Access Control on Smart Contract

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Access Control

Technique to decide whether a Subject requesting to perform an Action on a Resource in a given Context holds the right the perform it

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Subject

Resources

Access Control

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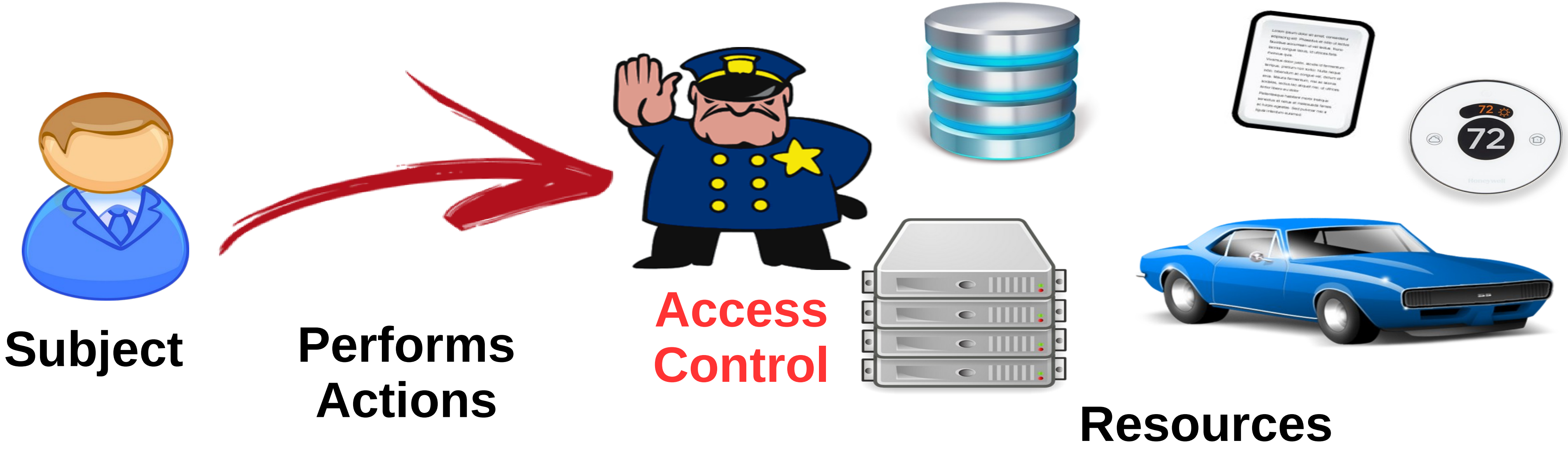
Subject

Performs Actions

Resources

Access Control

Technique to decide whether a Subject requesting to perform an Action on a Resource in a given Context holds the right the perform it



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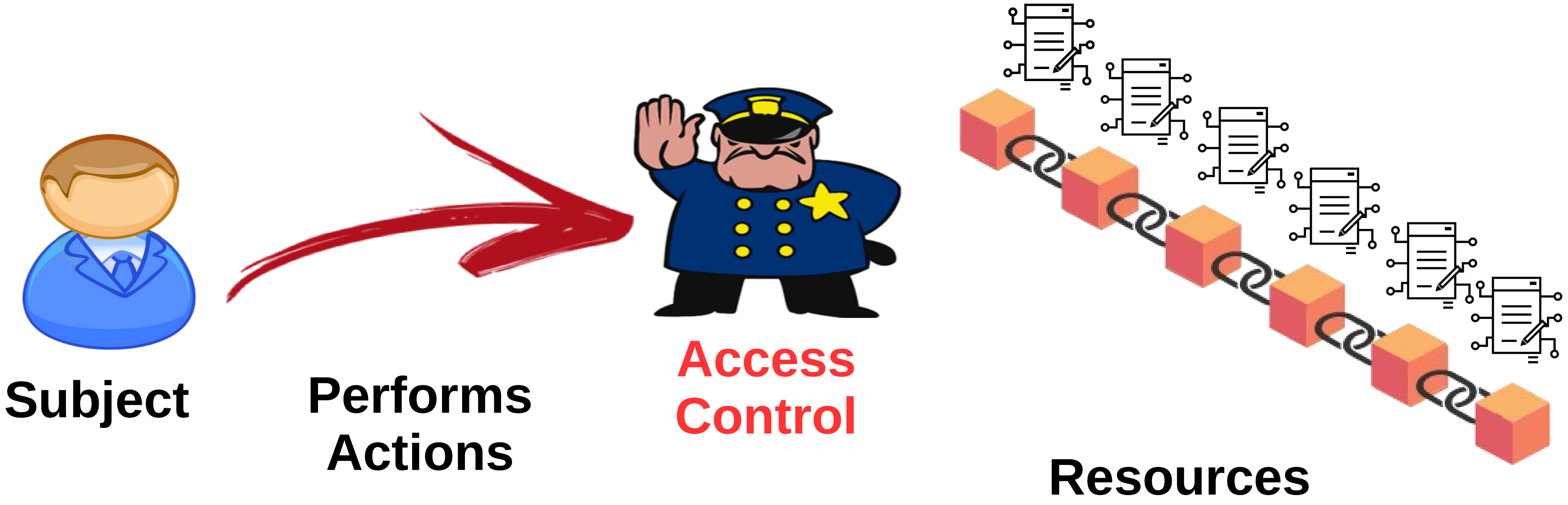

Blockchain-based Access Control Systems

- The access control system logic is a smart contract on the blockchain
- The access control policies are on the blockchain
- The decision factors are on the blockchain
- The access decision process is executed on the blockchain

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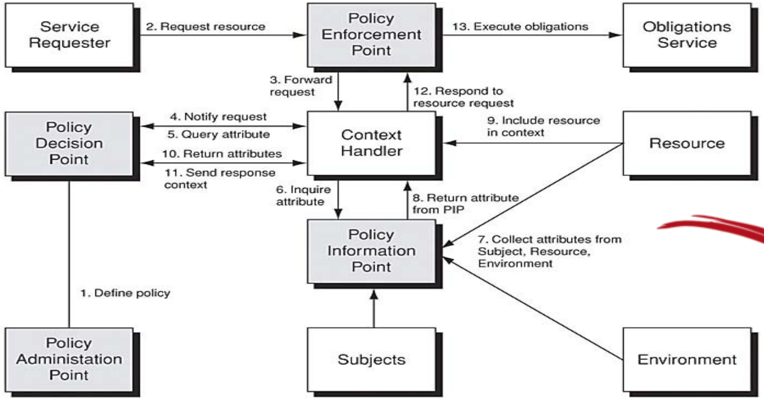
Blockchain Brings to Access Control Systems

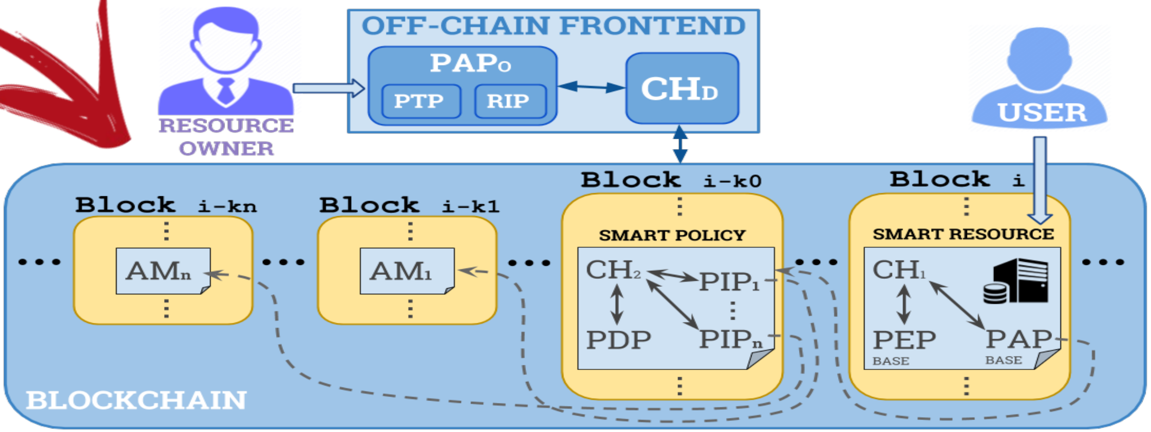
- Trusted execution environment
- Transparency
- Auditability

Attribute Based Access Control on Blockchain

- Decision factors are attributes paired to subjects and objects
- OASIS XACML is a well known standard for ABAC



OASIS XACML
reference architecture



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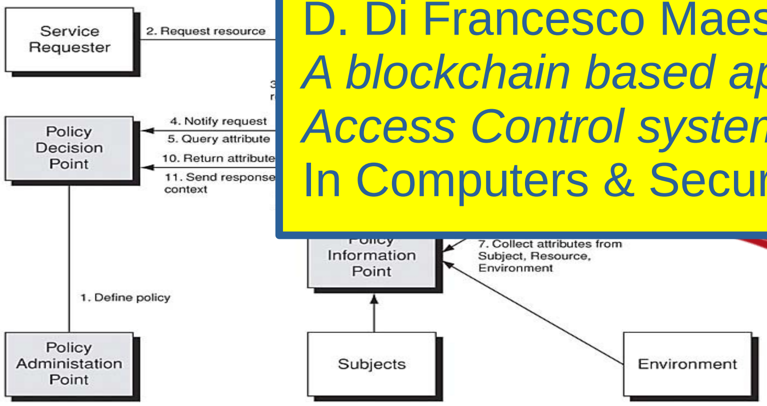
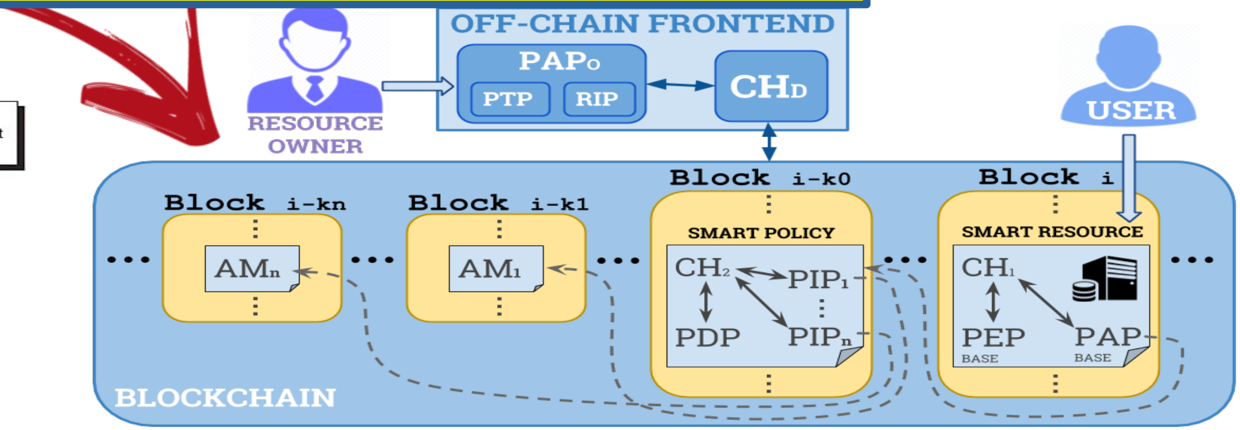
D. Di Francesco Maesa, P. Mori, L. Ricci:
A blockchain based approach for the definition of auditable Access Control systems.
In Computers & Security, Elsevier Science, vol. 84, 2019

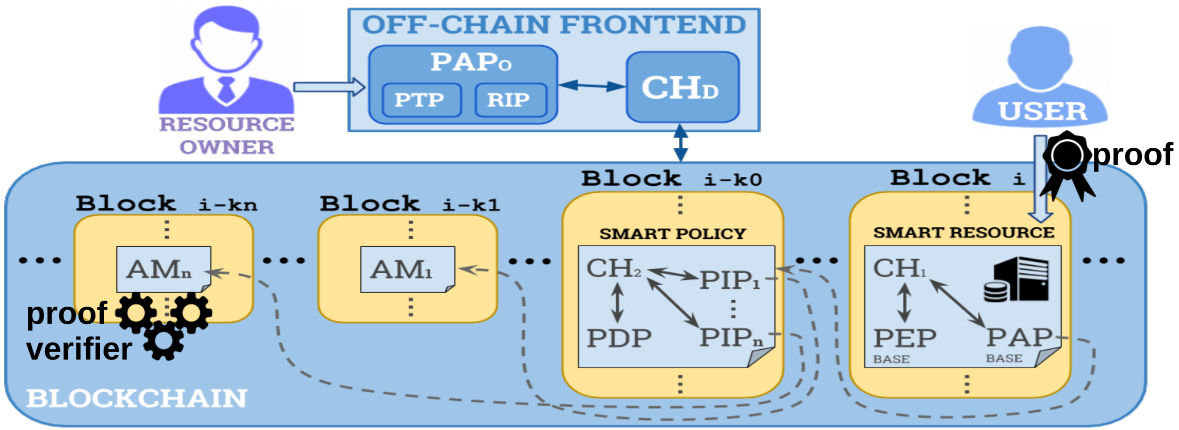


XACML reference architecture



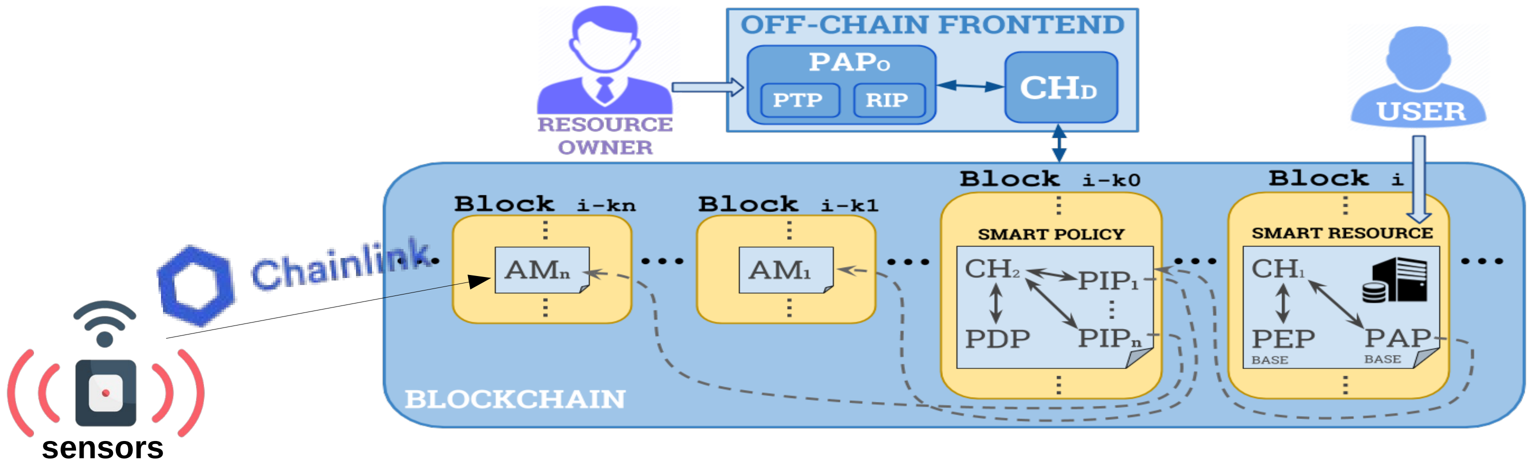
Attribute Based Access Control on Blockchain with **Privacy** Preserving Attribute Management

- Some user attributes could be **sensitive information**
- Zokrates is used to allow zero-knowledge evaluation of conditions on sensitive attributes



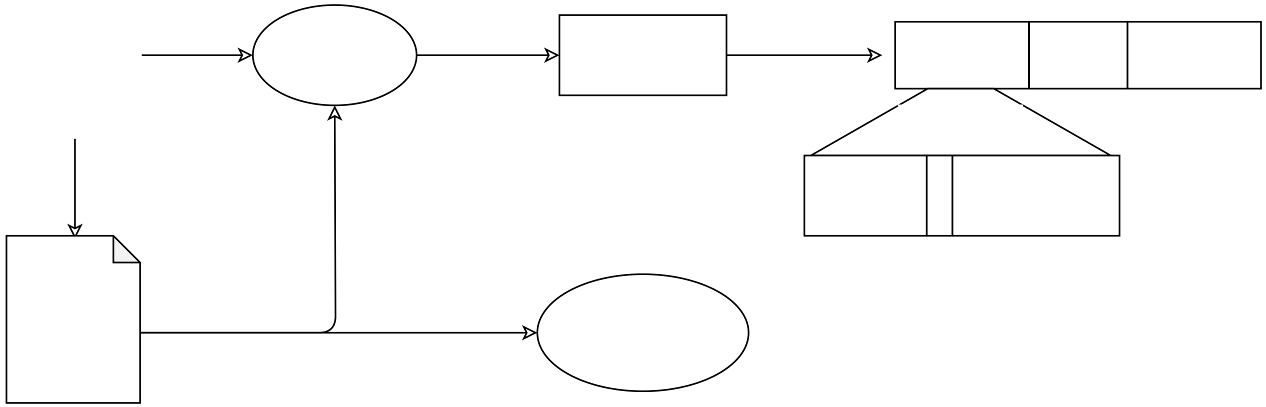
Attribute Based Access Control on Blockchain with **Externally Produced Attributes**

- Some attribute values are produced outside the blockchain (physical sensors)
- Chainlink is used to import externally produced values on the blockchain



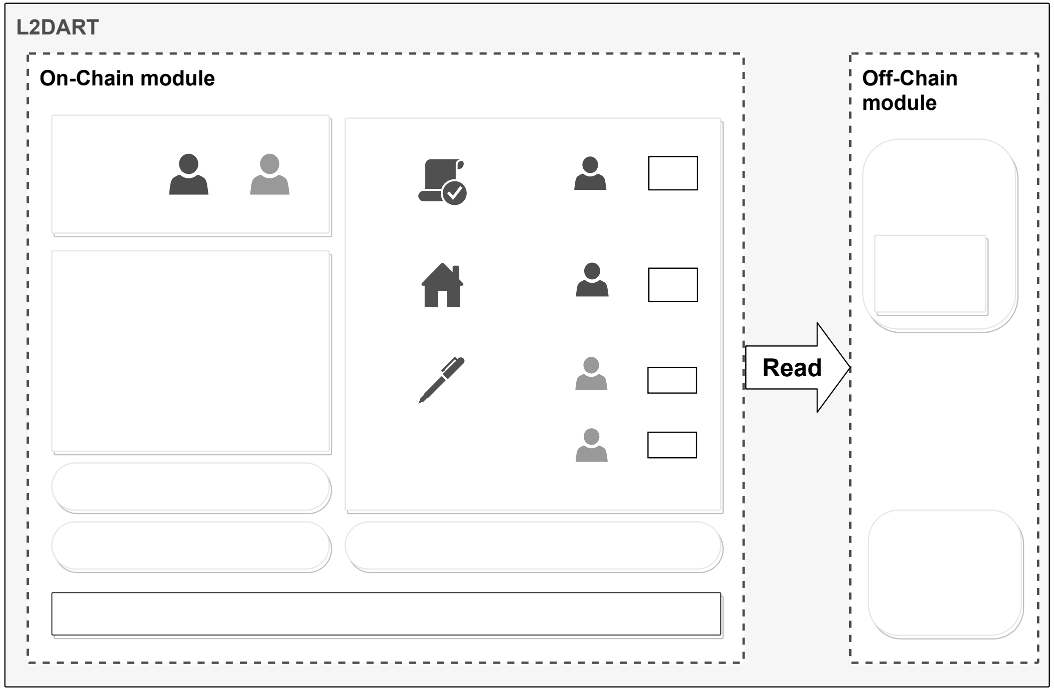
RTML-based Access Control on Blockchain

- Decision factors are roles paired to the subject
- Actors define Trust credentials
- Trust credentials allow to compute roles dinamically (RTML)



RTML-based Access Control on Blockchain with **Off-chain** Computation of Roles

- Roles computation is performed off-chain, along with the proof
- The proof is verified on-chain



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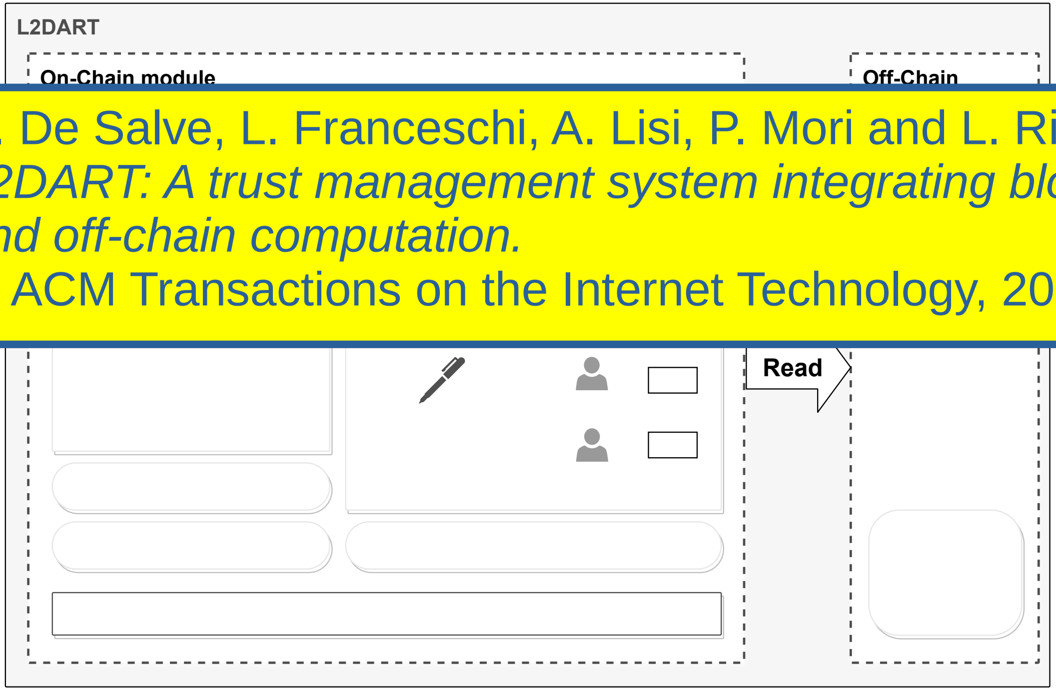

A. De Salve, L. Franceschi, A. Lisi, P. Mori and L. Ricci:
L2DART: A trust management system integrating blockchain and off-chain computation.
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Thank you!