OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

INF FACULTY OF COMPUTER SCIENCE

Vernetzte Systeme
Teamprojekte und Seminararbeiten

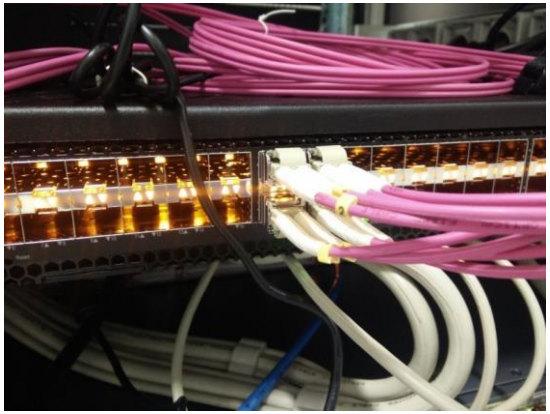
Prof. Dr. David Hausheer

About me

- MSc Electrical Engineering @ ETH Zurich ('96–'01)
- MSc thesis @ IBM Research Zurich ('01)
- PhD @ ETH Zurich ('01–'05)
  - Comsys Group (Prof. Stiller / Prof. Plattner)
- Postdoc @ University of Zurich ('05–'11)
  - Comsys Group (Prof. Stiller)
- Visiting Scholar @ UC Berkeley ('09–'11)
  - Host: Prof. Jean Walrand
- Juniorprofessor @ TU Darmstadt ('11–'17)
  - Head of P2P Systems Engineering Lab
  - Department of Electrical Engineering and Information Technology
- Guest Lecturer @ ETH and University of Zurich ('16–'17)
  - ETH: Netsec Group (Prof. Perrig), UZH: Comsys Group (Prof. Stiller)
- Professor @ OVGU (Since May 17)
  - Head of Networks and Distributed Systems (NetSys) Lab
  - http://www.netsys.ovgu.de/

Research Focus

- Software-defined networking and network functions virtualization
- Decentralized (P2P) systems and overlay networks
- Network security
- Internet architectures, networks economics



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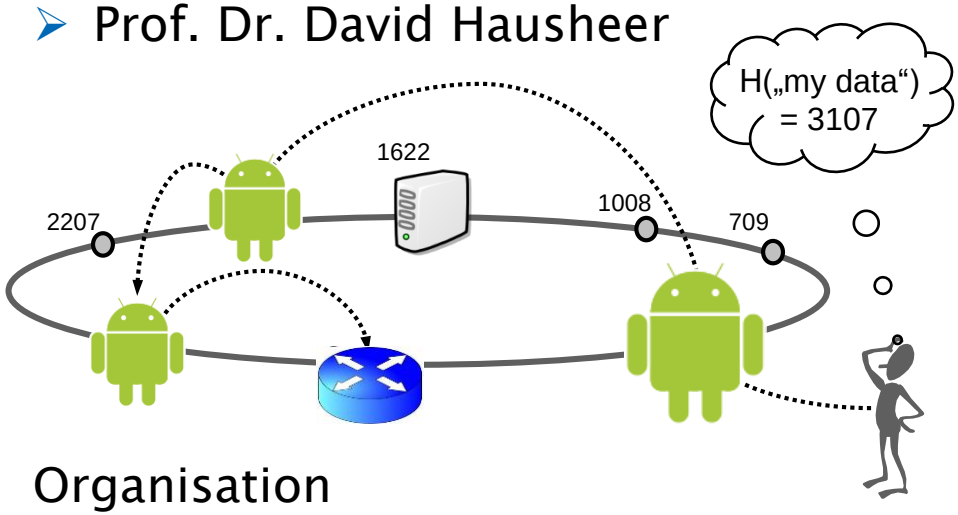
INF FAKULTÄT FÜR INFORMATIK
Networks and Distributed Systems Lab
Prof. Dr. David Hausheer
Networks and Distributed Systems Lab (NetSys)

Kickoff am 06.04.2018
13:15h G29 Raum 334

Praktikum Vernetzte Systeme

Dozent:

- Prof. Dr. David Hausheer



Organisation

- Individual- oder Team-Projekt
- 6 Kreditpunkte = 180h

Voraussetzungen

- Studenten im MSc CV/INF/INGINF/WIF
- Solide Programmiererfahrungen
- Komm. und Netze wird empfohlen

Interesse? Weitere Infos unter:
http://www.netsys.ovgu.de/

Inhalte, u.a.:

- Software-defined Networking
- Network Functions Virtualization
- Netzwerk Sicherheit
- P2P und Overlay Netze
- Mobile Netze, Video Streaming
- Energy-effiziente Netze
- Netzwerk Simulation
- Oekonomische Aspekte

Lernergebnisse

- Design & Entwicklung von Anwendungen in Kommunikationsnetzen
- Anwendung von objektorientierten Programmiertechniken

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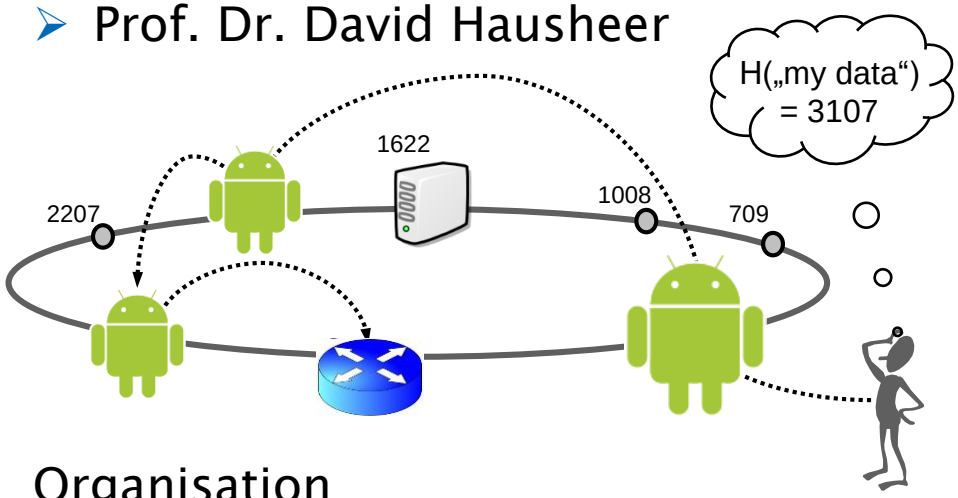
Seminar Vernetzte Systeme

Dozent:

- Prof. Dr. David Hausheer



Organisation

- Wissenschaftliches Seminar
- 3 Kreditpunkte

Voraussetzungen

- Studenten im MSc CV/INF/INGINF/WIF
- Kommunikation und Netze wird empfohlen

Interesse? Weitere Infos unter:
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Inhalte, u.a.:

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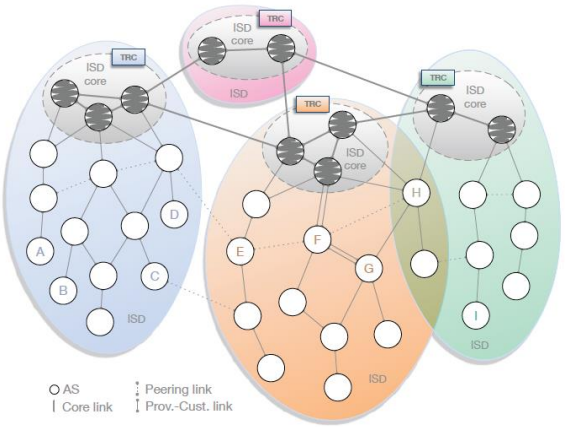
Lernergebnisse

- Literatursuche, Klassifizierung, Evaluation, Vergleich
- Bericht (6-10 Seiten) und Präsentation (20-30min) einer Literaturstudie

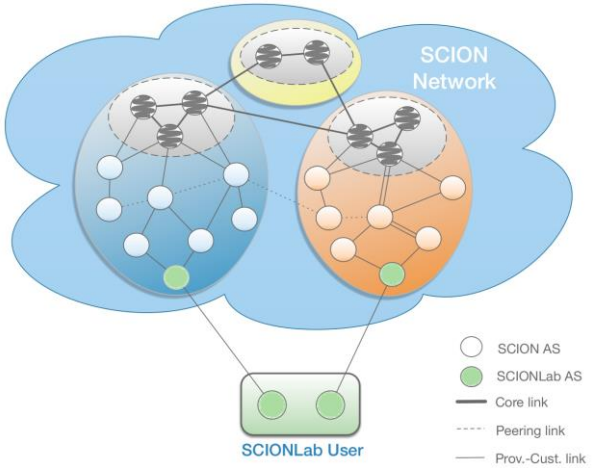
SD-WAN and Network Security: SCION



- SCION: Scalability, Control, and Isolation on Next-Generation Networks
  - A Software-defined WAN approach
- SCION Design Goals
  - Availability in the presence of adversaries (e.g. DDoS)
  - Transparency and control over forwarding paths
  - Multipath forwarding
  - Efficiency, Scalability, and Extensibility
  - Deployability
- SCION provides incentives for deployment to overcome the resistance for upgrading today's core Internet infrastructure
  - ISPs are able to define new business models and sell new services.
  - Migration requires minimal added complexity (and cost) to the existing infrastructure.
- In cooperation with Adrian Perrig (ETH Zurich)

SCION

SCIONLab



- Fast setup, low entry bar for users
- Little required technical expertise: Setup of a SCION should be simple, intuitive and automated
- SCION AS can be instantiated as a VM in few clicks
  - http://www.scionlab.org/

- Ongoing Projects:
  - Virtual credit for SCIONLab users
    - Provide incentives run a SCIONLab AS, use resources efficiently
    - Users can gain additional credit for offering connections to other users
  - SpeedCam: Monitoring of multipath resource usage
  - SCION on small scale devices (e.g. RaspberryPI, Odroid)
    - Platform for smart home environments, IoT applications

- Joint work with Ercan Ucan, Jonghoon Kwon, Kilian Gärtner, Stefan Schwarz, et al.

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Topics (1): SCION – A Secure Internet Architecture

- Extension of a Virtual Credit based Resource Allocation Mechanisms for SCION (T, L)
- Extension of the SCIONLab Coordination Service (T, L)
- Design and Evaluation of SCION Multi-path over GEANT Topology (T, L)
- A Fast Image and Package Creation for SCION AS Installations (L)
- Deployment and Evaluation of SCION on the EU GEANT Network (T, L)
- Bandwidth Measurements as a Basis to Evaluate SCION (T, L)
- Comparison of SCION with alternative SD-WAN Approaches (S)
- Evaluation of Multi-path Approaches in SCION (T, L)
- Comparison of MP-QUIC with other Multi-path Appraoches (S)
- Does Multi-path lead to more resource usage? (T, S)
- Usage Scenarios und Requirements of Secure Internet Architectures in the Telecommunications-Industry (S)
- Automatic Deployment of SCION on Small Scale Devices (L)
- Performance Evaluation of SCION on Small-Scale Devices (T, L)
- Design and Analysis of IoT Applications on SCION (T, L)

Type: T(hesis), L(ab), S(eminar)

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Topics (2): Distributed Systems and Overlays

- Secure Mobile Fog Computing for Critical Applications (T, S)

Type: T(hesis), L(ab), S(eminar)

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Topics (3): Software-defined Networking (SDN)

- Developing an SDN Lab with the Zodiac FX Switch (L)

Type: T(hesis), L(ab), S(eminar)

Organization

- This week: Write me an e-mail to hausheer@ovgu.de with:
  - Topics you are interested (may be multiple, in order of preference)
  - Type (Lab, Seminar, Thesis)
  - Individual- or Teamproject
  - Name(s) of involved person(s)

- Next week: Make an appointment with me to discuss the topic and initiate the work

- Deadlines:
  - Presentations will take place after the end of the semester
  - Reports (+ Code) have to be handed in a week prior to the presentation (<tbd>)
  - A preliminary version needs to be handed in for feedback (<tbd>)

- Templates:
  - Presentation template will be provided later
  - Report template: IEEE Template for Transactions http://www.ieee.org/publications_standards/publications/authors/author_templates.html#sect1

Requirements

- Report
  - Team projecs: 5 pages for 1 person, 5,5 pages for 2 persons, 6 pages for 3 persons
  - Seminar work: xxx
- Presentation
  - Team projecs: 20min (+5-10min demo)
  - Seminar work: 20-30min (+15min discussion)
- Registration
  - To be done with the corresponding exam registration form
  - To bring with you for my signature, once the presentation date is fixed
- Plagiarism
  - Please take care to correctly reference other work and dont copy/paste content from other documents
  - Reports will be checked for plagiarism and plagiarism will be reported

Thank you for your attention!
Questions?

hausheer@ovgu.de
http://www.netsys.ovgu.de/