**PhD Student Thematic Workshop**

**A Scalable Adaptive Multimedia Streaming Middleware**

Video-on-Demand services are becoming more and more popular. Instead of large dedicated TV sets, people tend to use their workstations or mobile devices, such as PDAs (Personal Digital Assistants) or mobile cellular phones, to consume video and audio content. However, streaming (live) content to these devices introduces a number of difficulties. A small mobile device usually has very limited resource capabilities compared to a standard workstation or a TV set, and therefore, the content has to be adapted to the capabilities of the device, for example by using the MPEG-21 standard.

The main goal of this student workshop will be to examine the use of different existing wired and wireless network infrastructures to provide both mobile and stationary devices with the best multimedia streaming quality. Quality improvements (e.g. packet loss reduction) can be achieved by balancing the load among various participating devices, for example by sending the data over alternative paths (multiple source streaming) and merging it at the receiver using the Real-time Transport Protocol (RTP). This could be achieved by building a dynamic adaptive overlay network between the sender and the receiver. A key challenge in creating such an overlay network is peer selection, i.e., the selection of peers suitable for media streaming, which requires the introduction of a peer utility metric in order to distinguish a "fragile" peer from a "stable" peer. A number of utility metrics will be investigated. One approach would be to use the average peer uptime as a utility metric. Other potential approaches may be based on a peer's available bandwidth or average latency. Once the dynamic overlay network has been established, the content can be disseminated to client devices. Different overlays will be considered, including application-level multicast and content-based publish-subscribe services.

**Expected Outcome**

Combine the outcome from young researchers from Austria, Ireland and Norway, working in the area of peer to peer networks, multimedia streaming, and publish-subscribe systems. The researchers from Austria have experience in adapting multimedia data depending on the quality of the network connection. The researchers from Ireland are more familiar with the field of self-organising and adaptive overlay networks. The researcher from the Simula Research Laboratory will contribute his knowledge about adaptive video streaming over content-based publish-subscribe systems, which is especially valuable since Video-on-Demand services are a perfect application area for publish subscribe systems.

The final goal is to establish an adaptive framework for multimedia streaming and to produce a publication together.

**Participants**

- Eide Viktor S. Wold (Simula Research Laboratory, Norway)
- Biskupski Bartosz (Trinity College Dublin, Ireland)
- Sacha Jan (Trinity College Dublin, Ireland)
- Schöffmann Klaus (University Klagenfurt, Austria)
- Spielvogel Christian (University Klagenfurt, Austria)

**Estimated cost**

The estimated total cost for the Workshop is 6,500 Euro (1300 Euro for each participant) including accommodation, flights and meals for one week.
Curriculum Vitae

Viktor S. Wold Eide

February 2006

Current position     Post Doc.
Date of birth        10th May 1971
Nationality          Norwegian

Education
1999 - 2005 Dr. Scient. (Ph. D.) in computer science, Department of Informatics, University of Oslo, Norway
1996 - 1998 Cand. Scient. (Master of Science) in computer science, Department of Informatics, University of Oslo, Norway
1992 - 1995 Cand. Mag. (Bachelor of Science) University of Oslo, Norway

Employment history
2005 - Post Doc. in the Networks and Distributed Systems group at Simula Research Laboratory, Norway
2003 - 2005 Scientific programmer in the Networks and Distributed Systems group at Simula Research Laboratory, Norway
2001 - 2004 Involved in the system administration group at Simula Research Laboratory, Norway
2001 - 2002 Involved in the design and installation of the computer and communication infrastructure at Simula Research Laboratory, Norway

Current research interests
- Distributed systems
- Communication systems
- Event-based communication
- Multimedia
- Real-time systems
- Parallel processing

Courses for the Dr. Scient. degree
2001 INFPRI Protocols and Routing in Internet
2000 INODP Open Distributed Processing
2000 INMOS Modern Operating Systems
2000 IN318 Logic
1999 MNVIT401 Science theory
1999 UNIKI305 Protocols for Multimedia Communications

Courses for the Cand. Scient. degree
1998 IN310 Compiler Design
1997 IN305 Parallel programming and operating systems
1996 IN218 Software Engineering

Teaching
2001 Teaching assistant for the course INF242, Operating systems
2000 Responsible for and teaching the exercise solving class for the course
INO DP, Open Distributed Processing
1999 Teaching one of the exercise solving classes for the course IN270, Com-
puter Communication

Supervision
14th August 2005, University of Oslo, Norway
of Oslo, Norway
2002 Daoshan Lie, “Distributed Media Journaling -A Case for Event-based
Communication with CORBA Notification Service”, Master thesis, Narvik
University College and Simula Research Laboratory
2000 - 2002 Kjetil Tyvand,; “An Evaluation of Event Notification Services for the
DMJ project”, Cand. Scient. thesis (in Norwegian), University of Oslo,
Norway

References
Distributed and Parallel Video Content Analysis. Dr. Scient. thesis, Faculty of
Mathematics and Natural Sciences, University of Oslo, Norway, 2005.

[2] Viktor S. Wold Eide, Ole Christoffer Granmo, Frank Eliassen, and Jørgen And-
reas Michaelsen. Real-time Video Content Analysis: QoS-Aware Application
Composition and Parallel Processing. To appear in ACM Transactions on Mul-

Content-Based Networking for Fine Granularity Multi-Receiver Video Stream-
ing. In Surendar Chandra and Nalini Venkatasubramanian, editors, Proceedings
of the 12th Annual Multimedia Computing and Networking (MMCN ’05), SPIE,
San Jose, California, USA, volume 5680, pages 155–166, January 2005.


Curriculum Vitae

Name: Bartosz Biskupski
Office: Lloyd Institute 015, Distributed Systems Group, Trinity College Dublin, Ireland
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Education:

- July 2004 – To Date:
  Ph.D. student, Distributed Systems Group, Trinity College Dublin, Ireland
  working on peer-to-peer-based middleware for multimedia streaming
  and a peer-to-peer architecture for the Digital Business Ecosystem project
  under supervision of Dr. René Meier

- 2002 - 2003:
  M.Sc. In Computer Science, Vrije Universiteit, Amsterdam, The Netherlands
  Thesis: Transparent Fault Tolerance for Parallel Java Applications
  under supervision of Prof. Henri Bal

- 1998 - 2003:
  M.Sc. In Computer Science, Warsaw University, Poland
  Thesis: Transparent Fault Tolerance for Parallel Java Applications
  under supervision of Dr. Janina Mincer-Daszkiewicz

Publications:

- Designing Self-Organising Systems for MANETs and Overlay P2P Networks
  Submitted for journal publication
- Binding- and Port-Agnostic Service Composition using a P2P SOA
  In Proceedings of the ICSOC Workshop on Dynamic Web Processes (DWP), Amsterdam, The Netherlands, December 2005
- Transparent Fault Tolerance for Grid Applications
  In Proceedings of the European Grid Conference (EGC2005)
  Amsterdam, The Netherlands, February 2005

Interests:

- Peer-to-peer-based Middleware for Multimedia Streaming
- Peer-to-peer Application Level Multicast
- Peer-to-peer Networks
- Self-organising Distributed Systems
- Distributed Algorithms
Jan Sacha
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Education

Since 2004  **Trinity College, Dublin**, Ph.D. student in Computer Science Department, Distributed Systems Group, 3-year scholarship funded by the EU, Member of the DBE project (www.dsg.cs.tcd.ie/sites/DBE.html), Main research interests: *Distributed Systems, Self-Organising Systems, Peer-to-Peer Systems*


1994 – 1998  XXVII High School in Warsaw, Computer Science major

Publications


Jim Dowling, Dominik Dahlem, and Jan Sacha “*Matching Distributed Systems to their Environment using Dissipative Structures*”, Workshop on Stochasticity in Distributed Systems (StoDiS), San Jose, CA, 2005.


Bartosz Biskupski, Jim Dowling, and Jan Sacha, "*Designing Self-Organising Systems for MANETs and Overlay P2P Networks*", Under review.

Jan Sacha, Jim Dowling, Raymond Cunningham, and Rene Meier, "*Discovery of Stable Peers in a Self-Organising Gradient Peer-to-Peer Topology*", Under review.
Klaus Schöffmann

Curriculum vitae

Personal Data
Date of Birth: 23 June 1979
Place of Birth: St. Veit / Glan (Austria)
Citizenship: Austrian
Languages: German (native), English
Current Residence: 9343 Zweinitz 118, Austria
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        9020 Klagenfurt, Austria
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WWW: http://www.ifi.uni-klu.ac.at/ITEC/Staff/Klaus.Schoeffmann

Education
2005 – present
Ph. D. student in Applied Informatics
Department for Information Technologies
Universitätsstraße 65-67
9020 Klagenfurt, Austria
Investigation in Multimedia Home Gateway Techniques.
Advisor: Prof. László Bőszörményi

1999 – 2005
Studies of Applied Informatics
University Klagenfurt

Thesis: Design and Implementation of a
Video Session Migration System
Advisor: Prof. Hermann Hellwagner

Teaching experience:
2005 – present: Web Technologies, Distributed Systems,
Introduction to structured and object-oriented Programming

Selected Publications
[1] Christian Spielvogel, László Bőszörményi, Klaus Schöffmann
An adaptive and self-organizing Proxy-to-Proxy Middleware
Christian Spielvogel

Curriculum vitae

Personal Data
Date of Birth: 14 march 1979
Place of Birth: Klagenfurt (Austria)
Citizenship: Austrian
Languages: German (native), English, Italian
Current Residence: Sonnrain 16, 9500 Villach, Austria
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Education
2003 – present
Ph. D. student in Applied Informatics
Department for Information Technologies
Universitätsstraße 65-67
9020 Klagenfurt, Austria
An adaptive and self-organizing Proxy-to-Proxy Middleware
Advisor: Prof. László Bőszörményi

1998 – 2003
Studies of Applied Informatics
University Klagenfurt
Thesis: Design and Implementation of a Network Resource Service for QoS aware Servers
Advisor: Prof. László Bőszörményi

Teaching experience:

Selected Publications

[1] Christian Spielvogel, László Bőszörményi, Klaus Schöffmann
An adaptive and self-organizing Proxy-to-Proxy Middleware

A Quality of Service based Infrastructure for Adaptive Video Servers