NODES: Networking And Services

Introduction and Research Groups
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Mission

The Networking and Services unit educates experts and strategic leaders for the design and realization of new, global platforms and infrastructures.

Organization

The unit consists of four professors, five lecturers, and many post doctoral researchers and PhD candidates.

NODES is a community of interacting research groups in the field of networks and distributed systems, ranging from Internet protocols, wireless communication and ubiquitous computing to new challenges pertaining to globally interoperating business services and human-computer interaction.

Professors, lecturers, and researchers forming NODES are responsible for the teaching and organization of the Networking and Services master and PhD program at the Department of Computer Science.

History

- The NODES group at the Department of Computer Science was launched in 1995
- Aligned department's educational specialization line "Distributed systems and Data communication", later renamed to "Networking and Services"
- KOPS Glögi predates NODES
  - One of the Department's groups in early 1980s was called KOPS for Käyttöjärjestelmät - Operativ Systems, i.e., Operating systems in Finnish and Swedish.
  - The Glögi survives reorganizations ☺

NODES History

- Memo from November 22, 1994
  - Networking in Open Distributed Environments (NODES)
  - Timo Alanko, Lea and Petri Kutvonen, Markku Kojo, Liisa Marttinen and Kimmo Raatikainen
  - Name proposed by Petri Kutvonen and approved by Martti Tienari
  - Scope: Concurrency, telecommunication software, and distributed systems
- Mentioned in the Annual Report of the Department in 2000
  - Distributed systems, nomadic computing, formal methods, operating system enhancements
  - 2000-2005 refined to Wireless Internet, Open Distributed and Collaborative Systems, Formal Methods, Trust-Privacy-Security, and Linux Developments
- The First Ten Years of the NODES Group edited by Professor Kimmo Raatikainen, 2005
  - http://www.cs.helsinki.fi/docs/NodesTenYearsEversion.pdf

2014

- Our group is 20 years old next year
- We will produce a jubilee book
  - The First Twenty Years
  - The Next Ten Years

News: Projects and Visits

- Reknow strategic Tekes project started at HIIT
  - www.reknow.fi
- Prof. Kangasharju visited South Korea and Berkeley on a sabbatical
- Prof. Tarkoma visited Cambridge Computer Lab in Summer 2013
- PhD student Aaron Yi Ding visits Cambridge Computer Lab June-December, 2013
- Intel Security Institute founded at HIIT/UH
- Prof. Jacucci coordinates the new MindSee FP7 project
- Extension of Nodes lab with IoT lab

News: Awards and Visibility

- Prof. Jacucci et al. received best paper award at IUI 2013 for a paper on explorative search
- The rooftop greenhouse of Pervilä and prof. Kangasharju received wide visibility
- Carat project with prof. Tarkoma and Lagerspetz (with UCB) reached 650 000+ users, press visibility, articles at SenSys 2013 and CHI 2014
- Transport mode detection Sensys 2013 article featured in many newspapers (including Daily Mail)

2013 in a nutshell

- System security and Big Data as rising teaching/research topics
- New senior researcher: Docent Petteri Nurmi
- New Docent: Dr. Pasi Sarolahti
- Ph.D. theses: Toni Ruokolainen, Tatiana Polishchuk, Mikko Pervilä
- Ph.D. theses statistics
  - 2013: 3
  - 2012: 3
- M.Sc. Theses statistics
  - 2013: 22
  - 2012: 20

Specialization profiles

Future internet

- Building the internet and other global architectures, especially for mobile users' needs
- Internet-protocols, P2P, security, specification
- Internet of Things

Collaborative and interoperable computing

- Evolving open service ecosystems by providing global infrastructure solutions and service-oriented engineering practices and tools that enable semantic and pragmatic interoperability management
- Developing infrastructure services for service interoperability, contract-based collaboration control and management for dynamically formed business service collaborations amongst autonomous parties

Interactive systems

- Human-computer interaction
- Interaction Design
- Ubiquitous Computing
- Adaptive User Interfaces

Security

- System and protocol security
- Security and usability

Degree Requirements

- Programming in C (4 cr) (obligatory, if not in bachelor's degree)
- Advanced level computer science, min 80 cr
- Obligatory courses (8 cr)
  - Distributed Systems (4 cr)
  - Distributed Systems Project (4 cr)
- At least one of these:
  - Internet-protocols (4 cr)
  - Overlay and P2P Networks (4 cr)
  - Service Ecosystems (4 cr)
  - Interactive Systems (6 op)
- Other advanced level computer science courses minimum 22 cr following the instructions of the specialization line
  - Seminars (6 cr)
- Master' s thesis (40 cr)

Research groups

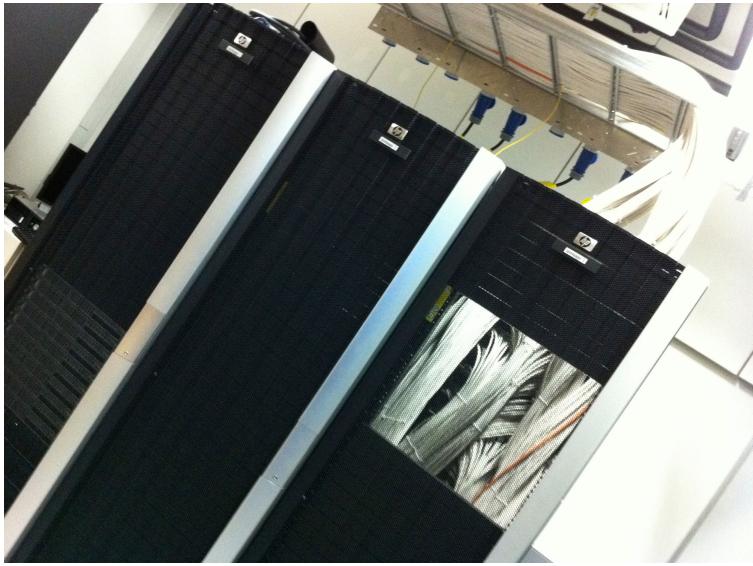
Collaborative and Interoperable computing **Lea Kutvonen**	▪ Inter-enterprise collaboration ▪ Service interoperability and open service ecosystems ▪ eContracting & NFP ▪ Trust, reputation, privacy ▪ Service-oriented software engineering
Collaborative Networking **Jussi Kangasharju**	▪ Information-centric networking ▪ Opportunistic networks ▪ Green networking
Interactive Systems **Giulio Jacucci** **Eve Hoggan**	▪ Multimodal interaction ▪ Ubiquitous and surface computing ▪ Adaptivity and Engagement in User Interfaces
Content-centric Structures and Networking **Sasu Tarkoma**	▪ Distributed services; mobile solutions ▪ Content in Future Internet ▪ Energy aware computing & communication
Wireless Internet **Markku Kojo**	▪ Wireless and mobile computing ▪ Internet Protocol enhancements ▪ Seamless connectivity
Secure Systems **N. Asokan**	▪ System and protocol security ▪ Mobile security ▪ Security and usability

NODES Lab highlights

- Software-defined networks
- HCI Lab
- Home gateway testbed
- Wireless experiments
- Energy modelling
- Connection to the Ukko cluster for combined real-life and simulation/emulation experiments

Software-defined networking

- OpenFlow switches
- Servers for emulation/simulation
- NetFPGA cards for low-level implementation



HCI Lab

- Lab room for HCI experiments
- Multitouch displays
- 3D depth cameras
- Sensor kits
- Video projects for immersive interfaces

Talks

- Sasu Tarkoma: Overview of Networking and Services
- Jussi Kangasharju: Picking Digital Pockets and Errors in BitTorrent
- Lea Kutvonen: Challenges in collaborable and interoperable computing
- Sini Ruohomaa: Secure Systems Group: Special Holiday Report
- Antti Jylhä: Interactive Systems
- Markku Kojo
- Posters and demos!