

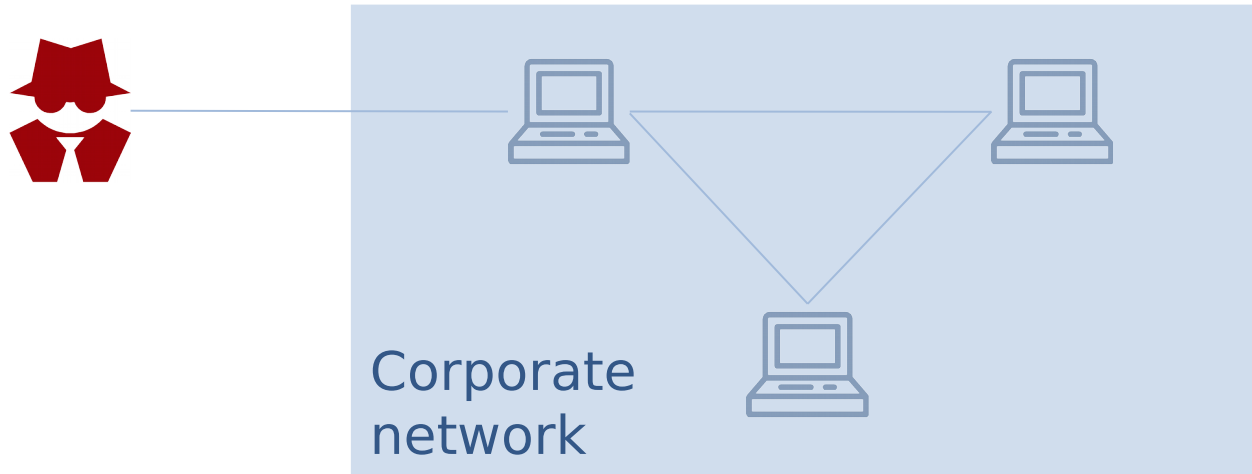


# Privacy-preserving storage of enterprise logdata using pseudonymisation and threshold cryptosystems

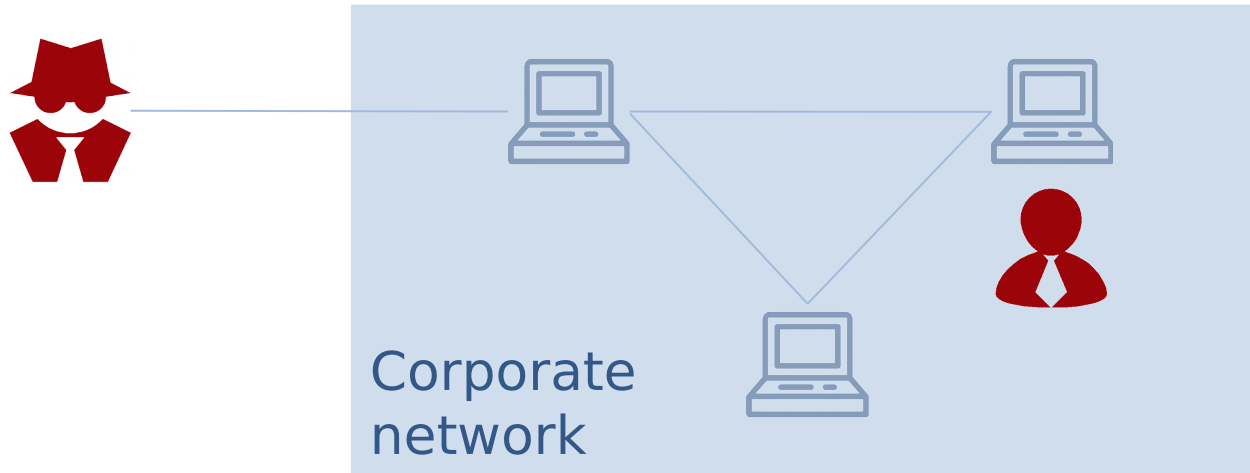
Tom Petersen

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

# Insider attacks (I)



# Insider attacks (I)

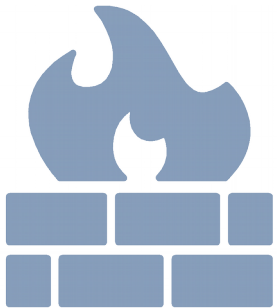


## **Bitkom Spezialstudie Wirtschaftsschutz (2016):**

- 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, ...

## Insider attacks (II)

---



Firewall, IDS, ...

## Insider attacks (II)

---



Firewall, IDS, ...



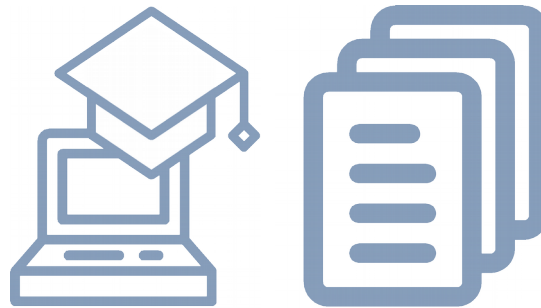
Anomaly-based  
detection

## Insider attacks (II)

---



Firewall, IDS, ...



Anomaly-based  
detection



§32 BDSG

# Approach (I)

---

**Pseudonymisation**

**Threshold  
cryptosystems**

**+**



# Approach (I)

## 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**

+

## Threshold cryptosystems

# Approach (I)

## Pseudonymisation

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

**Alice : 0x2003**

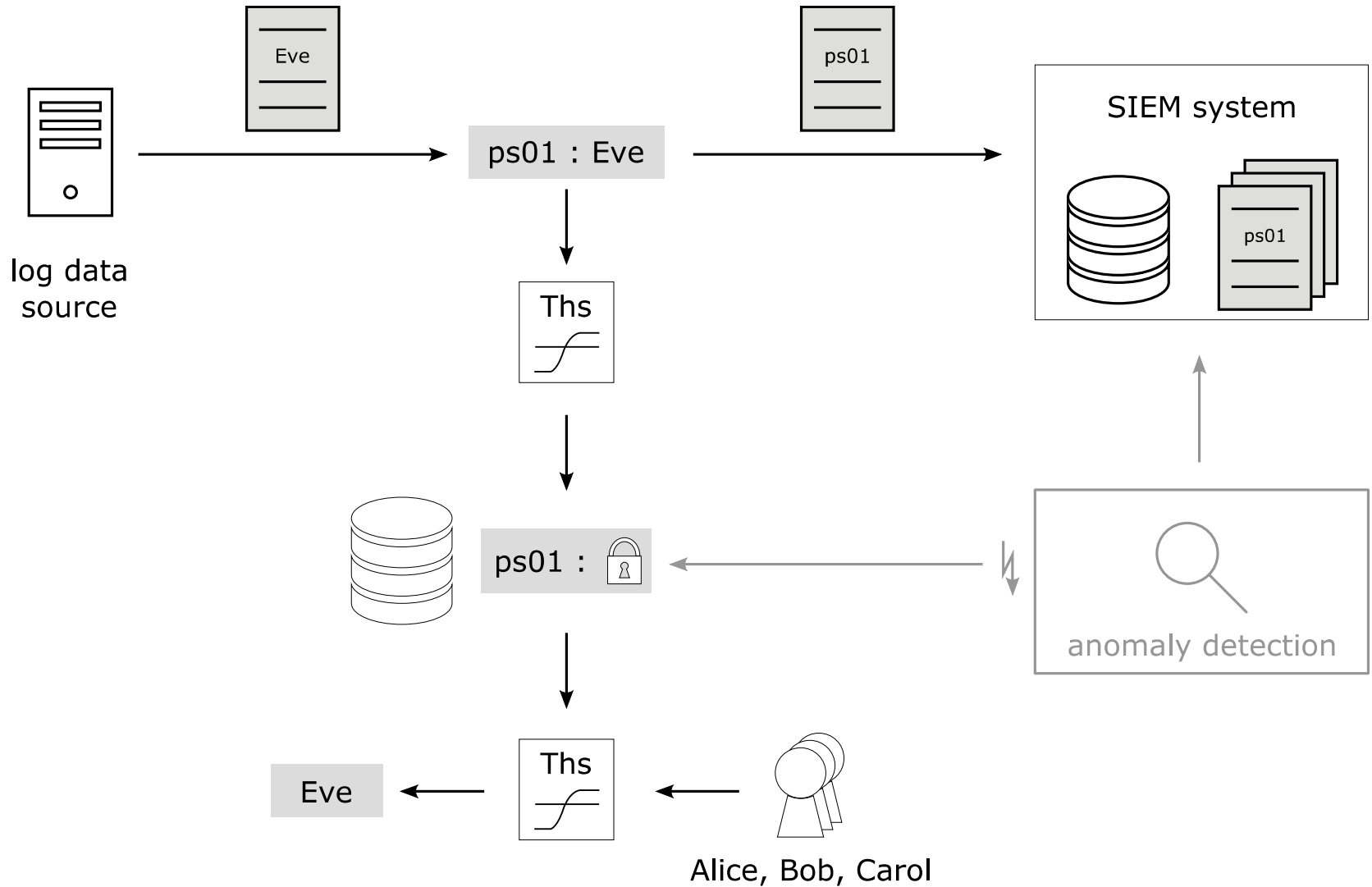
- Assignment e.g. by using functions like hash algorithms or **mapping tables**

+

## Threshold cryptosystems

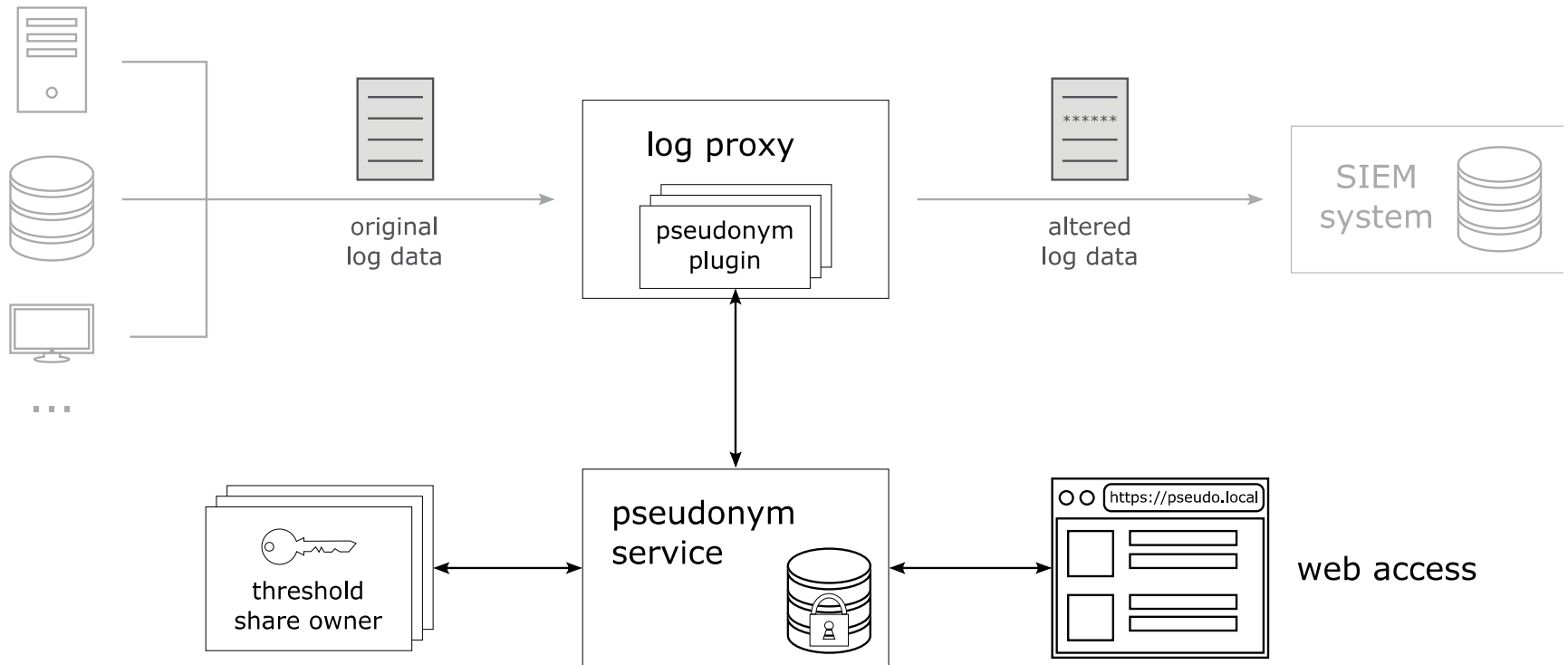
- **(t,n) threshold decryption**
  1. Key generation (pk, shares)
  2. Message encryption (pk)
  3. Computing partial decryptions
  4. Decrypting message
- Secret key is NOT restored
- Distributed trust

# Approach (II)



# Prototypical implementation

log data source



## Key points

---

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

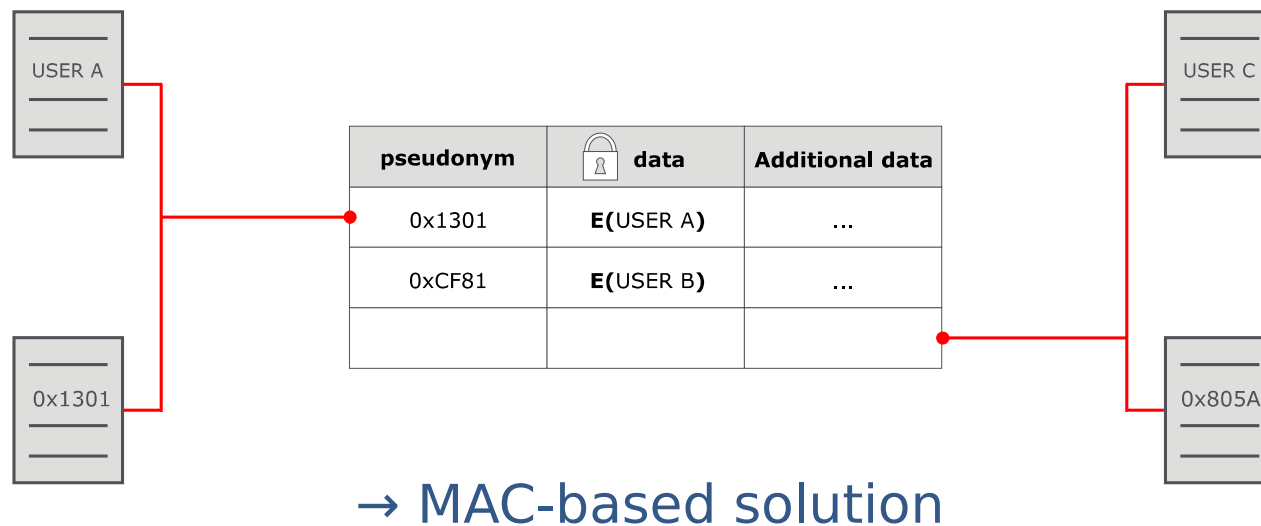
## Key points

---

- Parameter-dependent pseudonymization: time and usage based → influence on linkability
- Threshold public key decryption combining ElGamal and Shamir's secret sharing → own implementation

# Key points

- Parameter-dependent pseudonymization: time and usage based → influence on linkability
- Threshold public key decryption combining ElGamal and Shamir's secret sharing → own implementation
- Identifying created pseudonyms:



## 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



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

---

Thank you!