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 Rellermeyer
middleware for big-data processing

Dr. Stefanie Roos
scalability of blockchains anonymous communication networks

September 2021
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)

September 2021
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](http://www.ds.ewi.tudelft.nl)
Experimentation: DAS-6

Network:
- SURFnet
- lambdas

VU
- UvA/MultimediaN (62)
- UvA
- 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

TU Delft
- Astron
- Leiden

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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

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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](http://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

September 2021
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
More information

- **MSc coordinator:** Jan Rellermeyer

- **Some previous MSc theses:**
  - [www.ds.ewi.tudelft.nl/epema/teaching](http://www.ds.ewi.tudelft.nl/epema/teaching)

- **Home page Distributed Systems:**
  - [www.ds.ewi.tudelft.nl](http://www.ds.ewi.tudelft.nl)

- **Web sites:**
  - DAS: [www.cs.vu.nl/das](http://www.cs.vu.nl/das)
  - Delft Blockchain Lab: [https://www.tudelft.nl/delft-blockchain-lab](https://www.tudelft.nl/delft-blockchain-lab)
  - Tribler: [www.tribler.org](http://www.tribler.org)
Distributed Systems Tag Cloud