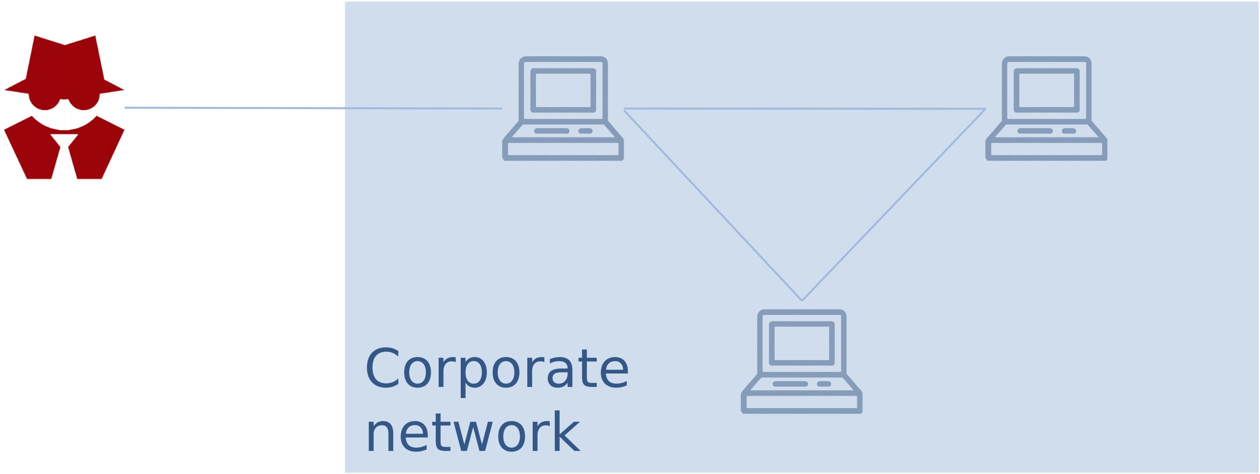
Privacy-preserving storage of enterprise logdata using pseudonymisation and threshold cryptosystems

Tom Petersen

Research group on Security in Distributed Systems (SVS)
Department of Computer Science
University of Hamburg

Insider attacks (I)



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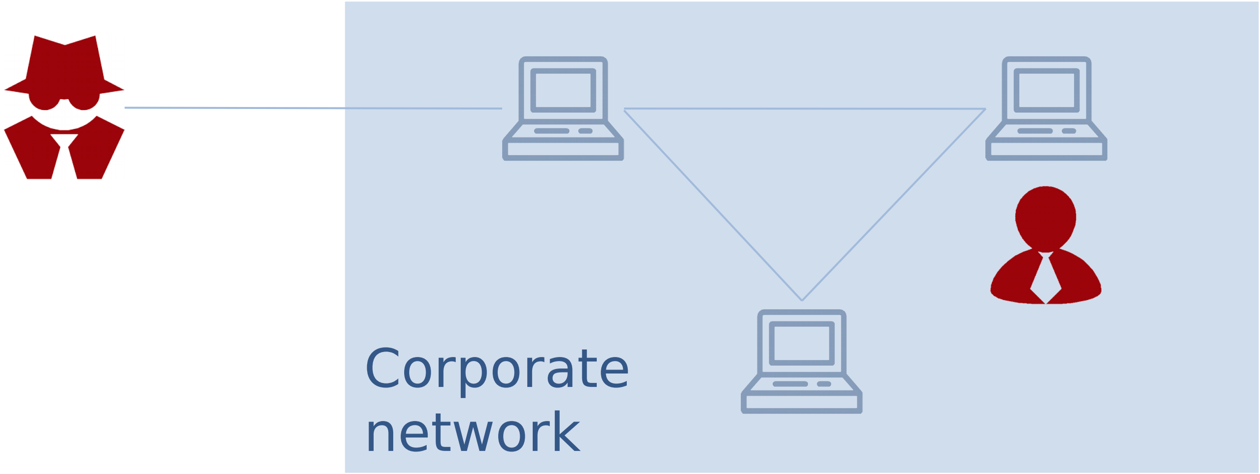

Bitkom Spezialstudie Wirtschaftsschutz (2016):

- about 60% of incidents *in the area of data theft, industrial spying or sabotage* have a connection to current or former employees

Insider attacks (II)

Firewall, IDS, …

Icons from: https://www.shareicon.net (Flaticon basic license)

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Anomaly-based detection

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§32 BDSG

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Approach (I)

Pseudonymisation

+

Threshold cryptosystems

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Pseudonymisation

- Using an identifier different from the real identifier of a subject

Alice : 0x2003

- Assignment e.g. by using functions like hash algorithms or **mapping tables**

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Threshold cryptosystems

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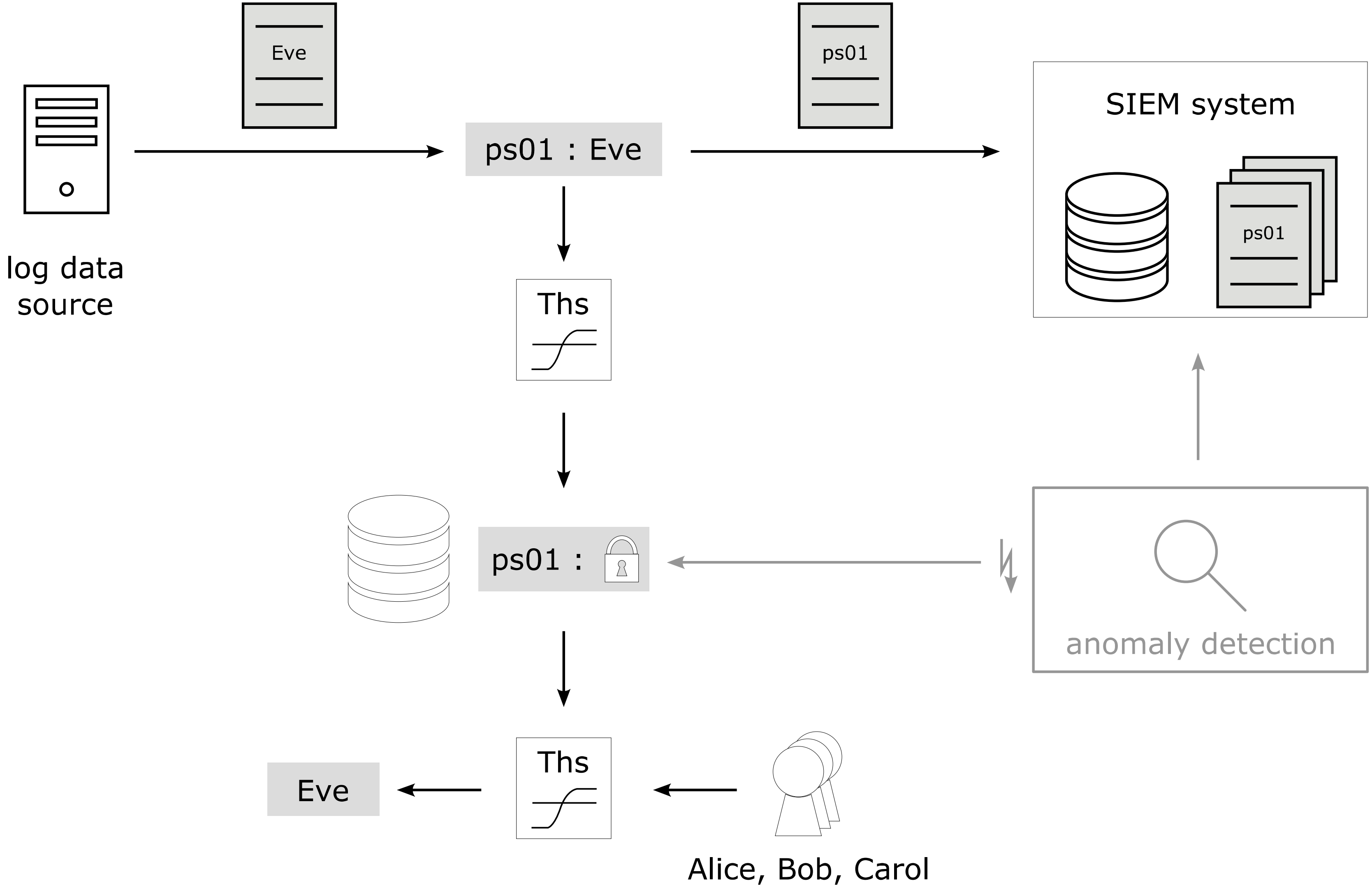
Threshold cryptosystems

- (t,n) **threshold decryption**
- Key generation
  1. (pk, shares)
  2. Message encryption (pk)
  3. Computing partial decryptions
  4. Decrypting message
- Secret key is NOT restored
- Distributed trust

Approach (II)



log data source

Eve

ps01 : Eve

ps01

SIEM system

ps01

Ths

ps01 :

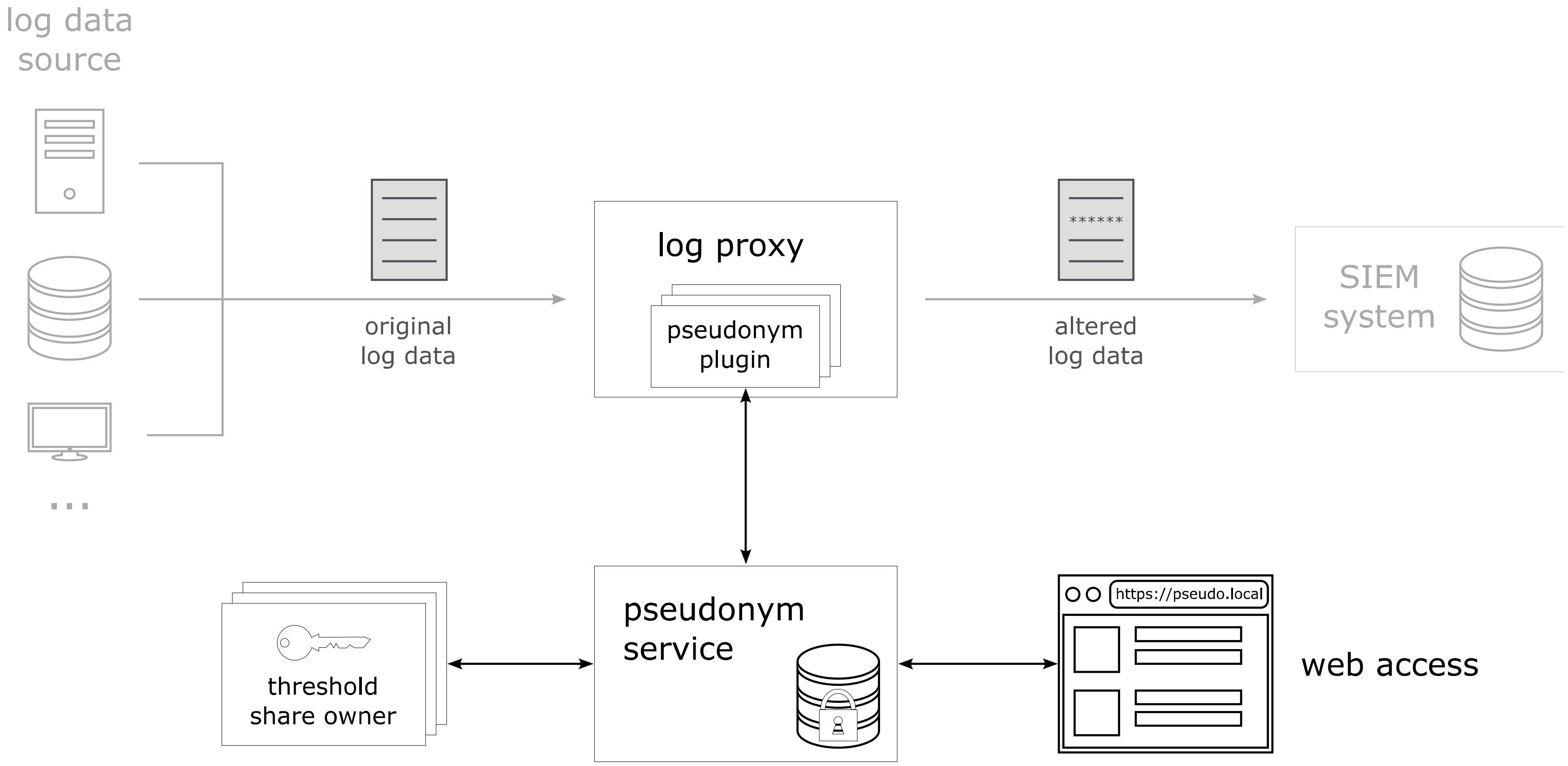
anomaly detection

Ths

Eve

Alice, Bob, Carol

Prototypical implementation



Key points

- Parameter-dependent pseudonymization: time and usage based → influence on linkability

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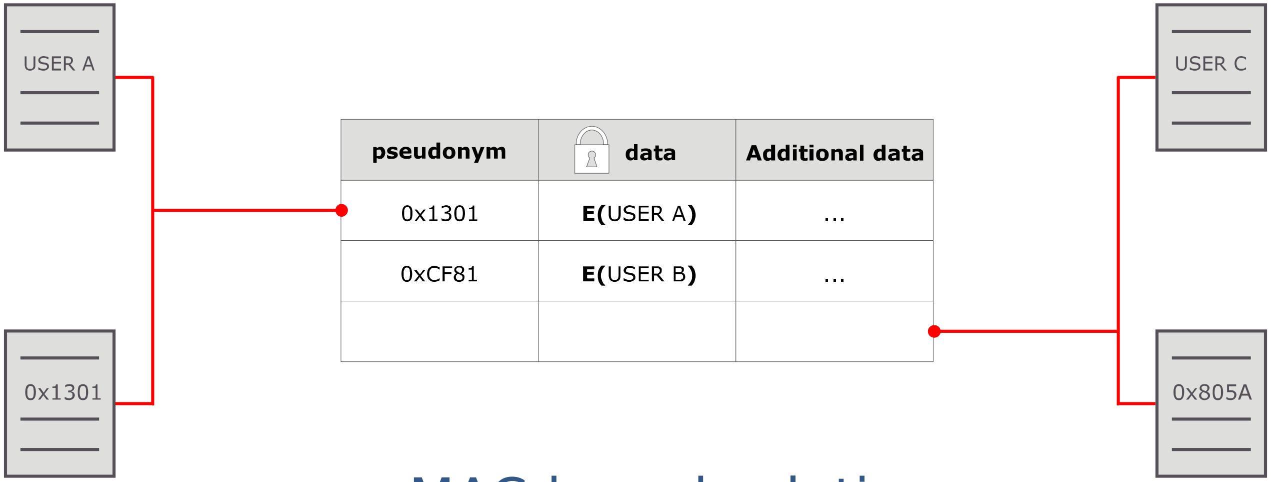
- Threshold public key decryption combining ElGamal and Shamir’s secret sharing → own implementation
- Identifying created pseudonyms:



pseudonym	🔒 data	Additional data
0x1301	**E(**USER A**)**	…
0xCF81	**E(**USER B**)**	…

→ MAC-based solution

Conclusion and future work

- Well-suited approach for the stated problem
  - Parameter-dependent linkability for pseudonymous log data
    → privacy-preserving anomaly detection
  - Disclosure of pseudonym owner secured by four-eye principle

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- Open questions
  - Effects of different parameter choices
    - on anomaly detection
    - on (unintentionally) disclosing pseudonym owners
  - Further (context-dependent) parameters

Thank you!