



ALMA MATER STUDIORUM  
UNIVERSITÀ DI BOLOGNA

# A Blockchain-based Flight Data Recorder for Cloud Accountability

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# Cloud Computing

On-demand self service

Broad network access

Resource pooling

Rapid elasticity

Measured service



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## Reliability



# Cloud Computing

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Broad network access

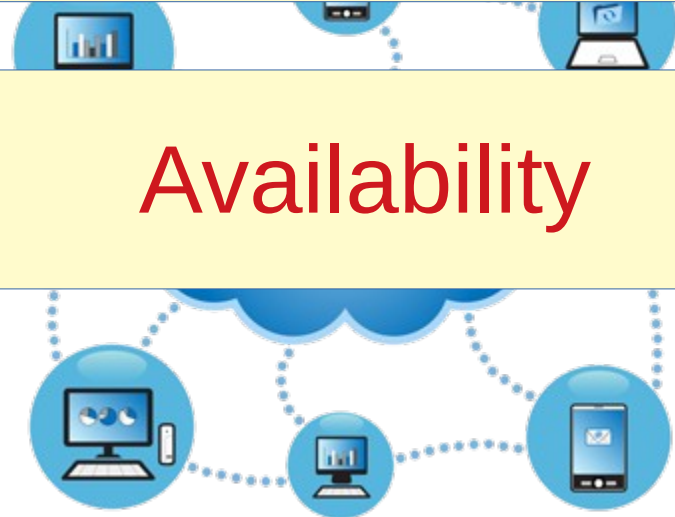
Resource pooling

Rapid elasticity

Measured service

Reliability

Availability



# Cloud Computing

On-demand self service

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Resource pooling

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Measured service

**Reliability**

**Availability**

**Accountability**



# Cloud Computing

User Domain

Alice



# Cloud Computing

User Domain

Alice



Service Domain

Bob



# Cloud Computing

User Domain

Service Domain

Bob, please handle my data

Alice



Bob





# Cloud Computing

User Domain

Alice



Service Domain

Bob



# Cloud Computing

User Domain

Alice



Service Domain

Bob



Cloud Domain

Carl



# Cloud Computing

User Domain

Alice



Service Domain

Carl, please hold my service  
and the data I have

Bob



Cloud Domain

Carl



# Cloud Computing

User Domain

Alice



Service Domain

Bob



Cloud Domain

Carl



# Accountability

User Domain

Alice



Service Domain

Bob



Cloud Domain

Carl



If something goes **wrong**, **who** is **accounted**?



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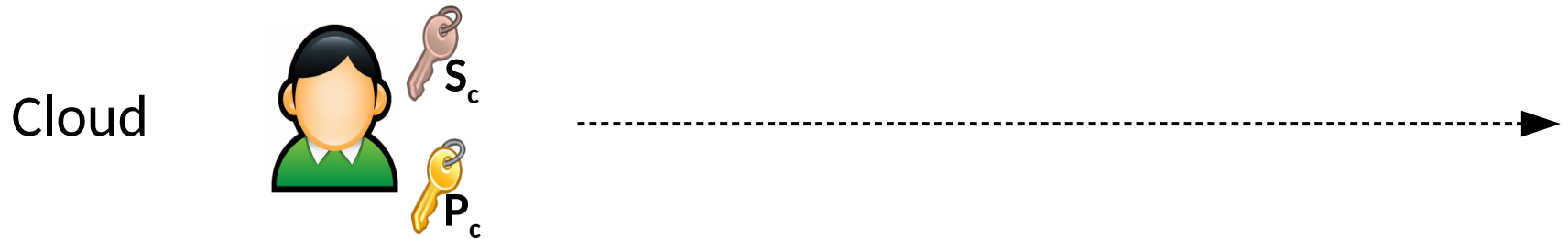
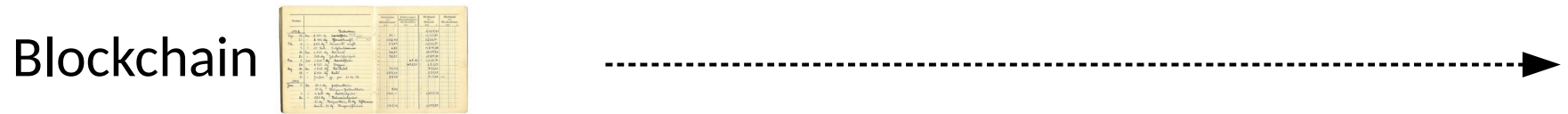
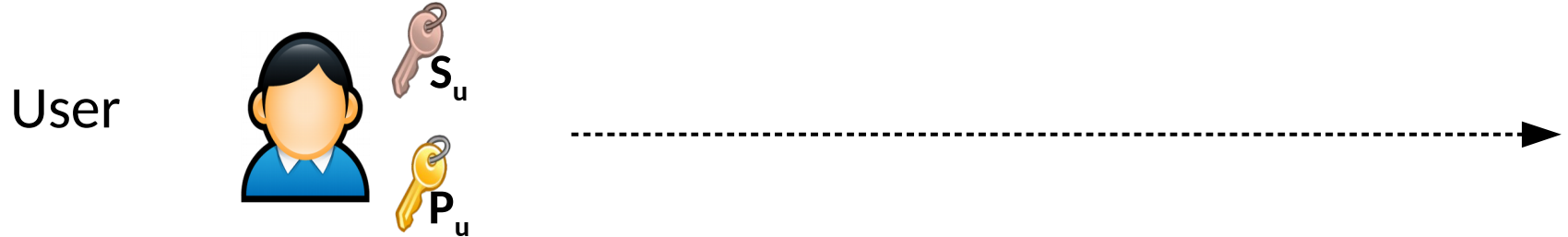


# Blockchain as a Flight Data Recorder

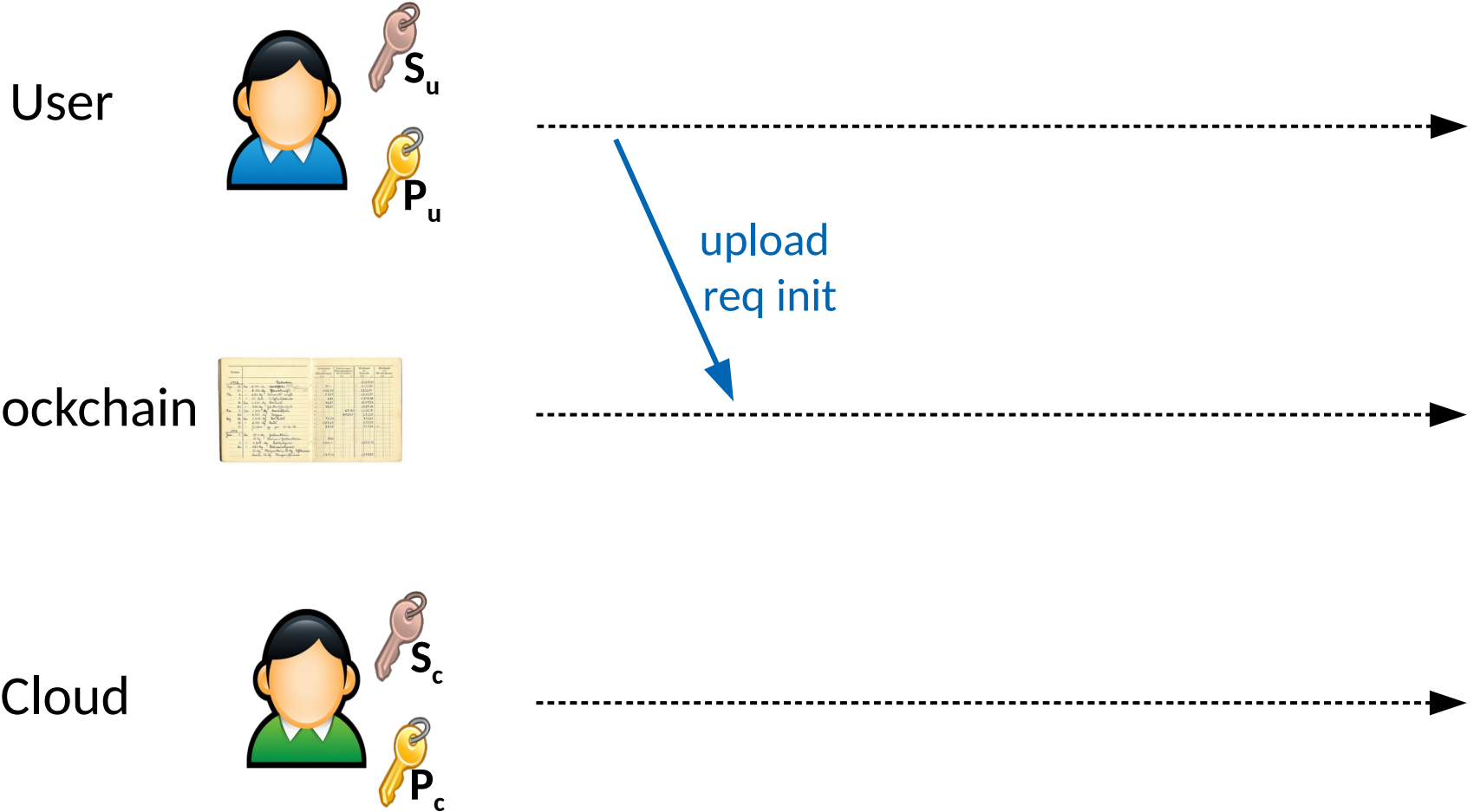
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  - Logging with **smart contracts**
    - Smart contract acts as the arbitrator



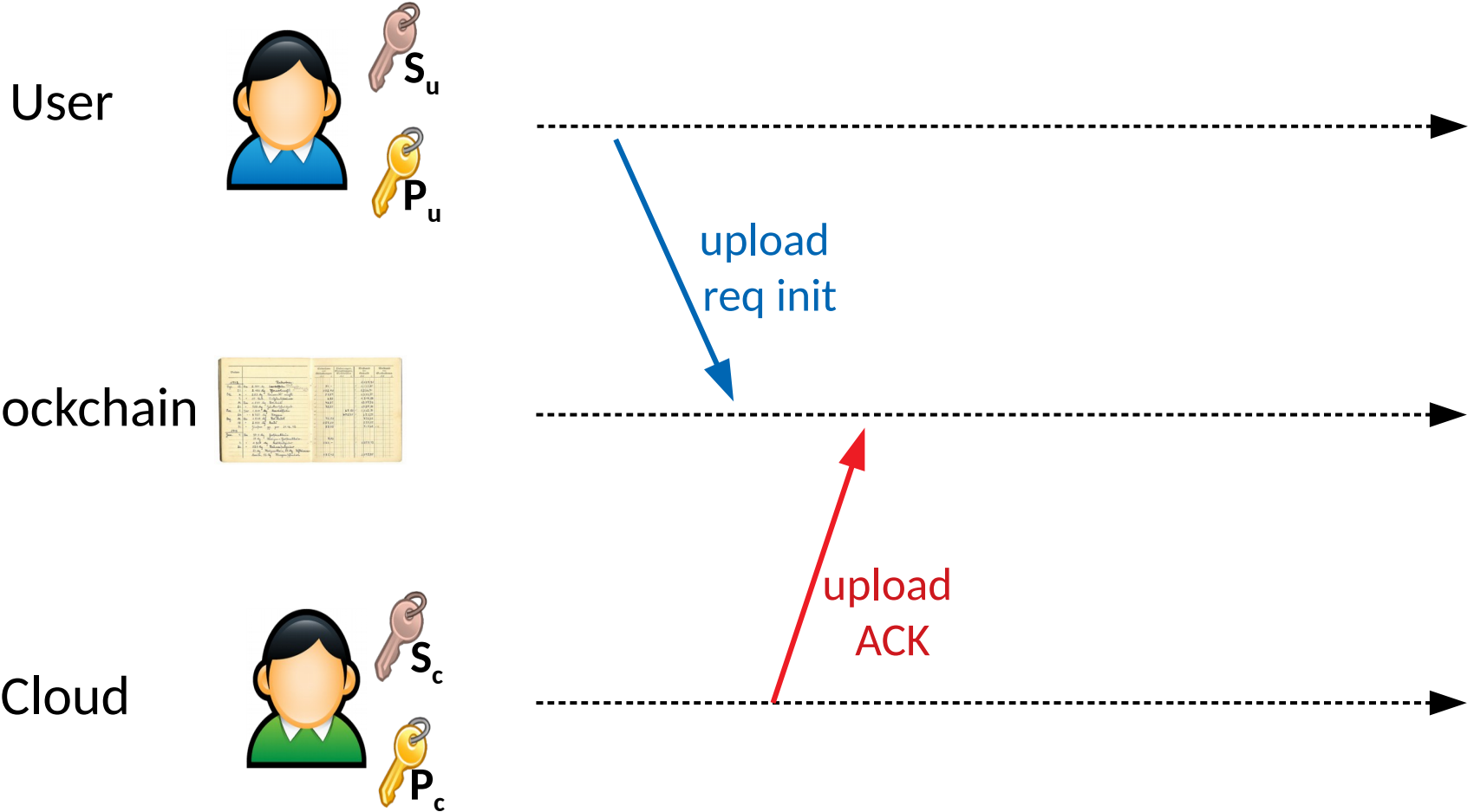
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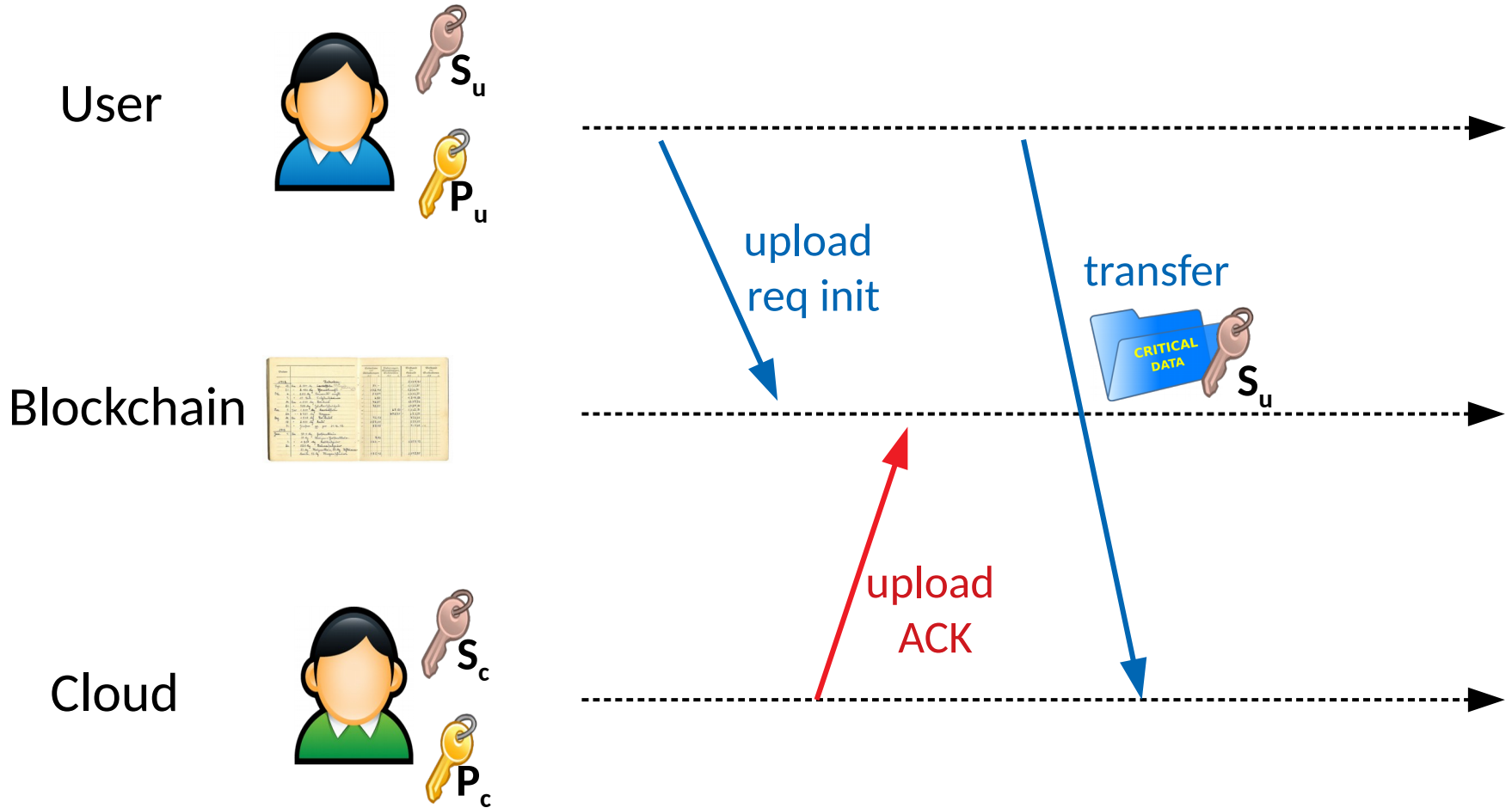
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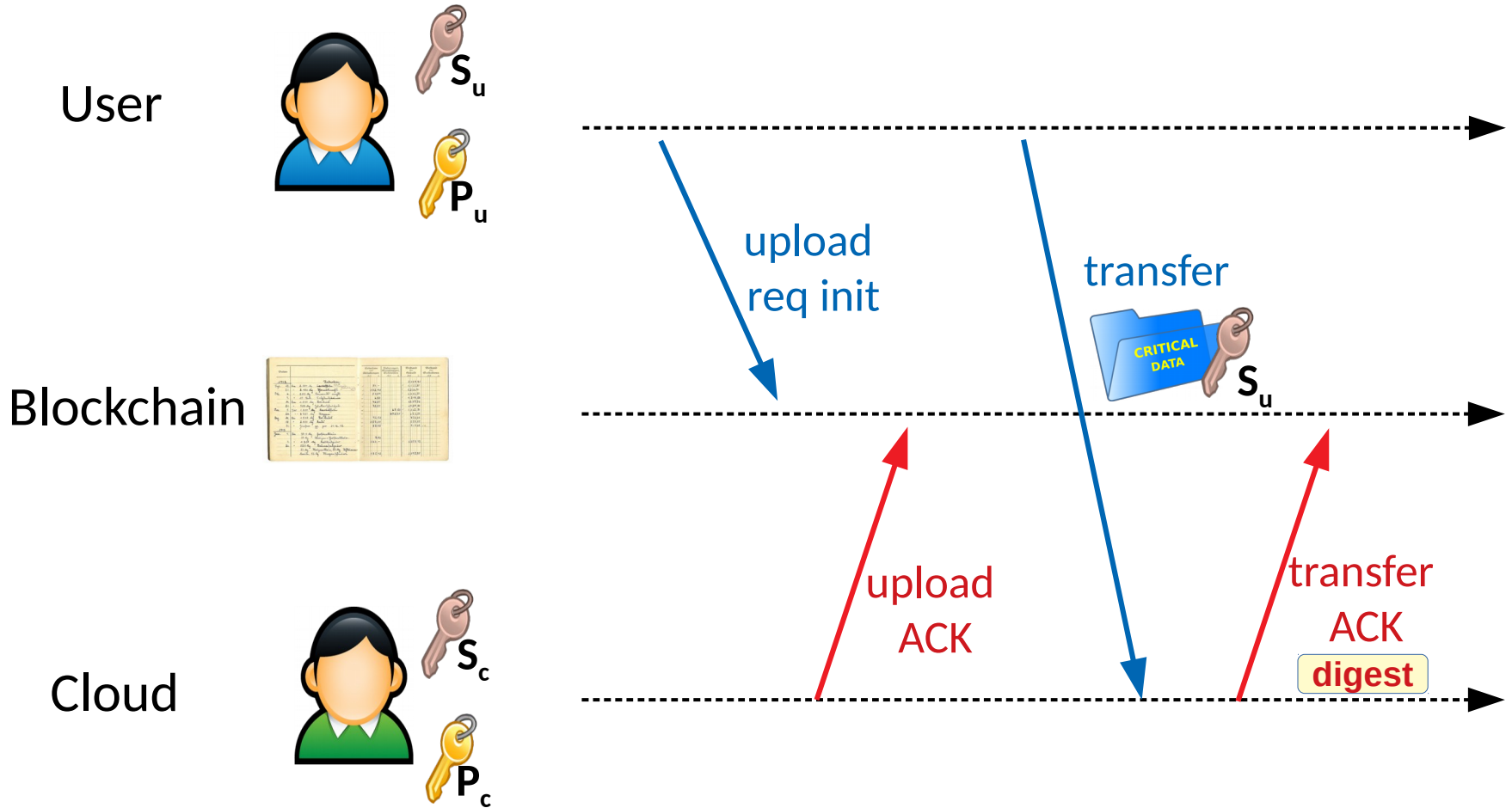
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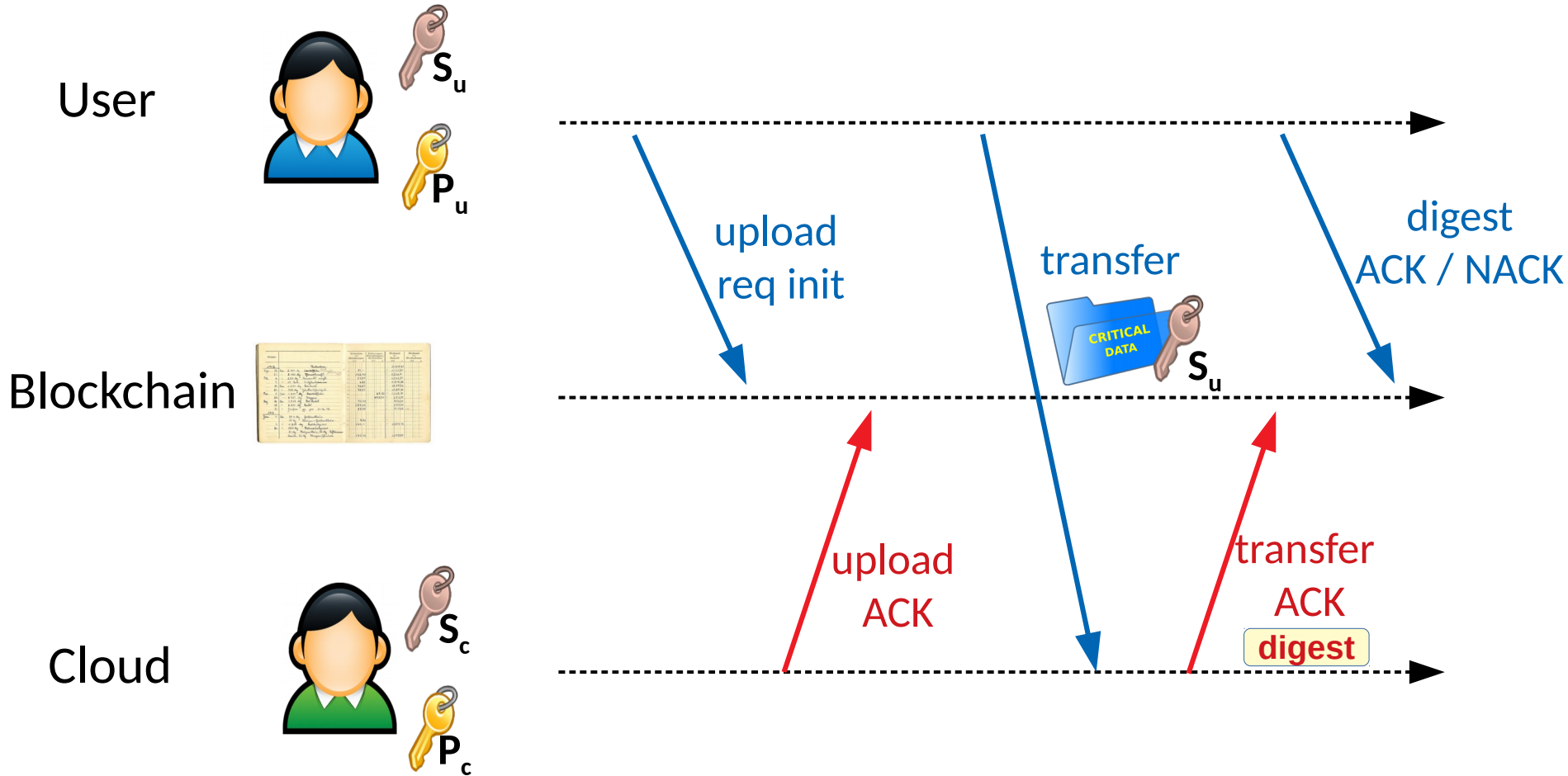
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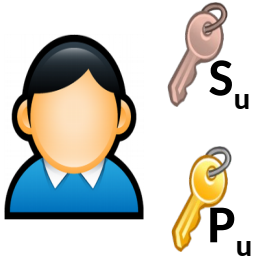
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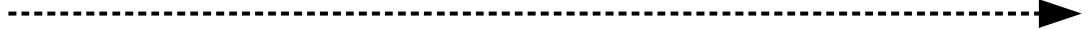
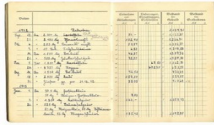


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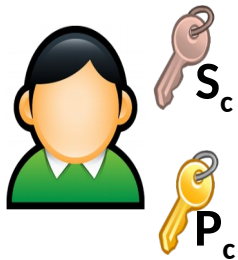
User



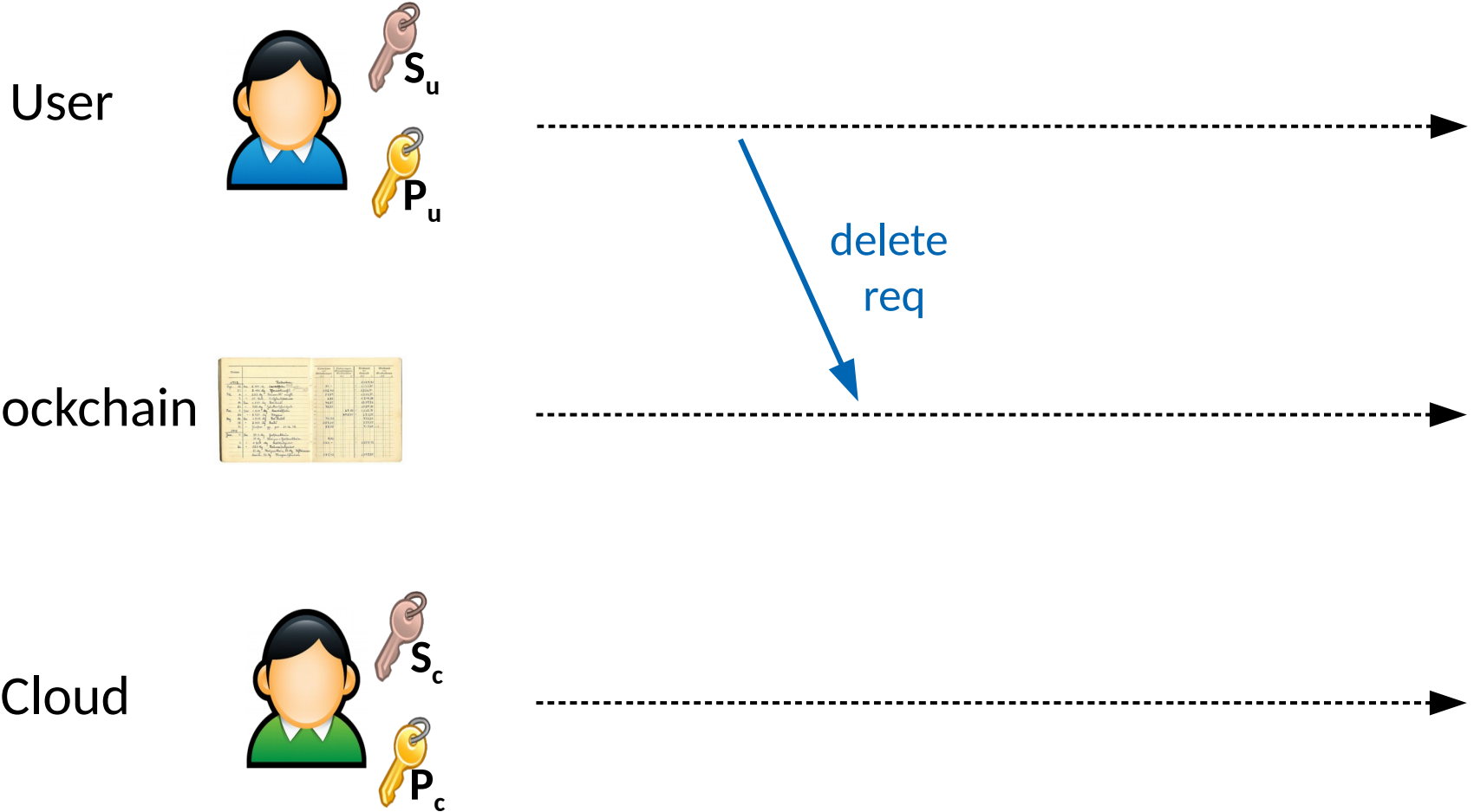
Blockchain



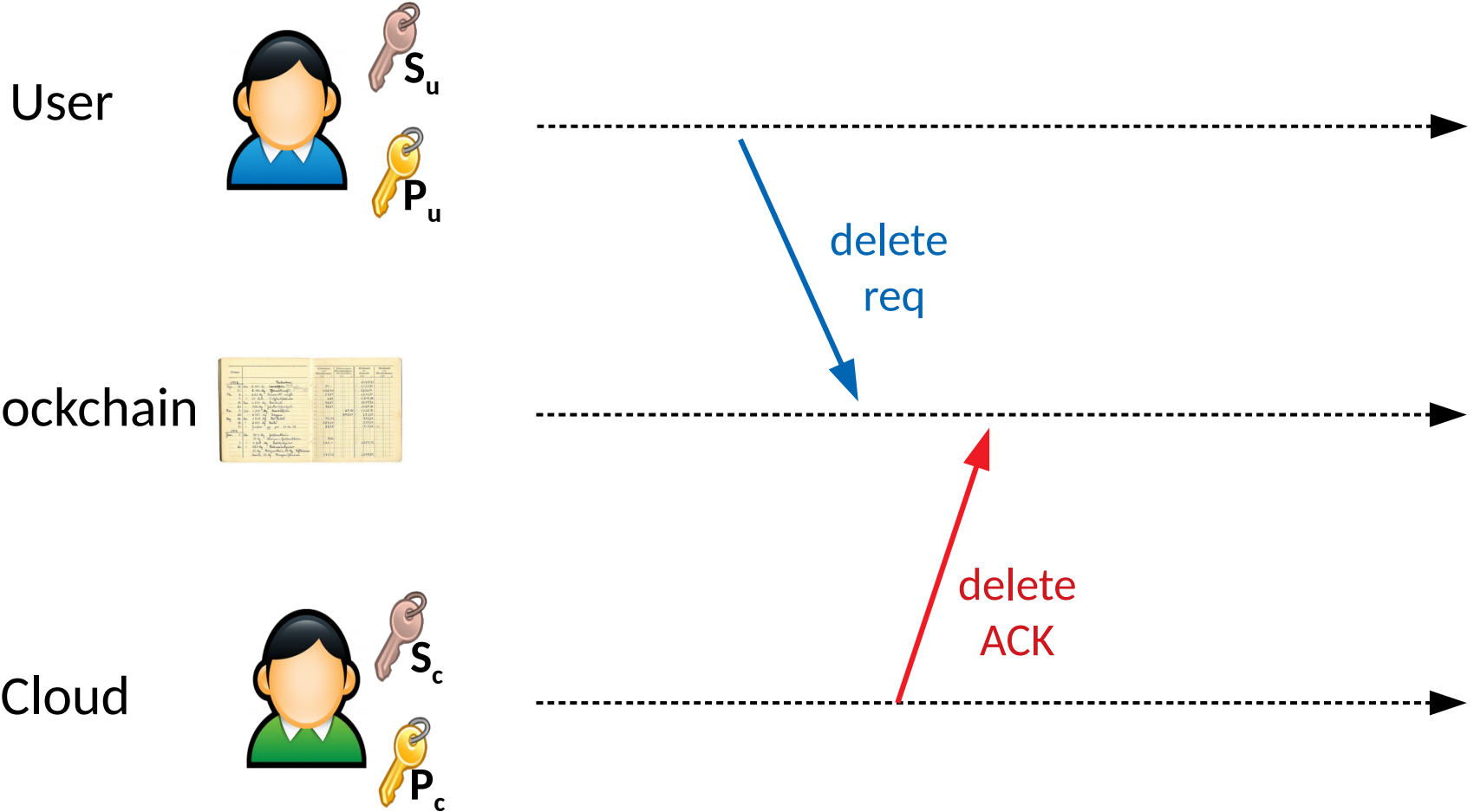
Cloud



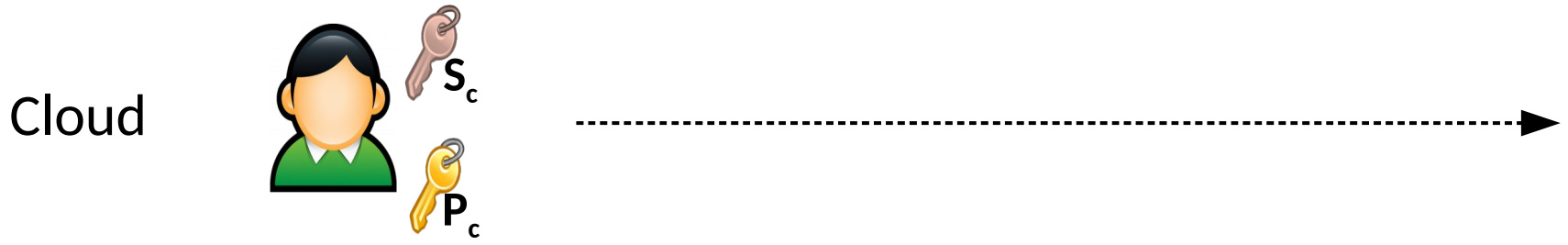
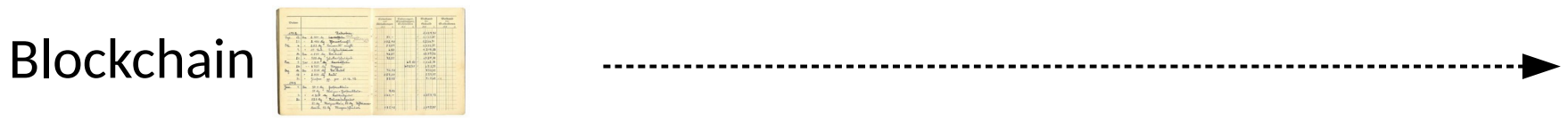
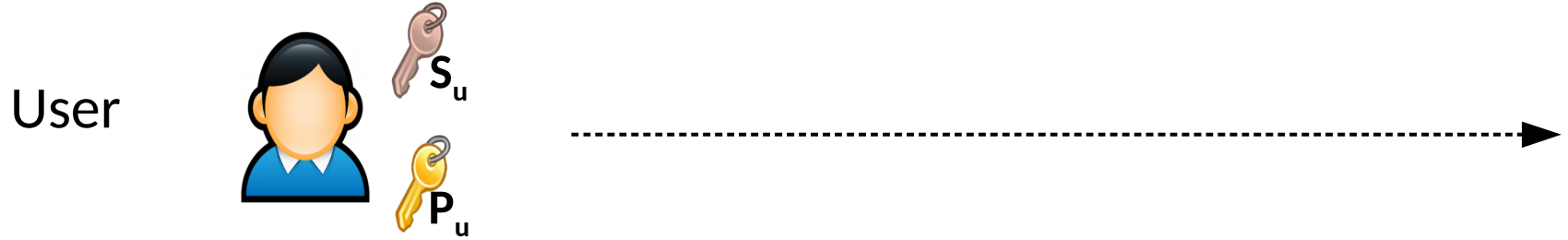
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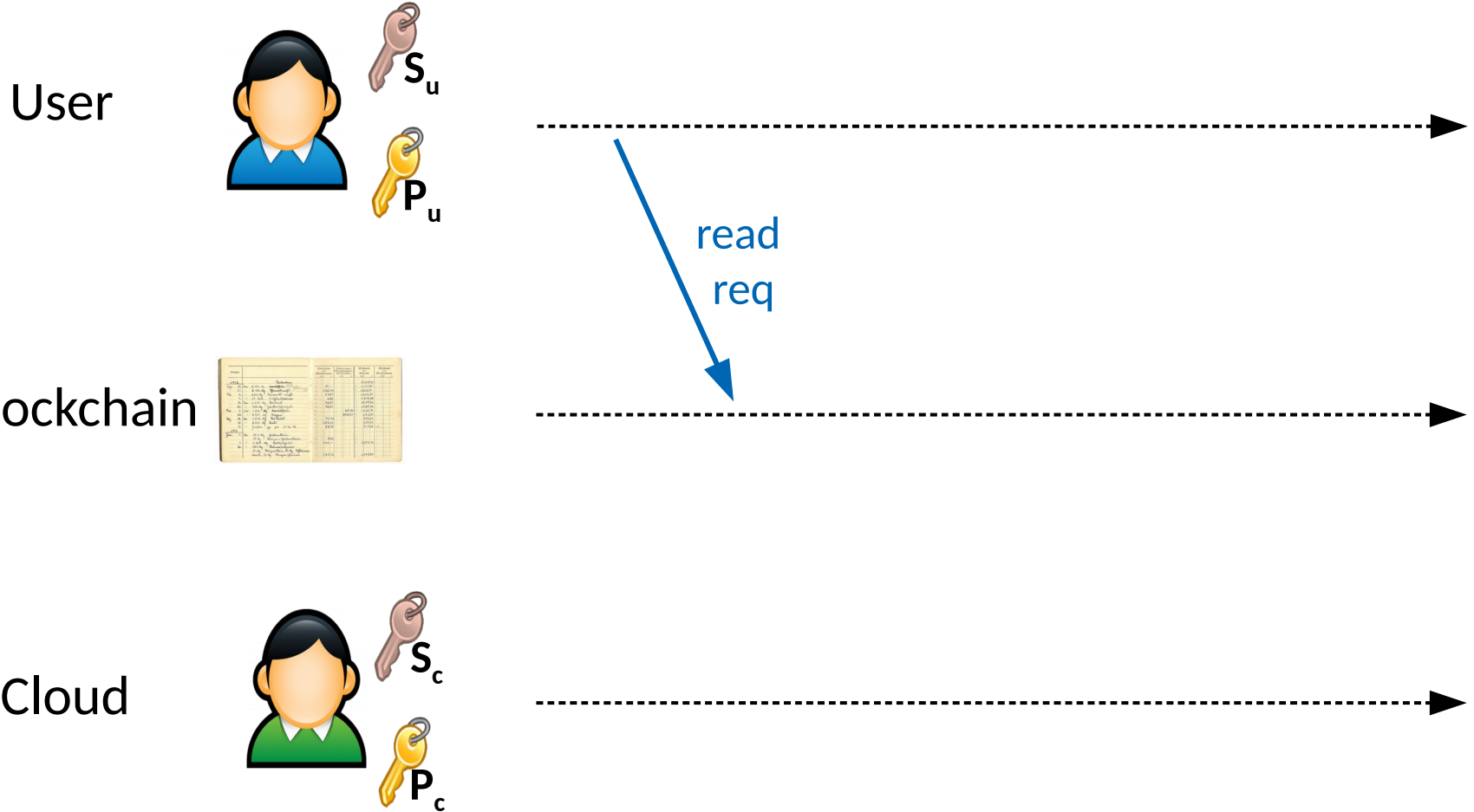
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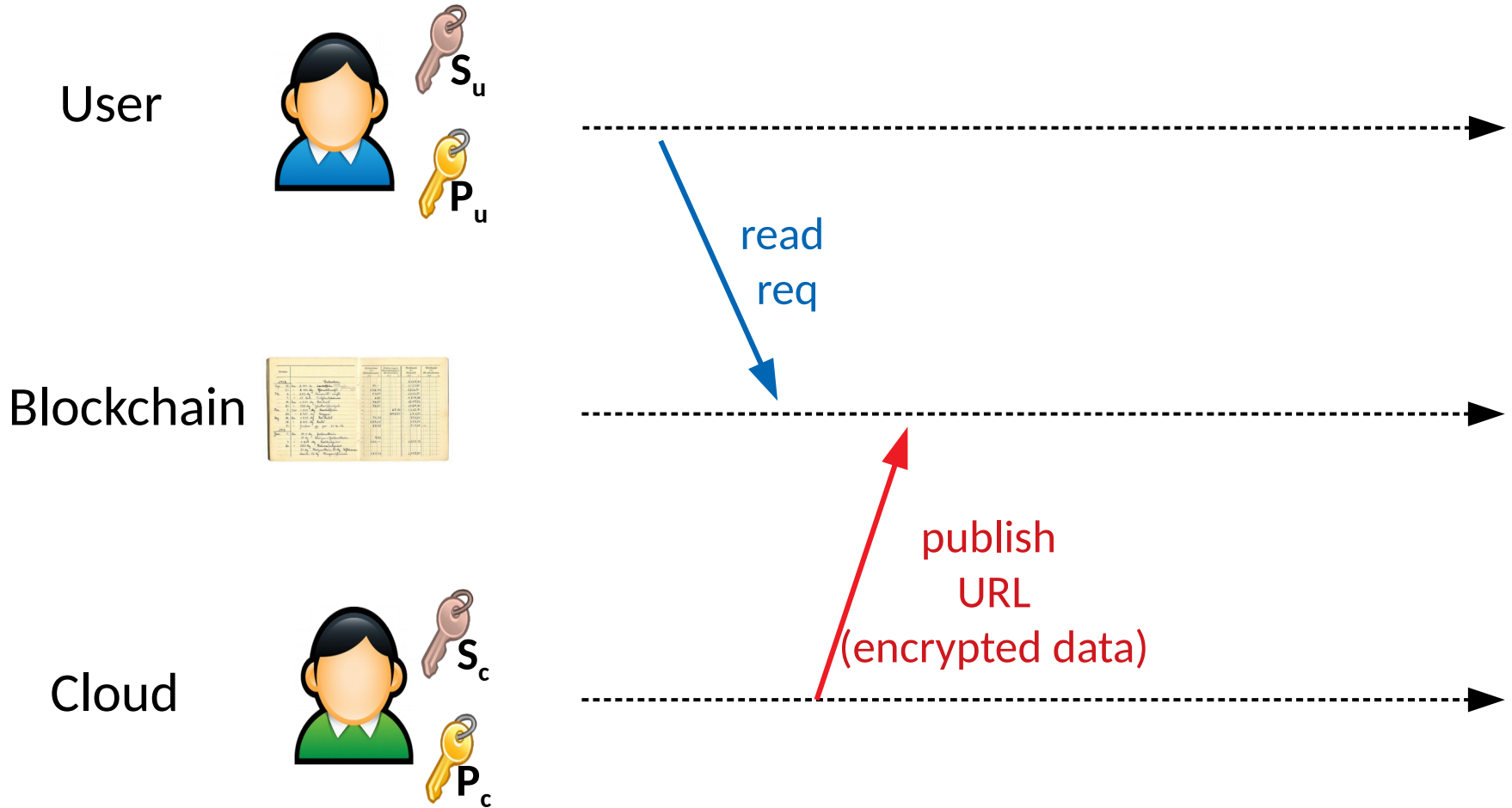
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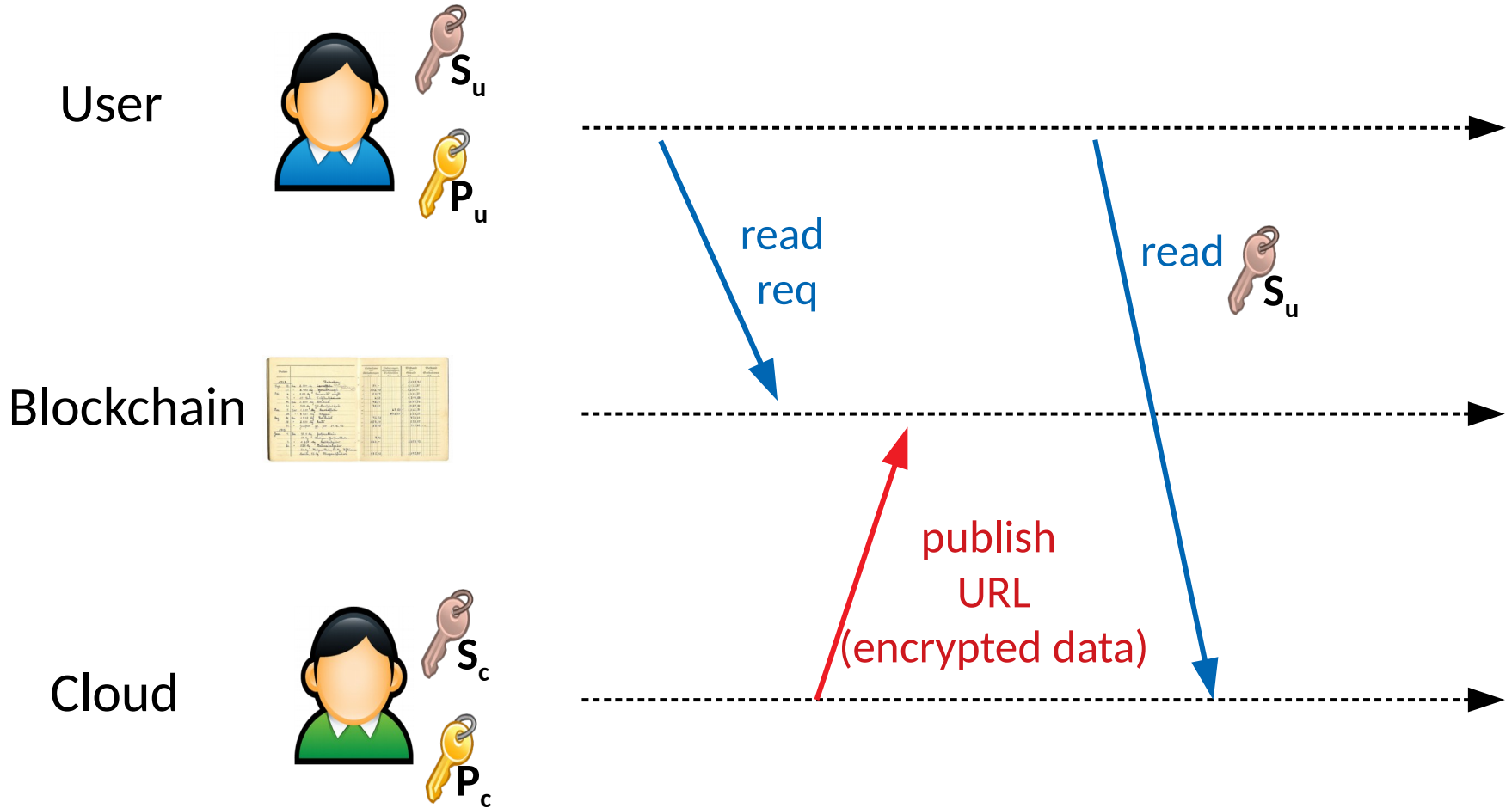
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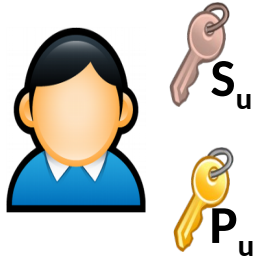


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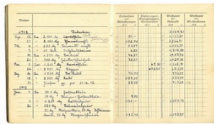


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User



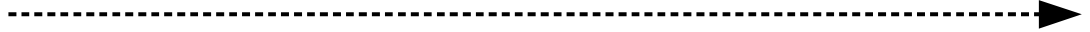
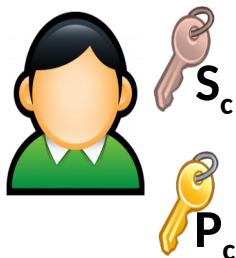
Blockchain



Smart Contract

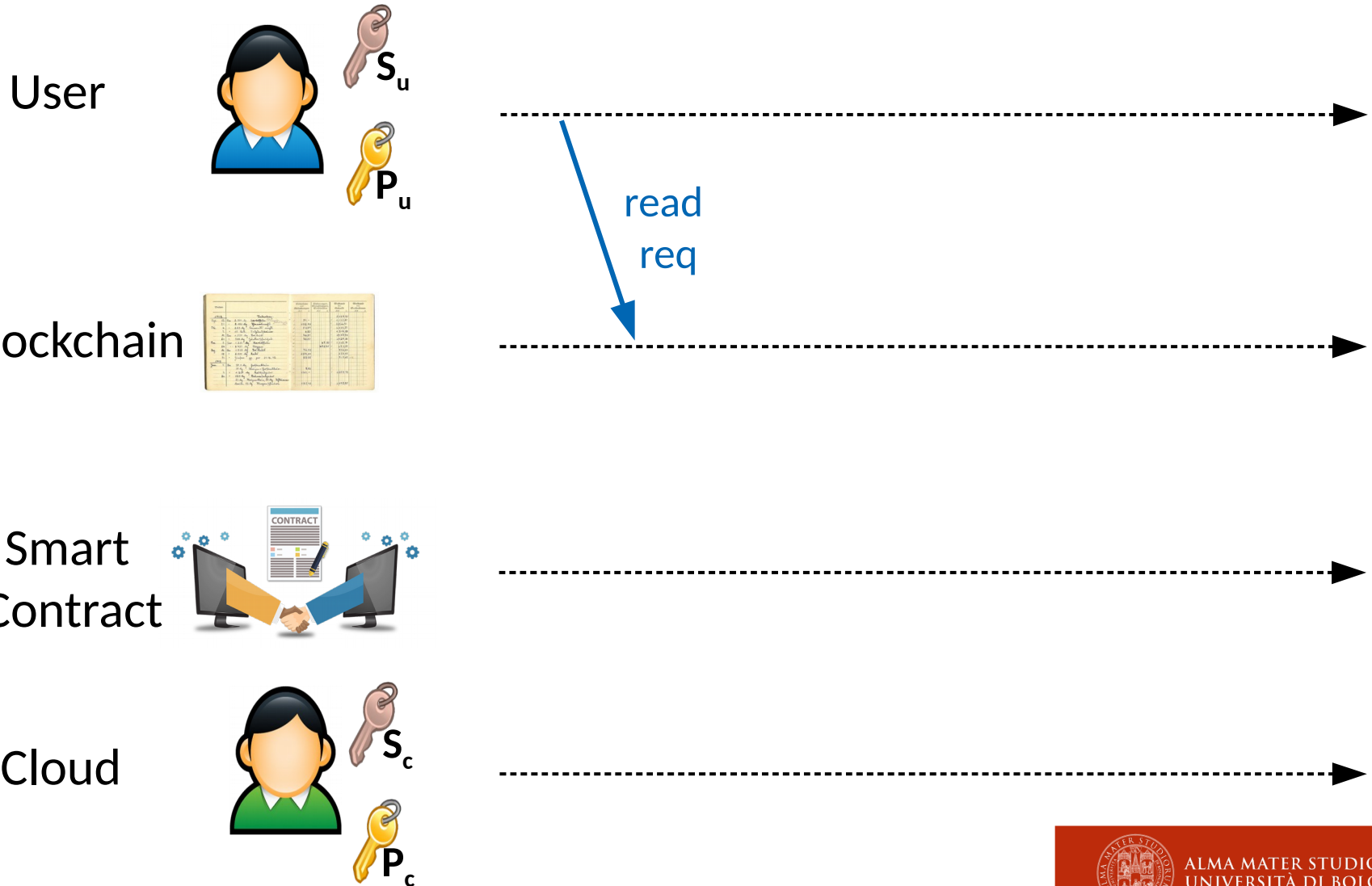


Cloud

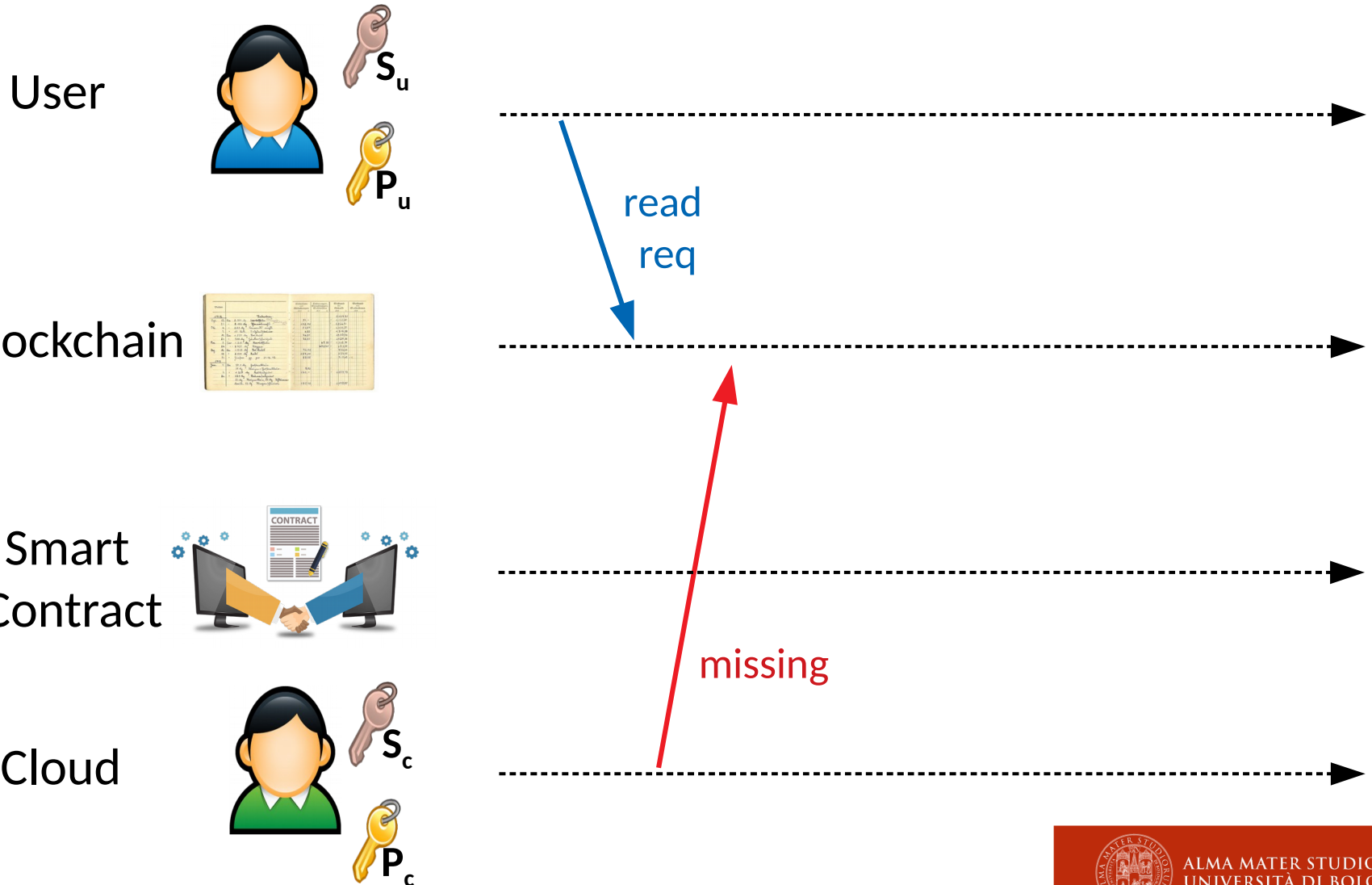




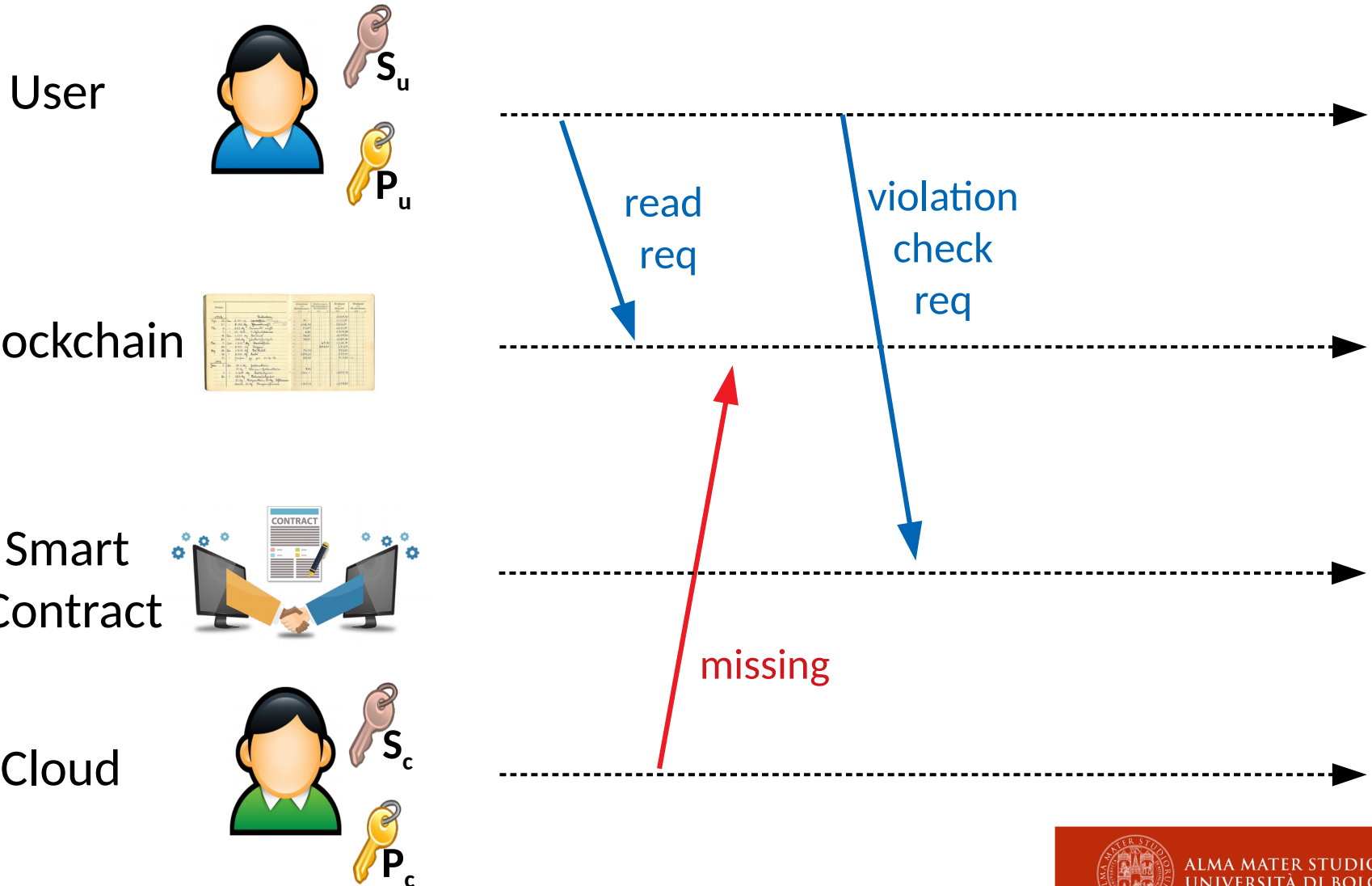
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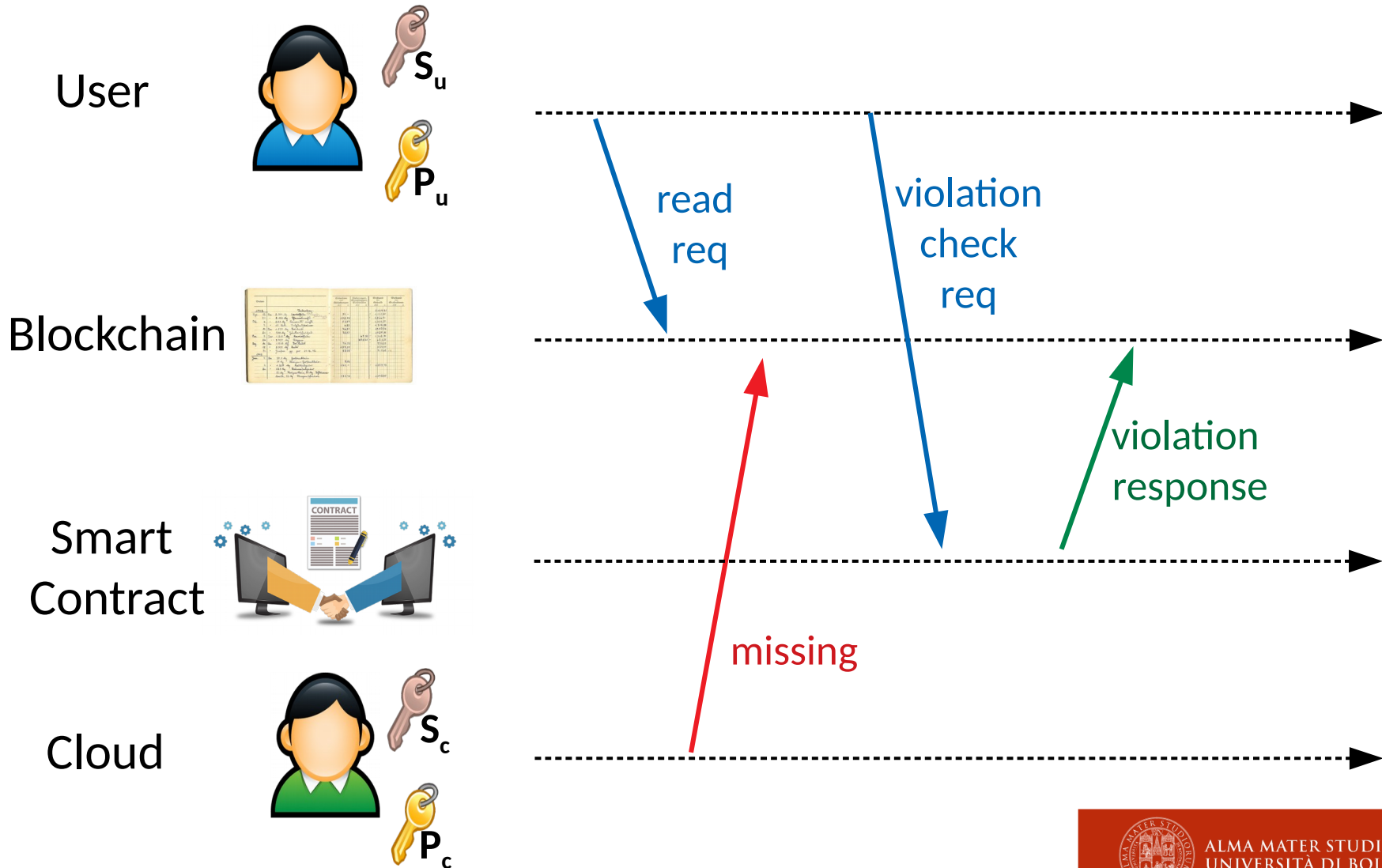
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# Concluding Considerations

- Blockchain as a **flight data recorder** for Cloud accountability
  - Pseudo-anonymous and tamper-proof logging of events
  - Ledger used to verify if SLAs are violated
  - Self-enforcing smart contracts allow to automatically identify responsibilities and settle disputes
- **Efficiency** issues:
  - Current blockchains might not provide a short time responses
  - Transaction fees might represent an economic disincentive
- Lightweight, **permissioned blockchains** might be more performant, scalable, and only accessible by a dedicated group of entities





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