The Distributed Systems Group

Prof. Dick Epema
scheduling and resource management blockchain

Dr. Lydia Chen
robust, slim and private machine learning 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 2019
The Distributed Systems Group
Teaching

MSc courses:

- CS4215: Quantitative Performance Analysis of Computer Systems (Q1)
- IN4150: Distributed Algorithms (Q2)
  (core Software Technology)
- IN4391: Distributed Computing Systems (Q3)
  (core Data Science & Technology)
- IN4253: Blockchain Engineering (Q3)
- IN4392: Seminar Cloud Computing (Q4)

September 2019
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. Resource Management and Scheduling
2. Big Data Processing
3. Cooperative Systems (trust, blockchain)

See research pages and annual report 2015-2018 at
http://www.ds.ewi.tudelft.nl
Experimentation: DAS6 on the way!!

- SURFnet6
- UvA/MultimediaN (62)
- UvA (36)
  - System purely for CS research
  - Operational since June 2015
  - Specs:
    - 3,200 cores (8-core CPUs)
    - 2.4 GHz CPUs
    - accelerators (GPUs)
    - 800 TB storage
    - 10 Gb/s Infiniband
    - Gb Ethernet
  - Article in IEEE Computer 49(5), 2016
The KOALA multicloud scheduler

- Parallel applications
- Workflows
- MapReduce / Spark

Local Resource Managers
- LRM
- LRM
- LRM
- LRM

Information service

Deployed on the DAS since 2005

September 2019
Big Data Processing (1/2)

graph processing
  • benchmarking
  • performance analysis

data processing frameworks:
  • optimizations for new hardware
  • forget about VMs

Linkedin
Graphalytics

Jan Rellermeyer
Big Data Processing (2/2): efficient, robust, private, fair learning systems

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 (1/3): 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 (2/3): 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*
  - record decentralized interaction history
  - disseminate this history in an attack-resilient way
  - create decentralized markets

• **In Tribler:**
  - **Trustchain:** alternative to the blockchain
Cooperative Systems (3/3): 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
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 projects:**
  - KOALA: [www.st.ewi.tudelft.nl/koala](http://www.st.ewi.tudelft.nl/koala)
  - DAS5: [www.cs.vu.nl/das5](http://www.cs.vu.nl/das5)
  - Tribler: [www.tribler.org](http://www.tribler.org)
Distributed Systems Tag Cloud