



Today, distributed systems are the rule rather than the exception—it is almost impossible to point at any two computers in the world that are not connected in some way. Virtually all application areas, from health care to entertainment, and from industrial automation to traffic management, rely on distributed systems. Responding to challenges in this field, our mission is to model, design, implement, and analyze distributed systems and algorithms.

This is a brief annual report of the Distributed Systems (DS) Group of Delft University of Technology for the year 2016. It is meant to present the main changes and achievements of the DS group to other groups in the faculty, to our previous master's and PhD students, to our research partners, and to anyone who might be interested in a collaboration.



#### CURRENT STAFF

[Dick Epema](#), full professor (chair)  
[Johan Pouwelse](#), associate professor  
[Otto Visser](#), education innovator  
[Alexandru Iosup](#), full professor at VU Amsterdam and associate professor at TU Delft  
[Ana Lucia Varbanescu](#), assistant professor (guest, UvA)  
[Nicola Zannone](#), associate professor (guest, TU/e)



#### CHANGES IN STAFF IN 2016

- Alexandru Iosup was appointed full professor at the VU University in Amsterdam, but remains affiliated with TU Delft
- Henk Sips, full professor and previous chair of the section, retired from TU Delft



#### PHD DEFENSES IN 2016

- Riccardo Petrocco, *Improving Peer-to-Peer Video Streaming* (Dick Epema, promotor, Johan Pouwelse, co-promotor)
- Yong Guo, *Distributed Heterogeneous Systems for Large-Scale Graph Processing* (Dick Epema, promotor, Alexandru Iosup, co-promotor)



#### AWARDS IN 2016

- Alexandru Iosup received the Dutch prize for ICT research
- Alexandru Iosup was appointed member of the "Jonge Akademie," the junior section of the Royal Dutch Academy of Sciences (KNAW)



#### HIGHLIGHTS IN 2016

- Johan Pouwelse obtained two projects on *blockchain technology*, one with the top sector Logistics and one with ABN-AMRO bank
- Alex Iosup obtained a VIDI grant from NWO for a proposal called MagnaData on datacenter computing
- Dick Epema was area chair of Clouds and Distributed Computing of *Super Computing 2016*



#### MAIN INDUSTRY COLLABORATION IN 2016

- ABN-AMRO, Solvinty, Oracle, Intel, SPEC, LDBC



#### SELECTED RESEARCH ACHIEVEMENTS IN 2016



##### Big-Data Processing:

- Design of LDBC Graphalytics, a benchmark for graph-processing platforms
- Design and experimental evaluation of distributed heterogeneous graph-processing systems



##### Scheduling:

- Design and analysis of scheduling policies for Hadoop, to reduce slowdown variability for different jobs sizes
- Design and analysis of a cluster scheduler for scheduling multiple data-processing frameworks
- Benchmarking of auto-scaling algorithms for workflows in clouds



##### Cooperative Systems:

- Large increase in research efforts in blockchain technology
- Creation of a tamper-resistant datastructure to store proof-of-work records using scalable graphs
- Launch of a self-compiling smartphone app capable of mutation and viral spreading
- Development of a proof-of-principle for a fully decentralized market for cybercurrency, complete with a fast limit-order book



#### MAIN PUBLICATIONS IN 2016

- A. Iosup et al., "LDBC Graphalytics: A Benchmark for Large-Scale Graph Analysis on Parallel and Distributed Platforms," *PVLDB* 9(13)
- A. Lu Jia et al., "When Game Becomes Life: The Creators and Spectators of Online Game Replays and Live Streaming," *TOMCCAP* 12(4)
- D. Epema et al., "A Medium-Scale Distributed Systems for Computer Science Research: Infrastructure for the Long Term," *IEEE Computer* 49(5)
- B. Ghit et al., "Tyrex: Size-based Resource Allocation in MapReduce Frameworks," *CCGrid*
- Y. Guo et al., "Design and Experimental Evaluation of Distributed Heterogeneous Graph-Processing Systems," *CCGrid*
- A. Kuzmanovska et al., "KOALA-F: A resource Manager for Scheduling Frameworks in Clusters," *CCGrid*

