

An aerial photograph of the TU Delft campus, showing various buildings, green spaces, and a canal. A network diagram is overlaid on the right side of the image, consisting of several blue circular nodes connected by lines. One node in the center of the diagram is highlighted in red. The diagram is partially obscured by a black rectangular box containing text.

Distributed Systems Group

Department Software Technology

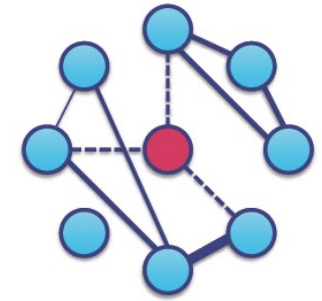
Prof.dr.ir. Dick H.J. Epema

 TU Delft

September 2021

The Distributed Systems Group

People



Prof. Dick Epema

*scheduling and
resource management
blockchain*



Dr. Lydia Chen

*robust, slim and
private machine
learning systems*



Dr. Jeremie Decouchant

*resilient and
privacy-preserving
distributed systems*



Dr. Johan Pouwelse

*blockchain
trust in the internet*



Dr. Jan Rellermeier

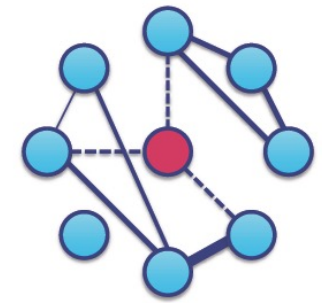
*middleware for
big-data processing*



Dr. Stefanie Roos

*scalability of
blockchains
anonymous
communication
networks*

The Distributed Systems Group Teaching



MSc courses:



- CS4215: Quantitative Performance Analysis of Computer Systems (Q1)



- CS4285: Seminar Decentralized Systems (Q1)



- IN4150: Distributed Algorithms (Q2)

(core Software Technology)



- IN4391: Distributed Systems (Q3)

(core Data Science & Technology)

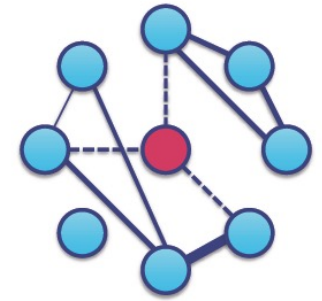


- IN4253: Blockchain Engineering (Q3)



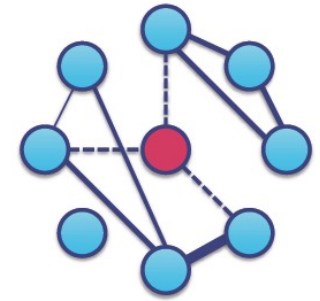
- CS4290: Seminar Distributed Machine Learning Systems (Q4)

The Distributed Systems Group Research Flavor



- Our research is:
 - **fundamental:** devise new application-independent concepts in distributed systems
 - **experimental:** show the value of new concepts in prototypes or real deployments

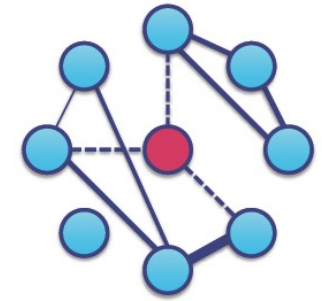
The Distributed Systems Group Research Topics



1. Distributed Machine Learning Systems
2. Cooperative Systems (trust, blockchain)

See research pages and annual reports at <http://www.ds.ewi.tudelft.nl>

Experimentation: DAS-6



VU



UvA/MultimediaN (62)



UvA

Network:

SURFnet

lambdas



TU Delft



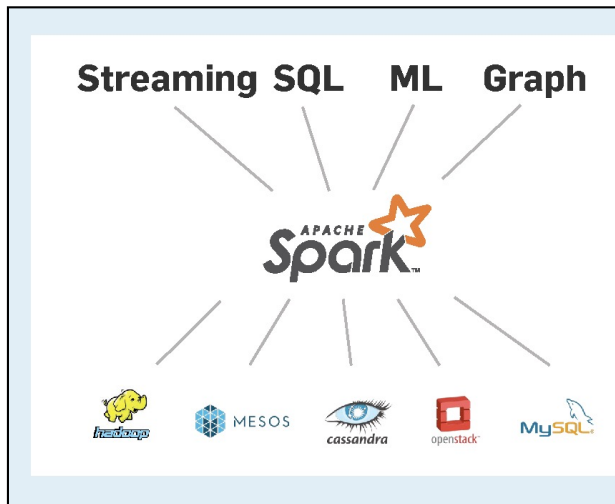
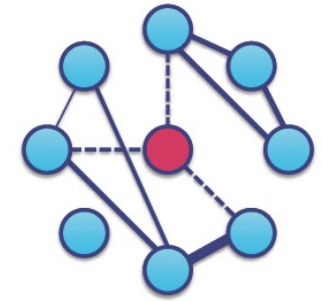
Astron



Leiden

- **System purely for CS research**
- **Operational since spring 2021**
- **Specs:**
 - 16/24-core CPUs
 - 100 single/dual nodes
 - 2.8 GHz CPUs
 - accelerators (GPUs)
 - 896 TB storage
 - 100 G Infiniband
 - 100 G Ethernet
- **Article in IEEE Computer 49(5), 2016**

Distributed Machine Learning Systems (1/2)



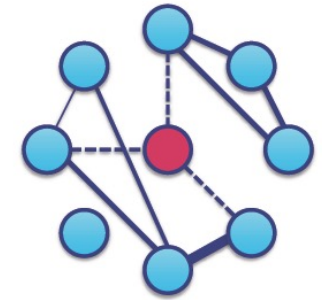
data processing frameworks:

- optimizations for new hardware and ML applications

Jan Rellermeyer



Distributed Machine Learning Systems (2/2)



Processing Systems

- anomaly detection
- sprinting
- tail latency
- dependability
- workload analysis

Learning System

- slim and private
- robust and adversarial
- large scale and efficiency
- novel applications

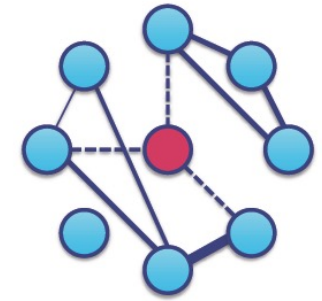
Artificial Intelligence

- active learning
- fair learning
- distributed learning

Lydia Chen



Cooperative Systems (1/4): Tribler



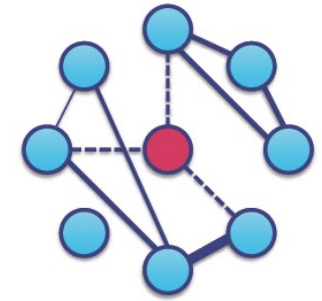
- Is based on the **BitTorrent P2P** file-sharing system
- Uses an **epidemic protocol** for peer and content discovery
- Was **first released** on 17 March 2006 (2,000,000+ downloads)
- Enables **video-on-demand** and **live streaming**
- Is our **research vehicle** for P2P, Online Social Networks, reputation systems, blockchain
- **Current focus:** reputation, trust, blockchain
- **Download** at www.tribler.org



Johan Pouwelse



Cooperative Systems (2/4): trust/reputation



- **Problems:**

- why help others downloading in P2P systems?
- why contribute to Wikipedia?
- why trust money without central banks?

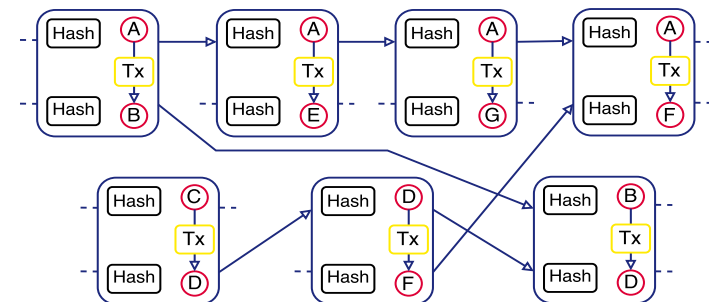


- **Solution:** create a trust system **without central control**

- a complete software stack for blockchain-based systems
- decentralized markets
- self-sovereign identity system

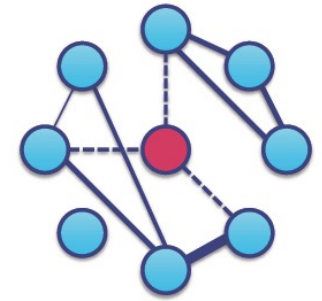
- **In Tribler:**

- **Trustchain:** alternative to the blockchain





Cooperative Systems (3/4): Anonymity and Blockchain



Scalable Anonymity

- How to deal with millions of Tor users?
- More efficient protocols, incentives to contribute, ...

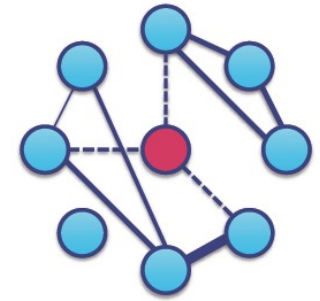
Anonymity and Blockchain

- Attacking Zcash's and Monero's anonymity
- Building network layer protocols for blockchain anonymity

Stefanie Roos



Cooperative Systems (4/4): Consensus



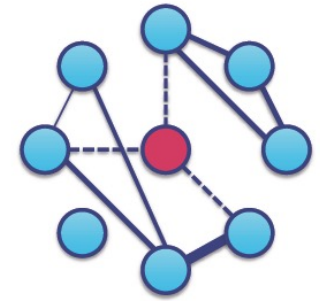
Light-weight mechanisms for consensus in Blockchains

- modular composition of Byzantine Fault Tolerant State Machine Replication (BFT-SMR) and Blockchains
- how to use BFT-SMR protocols in permissionless Blockchains

Jérémie Decouchant



More information



- **MSc coordinator:** Jan Rellermeyer
- **Some previous MSc theses:**
 - www.ds.ewi.tudelft.nl/epema/teaching
- **Home page Distributed Systems:**
 - www.ds.ewi.tudelft.nl
- **Web sites:**
 - DAS: www.cs.vu.nl/das
 - Delft Blockchain Lab: <https://www.tudelft.nl/delft-blockchain-lab>
 - Tribler: www.tribler.org

Distributed Systems Tag Cloud

