# Blockchain-based enterprise applications

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## MOTIVATION

- Sophisticated consumption monitoring is a challenge for the energy sector
- The issues related to the security and privacy of consumption data present serious challenges
- Consumers, property management companies, heating distributors and heating companies together form a business network
- Such a business network must be decentralized in order to prevent decision-making from becoming concentrated in the hands of a single party.

## INTRODUCTION

- Blockchain is a decentralized immutable ledger that forbids any member from unilaterally processing transactions or making decisions on the network.
- Transactions are kept in blocks, with each block containing the hash of the previous one, making the ledger verifiable.
- Network participants in permissioned networks, such as Hyperledger Fabric, are identified and authenticated. Resource-intensive approaches like Proof of Work are no longer required and the need to deploy cryptocurrency is eliminated.

## THESIS GOALS

- Design of blockchain-based enterprise application for real-world use case.
- Implement and evaluate a proof-of-concept solution.
- Evaluate performance of developed solution.

## MONITORING

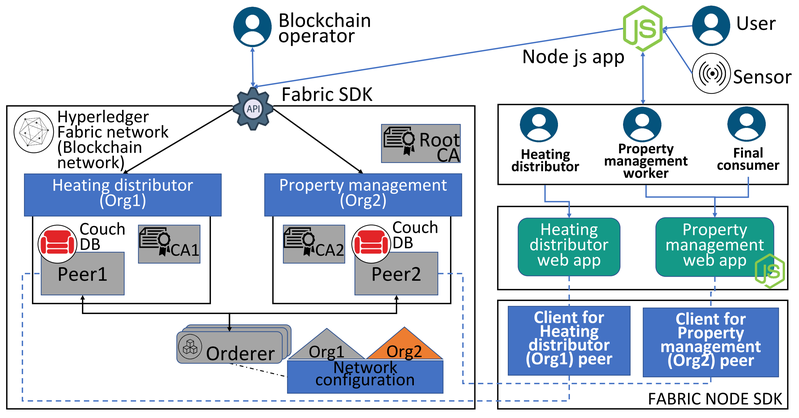
**BEFORE Blockchain**

- MANUAL EASY TO MANIPULATE READINGS
- EVERY PARTICIPANT HAS HIS OWN "VIEW OF TRUTH"
- UNRELIABLE RECORDS, QUESTIONABLE AUDITABILITY
- ABILITY TO FAKE PROBLEMS
- INTERMEDIARIES

**AFTER Blockchain**

- MORE FREQUENT IMMUTABLE READINGS
- EVERY PARTICIPANT HAS THE SAME "VIEW OF TRUTH"
- RELIABLE RECORDS, AUDITABILITY
- INABILITY TO FAKE PROBLEMS
- NO INTERMEDIARIES

## HIGH LEVEL ARCHITECTURE




## EVALUATION – PERFORMANCE CALIPER

**EXPERIMENT 1**

- Determines Caliper's highest possible actual send rate
- Fixed-rate rate controller
- Higher amount of workers should lead to higher send rate

**EXPERIMENT 2**

- Measurable metric - throughput
- Fixed-load rate controller
- Highest possible success rate

| Name | Workers | TRXN succ | TRXN Fail | Throughput (TPS) |
|---|---|---|---|---|
| EXPERIMENT 1 readFixed | 1 | 10000 | 0 | 280.8 |
| | 2 | 10000 | 0 | 397.9 |
| | 3 | 9130 | 869 | 461.8 |
| | 4 | 7676 | 2324 | 463.6 |
| | 5 | 7510 | 2490 | 447.8 |
| EXPERIMENT 1 getHistoryFixed | 1 | 9216 | 784 | 143.2 |
| | 2 | 5729 | 4271 | 185.8 |
| | 3 | 6273 | 3726 | 317.1 |
| | 4 | 5318 | 4682 | 288.9 |
| | 5 | 4943 | 5057 | 291.9 |
| EXPERIMENT 2 readLoad | 1 | 10000 | 0 | 292.8 |
| | 2 | 10000 | 0 | 449.6 |
| | 3 | 9999 | 0 | 487.4 |
| | 4 | 10000 | 0 | 408.5 |
| | 5 | 10000 | 0 | 416.7 |
| EXPERIMENT 2 getHistoryLoad | 1 | 10000 | 0 | 170.3 |
| | 2 | 10000 | 0 | 153.9 |
| | 3 | 9999 | 0 | 138.7 |
| | 4 | 10000 | 0 | 132.3 |
| | 5 | 10000 | 0 | 130.7 |

## SOLUTION BUILDING