Introduction to SPIN
In this note we introduce the SPIN model checker for verification of concurrent programs.

Basic Concurrency Theory
In this set of notes, we present some of the basic theory underlying the discipline of programming with concurrent processes/threads. The notes are intended to supplement a standard textbook on concurrent programming.
Towards a Process Algebra for Shared Processors

We present initial work on a timed process algebra that models sharing of processor resources allowing preemption at arbitrary points in time. This enables us to model both the functional and the timely behaviour of concurrent processes executed on a single processor. We give a refinement relation that describes that one process is more deterministic than another. Applications of the model for process scheduling, programming language semantics, and kernel development are outlined.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Computer Science and Engineering
Authors: Buchholtz, M. (Intern), Andersen, J. (Ekstern), Løvengreen, H. H. (Intern)
Pages: 275–294
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Electronic Notes in Theoretical Computer Science
Volume: 52
Issue number: 3
ISSN (Print): 1571-0661
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.256 SNIP 0.609 CiteScore 0.66
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.373 SNIP 0.781 CiteScore 0.67
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.382 SNIP 0.771 CiteScore 0.6
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.323 SNIP 0.72 CiteScore 0.55
ISI indexed (2013): ISI indexed no
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.386 SNIP 0.608 CiteScore 0.55
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.325 SNIP 0.582 CiteScore 0.57
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.408 SNIP 0.567
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.419 SNIP 0.689
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.407 SNIP 0.619
Scopus rating (2007): SJR 0.419 SNIP 0.611
Scopus rating (2006): SJR 0.377 SNIP 0.649
Scopus rating (2005): SJR 0.373 SNIP 0.633
Scopus rating (2004): SJR 0.406 SNIP 0.713
Scopus rating (2003): SJR 0.343 SNIP 0.56
Scopus rating (2002): SJR 0.464 SNIP 0.661
Scopus rating (2001): SJR 0.435 SNIP 0.679
Towards a Process Algebra for Shared Processors

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Computer Science and Engineering
Authors: Buchholtz, M. (Intern), Andersen, J. (Ekstern), Løvengreen, H. H. (Intern), Corradini al. al., F. (ed.) (Ekstern)
Pages: 87-99
Publication date: 2001

Host publication information
Title of host publication: Preliminary proceedings of 2nd International Workshop on Models for Time-Critical Systems, MTCS '01
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 57829
Publication: Research - peer-review › Article in proceedings – Annual report year: 2001

Streams and Sockets in DTU-RTMM

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Sharp, R. (Intern), Løvengreen, H. H. (Intern), Todirica, E. A. (Intern)
Publication date: 2000

Publication information
Publisher: Department of Information Technology, Technical University of Denmark
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 201037
Publication: Research - peer-review › Report – Annual report year: 2000

Interval-based Specification of Concurrent Objects
We propose a logic for specifying the behaviour of concurrent objects, i.e. concurrent entities that invoke operation of each other. The logic is an interval logic with operation invocations as primitive formulas. The strengths and deficiencies of the logic are illustrated by specifying a variety of simple registers.

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling, Department of Information Technology
Authors: Løvengreen, H. H. (Intern), Sørensen, M. U. (Intern)
Pages: 111-131
Publication date: 1998

Host publication information
Title of host publication: Proceedings of ESSLLI'98 workshop on Duration Calculus
Protected Objects in Java
We present an implementation of Ada 95's notion of protected objects in Java. The implementation comprises a class library supporting entry queues and a (pre-) compiler translating slightly decorated Java classes to pure Java classes utilizing the library.

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Løvengreen, H. H. (Intern), Schwarzer, J. C. (Ekstern)
Pages: 53-58
Publication date: 1998

Host publication information
Title of host publication: Proceedings of IEEE Workshop on Languages for Real-Time Industrial Applications
Place of publication: Madrid, E
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 170890
Publication: Research - peer-review › Article in proceedings – Annual report year: 1998

Combining Temporal Specification Techniques

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Sørensen, M. U. (Ekstern), Hansen, O. E. (Ekstern), Løvengreen, H. H. (Intern), Gabbay, D. (ed.) (Ekstern), Ohlbach, H. (ed.) (Ekstern)
Pages: 1-16
Publication date: 1994

Host publication information
Title of host publication: ICTL '94 Temporal Logic
Publisher: Springer Verlag
Main Research Area: Technical/natural sciences
Conference: ICTL '94 Temporal Logic, 01/01/1994
Source: orbit
Source-ID: 200400
Publication: Research - peer-review › Article in proceedings – Annual report year: 1994

Synchronous Realization of Asynchronous Computations

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling, Department of Information Technology
Authors: Løvengreen, H. H. (Intern), Staunstrup, J. (Intern), Stavridou, V. (ed.) (Ekstern), Melham, T. (ed.) (Ekstern)
Publication date: 1992

Host publication information
Title of host publication: IFIP WG 10.2 International Conference on Theorem Provers in Circuit Design: Theory, Practice and Experience
Publisher: Elsevier
Main Research Area: Technical/natural sciences
Conference: IFIP WG 10.2 International Conference on Theorem Provers in Circuit Design: Theory, Practice and Experience, 01/01/1992
A Systematic Kernel Development

General information
State: Published
Organisations: Department of Information Technology, Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Søgaard-Andersen, J. F. (Intern), Rump, C. Ø. (Intern), Løvengreen, H. H. (Intern)
Pages: 55-65
Publication date: 1991

Host publication information
Title of host publication: ACM Software Engineering Notes
Volume: Vol. 16, No. 5.
Publisher: ACM Press
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 200393
Publication: Research - peer-review › Article in proceedings – Annual report year: 1991

Base System Verification

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling, Department of Physics, Department of Information Technology
Authors: Gammelgaard, A. (Ekstern), Løvengreen, H. H. (Intern), Rump, C. Ø. (Intern), Søgaard-Andersen, J. F. (Intern)
Publication date: 1991

Publication information
Publisher: Department of Computer Science, Technical University of Denmark
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 200914
Publication: Research - peer-review › Report – Annual report year: 1991

Stepwise Development of a Distributed Load Balancing Algorithm

General information
State: Published
Organisations: Department of Information Technology, Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Grønning, P. (Intern), Nielsen, T. Q. (Ekstern), Løvengreen, H. H. (Intern), van Leeuwen, J. (ed.) (Ekstern), Santoro, N. (ed.) (Ekstern)
Pages: 151-168
Publication date: 1991

Host publication information
Title of host publication: 4'th International Workshop on Distributed Algorithms
Publisher: Springer Verlag
Main Research Area: Technical/natural sciences
Conference: 4'th International Workshop on Distributed Algorithms, 01/01/1991
Source: orbit
Source-ID: 200103
Publication: Research - peer-review › Article in proceedings – Annual report year: 1991

Design of Embedded Real-time Systems: Developing a Method for Practical Software Engineering
The methodological issues and practical problems in development and industrial use of a theory-based design method for embedded, real-time systems are discussed. The method has been used for several years in a number of smaller
industries that develop both electronics and software for a professional market. The design is expressed in a notation for communicating sequential processes, while data types and operations are expressed in a notation built on mathematical set theory. The authors present an order in which to use the notations, a technique for deriving states and operations, and a method to provide systematic checks of a design with respect to system requirements.

**General information**
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling, Department of Information Technology
Authors: Løvengreen, H. H. (Intern), Ravn, A. P. (Intern), Rischel, H. (Intern)
Pages: 385-390
Publication date: 1990

**Host publication information**
Title of host publication: IEEE International Conference on Computer Systems and Software Engineering
Publisher: IEEE
ISBN (Print): 0-8186-2041-2
Main Research Area: Technical/natural sciences
Conference: IEEE International Conference on Computer Systems and Software Engineering, Tel-Aviv, 01/01/1990

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**Distributed Implementation of DATALOG**

**General information**
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Jensen, L. S. (Ekstern), Løvengreen, H. H. (Intern)
Publication date: 1990

**Publication information**
Publisher: Department of Computer Science, Technical University of Denmark
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 200934
Publication: Research - peer-review › Report – Annual report year: 1990

**Refinement and Composition of Transition-based Rely-Guarantee Specifications with Auxiliary Variables**

**General information**
State: Published
Organisations: Department of Information Technology, Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Pages: 332-348
Publication date: 1990

**Host publication information**
Title of host publication: 10'th Conference on Foundations for Software Technology and Theoretical Computer Science
Publisher: Springer Verlag
Main Research Area: Technical/natural sciences
Conference: 10'th Conference on Foundations for Software Technology and Theoretical Computer Science, 01/01/1990
Source: orbit
A Design Method for Embedded Software Systems

General information
State: Published
Organisations: Department of Information Technology, Department of Informatics and Mathematical Modeling, Computer Science and Engineering
Authors: Ravn, A. P. (Intern), Rischel, H. (Intern), Løvengreen, H. H. (Intern)
Pages: 427-438
Publication date: 1988
Main Research Area: Technical/natural sciences

Publication information
Journal: BIT
Volume: 28
Issue number: 3
ISSN (Print): 0006-3835
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 1.535 SNIP 1.312 CiteScore 1.41
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.15 SNIP 1.275 CiteScore 1.11
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.044 SNIP 1.208 CiteScore 1.01
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.087 SNIP 1.246 CiteScore 1.2
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.967 SNIP 1.141 CiteScore 0.99
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.683 SNIP 1.171 CiteScore 0.79
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.273 SNIP 1.093
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.696 SNIP 0.97
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.805 SNIP 1.273
Scopus rating (2007): SJR 0.99 SNIP 1.081
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.869 SNIP 1.058
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.825 SNIP 0.937
Scopus rating (2004): SJR 0.662 SNIP 0.948
Scopus rating (2003): SJR 0.924 SNIP 1.279
Scopus rating (2002): SJR 0.962 SNIP 1.031
Web of Science (2002): Indexed yes
Konstruktion af programmel til formålsbundne systemer

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling, Department of Information Technology
Authors: Løvengreen, H. H. (Intern), Ravn, A. P. (Intern), Rischel, H. (Intern)
Publication date: 1988
Main Research Area: Technical/natural sciences

Publication information
Journal: CUBUS
Issue number: 4
Original language: English
Source: orbit
Source-ID: 199772
Publication: Research - peer-review › Journal article – Annual report year: 1988

Rigorous Development of a Distributed Calendar System

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Pages: 188-205
Publication date: 1987

Host publication information
Title of host publication: Parallel Architectures and Languages Europe: Parallel Languages on PARLE
Volume: II
Place of publication: London, UK
Publisher: Springer Verlag
ISBN (Print): 0-387-17945-3
Main Research Area: Technical/natural sciences
Conference: PARLE Parallel Architectures and Languages Europe, Volume II: Parallel Languages, 01/01/1987
Source: orbit
Source-ID: 200044
Publication: Research - peer-review › Article in proceedings – Annual report year: 1987

Formel specifikation af parallelle systemer – en kort orientering

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Løvengreen, H. H. (Intern)
Publication date: 1986

Publication information
Publisher: Department of Computer Science, Technical University of Denmark
Original language: English
On Concurrency Formalization

General information
State: Published
Organisations: Computer Science and Engineering, Department of Informatics and Mathematical Modeling
Authors: Løvengreen, H. H. (Intern)
Number of pages: 496
Publication date: May 1985

Publication information
Original language: English
Series: Uden navn
Number: ID-TR:85-3
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 200824
Publication: Research › Ph.D. thesis – Annual report year: 1985

Formalization of Database Models

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Computer Science and Engineering
Authors: Bjørner, D. (Intern), Løvengreen, H. H. (Intern)
Pages: 379-442
Publication date: 1982

Host publication information
Title of host publication: Formal Specification and Software Development
Main Research Area: Technical/natural sciences
Links:
http://www2.imm.dtu.dk/pubdb/p.php?2042
Source: orbit
Source-ID: 200628
Publication: Research - peer-review › Book chapter – Annual report year: 1982

Formalization of Database Systems – and a Formal Definition of {IMS}

Drawing upon an analogy between Programming Language Systems and Database Systems we outline the requirements that architectural specifications of database systems must fulfill, and argue that only formal, mathematical definitions may satisfy these. Then we illustrate home aspects and touch upon some of formal definitions of data models and database management systems. A formal model of IMS will carry this discussion. Finally we survey some of the exciting literature on formal definitions of database systems. The emphasis will be on constructive definitions in the denotational semantics style of the VCM: Vienna Development Method. The role of formal definitions in international standardization efforts is briefly mentioned.

General information
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Computer Science and Engineering
Authors: Bjørner, D. (Intern), Løvengreen, H. H. (Intern)
Pages: 334-347
Publication date: 1982

Host publication information
Title of host publication: Eighth International Conference on Very Large Data Bases
Main Research Area: Technical/natural sciences
Conference: Eighth International Conference on Very Large Data Bases, 01/01/1982
Source: orbit
Source-ID: 199976
Computer Based Systems Laboratory

A computer based system is controlled by a program which has been designed to this specific task. Today all kinds of electronic devices are computer based so the design and implementation of programs for computer systems is an important issue in industry today. The design of computer based systems has been a central research area at this department for a number of years, and more recently a laboratorium for doing pratical experiments has been formed. The laboratory contains various kinds of computers -- ranging from PC's to small micro-processors -- plus exlecrtonic and mechanical equipment which can be connected to the computers in order to build experimental systems. The mechanical equipment includes a small-scale hydraulic actuated robot which has been donated by Danfoss Fluid Power.
Real-Time Multimedia (RTMM)
This project is part of the Distributed Multimedia project within the framework of the Danish Research Councils' Center for Multimedia. The aim is to investigate technical aspects of multi-user distributed multimedia systems, especially for teaching use.

Department of Information Technology
Department of Informatics and Mathematical Modeling
Department of Telecommunication
Department of Photonics Engineering

Financing sources
Source: Unknown
Name of research programme: Ukedt
Amount: 1,554,000.00 Danish Kroner

Højniveau-design af programmet til indlejrede, reaktive systemer

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Syntese af hybride systemer

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD
Financing sources
Source: Internal funding (public)
Name of research programme: DTU-Su Stipendium, Eksperiment
Project: PhD

Concurrent Objects
Investigation of techniques for formal specification and verification of concurrent objects.
Department of Information Technology
Period: 01/09/1993 → ...
Number of participants: 1
Project Manager, organisational:
Løvengreen, Hans Henrik (Intern)

Specifikation og verifikation af modulære parallelprogrammer
Department of Informatics and Mathematical Modeling
Period: 01/09/1993 → 09/09/1997
Number of participants: 4
Phd Student:
Sørensen, Morten U. (Intern)
Main Supervisor:
Løvengreen, Hans Henrik (Intern)
Examiner:
Hansen, Bo Stig (Intern)
Liu, Zhiming (Ekstern)

Implementering af parallelkomposition
Department of Informatics and Mathematical Modeling
Number of participants: 2
Phd Student:
Rump, Camilla Østerberg (Intern)
Main Supervisor:
Løvengreen, Hans Henrik (Intern)

Korrekthed af protokoller i distribuerede systemer
Department of Informatics and Mathematical Modeling
Period: 01/09/1990 → ...
Number of participants: 2
Phd Student:
Søgaard-Andersen, Jørgen F. (Intern)
Main Supervisor:
Løvengreen, Hans Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: DTU-stipendium
Project: PhD
Formelle metoder til udvikling af parallele systemer
Department of Informatics and Mathematical Modeling
Period: 01/02/1990 → 30/01/1997
Number of participants: 2
Phd Student:
Grønning, Peter (Intern)
Main Supervisor:
Løvengreen, Hans Henrik (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Gammel ordning u/skema-SU
Project: PhD