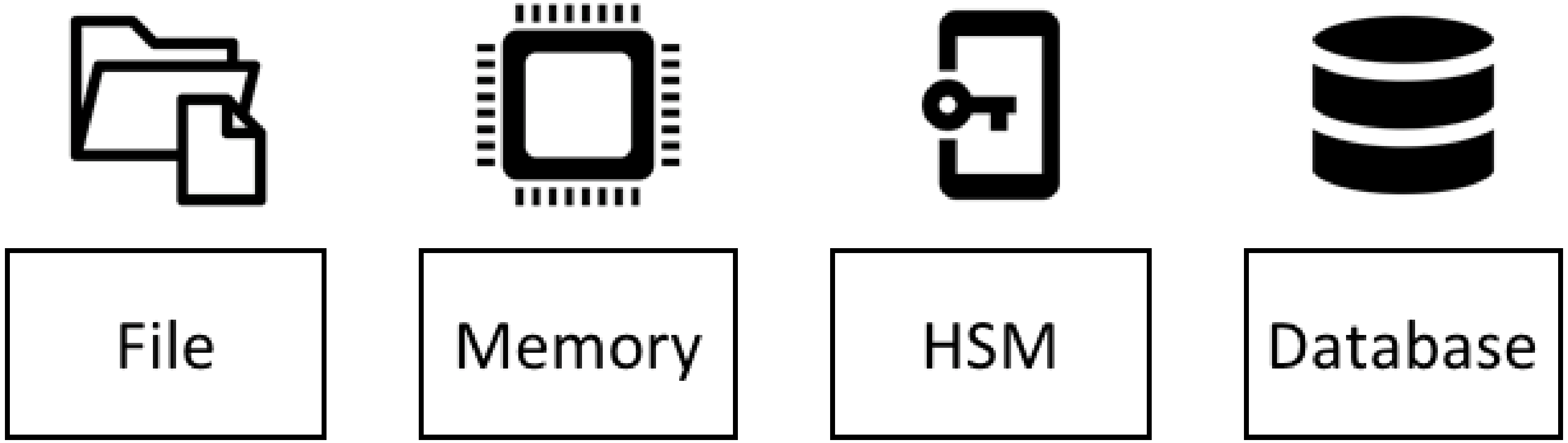


Certificate Authorities

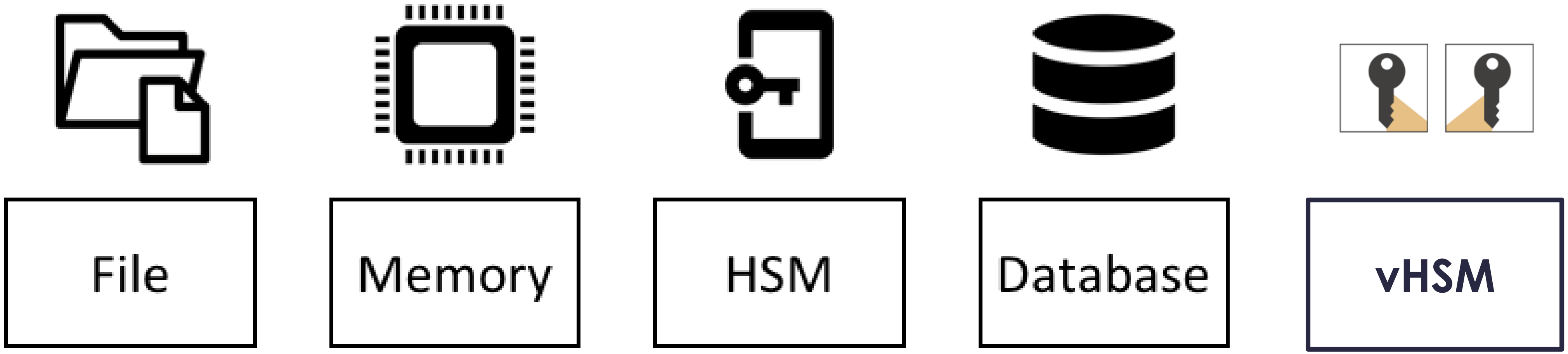


Wallet Types

A wallet contains a set of user identities (=authentication keys).
An application selects one of these identities when it connects to a channel.



Wallet Types



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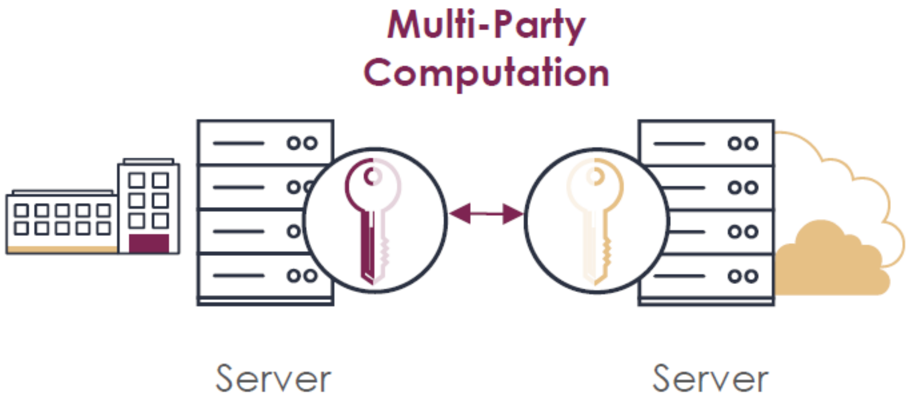
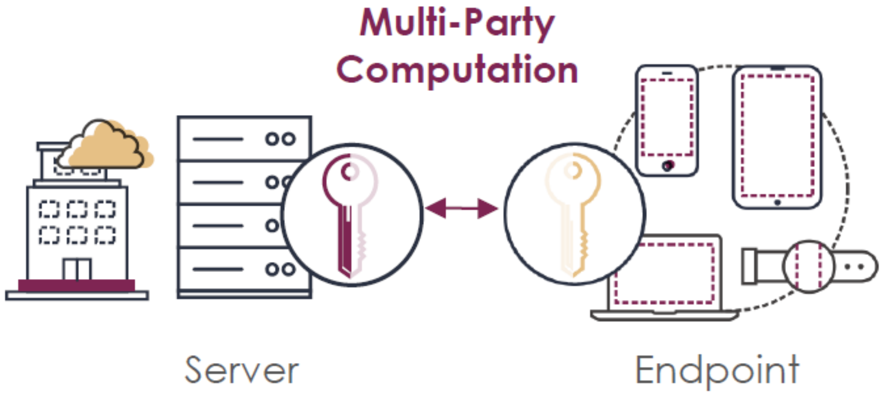
Unbound MPC

Multi Party Computation



Pure-software approach

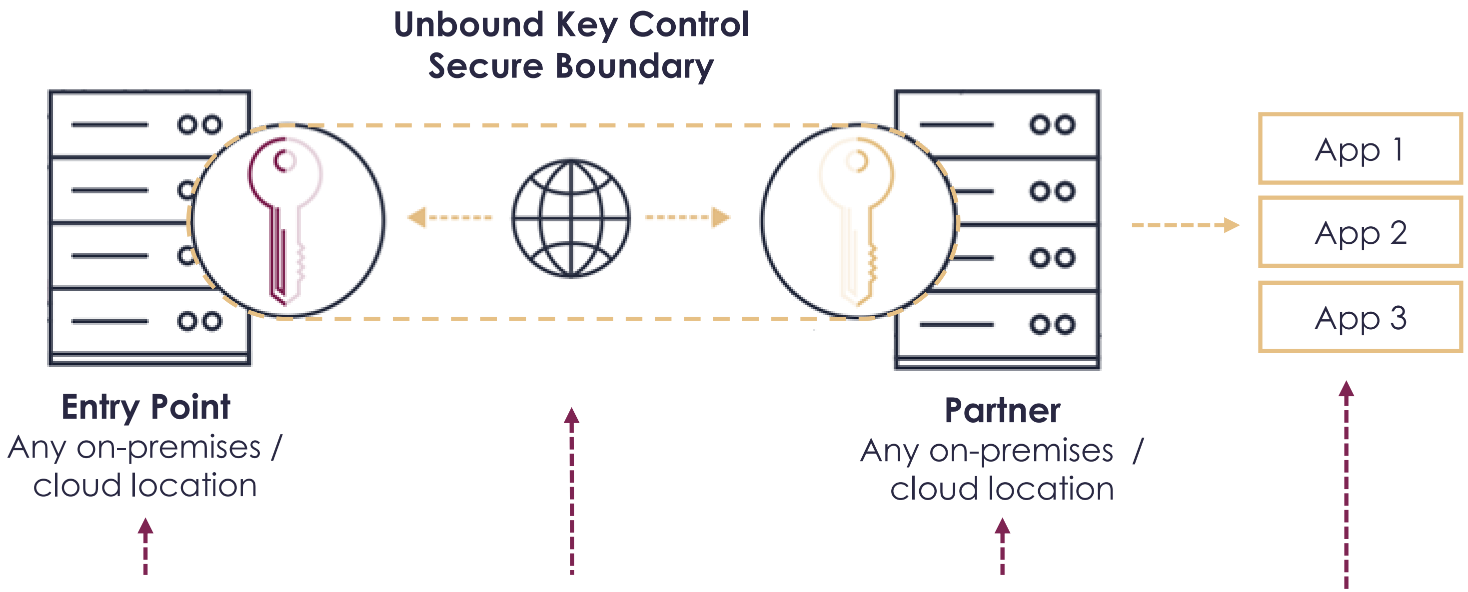
- The key never exists as one entity. It is created and maintained as N random shares
- You can place the random shares at different places
- Use of shares without ever bringing them together
- The Share are refreshed after each transaction



Underlying technology

- MPC cryptography protocol
- Machines jointly working while keeping inputs private (Zero Knowledge Proof)
- Security guarantee – mathematically proven

Secure as Cold. Purely in Software



You control the full key lifecycle

Revoke keys instantly at any time

Never trust any single entity with key material, even when generated and when in use

Mathematical guarantee of confidentiality unless key shares from **all** nodes are exposed **simultaneously**

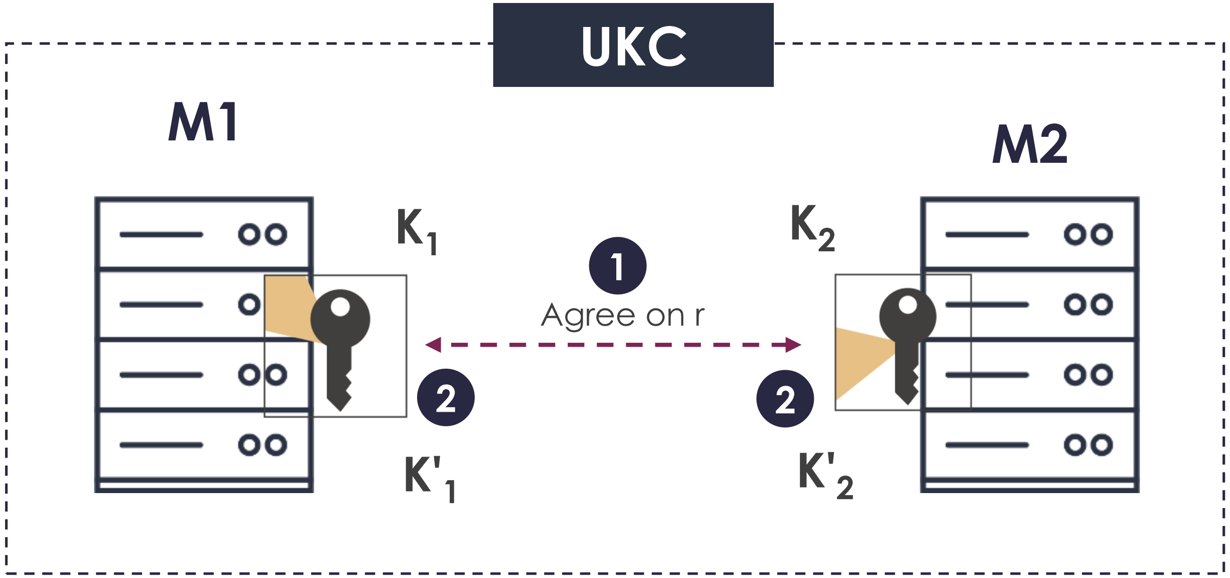
Keys can be used for any purpose by any service or app, anywhere, without obtaining key material

Key Part Refresh

Frequent refresh intervals using jointly chosen random number means attackers must have access to both servers simultaneously

1. Machines M1 and M2 choose random number (r) via secure coin tossing protocol

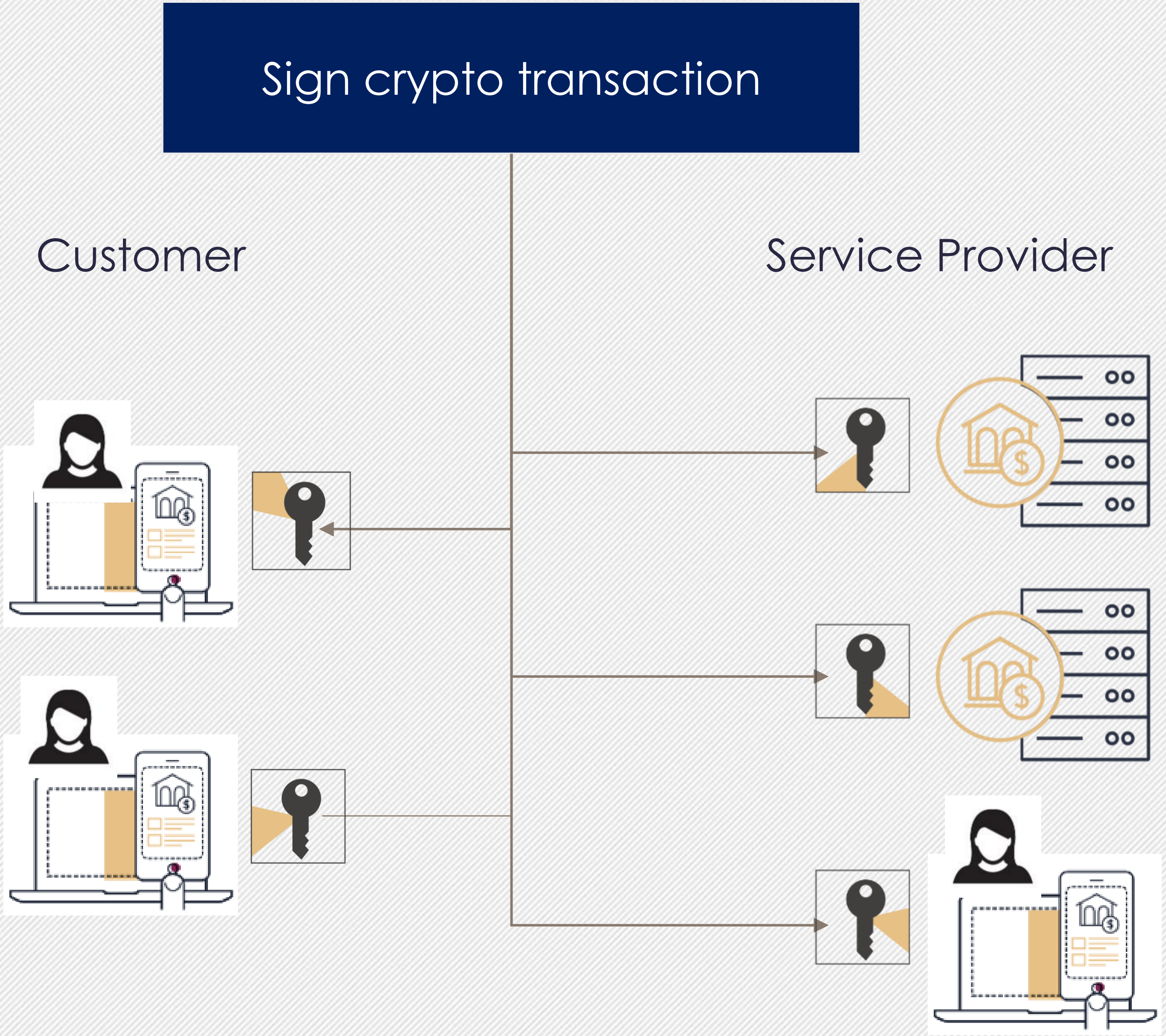
2. Given private key (K) and existing key shares (K_1) and (K_2):
M1 computes $K'_1 = K_1 + r$
M2 computes $K'_2 = K_2 - r$



Given K_1 and $K'_2 = K_2 – r$, **nothing can be learned about the private key, K**

CASP – Risk Based Policies

- Distributed cryptography - no single point of compromise
- Key material is never in the clear
- Supports any device and platform
- Async approval of transactions
- Ledger Agnostic
- Sophisticated MofN Quorums



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Unbound Crypto Asset Security Platform
Key Features

Pure Software

A software solution providing hardware level security using MPC for Blockchain based Crypto Assets.

Asset Agnostic

Support for the top any asset, any platform and any client.

Crypto Agile

Supporting ECDSA and EDDSA(Ed25519) curves;
Adding new curves as needed.

Deterministic Wallets

Supporting BIP 32/44

Cryptographically Enforced

Multi Party Approval

M-of-N quorum (in N groups) enforcement, multiple approvers required for transactions.

Risk Based Policies

Example risk related parameters:

- Amount,
- Asset type,
- Time in the week
- Time in the day

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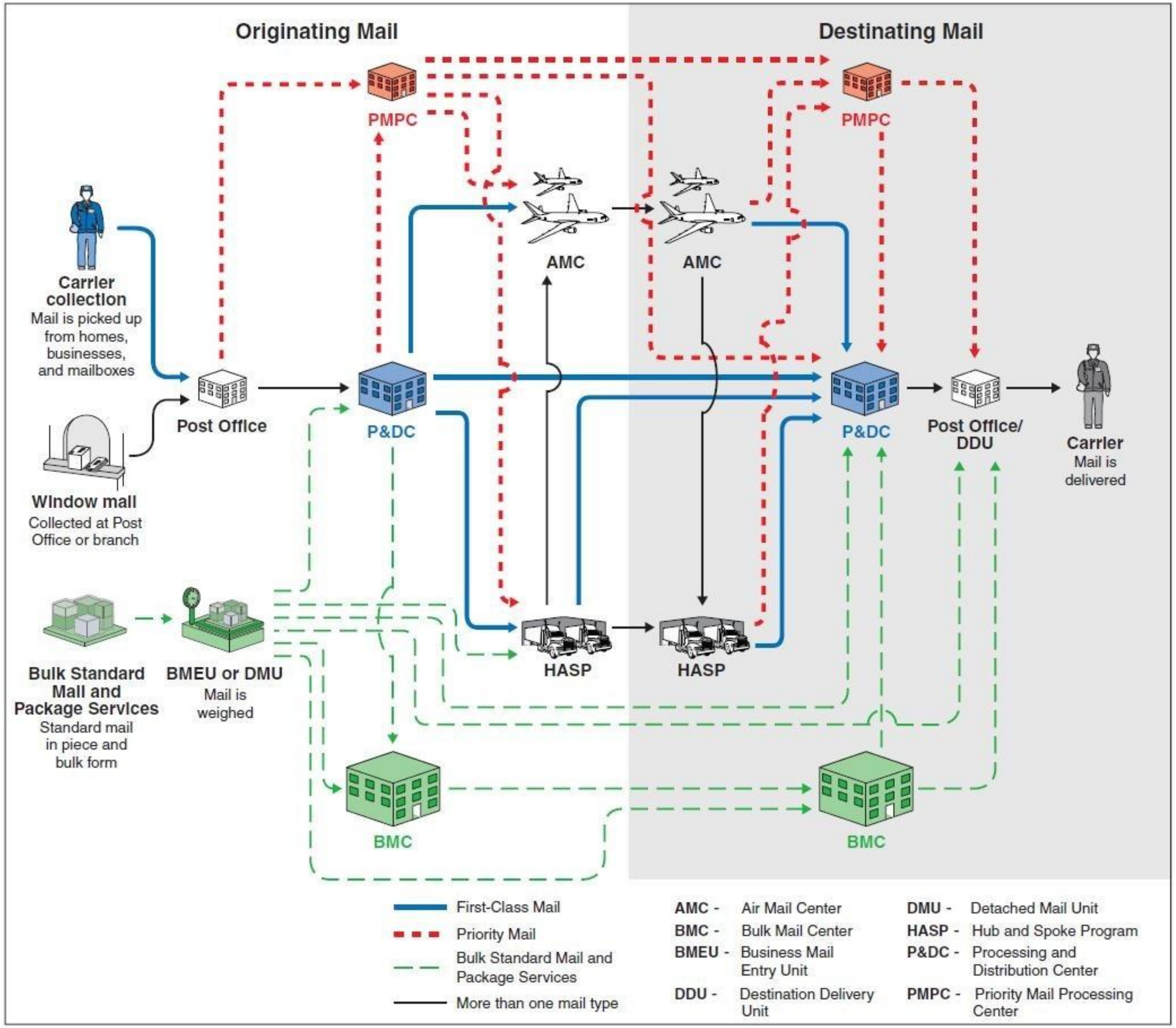
Case Study

Supply Chain Case Study



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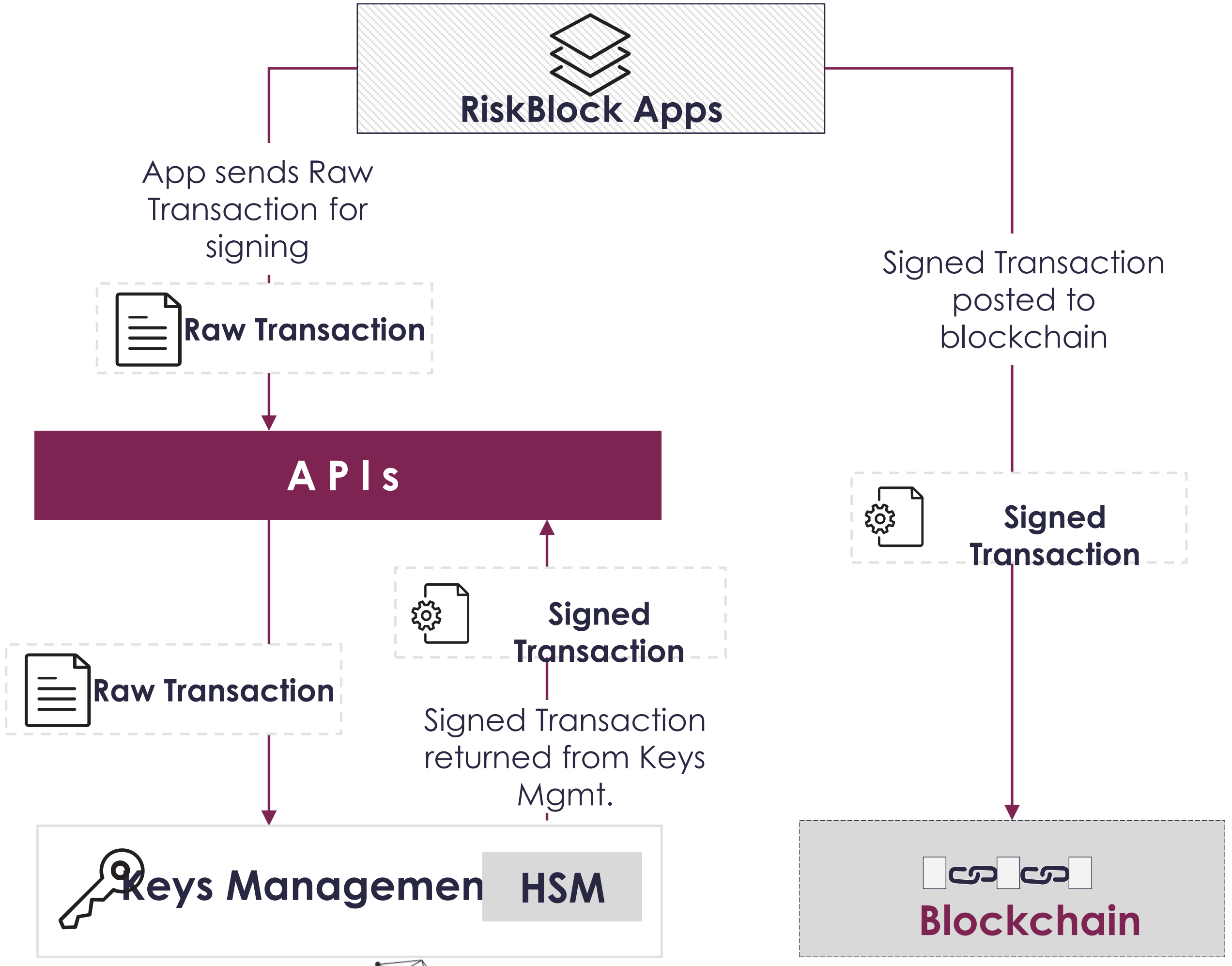
Example

Keys Management - Transaction Signing

Architecture | Interoperability | Membership Management | Identity Management | Permissions Management | **Keys Management** | Information Management | Usage Monitoring



Transaction Signing

- As an overarching **Security Guideline**, Account Keys once stored on HSM will never leave the HSM
- Keys Management module exposes a **robust and lightweight API** for application integration
- Applications will need to **sign transactions** via Key Management APIs before posting to respective blockchains
- **High performance** to ensure high system throughput

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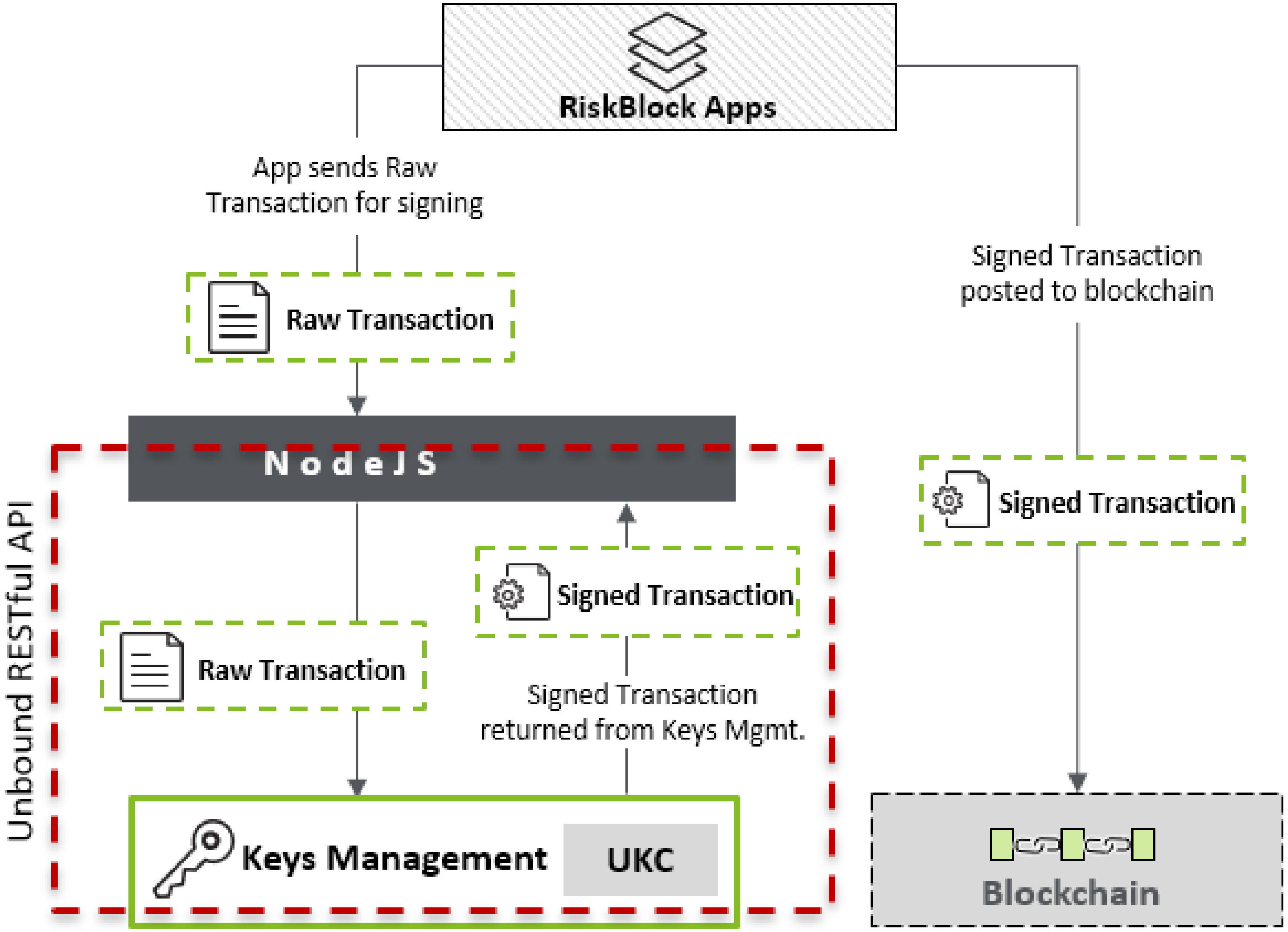
Example

Keys Management - Transaction Signing



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