Activity Report
2002

LUCAS
Center for Applied Software Research

Lund Institute of Technology
Lund University
LUCAS – CENTER FOR APPLIED SOFTWARE RESEARCH was established in late 1999 as a research center at Lund Institute of Technology, Lund University. The objective of LUCAS is to gather the competence on applied software research at Lund Institute of Technology into a network. Today it comprises about 40 researchers half which are faculty members and half are Ph. D. Students.

The research of LUCAS covers three thematic areas:

- Software Engineering Environments – languages and tools for software development
- Methods in Software Engineering – methods and processes for software development
- Real-Time System Development – software in systems with hard realtime constraints

Industry relevance is a key issue for the LUCAS research and much of the research is conducted in joint projects with primarily Swedish, but also international industry. During 2002 LUCAS has deepened the common interface to our industrial partners and members. A wide spectrum of involved groups offer a variety of application domains, which gives LUCAS unique possibilities to perform software research. Examples of joint efforts are co-funding of Ph. D. students and using industrial projects as research objects. A course in Software Engineering for technical managers at Sony Ericsson and the LUCAS ARCHITECTURE ACADEMY are other examples of industry-academia interaction where both parties win knowledge and experiences.

When 2001 was a year of expansion, 2002 has been a year of consolidation and further research. LUCAS enters the future well confident in its ability to serve its purpose:

- to stay on the competitive edge on applied software research
- to offer results to industry for future software development projects
- to provide education and training to fulfil industry needs.

This report gives a brief picture of LUCAS 2002. Please follow our activities and achievements at www.lucas.lth.se.
Software Engineering for technical managers at Sony Ericsson Mobile Communications

During 2002 LUCAS started an high level course in Software Engineering for a group of technical managers at Sony Ericsson. Faculty staff from LUCAS arranges eight one-day seminars on topics like Requirements Engineering, Extreme Programming, Configuration Management, Java in real-time embedded systems etc. The course will be finished and evaluated in the summer 2003 and probably opened for a broader group of participants in the future.

LUCAS days

In late October 2002 about one hundred practitioners and researcher, mostly from LUCAS member companies, gathered for a two-day forum at Lund Institute of Technology. Besides a keynote speech on Usability Engineering, held by Mary-Beth Rosson, Virginia tech, the LUCAS-DAYS offered eight seminars on a variety of LUCAS research areas and a demo-show with applications and demonstrations from current research.

TrueTime gets Network Interface

TRUETIME is a Matlab/Simulink-based simulator for real-time control systems, which makes it possible to simulate the temporal behavior of a multitasking real-time kernel executing controller tasks.

TRUETIME is used as an experimental platform for research on dynamic real-time control systems.

During 2002 a network interface has been developed, which makes it possible to simulate simple models of communication networks and their influence on networked control loops.

LUCAS Architecture Academy

LUCAS ARCHITECTURE ACADEMY is a forum for current and upcoming architects targeted at LUCAS gold and silver members. During a 10 months part time program experienced practitioners and LUCAS researchers have seminars, evaluations and discussions on topics related to advanced software architecture. A typical 10-month program consists of 6 sessions, each 2-3 days on-site.

During 2002 the first program finished and the second one started with industry participants from Telelogic, Q-Labs, Ericsson Microwave Systems, Sony Ericsson Mobile Communications and ABB.

Dissertations

Doctoral

• Håkan Peterson, "Supporting Software Inspections through Fault Content Estimation and Effectiveness Analysis", September 13th.

• Thomas Thelin, "Empirical Evaluations of Usage-Based Reading and Fault Content Estimation for Software Inspections," September 20th.

• Ulf Asklund, "Configuration Management for Distributed Development in an Integrated Environment", December 12th.

Licentiate

• Enrico Johanson, "Quality Improvement in Software Platform Development", April 26th.

• Johan Natt och Dag, "Elicitation and Management of User Requirements in Market-Driven Software Development", June 12th.

• Thomas Olsson, "Software Information Management in Requirements and Test Documentation", October 3rd.

• Daniel Karlström, "Increasing Involvement in Software Process Improvement", November 6th.

• Josef Nedstam, "Changes to Processes and Architectures; Suggested, Implemented and Analyzed from a Project Viewpoint", November 14th.

• Rasmus Olsson, "Exception Handling in Recipe-Based Batch Control", December 6th.

Jitterbug Covers all System Signals

JITTERBUG is a Matlab toolbox for easy control system performance evaluation in real-time implementations. The toolbox allows modeling of random delays (jitter) and other random events such as data drop-out. New for year 2002 was that JITTERBUG can calculate power spectral densities of all signals in the system.

Lund Institute of Technology

Public financing

European Union 2 835
SSF 1 460
VINNOVA 3 850
Vetenskapsrådet 550
Total 8 695

Lund Institute of Technology 7 430

Grand total 19 485

Company support in other resources

ABB Robotics 50
BlueCell 50
connectBlue 50
Ericsson Microwave Systems 160
Q-Labs 200
Telelogic 200
Total 3 360

Funders

Economy 2002

Vinnova

SSF

European Union

Vetenskapsrådet

Public financing

Company support in other resources

Company financing

Development of a bicycle cart during Extreme Hour.


Committee assignments
Program Chair
CC '03 (12th International Conference on Compiler Construction), Warsaw, 2003, Program Chair, Görel Hedín

Conference on Engineering Computer-Based Systems, Lund, 2002, Program Chair, Per Runeson

ECOOP 2002 (16th European Conference on Object Oriented Programming), Malaga, 2002, Program Chair, Boris Magnusson

LDTA 2004 (4th Workshop on Language Descriptions, Tools and Applications), Barcelona, 2004, Program Co-Chair, Görel Hedín

REFSQ/02Eighth International Workshop on Requirements Engineering: Foundation for Software Programme Co-Chair, Björn Regnell

Technical Committee
IEEE Control Systems Society Technical Committee on Real-Time Control, Computing and Signal Processing, Committee Chair, Karl-Erik Årznén

FAC Technical Committee on Computers and Control, Vice Chair, Karl-Erik Årznén

Program Committee
9th IEEE Conference on Mechatronics and Machine Vision in Practice (MZVIP), Chiang Mai, Thailand, September 2002, PC member, Reif Johansson

ADHS'03 (IFAC Conference of Analysis and Design of Hybrid Systems), PC member, Karl-Erik Årznén

CBSE Euromicro, 2002, PC member, Even-André Karlsson

CC 2004 (13th International Conference on Compiler Construction), Barcelona, 2004, PC member, Görel Hedín

Conference of Software Engineering Education and Training, 2002, PC member, Per Runeson

Conference on Software Engineering Research and Practice in Sweden, 2002, PC member, Even-André Karlsson and Per Runeson

Empirical Assessment and Evaluation in Software Engineering (EASE), 2002, PC member, Martin Höst

ETAPS 2002 (European Joint Conference on Theory and Practice of Software), Grenoble, 2002, Member of the Steering Committee, Görel Hedín

ETAPS 2003 (European Joint Conferences on Theory and Practice of Software), Warsaw, 2003, Member of the Steering Committee, Görel Hedín

Euromicro 2003 (The 15th Euromicro Conference on Real-Time Systems), PC member, Karl-Erik Årznén

Guest editor, together with Prof. Claes Wohlin, for a special issue of Information and Software Technology on controlled experiments in software engineering, 2002, Martin Höst.

LDTA'02 (2nd Workshop on Language Definitions Tools and Applications), Grenoble, 2002, Member of the Organizing Committee. Görel Hedín

NWPER'02, (10th Nordic workshop on Programming and Software Development Tools and Techniques), Copenhagen, 2002, PC member, Görel Hedín

OOPSLA'02 ACM Conference on Object Oriented Programming, Systems, Languages and Applications, Seattle 2002, PC member, Boris Magnusson

RE'02 10th International Conference on Requirements Engineering, 2002, PC member, Björn Regnell

RTAS 2002 (The 8th IEEE Real-Time and Embedded Technology and Applications Symposium), PC member, Karl-Erik Årznén

TCRE 2002, International Workshop on Time Constrained Requirements Engineering 2002, PC member, Björn Regnell

Events and Seminars
Industrial Automation, LUCAS workshop, February 26.

Software Architecture in Practice, seminar with Dr. Paul C. Clements, SEI, March 5.

ECBS Conferens on Engineering of Computer-Based Systems, April 4-6.

Formal Engineering Methods for Software Systems Development, seminar by Prof. Shaoying Liu, Hous University, Tokyo, Japan, September 30.

LUCAS days, October 21-22.

External presentations


Sample-induced delays in synchronous multirate systems, University of Illinois, April 26, 2002. Björn Wittenmark


Seminar at AXIS, November 6, 2002 on Requirements Engineering Process Improvement. Björn Regnell and Lena Karlsson

Seminarium på Sveriges verkstadsindustriens konferenser om produktdelning den November 27. Björn Regnell

Configuration Management från utvecklarns perspektiv - att använda metaforer för att identifiera och lösa problem, Sweden Configuration Management Summit, December 5-6, 2002. Lars Bendix

Konfigurationsstyring - hvad, hvorfor og hvem?, Softwareudvikling-på-øvrs, Copenhagen, Denmark, May 29, 2002. Lars Bendix

Experinence con XP in a curriculum universitario, seminars at Italian universiti, Lars Bendix

Master thesis projects
"Poring the Ericsson Bluetooth Stack - A Real-Time Analysis", Dept of Automatic Control and Ericsson. Mats Attnäs, Ulrik Laurén

"Introducing a Software Test Process into a Smale-Scale Software Organisation", Dept. of Communication Systems and Tancom, Lund University, 2002. Anders Bengtsson and Magnus Björnforf

"AICG Axis Internet Camera Gateway" AXIS and Dept. of Communication Systems and Tancom, Lund University, 2002. Niklas Brunlid and Perter Happonen

"Distributed Brake-By-Wire Based on TTPC", Dept of Automatic Control and Volvo TU, Maria Bruce

"Implementation and design of an intelligant and dynamic remote control in Palm OS", Dept of Automatic Control and Lindhvent, Henrik Fredriksson

"Common Language Infrastructure - positionning and impact on Ericsson mobile platform", Dept. of Computer Science, Dariusz Cieplota och Patrik Hansson

"Mai - Migrating User Interfaces for Audio Video Recorder, Dept. of Computer Science and Bluecell, December 2002. Torbjörn Eklund and David Svensson

"Scheduling of Real-time Traffic in a Switched Ethernet Network", Dept of Automatic Control, Anders Martinsson

"An experimental compiler for RAPID, a language for programming industrial robots", Dept. of Computer Science and ABB, Marie Persson

"Qualitative and Quantitative Evaluation of Software Inspections", Q-Labs and Dept. of Communication Systems, Perinella Persson

"Software Architecture Verification Tool for Software Platforms", Dept of Computer Science and Ericsson Mobile Platforms AB, Camilla Johansson and Lotta Wennöf


"Real-Time Linux in an Embedded Environment A Port and Evaluation of RTAI on the CRIS Architecture", Dept. of Computer Science and Axis, Martin P Andersson and Jens-Henrik Lindskov

LUCAS - Center of Applied Software Research - Activity Report 2002
People

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Sten Minör,
Sony Ericsson Mobile Communications
Göran Arinder,
ABB Automation Technology Products
Anders Ek, Tellogic AB
Björn Wittenmark,
Lund institute of Technology

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Görel Hedin, Dr.
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Martin Höst, Dr.
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LUCAS research is performed within application domains such as robotics, wireless communication, embedded systems and mobile Internet. Technical issues involve configuration management, software architecture, programming languages, software test methodology, control and evaluation of software quality and real-time problems. New technologies are developed in co-operation with industry in order to master complex software systems. Industry offers co-financing of Ph. D. students and products and projects as research objects.

LUCAS is a research center at Lund Institute of Technology with researchers from the Department of Computer Science, the Department of Automatic Control and the Department of Communication Systems.

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