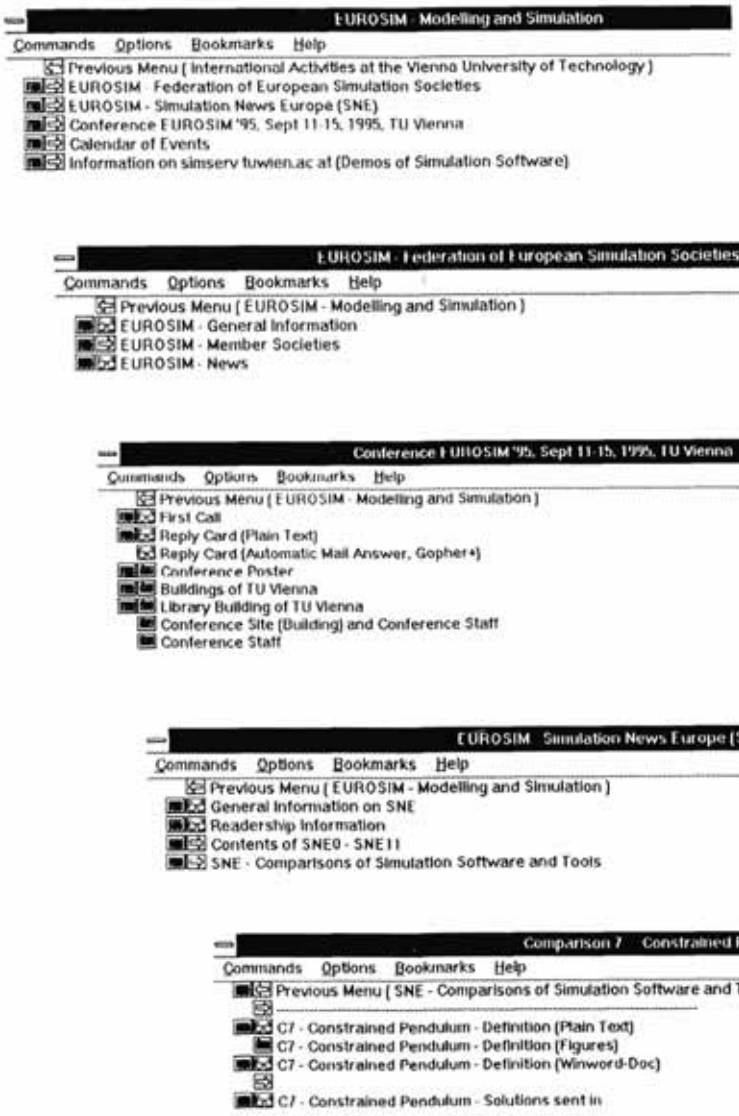
SIMULATION NEWS EUROPE

EUROSIM

ISSN 0929 - 2268



Number 11 July 1994

A EUROPEAN FORUM ON SIMULATION ACTIVITIES

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Readership Information

EUROSIM - Simulation News Europe is published on behalf of EUROSIM (the Federation of European Simulation Societies) three times a year by the "ARGE Simulation News", a non-profit working group. Circulation is 2000. EUROSIM - Simulation News Europe is distributed by all member societies to their individual members (as part of the membership services). It is also included in the scientific journal "Simulation Practice and Theory", published by Elsevier Science B.V.

Editors: Prof. Dr. Felix Breitenecker,
Mrs. Irmgard Husinsky

Address: c/o Computing Services, Technical University of Vienna, Wiedner Hauptstraße 8-10, A - 1040 Vienna. Tel: +43-1 58801-5484. Fax: +43-1 587 42 11.
E-mail: husinsky@edvz.tuwien.ac.at or
sne@simserv.tuwien.ac.at.

If you have any contributions, remarks, suggestions, etc. please contact the editors. Deadline for the next issue will be October 4, 1994.

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EUROSIM - Simulation News Europe

Scope: Information on simulation activities, membership information for European simulation societies

Editors: F. Breitenecker, I. Husinsky
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Editorial

This issue of the EUROSIM Simulation News Europe presents the first results results of our new comparison on parallel simulation techniques. We are happy on the positive reaction - we received more material than we could publish in this issue. Also our sofware comparisons are continued resulting in interesting results. At the forthcoming EUROSIM'95 conference there will be two special interest sessions on both type of comparsions, where extended versions of solutions (parallel comparison) and summaries (software comparisons) will be presented.

We would like to thank all those who have contributed to this issue. Our special thanks go to G. Birtwistle for his interesting essay on object oriented approaches in simulation.

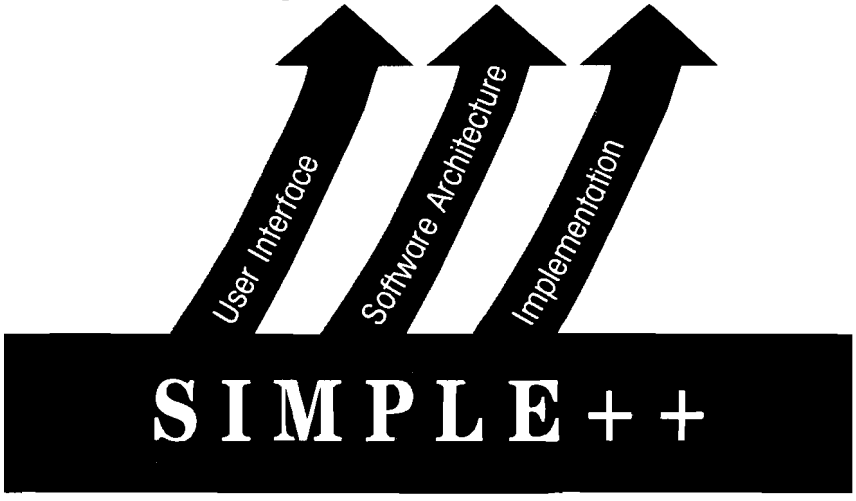
F. Breitenecker, I. Husinsky

Aims and Scope

The journal EUROSIM - Simulation News Europe publishes information related to simulation. It is distributed to all members of all European member societies. It contains essays on simulation, reports from EUROSIM and from the European simulation societies, reports from international societies, presentations of simulation centres, industry news, book reviews, a calendar of events. A special series on simulation comparisons gives an overview on features of simulation software and hardware. All contributions are selected and may be edited by the editors of the newsletter.

The new Class of Simulation Software

»Full Object Orientation«



Features of SIMPLE++

- **full object orientation**
- **classes, hierarchy, inheritance**
- **innovative building block concept**
- **user definable building blocks and individual libraries**
- **effective, none procedural environment for simultaneous modeling, simulation and animation**
- **incremental modeling from the rough function stepwise to the finest detail**
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- **easy-to-use graphical user interface, all information is represented graphically**
- **interfaces: ASCII, SQL, C, C++, Program to Program Communication**

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SIMPLE++ was developed by AESOP together with the Fraunhofer Institute for Production and Automation (IPA) and is based on over 10 years of experience in applying and developing simulation software.

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Peter Gangl
Phone (+49-711) 16 35 90
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AESOP GmbH, Königstraße 82
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Germany

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EUROSIM News

EUROSIM, the **Federation of European Simulation Societies**, was set up in 1989. The purpose of EUROSIM is to provide a European forum for regional and national simulation societies to promote the advancement of modelling and simulation in industry, research, and development.

The following national and regional simulation societies form EUROSIM: ASIM - Arbeitsgemeinschaft Simulation (Austria, Germany, Switzerland), CSSS - the Czech & Slovak Simulation Society (Czech Republic, Slovak Republic), DBSS - Dutch Benelux Simulation Society (Belgium, The Netherlands), FRANCOSIM - Société Francophone de Simulation (Belgium, France), HSTAG - the Hungarian Simulation Tools and Application Group (Hungary), ISCS - Italian Society for Computer Simulation (Italy), SIMS - Simulation Society of Scandinavia (Denmark, Finland, Norway, Sweden), UKSS - United Kingdom Simulation Society (UK).

EUROSIM is governed by a **Board** consisting of one representative of each member society. The Board elects officers, who are at present:

F. Breitenecker (ASIM)	president,
F. Maceri (ISCS)	past president,
R. Zobel (UKSS)	secretary,
L. Dekker (DBSS)	treasurer.

EUROSIM's journal **"EUROSIM Simulation News Europe" (SNE)** publishes information on simulation news in Europe and trends in simulation, including reports of EUROSIM's member societies. **"Simulation Practice and Theory"**, EUROSIM's scientific journal, publishes high qualtity contributions on modelling and simulation.

At present EUROSIM tries to stimulate simulation activities in Spain and Portugal and to intensify contacts to simulation societies and simulation groups in the reform contries.

EUROSIM goes Internet

Information services via Internet become more and more important and available to people in the simulation area. Consequently we decided, to offer some information on EUROSIM, on **SNE**, and on the conference **EUROSIM'95** via Internet. Information is located within the information server (Gopher server) of the Technical University of Vienna.

For connecting to this EUROSIM information via a Gopher client (or via a compatible client, e.g. Mosaic or Cello) please adress to

`info.tuwien.ac.at`

and choose the entry point "International Activities", where the entry "EUROSIM - Modelling and Simulation" offers the information structured as shown in the figure below. Direct access is given by the URL

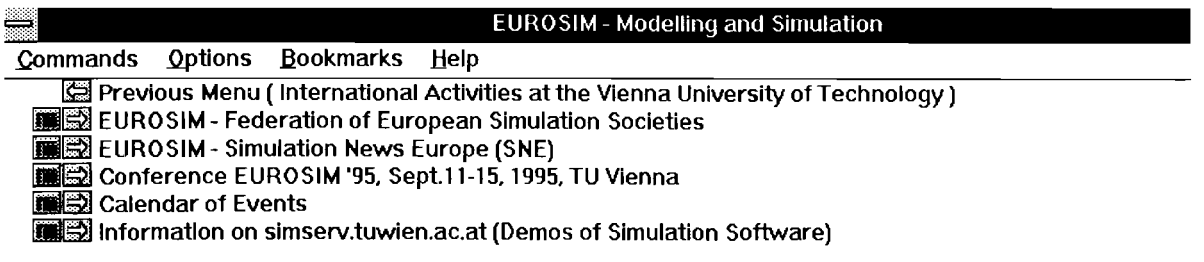
`gopher://info.tuwien.ac.at:4322/11/EUROSIM`

The entry point "EUROSIM - Federation of European Simulation Societies" offers relevant information on EUROSIM and on all member societies (general information and news, see title page). This information is taken from the corresponding contributions of the last issue of **SNE**, as well as information in the entry "Calendar of Events".

The entry "EUROSIM Simulation News EUROPE (SNE)" offers general information and a readership information on **SNE**, furthermore extended lists of contents of each **SNE**, and the definition and a list of solutios of each comparison. Furthermore information on demo sofware available at `simserv.tuwien.ac.at` can be found in "Information on simserv.tuwien.ac.at (Demos of Simulation Software)".

As we are preparing the conference EUROSIM'95, newest information on this conference can be found in the entry "Conference EUROSIM'95".

The editors



Objects Then and Now

Graham Birtwistle
Department of Computer Science, University of Calgary

Abstract

This is a summary of an invited talk given at UKSS 93 in Keswick, Cumbria, in which I attempted to relate two programming strands - objects for modelling clarity, and techniques from process algebras and process logics for model checking (no deadlock, safety, liveness, etc.).

Objects then

I was introduced to objects by Kristen Nygaard in 1968 when I started work at the Norwegian Computing Center as a minor member of a team implementing Simula on the IBM360 series. Together with Ole-Johan Dahl, Nygaard had earlier designed and implemented Simula1, a discrete event extension to Algol60. The language manual contained the interesting view that:

> Simula is intended as a system description language. With the addition of input and output statements, these descriptions should run on a digital computer.

Besides objects, Simula1 also had a library of simulation methods and tools which were precompiled and could be brought down upon request. It was at once apparent that objects and libraries were generally useful modelling tools and Simula67 was born. Besides the block structure of Algol60, other major influences were Tony Hoare's ideas for record handling, although Simula67's prefixing and pointer handling were big advances.

Simula67 (henceforth Simula) was intended as a neat kernel in which to write application libraries of user-oriented methods and tools. The idea here was that it would take only one or two wizards with a good knowledge of Simula to write the library package, and fashion it in such a way that users experienced in the application area could use it in the terms and style of their discipline without needing in-depth expertise in Simula. Libraries could be designed in levels of abstraction and contents inherited from one level to the next. An early success was Tetrasim (a telephone traffic simulator), which was layered upon Simset (a list processing level) and Simulation (a simulation level). Tetrasim itself contained 20,000 lines of code (far too many for one level!) describing basic switching components, routing methods, and usage patterns for Norway. A typical Tetrasim program would be around 100 lines of code, instantiating a specific network, its usage, and running it.

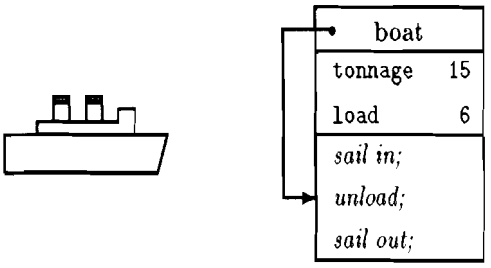


Figure 1: a boat object

Besides libraries, Simula introduced objects to the (then unwilling) world. Major components in the real world were mapped one for one into objects in Simula, minor components into counters (with associated queues for blocked objects) and the system description was their composition in parallel. A Simula object had 4 characteristics: (i) a type leading to strict yet flexible accessing; (ii) its own properties and operators (data, functions/procedures); (iii) an action history which could be unfolded in stages; (iv) an LSC (local sequence control), one to each object, to keep tabs on what this object was doing now. Thus the boat in figure 1 is currently unloading. Note that objects can also be built in levels, and thus inherit attributes and actions.

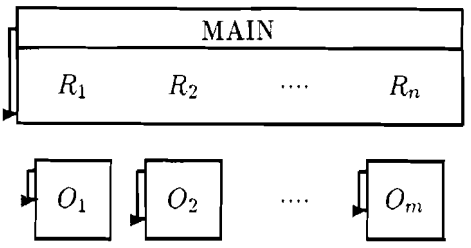


Figure 2: Object oriented model structure

Object oriented discrete event models have a clean and consistent structure (see figure 2): (i) a MAIN program which contains model resources (and other globals) and establishes the objects (or object streams) and (ii) a set of cooperating objects each of which "runs

for a while" and then passes control to another object. Active objects are held in an event list, sorted on time of next event. The object which is "running" is the one at its head - when it moves on, the new head becomes active. The system shuts down with a final report when control returns to MAIN. Actually Simula permitted MAIN to behave as an object in that it too could acquire and release resources, and so on. This extra flexibility is a godsend when dealing with tricky model shut-downs.

Besides a consistent top-level model structure as a collection of objects, objects were also well-structured within themselves. Not only could their actions be viewed as a sequence of activities, but each activity also had a pattern of get extra resources; hold them for the activity duration; drop some resources. Several British simulation languages were founded on the notion of activity. Noteworthy players include Tocher, Clementson and Mathewson. Tocher was decomposing systems into collections of objects in the 1950's, but didn't get the idea of an LSC, and so described them as collections of activities. Tocher also introduced activity diagrams (see figure 3) as high level model representations and these proved ideal for discussing model content with real practitioners. They were also useful for developing actual programs: so useful that Clementson and Mathewson automated the process in the early 1970's. Mathewson's DRAFT system was smart enough to generate object, event, or activity based programs from the same activity diagram, thus showing the equivalence of their descriptive powers.

```
class boat;
begin
  acquire 1 jetty;
  acquire 2 tugs;
  dock;
  release 2 tugs;
  unload;
  acquire 1 tug;
  leave;
  release 1 tug;
  release 1 jetty;
end***boat***;
```

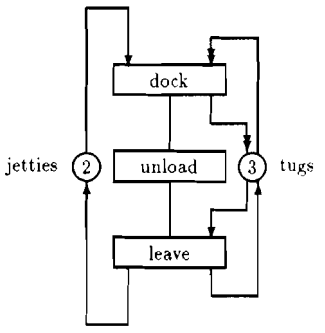


Figure 3: Mechanisation of an activity diagram

Application to modelling real time software

The object oriented model structure turned out to be very appropriate to all the then classic simulation problems. It also opened up new areas, e.g. modelling hardware and modelling the software of real time systems, both of which can be viewed as collections of interconnected objects. Now real time software is notoriously hard to get right, and is often debugged live in assembler on an actual network. Since it consists of a collection of interacting processes (objects), why not map it into Simula and model it and its environment first in simulation mode? A fine Simula project from the 1970's (led by Dag Belsnes at the University of Oslo) was the description and successful implementation of the X25 link and packet levels. The basic idea is shown in figure 4.

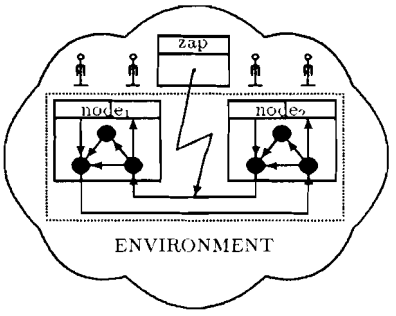


Figure 4: Simulation of network software

Each node in this X25 network is linked to others by duplex transmission lines. Network software is defined in abstract layers. The *link* level makes sure that messages arrive in order and that each message sent is acknowledged, retransmitting it if need be. The *packet* level multiplexes several senders into one output stream, and demultiplexes the (sound) input stream to the appropriate recipient. These abstractions are nicely handled with Simula libraries, the first one for the link level being inherited by the packet layer at the second level. Each node is modelled by an object, and within each node, traffic on each duplex line is handled by receive, send, and retransmit objects. With this structure in place, Belsnes' team then fleshed out the object bodies to the level of an implementation (remember Simula is a general purpose language). The description was tested by placing it in a special environment, containing models of various classes of user, acts of God (lines going down, etc.). Once thoroughly tested, the simulation code served as a blueprint for an actual implementation. It is easy to translate syntactically and semantically error free Simula code into the assembler of choice. Actually, Belsnes et al. were luckier - their targetted network machine actually ran Simula, so the model became the implementation without much further ado. A major weakness of the approach is that testing will not be exhaustive, and so some errors will creep through. If/when this happens, one reverts back to simulation mode, modifies the software and goes

through the whole process once more - at least it beats live modifications. In the next section, we point out that many key checks (e.g. on deadlock) can be made using standard techniques from process algebras.

Objects now

In the 1970's the Simula community was well-served with superb compilers for the DEC 10's and 20's from FOA in Stockholm. When DEC retired those machines, the other compilers then available were not so good, and I tired from banging my head against a brick wall and turned to formal methods, first hardware verification in HOL and then specifying asynchronous systems in the CCS process algebra.

The circle is complete since CCS is object oriented and a good specification in CCS may often be obtained by decomposing it into separate objects and composing them subject to constraints - exactly where Tocher and Nygaard came in! So my experiences in problem solving in Simula certainly helped me to get the right mind set for CCS.

That CCS comes equipped with techniques for the property checking of specifications was new to me. It is very easy to formulate and apply tests for:

- deadlock - can the system grind to a halt with a cycle of objects each wanting what another has,
- livelock - can the system get into an internal loop around which it spins forever,
- safety - do bad things not happen (is mutual exclusion guaranteed?),
- liveness and fairness - do good things eventually happen (a request will be served, an option missed this time, may be taken next).

Testing for such qualities is not only important[1], they are well nigh impossible to find by simulation. Since object oriented simulation programs are well structured, it is easy to map them into CCS. And once in CCS, we can apply the standard techniques to check interesting properties.

For example here is a fragment of Demos code and its translation into CCS:

Demos	R.acquire(1);	hold(dt.sample);	R.release(1);
CCS	gR.	dt.	pR. ...

Resource acquisition and release, and activity durations map trivially, one for one. The semantics of CCS permit more options in any given situation than does the semantics of Demos (e.g. a time delay may last no time at all or almost forever, anyone in a queue may go next), but a translated CCS behaviour is ALWAYS more general than the original Demos behaviour. Thus any properties we prove of the CCS translation must hold for the original model, but there may be some fine points that do hold in the Demos model, that cannot be captured by CCS (e.g. hard timings). If these are essential, we must use similar techniques but target our translation towards a more refined process algebra than CCS.

Summary

The main point of the talk was to show how standard techniques from the world of concurrency theory can be brought to bear on the simulation methodology. Because simulating for deadlock, say, is a hit-and-miss affair (the timings may have to be just right), it is usually not attempted at all by simulars. Likewise, neither safety, liveness and fairness testing are a part of the simulars' standard arsenal of techniques. As a result, many systems implemented from simulation models turn out to have undesirable properties. By adopting the technology of process algebra, we can now test for such properties and make our models that much more reliable. Further since this testing is done on the static description, it will save a considerable amount of expensive debugging time.

I have chosen to work with CCS, one of the simpler process algebras. CCS descriptions erase functionality and retain only the synchronisations. The bonus is that CCS descriptions are crisp and clear, and their testing can be mechanized efficiently. The main drawback, that CCS covers synchronisations but not functionality, is partially countered by the argument that getting the synchronisations right is by far the hardest part of the task of debugging a complex interacting system. Varieties of CCS exist which can cope with hard timings and functionality (value passing), but they are harder to reason with and are correspondingly less well mechanised [6, 11, 9, 10, 12, 14, 15]. See also [1, 2].

The following books and papers are recommended for background material. Walker [16] and Milner [8] for material on CCS; Manna [7, part II, pages 177-387] for a basic understanding of safety, liveness, and fairness properties and how to express them; and Stirling [13] for the link between CCS and process logics.

1 I know of commercial hardware ventures that have been delayed over one year trying to find a deadlock by simulation, and of university researchers located livelock in the control system for a safety critical power plant.

Acknowledgements

Much of the work reported here has been carried out in collaboration with Rob Pooley and Chris Tofts [3, 4, 5] who are a joy to work with. I am happy to acknowledge the help and encouragement given over the years by the following: Alan Clementson, Robin Hills, Steve Mathewson, Keith Tocher (activities, methodology); Ole-Johan Dahl, Bjoern Myrhaug, Kristen Nygaard, Jean Vaucher (Simula, packages, objects); Paul Luker, Rob Pooley, Brian Unger (simulation environments); Robin Milner, Faron Moller, Colin Stirling, and Chris Tofts (CCS and process logics).

References

[1] J. C. M. Baeten. *Applications of Process Algebra.* Cambridge Tracts in Theoretical Computer Science 17, Cambridge University Press, Cambridge, 1990.

[2] J. C. M. Baeten and W. P. Weijland. *Process Algebra.* Cambridge Tracts in Theoretical Computer Science 18, Cambridge University Press, Cambridge, 1990.

[3] G. Birtwistle, R. Pooley, and C. Tofts. Characterising the Structure of Simulation Models in CCS. *Transactions of the Society for Computer Simulation,*10(3):205-236, 1993.

[4] G. Birtwistle and C. Tofts. Operational Semantics of Process-Oriented Simulation Languages. Part 2: Demos. Computer Science Technical Report , University of Calgary , 1993.

[5] G. Birtwistle and C. Tofts. Operational Semantics of Process-Oriented Simulation Languages. Part 1: πDemos . *Transactions of the Society for Computer Simulation*, To appear in 1994.

[6] M. Hennessy. *Algebraic Theory of Processes.* MIT Press, Cambridge, Mass, 1988.

[7] Z. Manna and A. Pnueli. *The Temporal Logic of Reactive Systems: specification.* Springer-Verlag, New York, 1992.

[8] R. Milner. *Communication and Concurrency.* Prentice Hall, London, 1989.

[9] R. Milner, J. Parrow, and D. Walker. A Calculus of Mobile Processes: Part I. Technical Report ECS-LFCS-89-85 , Computer Science Department, University of Edinburgh, 1989.

[10] R. Milner, J. Parrow, and D. Walker. A Calculus of Mobile Processes: Part II. Technical Report ECS-LFCS-89-86 , Computer Science Department, University of Edinburgh, 1989.

[119 R. Milner and M. Tofte. *Commentary on Standard ML.* MIT Press, Cambridge, Mass., 1991.

[12] F. Moller and C. Tofts. A Temporal Calculus of Communicating Systems. Technical Report ECS-LFCS-89-104, Department of Computer Science, University of Edinburgh, Edinburgh, 1989.

[13] C. Stirling. Modal and Temporal Logics for Processes. Tech Report ECS-LFCS-92-221, Laboratory for the Foundations of Computer Science, Computer Science, University of Edinburgh , 1992.

[14] C. Tofts. A Synchronous Calculus of Relative Frequency. In J. W. Klop J. C. M. Baeten, editor, *CONCUR '90,* number 458 in LNCS. Springer-Verlag, 1990.

[15] C. Tofts. Process Semantics for Simulation. Technical Report, Department of Mathematics and Computer Science, University of Swansea, Swansea, Wales, 1993.

[16] D. Walker. Introduction to a Calculus of Communicating Systems. Technical Report ECS-LFCS-87-22, Laboratory for the Foundations of Computer Science, University of Edinburgh, 1987.

ASIM

ASIM (*Arbeitsgemeinschaft Simulation*) is the association for simulation in the German speaking area. ASIM was founded in 1981 and has now about 680 individual members.

Report from ASIM

The ASIM board met on April 11, 1994 in Frankfurt. Main topic was the ASIM conference in Stuttgart in October. Prof. Kampe reported on the preparations for this conference, which are very good within the time schedule. About 120 papers will be accepted. Three tutorials and several user group meetings will be further parts of the program. A preliminary program will be mailed with this issue to all members of ASIM and is available from the organizers. Further points of discussion were finances, the organization of ASIM, working group meetings, the structure of working groups and future ASIM conferences.

Prof. Krug suggested a new working group "*Simulation und Optimierung in der Integrierten Produkt- und Prozeßmodellierung*". This group will act as "working group in foundation" in cooperation with the working group "*Simulation in der Fertigungstechnik*" until the ASIM board will decide on a new structure of working groups. Prof. Krug will furthermore host the "*10. Symposium Simulationstechnik*" in Dresden 1996. This will be ASIM's main conference in 1996.

The ASIM board will meet again on October 10th, 1994 in Stuttgart.

Contact Addresses

Austria and membership administration:
Prof. Dr. Felix Breitenecker
Technische Universität Wien, Abt. Simulationstechnik
Wiedner Hauptstraße 8-10, A-1040 Wien
Tel: +43-1/58801-5374, Fax: +43-1/5874211
E-mail: asim@email.tuwien.ac.at

Germany: Prof. Dr. D. Möller
TU Clausthal, Institut für Informatik
Erzstraße 1, D-38678 Clausthal-Zellerfeld
Tel: +49-(0)5323/72-2504 or -2402 (Secretary)
Fax: +49-(0)5323/72-3572

Switzerland:
PD Dr. Jürgen Halin
ETH Zürich, Institut für Energietechnik
Clausiusstrasse 33, CH-8092 Zürich
Tel: +41-(0)1/632-4608, Fax: +41-(0)1/262-2158

ASIM Meetings to come

October 11-13, 1994: *9. Symposium Simulationstechnik* in Stuttgart. Contact Dipl.-Ing. (FH) Martin Kraus, Fachhochschule für Technik Esslingen, Flandernstr.101, D-73732 Esslingen, Tel: +49-(0)711/397-3755, Fax: +49-(0)711/397-3763, Email: kraus@ti.fht-esslingen.de

February 20-21, 1995: Meeting of the Working Group "*Simulation Technischer Systeme*" at DASA in Hamburg. Contact Prof. Kampe for more information.

April 1995: Conference of the working group "*Simulation in der Fertigungstechnik*". Contact Prof. Kuhn (address see below) for more information.

September 11-15, 1995: EUROSIM Congress at TU Vienna. For information see p.22-23.

September 23-26, 1996: *ASIM 96 - 10. Symposium Simulationstechnik* in Dresden. Contact: Michael Schebesta, DUAL-ZENTRUM Dresden, Gillesstraße 2, D-01219 Dresden.

Meetings with ASIM Participation to come

August 22-25, 1994: CISS-First Joint Conference of International Simulation Societies. ETH Zürich. Contact PD Dr. Jürgen Halin (address see above).

August 28 to September 2, 1994: *IFIP-GI-Jahrestagung 1994*. Hamburg. Coordinator: Dr. Ingrid Bausch-Gall, Wohlfartstraße 21b, D-80939 München, Fax: +49-(0)89/3231063.
Workshop FG 8 "Simulation Techniques":
F. Breitenecker, TU Vienna, the acting president of EUROSIM will open this session with an overview of simulation in Europe from a scientific and organizational viewpoint.
Further presentations will be: Simulation of Complex Dynamical Systems in Medicine and Environment (D. Möller), USE!-SimAL - The Basis for the configuration of Individual Scheduling Systems (G. Schröder), The Role of Artificial Intelligence Concepts in System Modelling and Simulation (H. Szczerbicka).

September 18-23, 1994: 18th Artificial Intelligence Conference KI 94 in Saarbrücken. For more information contact the speaker of the working group "*Simulation und künstliche Intelligenz*".

9th Symposium on Simulation (ASIM 94)

This symposium will be organized in October 10-13, 1994, in Stuttgart, Southern Germany. It covers all aspects of modelling and simulation methods and tools, as well as the application of simulation in various technical and scientific areas. During the symposium an exhibition will show the state-of-the-art in simulation hardware and software.

On the first day user groups will meet (ACSL, ADAMS, GPSS, MATLAB, MATRIXx, SIMAN, SPICE). Three tutorials will give an insight into Hardware-in-the-Loop-Simulation, Animation, Mechatronics.

Invited papers will be presented on simulation program interfacing, automotive simulators, simulation in chemical industry, modelling and simulation in molecular genetics, simulation in the GUS.

Participants will visit the Stuttgart Planetary Simulator and a traditional wine cave in the nearby Rems Valley (for animation and real taste). The conference language is German.

Working Groups

"Simulationsmethoden und Sprachen für parallele Prozesse"

The working group met in February 1995 at the Technical University of Vienna together with the working group "Simulation technischer Systeme". The contributions of this meeting are available as *ASIM-Mitteilungen Nr. 40*. The next workshop will be held later in the year 1995.

Speaker: Dr. Hans Fuss, GMD, D-53731 St. Augustin. Tel: +49-(0)2241/ 14-3125, Fax: +49-(0)2241/14-3006, E-mail: fuss@gmd.de

"Simulationssoftware und -hardware"

The working group had, after changing the speaker, its first meeting on March 24 and 25, 1994 at the Technical University of Clausthal, Computer Science Department. Topic was "The importance of simulation software and hardware in solving engineering problems". Introductory lectures were given by Prof. Dr. F. Durst (Univ. of Erlangen-Nürnberg) "Numerical Flow Simulation as Basis to solve Engineering Problems" and Prof. Dr. Ch. Zenger (Univ. of München) "Simulation of Technical Processes on Workstation Nets" and Dr. M. Nölle (Technical Univ. of Hamburg-Harburg) "PiPs: A Parallel Programming Envronment for Solving Imageprocessing Problems".

From industry introductory lectures were given by Dr. H. Daniels (IBM Scientific Center Heidelberg) "Large 3D Time Dependent Finite Element Flow Simulations on IBM Scalable POWERparallel Systems (9076 SPX)" and Dr. J. Krebs (Digital Equipment München) "The Application of Alpha Architecture on Scientific Problems".

Participants from the industrial side as well as from the university side reported on their experiences with simulation software and -hardware in solving engineering problems. The papers presented will be published as *ASIM-Mitteilungen* and can be ordered from ASIM. Moreover an industrial exhibition was held. The meeting had 45 participants from companies and universities. Thursday evening a rustic dinner took place.

Prof. Dr. D.F.P. Möller, Technical University of Clausthal, was elected as speaker of the working group and Prof. Dr. F. Breitenecker, Technical University of Vienna, as vice-speaker.

The next meeting will be held in spring 1995 at the location of a working group member from industry.

Speaker: Prof. Dr.-Ing. Dietmar P.F. Möller, TU Clausthal, Institut für Informatik, Erzstraße 1, D-38678 Clausthal-Zellerfeld, Tel: +49-(0)5323/72-2402 or 72-2504, Fax: +49-(0)5323/72-3572

"Simulation und künstliche Intelligenz"

The working group met in April in Braunschweig; *ASIM-Mitteilungen* of the contributions of this meeting are in preparation.

In order to intensify th co-operation with the AI community the working group will organize a workshop within the 18th Artificial Intelligence Conference KI'94 Saarbrücken, September 18-23, 1994: Methods and Concepts of AI in Simulation.

Speaker: Dr.-Ing. Helena Szczerbicka, Universität Karlsruhe, Inst. für Rechnerentwurf und Fehlertoleranz, Postfach 6980, D-76128 Karlsruhe, Tel. +49-(0)721/608-4216, Fax +49-(0)721/370455, E-Mail: helena@ira.uka.de.

"Simulation in Medizin, Biologie und Ökologie"

The 6th Ebernburg workshop was organized from April 28th to April 30th by D. Möller, TU Clausthal and O. Richter, TU Braunschweig. The topics of the meeting were environmental system analysis and computer science. 46 researchers from Austria, Germany and Switzerland participated at this bi-annual meeting. The interdisciplinary talks during the workshop gave an overview of action and reaction between environment and human beings influence with the help of computer simulation.

Main lectures were held by B. Diekkrüger (Braunschweig), A. Fischlin (Zürich), M. Lüdecke (Frankfurt) and U. Ranft (Düsseldorf). Moreover 23 papers were presented in 6 sessions, reflecting the state-of-the-art in research in environmental system analysis and environmental computer science. Topics were methodology for modeling ecological systems in a specific or global manner bearing in mind the environmental aspects, the methodology of interactive modeling and simulation of environmental systems on PCs or workstations, case studies as well as tools to be used for environmental system analysis developed from environmental computer science experts.

Prof. Möller announced that he will no longer act as speaker of this working group, due to his election as speaker of ASIM and as speaker of the working group *"Simulationssoftware und Simulationshardware"*.

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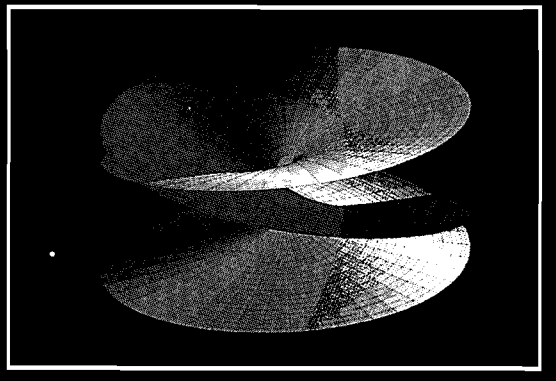

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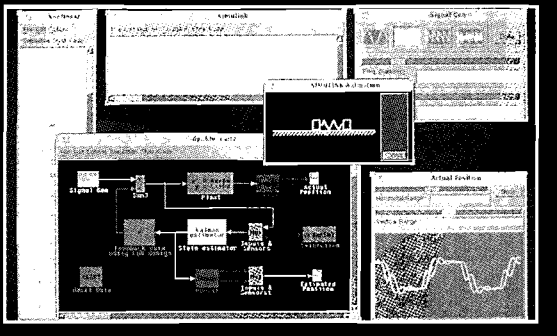

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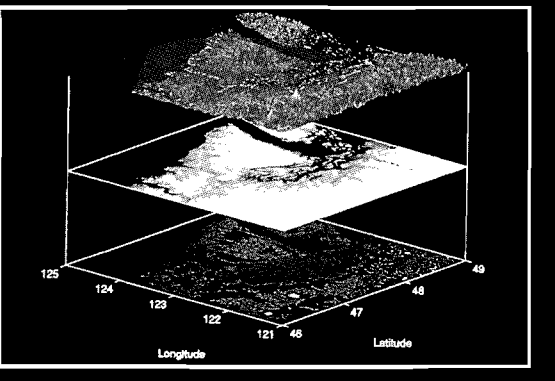

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New speaker and vice-speaker will be elected at the next ASIM conference to be held in Stuttgart in October 1994.

Candidate for the position of the speaker is Prof. Dr. O. Richter, TU Braunschweig, for vice-speaker Prof. Dr. B.A. Gottwald, University of Freiburg.

Interim speaker: Prof. Dr. Björn Gottwald, Universität Freiburg, Fakultät für Biologie, Schänzlestraße 1, D-79104 Freiburg, Tel.: +49-(0)761/203-2891 Fax: +49-(0)761/203-2894

"Simulation technischer Systeme"

The working group met in February 1995 at the Technical University of Vienna together with the working group ""*Simulationsmethoden und Sprachen für parallele Prozesse*". The contributions of this meeting are available as *ASIM-Mitteilungen Nr. 40.*

The 1995 workshop will be held at Deutsche Aerospace Airbus GmbH in Hamburg on February 20 and 21, 1995. Persons who want to give a talk, organize a session or a round table discussion please contact the speaker.

Speaker: Prof. Dr.-Ing. Gerald Kampe, FHT Esslingen, Flandernstraße 101, D-73732 Esslingen. Tel: +49-(0)711/397 3740 or -3741, Fax: +49-(0)711/397-3763, Email: kampe@fhti1.ti.fht-esslingen.de

"Simulation in der Fertigungstechnik"

The Working Group "*Simulation in der Fertigungstechnik*" organized a meeting on May 3rd, 1994 in Dortmund, Germany, to discuss the current and future importance of simulation technology in research and industry.

Additionally a special topic of the meeting was the preparation of the next event organized by this working group, which will be held at the University of Nürnberg/Erlangen, Germany in April 1995. The program will cover different sections concerning simulation technology in organizations, factory segmentation, interpretation methods and integration aspects of simulation methods in planning and operation. Please send your request for a copy of the "Call for papers" directly to the speaker or by email to "wenzel@iml.fhg.de".

Speaker: Prof. Dr.-Ing. A. Kuhn, Fraunhofer-Institut (IML), Joseph-von-Fraunhofer-Straße 2-4, D-44227 Dortmund. Tel: +49-(0)231/9743-132, Fax: +49-(0)231/9743-234

"Simulation in der Betriebswirtschaft"

Speaker: Prof. Dr.-Ing. W. Hummeltenberg, Universität Hamburg, FB Wirtschaftswissenschaften, Bundesstraße 55, D-20146 Hamburg. Tel: +49-(0)40 4123-4023, Fax: +49-(0)40 4123-6435

"Simulation von Verkehrssystemen"

Speaker: Mr. Karl-Heinz Münch, SIEMENS AG, Bereich VT2 SYS, Ackerstraße 22, D-38126 Braunschweig, Tel: +49-(0)531-226-2225, Fax: +49-(0)531-226-4305

Working Group in foundation: "Simulation und Optimierung in der Integrierten Produkt- und Prozeßmodellierung i. G."

At present this planned workink group is acting and cooperating with the working group "Simlation in der Fertigungstechnik". Interested people may contact the organizers. *Problemstellung: Concurrent Engineering, Simultaneous Engineering, Lean Production, Integrated Design und viele andere Begriffswelten sind Synonyme für ein und dieselbe Sache, nämlich die Schaffung von integrierten Modellstrukturen in einem flachen Unternehmen zum Zwecke einer effektiven marktorientierten Produktion. Der Gedanke führt demzufolge auf eine integrierte Produkt- und Prozeßmodellierung, der teilweise simultan ablaufenden Produktenwicklungs- und Produktherstellungsprozesse.*

Organizers: Prof. Dr.-Ing. habil. W. Krug, DUAL-Zentrum GmbH Dresden, Gillestr. 2, D-01219 Dresden, Tel. +49-(0)351/477910, Fax +49-(0)351/4779199;
Prof. Dr.-Ing. Dr. h. c. H. Grabowski, TU Karlsruhe, Institut für Rechneranwendung in Planung und Konstruktion, Kaiserstr. 12, D-76131 Karlsruhe, Tel. +49-(0)721/608 33 74

Organization

With the invoices for the membership fee a *Datenkorrekturblatt* was mailed. All members are asked to return this *Datenkorrekturblatt*, if there are any changes, in order to verify the ASIM data base (furthermore, members are asked to select anew their primary working group -*ASIM-Mitteilungen* free of charge - and other interesting working groups).

Ingrid Bausch-Gall

CSSS

General Information

CSSS (Czech & Slovak Simulation Society) is a scientific non-profit association of Czech/Slovak speaking individuals professionally involved in simulation. CSSS was founded in 1990 on the base of the former Technical Section for Simulation of Systems at the Czech/Slovak Society for Cybernetics and Informatics. It has now more than 70 individual members of Czech, Slovak and Hungarian nationality.

Activities

From May 31 to June 2, 1994, the traditional (28th in the row) Moravian-Silesian Conference on Modelling and Simulation of Systems MOSIS'94 was held in Zabreh (Moravia). A report on the meeting will be given in the next issue.

The Slovak Group of CSSS participates in the organisation of the 11th International Conference on Process Control and Simulation ASRTP'94, which will be held in Kosice (Slovak Republic) in September 1994. For further information contact Mr. Igor Polubny, ASRTP'94 Co-Chair, Dept. of Management & Control Engineering, Faculty of Mining, Technical University, ul. B. Nemcovej 3, 042 00 Kosice, Slovak Republic.

ESM'95
SCS European Simulation Multiconference

ESM'95 will take place in **Prague, June 5-7, 1995** (the ESM'95 location will be in the new building of the Technical University situated on the north side of the town) under the organisation of CSSS. ESM'95 is cosponsored by CASS (Chinese Association for System Simulation), EuSC (The European Simulation Council), EUROSIM (Federation of European Simulation Societies), JSST (Japanese Society for Simulation Technology), and SiE (Simulation in Europe, Esprit Working Group).

ESM'95 will bring together eight individual conferences and a specific session for students. We invite papers for presentation at the conference and for publication in the Conference proceedings on the following **subjects**: Simulation Theory and Methodology, Simulation Software, Tools and Applications, Simulation in Transport, Traffic and Telecommunications, Simulation in Economics, Simulation of Ecological and Environmental Systems, Simulation and Object-Oriented Programming, Advanced Computing and Simulation, Simulation in Military and Defense, Session for Students.

In each of the eight conferences, an **invited speaker** will give a special in-depth presentation, which will be included in the Conference Proceedings.

ESM'95 **Conference Committee**: Milan Kotva (General Conference Chairman), Milan Sujansky (General Program Chairman), Pavel Cerny (General Program Co-Chairman), Rainer Rimane (SCS Conference Coordinator).

Conference Coordination, **Contact Address**:
Philippe Geril, The Society for Computer Simulation, European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium
Tel.: +32.9.233.77.90, Fax: +32.9.223.49.41
E-mail: Philippe.Geril@rug.ac.be

Preliminary International **Program Committee**: F. Breitenecker (Austria), R. Crosbie (USA), L. Dekker (The Netherlands), F. G. Filip (Romania), A. Guash (Spain), J. Halin (Switzerland), A. Javor (Hungary), K. Juslin (Finland), A. Lehmann (Germany), F. Lehmann (Germany), F. Maceri (Italy), Z. Merkuryev (Latvia), I. Molnar (Hungary), E. Mosekilde (Denmark), D. J. Murray-Smith (United Kingdom), B. Schmidt (Germany), H. Szczerbicka (Germany), G. Vansteenkiste (Belgium), M. Wildberger (USA)

Deadlines: Extended abstracts: December 2, 1994. Notification of acceptance or rejection: February 9, 1995. Camera-ready copy of the full paper: March 9, 1995. The official conference language and the language of the accepted papers will be English.

Registration Fees: Preregistration before May 5th, 1995: Authors 15000 BF (375 ECU), Members 15000 BF (375 ECU), Other participants 17000 BF (425 ECU) Registration after May 5th, 1995: Authors Pre-registration required, Members 17000 BF (425 ECU), Other participants 19000 BF (475 ECU). Students can register at the conference for BF 2000.

Contact Addresses:

Milan Kotva (Chairman of CSSS)
Zeleny pruh 32,
147 00 Praha 4 - Branik, Czech Republic
Tel.: +42 2 7992145 (office), +42 2 464179 (at home)
Fax: +42 2 7992318 or 763211 or 7934594
E-mail: simul @ utia.cas.cz

Mikolas Alexik (Vice-Chairman of CSSS)
VSDS-KTK, Velky diel
010 26 Zilina, Slovak Republic
Tel.: +42 89 54042, Fax: +42 89 54806
E-mail: alexik @ uvt.utc.sk

M. Kotva

DBSS

General Information

The Dutch Benelux Simulation Society (DBSS) was founded in July 1986 for the purpose of creating an organization of simulation professionals within the Dutch language area. DBSS has actively promoted creation of similar organizations in other language areas. There are currently eight in West Europe in as many language areas. Together they have established the European umbrella organisation EUROSIM, a federation which started working in September 1989. DBSS works in close cooperation with the EUROSIM members, and is affiliated with SCS International and IMACS.

Objectives

DBSS' main purpose is the promotion of system simulation in all its features. The nation "system simulation" covers experimenting with models of real systems by means of computers, following the sequence: system modelling, model validation, simulation experiment implementation.

In practical terms, DBSS strives to achieve the following aims which deduce from the main objective:

- research promotion in the field of systems, models, modelling techniques (continuous, discrete and mixed systems, deterministic and stochastic systems); specific systems of different disciplines are all within its scope of interest;
- development and application promotion of concepts, methods and algorithms with respect of system description, modelling, experiments, hard- and software resources, and others;
- promotion of development and adaptation of appropriate hard- and software resources for the purpose of system simulation.

DBSS tries to achieve the preceding by:

- activity contributing to the organisation of congresses, workshops, etc;
- encouraging the organisation of work meetings on system simulation;
- providing "state-of-the-art" information to members, as well as with respect to relevant progress and activities in the field of system simulation;
- cooperation with other organisations (including foreign ones) which are directly or indirectly involved in system simulation;
- taking advantage of all other means which contribute to meet the objectives of DBSS.

DBSS-Membership

Both corporate entities (companies, institutes, etc.) in the Dutch/Flemish area of Benelux and individuals

from anywhere are welcome to join DBSS as full corporate or individual members. They receive 3 copies per year, free of charge, of *EUROSIM Simulation News Europe*. Elsevier Science B.V. offers them a discount on the subscription fee of the EUROSIM journal *Simulation Practice and Theory*. They enjoy reduction of the fees attending congresses, conferences, symposia organised by sister societies of EUROSIM.

The membership fee amounts to just Dfl. 50,- or Bfr. 900,- for individual and the double for corporate members.

Those interested in joining DBSS are invited to write to:

Dutch Benelux Simulation Society Secretariat:
Computing Centre
P.O. Box 354
2600 AJ Delft, The Netherlands
Tel.: +31-(0)15 78 5698
Fax: +31-(0)15 78 3787
E-mail: Zuidervaart@rc.tudelft.nl

(Please mention your name, affiliation and address and indicate whether you are interested in individual of corporate membership).

The Steering Committee of DBSS

L. Dekker (chairman)
Delft University of Technology
W. Smit AKZO Nobel
J.C. Zuidervaart (secretary/treasurer)
Delft University of Technology

Coming Events

In 1995 the second EUROSIM congress will take place in Vienna, Austria. Besides L. Dekker, Delft University of Technology and F.J. Pasveer, Polytechnic Rotterdam and Environments, DBSS nominated S.W. Brok, Delft University of Technology, in the scientific committee of this conference.

The international EUROSIM Conference "*Massively Parallel Processing Applications and Development*" will have taken place when this Newsletter is issued. We will report in detail on the conference in the next issue of SNE.

We will then also report on a DBSS seminar, where dr. Colin Whitby-Strevens (SGS-Thomson/INMOS Limited) UK and dr. Roland Marbot from Bull Systems, France, presented lectures.

J.C. Zuidervaart

FRANCOSIM

FRANCOSIM was created in 1991 and has its legal seat in Roanne, France.

FRANCOSIM
Maison de la Productique, Esplanade Diderot
F - 42300 Roanne, France
Tel: +33-77 70 80 80, Fax: +33-77 70 80 81
Contact: M. Lebrun or N. Sarles

FRANCOSIM in Belgium is represented by

Mr. Fr. Lorenz
Centre SOCRAN, Parc scientifique
Avenue Pré-Aily, B - 4031 Angleur
Tel: +32-41 67 83 75, Fax: +32-41 67 83 00

Next events to come

The meeting of the two user Groups "**ACSL**" and "**MATRIXx**" initially planned for June have been postponed until September for reasons of places of meeting. Further information will be sent to the people who participated in the first meetings. Otherwise, please contact Nathalie Sarles in Roanne.

Bond Graph School, September 12-16, 1994

"Bond Graph and Simulation" is the title of the next bond graph school. The bond graph club and FRANCOSIM agreed on a cooperation basis in January 1993 and any person interested in further information may contact us as well. The courses aim to help the participants get familiar with the bond graph techniques. Tutorials and practicals will be organized by industry engineers having a real experience of the use of bond graphs in their industrial applications.

Journees 2-AO, ESIEE

The third congress of Computer Aids in System Control is to be held on November 17-18 in the region of Paris. It is organized by the ESIEE group, with the collaboration of FRANCOSIM and SEE-Club 18.

Papers will be presented and software demonstrated. The scope of this forthcoming symposium will be expanded to cover all fields of computer aided systems control; CADSD naturally, but also symbolic manipulators, real-time and code generation.

Contact:
Group ESIEE, Alain Carriere, Arlette Maillard
Dept. Automatique 2 AO, BP 99
F-93162 Noisy le Grand
Tel: +33-1 45 92 66 09, Fax: +33-1 45 92 66 99

N. Sarles

AIMS AND SCOPE

Simulation Practice And Theory is the new international journal in the field of simulation, publishing original high-quality applied, research and tutorial papers across all facets of the discipline.

AIMS

Emphasis will be on providing a diverse combination of studies on different applications of simulation - from biology and medicine, through astrophysics and astronautics, to earthquake and civil engineering.

In order to make papers accessible for readers of all disciplines, they will be presented in the following major steps:

- modelling;
- computational implementation of the derived model;
- mathematical problems encountered;
- techniques applied.

Theoretical papers will only be included if they are of practical value for application-oriented readers. Articles on a new theory, method or algorithm will therefore deal with its objectives; its potential benefits; any experience gained; any innovation achieved through a specific approach.

Special issues will detail progress achieved in a particular field of interest, e.g. a significant application of simulation, simulation methodology or simulation tools.

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Simulation Practice And Theory will address the following interest areas:

- Parallel and distributed simulation;
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- Biology and medicine;
- Education and training;
- Economics, business and management;
- Astrophysics and astronautics;
- Energy systems;
- Transportation and traffic control;
- Earthquake and civil engineering;
- Factory simulation and automation, robotics;
- Aerospace and weapons simulation;
- Simulation in training and education;
- Computational physics and chemistry;
- Simulation in the automotive industry;
- Electronic circuits and systems, VLSI and ASIC's, computer systems and networks;
- Opto-electronic interconnects and computing;
- Simulation methodology and languages;
- Computer and simulation modelling;
- Man-machine interfacing in simulation.

CALL FOR PAPERS

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- universities.

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INSTRUCTIONS TO AUTHORS

All contributions should be made in English and may be submitted in quadruplicate to the Editor-in-Chief. The author(s) will be notified upon receipt of the manuscript. No page charge is made. Upon acceptance of an article, the author(s) will be asked to transfer copyright of the article to the Publisher. This will ensure the widest possible dissemination of information. Please make sure that the paper is submitted in its final form. Corrections in the proofstage, other than printer's errors, should be avoided; costs arising from such extra corrections will be charged to the authors. Manuscripts should be prepared for publication in accordance with instructions given in the "Guide for Authors" (available from the Publisher) details of which are condensed below:

① The manuscript must be typed on one side of the paper in double spacing (including abstract, footnotes, references) with wide margins. A duplicate copy should be retained by the author.

② The title page information should be typed on a separate sheet and include the title, name(s) of author(s), affiliation(s), complete address of the corresponding author with fax number and/or email address, an abbreviated title of less than 50 characters, an abstract of 50–200 words and a list of maximum 5 keywords.

③ All mathematical symbols which are not typewritten should be specified and listed separately. Awkward mathematical notations which require special typesetting procedures must be avoided. The numbers identifying mathematical expressions should be placed in parentheses in the right margin. Parts of text should not be subject to this numbering.

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⑤ Special care should be given to the preparation of the illustrations. Except for a reduction in size, they will appear in the final printing in exactly the same form as submitted by the author; normally they will not be redrawn by the printer. In order to make a photographic reproduction possible, all drawings should be on separate sheets, with wide margins, drawn large size, in India ink, and carefully lettered. Laser-printed illustrations are normally acceptable.

⑥ References should be listed alphabetically and conform to the following examples:
For a book: [1] P. Freyd, *Abelian Categories* (Harper & Row, New York, 1964).
For a paper in a journal: [2] M. Barr, Algebraically compact functors, *J. Pure Appl. Algebra* **82** (3) (1992) 211–231.
For a contribution to a contributed volume: [3] H. Kraft, Geometric methods in representation theory, in: M. Auslander and E. Lluis, eds., *Representations of Algebras*, Lecture Notes in Mathematics, Vol. 944 (Springer, Berlin, 1982) 180–258.
For a paper in a conference proceedings: [4] E. Katona, Assembly-level programming of cellular processors, in: *Proceedings of the 3rd Workshop on Parallel Processing by Cellular Automata and Arrays*, Berlin, Germany (1986) 94–100.
For an unpublished paper: [5] R. Schrauwen, Series of singularities and their topology, Ph.D. Thesis, University of Utrecht, The Netherlands, 1990.

AUTHOR'S BENEFITS

① 50 reprints per contribution free of charge.

② 30% discount off all Elsevier Science books. (Order forms will be sent together with the proofs.)

③ No page charges.

HSTAG

General Information

HSTAG (Hungarian Simulation Tools and Application Group) established in 1981 is an association promoting the exchange of information within the community of people involved in research, development, application, and education of simulation in Hungary and also contributes to the enhancement of exchanging information between the Hungarian simulation community and the simulation communities abroad. HSTAG deals with the organization of lectures, exhibitions, demonstrations, round table discussions, and conferences.

Activities

HSTAG as a co-sponsor with IMACS/Hungary participates in the organization of the *IMACS European Simulation Meeting on Simulation Tools and Applications* to be held in Gyor, Hungary (half way between Budapest and Vienna) in August 28-30, 1995. The scope of the Conference will include methodological questions, presentation of simulation software tools and specific application issues aimed at the solutions of practical problems in various fields. Leading edge issues of the field as artificial intelligence in simulation will be dealt with. Simulation software demonstrations will also take place during the Meeting. The official language of the Meeting as well as that of the Proceedings volume will be English.

Deadlines: Abstracts: November 25, 1994, final papers: April 14, 1995.

Further information can be obtained from Prof. Dr. András Jávor, address see below.

Contact Address

Prof. Dr. András Jávor (Chairman)
KFKI Research Institute for Measurement and Computing Techniques
H-1525 Budapest, P.O.Box 49, Hungary
Phone: +36-1 1699499
Fax: +36-1 1695532
E-mail: h7023jav@ella.hu

A. Jávor

ISCS

General Information

The Italian Society for Computer Simulation (ISCS) is a scientific non-profit association of members from industry, university, education and several public and research institutions with common interest in all fields of computer simulation. Its primary purpose is to facilitate communication among those engaged in all aspects of simulation for scientific, technical or educational purposes.

At present ISCS counts 132 members, of which 6 are institutional, 4 honorary, 120 regular and 2 affiliate. Charges per annum are Lit. 30,000 for regular and affiliated members and Lit. 400,000 for institutional members.

Activities

On April 27, 1994 the annual meeting of ISCS members was held in Rome. This meeting, besides representing an interesting forum to discuss and promote the activities of the society, was the occasion to elect the Steering Committee for the period 1994-1996.

The following persons have been elected: F. Cennamo, University of Naples; A. Giordano, IRSIP-CNR, Research National Council of Naples; F. Maceri, University of Rome "Tor Vergata"; M. Savastano, IRSIP-CNR, Research National Council of Naples; R. Vaccaro, University of Naples

The administrative offices will be distributed during the next meeting of the Steering Committee. Until that time, ordinary affairs of the ISCS are directed by the past Steering Committee consisting of the following persons: G. Iazeolla (chairman), F. Cennamo (vice-chairman), V. Grassi (treasurer), M. Colajanni (secretary.)

Therefore, for further information or application for membership you can still contact:

ISCS, c/o Dipartimento di Ingegneria Elettronica
Università di Roma "Tor Vergata"
Via della Ricerca Scientifica, I-00133, Roma, Italy
Phone: +39 6 7259.4477 - .4478 - .4486
Fax: +39 6 2020519
E-mail: {iazeolla, grassi, colajanni}
@tovvx1.ccd.utovrm.it

More details on the future ISCS activities that the new Steering Committee will decide after the distribution of the offices will be given in the next number of this bulletin.

M. Colajanni

SIMS

The Scandinavian Simulation Society, SIMS, has nearly 300 members from Denmark, Finland, Norway and Sweden. For 35 years SIMS has served as the regional simulation society in Scandinavia, gathering individuals and organisations involved in simulation. The activities have been concentrated on arranging annual meetings and courses, delivery of information letters, and co-operation at European and international level in the field of simulation.

How to join SIMS ?

If You or some of your Nordic colleagues are interested in simulation but are not yet a member of SIMS, then just send an informal application or recommendation for membership to the SIMS secretariat:

Eija Karita Puska
VTT Energy, Nuclear Energy, P.O.Box 1604
FIN-02044 VTT, Finland
Tel: +358-0 4565036, Fax: +358-0 4565000
Email: eija-karita.puska@vtt.fi

SIMS'94 Simulation Conference
Stockholm, Sweden, August 17-20, 1994

The largest of the SIMS Simulation Conferences ever will take place at the Berns Salonger, in Stockholm, August 17-20, 1994 with:
ten invited speakers from Sweden, Norway and USA;
about fifty scientific papers;
ten practical seminars and minicourses arranged by Comsol
social program: cruise in Stockholm archipelago, visit to Wasa-museum, balloon flight, etc.

For last minute information please contact:

SIMS
c/o Lars Langemyr
Computer Solutions Europe AB
Björnnäsvägen 21
S-113 47 Stockholm, Sweden
Tel: +46-(0)8 153022, Fax: +46-(0)8 157635
E-mail: sims@comsol.se

E.K. Puska

UKSS

A one day meeting on 'Distributed and Interactive Simulation' organised by Rob Pooley was held on 8th April 1994 at Edinburgh University. Highly informative state-of-the-art talks were presented showing the great advances in the area made recently.
The Committee also met, and a further one day meeting was scheduled for this autumn and one early next year. Contact Rob Pooley for further details.

The Individual Membership Fee for UKSS remains unchanged at 20 British pounds per annum. Join now to attract the discount for members for the National Conference. The Membership Secretary is:

Mrs Elizabeth Rimmington, Computer Centre
University of Brighton
Lewes Road, Brighton BN2 4GJ U.K.
Tel: +44 273 642660,
Email : jer@uk.ac.brighton.vms

R. Cheng

United Kingdom Simulation Society Conference UKSS 95

Marine Hotel, North Berwick, East Lothian, Scotland, 19th-21st April 1995

1st Call for Papers

A EUROSIM Member Society Meeting

Papers are invited on any aspect of simulation to be presented at a three day event organised for both scientific and cultural interest. The event will be held in North Berwick, situated in an area of Britain of great natural beauty. Access is easy; North Berwick is about 25 miles from Edinburgh, to which it is connected by good roads and a regular 35 minute rail service. The conference venue is a Victorian Hotel of great character, situated overlooking the mouth of the Firth of Forth, with views over the West Course, a qualifying course for the Open Golf Championship.
North Berwick is a seaside town, with large beaches and beautiful coastline. Known in Victorian times as the 'Biarritz of the North', North Berwick offers superb golf, sailing and other leisure facilities. The East Lothian area contains many sites of historic interest and offers easy access to the Borders and the North of Scotland as well as to Edinburgh.

Abstracts (two pages of A4 without figures) are invited on any aspect of simulation and its applications. The following are suggested topics, but papers on other topics are also welcome: Simulation methodology and practice, languages, tools and techniques. Models and modelling tools. Data/object bases. Analysis and statistical tools.Simulators and simulation hardware, training simulators. Integration of simulation with concurrent engineering, integrated design and simulation systems. AI in simulation. Parallel and distributed simulation, neural networks. Simulation applications including: aerospace; electronic circuits and systems; computer networks; business; management; finance; economics; leisure; environmental studies; biology; medecine; public health; manufacturing; planning; process control; robotics; measurement and monitoring; energy and safety critical systems; transportation, oil and gas industries; education and training; military.

Specially welcome are proposals for Introductory Tutorials, State-of-the-Art Reviews, and Special Sessions. Accepted papers will be published in the Proceedings of the Conference.

Although this is a national event, presenters and participants from any country have always been welcome, especially from EUROSIM member countries, in addition to North America, the Pacific Rim and elsewhere.

The registration cost, to be confirmed, is 150 pounds sterling for members of EUROSIM Societies (this includes proceedings, tea/coffee, lunches, get-together and conference dinner). Accommodation costs to be announced separately. Details of registration fee and accommodation will be sent to intending participants. Simulationists from Eastern Europe may be offered special rates.

Please send abstracts/submissions/proposals to the Programme Chairman, or contact for further information the Conference Chairmen:

Prof. Russell Cheng, Programme Chairman
Institute of Mathematics and Statistics,
The University, Canterbury, Kent, CT2 7NF, U.K.
Tel: +44 227 764000, Fax: +44 227 475453
Email: rchc@uk.ac.ukc

Mr. Rob Pooley, Conference Chairman,
Department of Computer Science,
University of Edinburgh, Kings Buildings,
Mayfair Road, Edinburgh, EH9 3JZ, U.K.
Tel: +44 31 650 5123, Fax: +44 31 667 720
Email: rjp@uk.ac.ed.dcs

Deadlines:
Abstract (four copies, 2 pages A4): 1st October 1994;
Notice of provisional acceptance: 16th December 1994;
Camera Ready Paper and Registration Fee : 1st Febr. 1995

European and International Societies

AES

AES, Asociación Española de Simulación (Spanish Simulation Society), is being established now and wishes to become a member of EUROSIM. The European Simulation Multiconference in Barcelona has been a great success and has been the meeting point of Spanish people that should be involved in AES in the very next future. An expansion of members and activities is expected.

Contact Address

AES, Asociación Espanola de Simulación
Universitat Politecnica de Catalunya
Departamento d'ESAII
Avgda. Diagonal 647, 2na. Planta
E-08028 Barcelona, Spain
Tel: +34-3-4016544, Fax: +34-3-4016600
E-mail: aes@esaii.upc.es

CROSSIM

CROSSIM (The Croatian Society for Simulation Modelling) was founded in March 1992 in Zagreb. CROSSIM is a non-profit society with the following main goals: promotion of knowledge, methods and techniques of simulation; establishment of professional standards in simulation; development of education and training in simulation; organization of professional meetings and publishing in the field; co-operation with similar domestic and international institutions. In June 1992 CROSSIM sent a letter of intention to EUROSIM with a request to become a full member of the EUROSIM federation, and in November 1993 another letter of intention to get the "Observer status" in the EUROSIM federation. The Society is also in the process to become an affiliation institution with The Society for Computer Simulation, USA.

Membership

The annual membership fee is equivalent to 8 German marks for regular members, and 2 German marks for students. CROSSIM currently has 51 individual members (including one member from each of the following countries: USA, United Kingdom and Hungary).

Contact Address:

Professor Vlatko Ceric (Chairman)
Faculty of Economics, University of Zagreb
Kennedyjev trg 6, 41000 Zagreb, Croatia
Tel: +385 41 231 111, Fax: +385 41 235 633
E-mail: vlatko.ceric@x400.srce.hr

Activities

- Organizing a simulation seminar which is regularly held at the Faculty of Economics, University of Zagreb.
- Co-operation in founding of the new international journal Computing and Information Technology, launched in 1993 (including computer modelling and simulation topics). Information about the journal is available from the CROSSIM Chairman.
- Work on several scientific projects in discrete and continuous simulation, and applications of simulation in such diverse fields as engineering, economy, medicine, ecology, etc.
- Publication of papers in international and domestic journals and conference proceedings.
- Co-organizing the 16h International Conference "Information Technology Interfaces" ITI '94, Pula, Croatia, 14-17 June 1994.
- Co-organizing the 4th Operations Research Conference in Croatia, in the beginning of October 1994 in Rab, Croatia.

V. Ceric

PSCS

During the European Simulation Symposium, Dresden, November 5-8, 1992, a meeting of Polish and SCS representatives took place. The SCS side was represented by: Prof. dr. ir. Eugene J.H. Kerckhoffs - Vice-President Europe, Prof.Rainer Rimane - Erlangen University, Frank Brautigen - EEC Programs, Philip Geril - SCS European Office. The Polish side was re-presented by Mr. Andrzej Jakiewicz from the Polish State Committee for Scientific Research-KBN and Dr. T. Szolc from the Institute of Fundamental Technological Research. Both sides expressed their intention to develop the cooperation in the areas of simulation and related fields. The forms of cooperation included among others the establishing of the Polish Society for Computer Simulation which would be affiliated to the Society for Computer Simulation International.

Thanks to the great support and many kind effords from the side of Prof. dr. ir Eugene J.H. Kerckhoffs - SCS Vice-President, Europe, the Polish Society for Computer Simulation has been established, the Statutes of the Society were officially approved by court on September 17, 1993. During that date the Introductive Seminar of the newly established Society has taken place under the guidance of Prof. dr ir Eugene Kerckhoffs.The aim of that Seminar was the presentation of

the Society for Computer Simulation, the Federation of European Simulation Societies - EUROSIM, the Special Interest Group "Simulation in Europe-SiE" and the SIMFORMATICS Workshop organised at the Gent University.

The Society was created by 17 members of the Executive Committee from various Warsaw Universities and the Polish Academy of Sciences. During the meeting of the PSCS Executive Committee on October 25, 1993 the Board officers were officially elected and 126 people have been accepted as new members. Prof. T. Tarnowski from Koszalin Technical University has offered Mielno as the place of future organisation of common SCS-PSCS simulation workshops.

We want to emphasize once more our gratitude for the support which we received from our colleagues from EUROSIM, our special thanks go to the Executive Board of Working Group of SiE, i.e. Prof. dr G.C. Vansteenkiste - Gent University and Prof. dr. ir. Eugene J.H. Kerckhoffs from Delft University of Technology.

The PSCS Society by its Statutes and Bylaws is a non-profit society with the following main goals:

- integration of scientific and industrial community dealing with computer simulation and related fields in all areas of science and technology;
- promotion of the application of excellence in science and technology by propagation of simulation, optimisation, artificial intelligence, modelling, expert systems, neural networks, concurrent engineering, flexible manufacturing systems, Petri nets in all areas of science and technology;
- supporting of research in the area of application of simulation and related computer techniques;
- promotion of special software commercialisation in the area of application of simulation and related computer techniques.

The forms of activities are:

- organisation of meetings, symposiums and scientific conferences;
- dissemination of information on international conferencies organised by SCS, EUROSIM, IMACS and others;
- cooperation with domestic and foreign research centers;
- cooperation with other domestic and foreign Societies and scientific organisation;
- publishing of professional publication in the field;
- organisation of domestic and foreign trainings and the apprenticeships;
- supporting and creation of the centers of excellence in simulation sciences;
- organisation of training courses and competitions;
- presenting the suggestions and projects to the certain authorities and governmental organisations in the range of interest of PSCS.

Any information about PSCS may be obtained from:

Prof.dr inz. Roman Bogacz
Institute of Fundamental Technological Research
of Polish Academy of Sciences-IPPT PAN
00-049 Warsaw, Swietokrzyska 21, Poland
Tel: +48-22 26-65-08 ext.263, Fax: +48-22 26-98-15

First Scientific **Workshop** of the Polish Society for Computer Simulation: Simulation in Research and Development, Mielno, 24-25 June, 1994. Scope of the workshop: simulation in manufacturing, simulation in energy, simulation in power engineering, simulation and artificial intelligence, simulation and neural networks, simulation in mechanical engineering, simulation in automatic control, simulation in transport and railway engineering, simulation in physics,chemistry and related technologies, simulation tools and software packages.

In the second week of April, the PSCS Board sent the letter to Prof. dr. Felix Breitenecker - the President of EUROSIM, expressing the interest of PSCS of the integration with EUROSIM. We hope to participate in the EUROSIM'95 Congress in Vienna, as one of the cosponsors.

A. Jaskiewicz

SLOSIM

SLOSIM (The Slovenian Society for Simulation and Modelling) was founded on May 30, 1994 as a scientific non-profit organisation. On the foundation meeting 41 participants became members of the society. Currently the majority of members come from two universities and some institutes. In the future efforts to include people from industry will be undertaken too. Beside the common directions of similar societies, beginning activities will be the following:

- identification of all propulsive groups in various fields in Slovenia,
- presentation of each group,
- acquisition of new members,
- transfer of knowledge between groups,
- dissemination of news,
- activities on the conference ERK (Electrotechnical and computer conference),
- activities of affiliation in EUROSIM.

The board of SLOSIM consists of 9 members (chairman, vice-chairman, secretary, treasurer and 5 members). The criteria were the tradition of the modelling and simulation area and the inclusion of as much as possible groups' representatives in the board. The membership fee (per annum) is equivalent to 25 German marks for regular members and 5 German marks for students.

Contact Address:

SLOSIM
Zupancic Borut, chairman
Faculty of Electrical and Computer Engineering
Trzaska 25, 61000 Ljubljana, Slovenia
Tel: +386 61 1768 208, Fax: +386 61 1768 290
Email: slosim@fer.uni-lj.si

B. Zupancic

EUROSIM

FEDERATION OF EUROPEANSIMULATION SOCIETIES

First Call for Papers

EUROSIM

Simulation Congress

September 11 - 15, 1995

Technical University of Vienna

Vienna, Austria

The EUROSIM Simulation Congress EUROSIM '95 is organized on behalf of EUROSIM by ASIM (*Arbeitsgemeinschaft Simulation*), the German speaking Simulation Society, in cooperation with CSSS, DBSS, FRANCOSIM, HSTAG, ISCS , SIMS, and UKSS

Organization Committee:

Felix Breitenecker, Dept. Simulation Techniques, Institute for Technical Mathematics, Technical University of Vienna

Irmgard Husinsky, Dept. for High Performance Computing, Computing Services, Technical University of Vienna

Local Organizers are the Dept. Simulation Techniques of the Technical University of Vienna and the "ARGE Simulation News", in cooperation with the Dept. for High Performance Computing of the Computing Services of the Technical University of Vienna

Local Organization Committee: M. Salzmann, I. Mannsberger; B. Gabler, E. Heilmann, M. Holzinger, K. Kiss, M. Klug, N. Kraus, M. Lingl, J. Schuch, A. Steinwender, H. Strauß

Sponsoring Societies:
AES (Asociación Española de Simulación), CASS (Chinese Association for System Simulation), CROSSIM (Croatian Society for Simulation Modelling), IMACS (International Association for Mathematics and Computers in Simulation), JSST (Japanese Society for Simulation Technology), LSS (Latvian Simulation Society), PSCS (Polish Society for Computer Simulation), ROMSIM (Romanian Society for Modelling and Simulation), SCS Europe (Society for Computer Simulation), SiE Esprit Working Group (Simulation in Europe), SLOSIM (Slovene Society for Simulation and Modelling)

Scientific Committee:

F. Breitenecker (Austria), Chairman;
H. Adelsberger (Germany), M. Alexik (Slovak Republic), W. Ameling (Germany), S. Balsamo (Italy), I. Bausch-Gall (Germany), S.W. Brok (The Netherlands), F.E. Cellier (USA), L. Dekker (The Netherlands), J. Dongarra (USA), V. De Nitto (Italy), J.M. Giron-Sierra (Spain), G. Feichtinger (Austria), P. Fishwick (USA), H.J. Halin (Switzerland), N. Houbak (Denmark), R. Huntsinger (USA), I. Husinsky (Austria), T. Iversen (Norway), A. Jávor (Hungary), K. Juslin (Finland), E. Kerckhoffs (The Netherlands), W. Kleinert (Austria), P. Kopacek (Austria), M. Kotva (Czech Republic), W. Kreutzer (New Zealand), M. Lebrun (France), F. Lorenz (Belgium), F. Maceri (Italy), Z. Minglian (China), D.P.F. Möller (Germany), D. Murray-Smith (U.K.), F.J. Pasveer (The Netherlands), R. Pooley (U.K.), W. Purgathofer (Austria), H.P. Schäfer (Germany), T. Schriber (USA), F. Stanciulescu (Romania), A. Sydow (Germany), H. Szczerbicka (Germany), S. Takaba (Japan), I. Troch (Austria), G.C. Vansteenkiste (Belgium), W. Weisz (Austria), J. Wilkinson (U.K.), R. Zobel (U.K.)

EUROSIM Simulation Congress EUROSIM '95, September 11 - 15, 1995

Scientific Programme:

The EUROSIM Simulation Congress is concerned with all aspects of computer simulation methodology and application. Topics of particular interest include, but are not limited to:

- Simulation Languages and Tools
- Simulation Methodologies
- Parallel Simulation
- Distributed Interactive Simulation
- High Performance Simulation
- Massively Parallel Applications,
- Modelling and Simulation
- Industrial Simulation
- Simulation in Manufacturing
- Molecular Modelling and Simulation
- Symbolic Computation in Modelling and Simulation
- Modelling and Simulation in Economics
- Modelling and Simulation in Social Sciences
- Applications in Engineering, Natural Sciences,Biotechnology, Biology, Medicine, Sociology, Econometrics, etc.
- Knowledge-based Simulation
- Telecommunication
- Use of Training Simulators
- Development of Simulators
- Real-time Simulation
- Virtual Reality, Multimedia Applications
- Synthetic Environments
- Modelling and Simulation in Education

Special Interest Sessions will be organized on the following topics (to be treated also in *EUROSIM-Simulation News Europe*):

- Parallel Simulation Techniques, including presentation of comparisons in *EUROSIM-Simulation News Europe* (W. Weisz)
- Comparison of Simulation Tools; Modelling and Simulation in Education (J. Wilkinson)
- KI Techniques for Modelling and Simulation (H. Szczerbicka)
- Business Administration and Industrial Management (H. Adelsberger, G. Feichtinger)
- Trends in Computational Mechanics
- Simulation in Industry (H.P. Schäfer)

Invited Speakers will give presentations on the following topics (preliminary):

- Development of Discrete Simulation (T. Schriber, USA),
- Molecular Modelling and Simulation (O. Steinhauser, Austria),
- Validation of Models (D. Murray-Smith, U.K.),
- Physiological Modelling and Simulation (R.E. Carson, U.K.),
- Symbolic Computation (B. Buchberger, Austria),
- Animation (M. Gervautz, Austria),
- Parallel Modelling and Simulation (N.N.)

Deadlines:

Participants are invited to submit abstracts according to the topics of the Congress. Please send abstracts (two pages typewritten without drawings and tables) in TRIPLICATE to the Contact Address. Abstracts will be reviewed by three members of the Scientific Committee.

March 15, 1995: deadline for receipt of abstracts

April 10, 1995: notification of acceptance or rejection

May 15, 1995: deadline for camera-ready copies of accepted papers

Only original papers which have not previously been published elsewhere will be accepted. The papers will be published in Proceedings available at the congress. The Proceedings will be published by Elsevier Science B.V.

Reviewed poster contributions will be presented in **Poster Sessions**. Abstracts of posters will be published separately.

Registration Fee:

(includes a copy of the Conference Proceedings, coffee breaks and social events)

Early registration (before May 15, 1995) for authors, members of EUROSIM member societies and sponsoring societies ATS 3700.-
for other participants ATS 4200.-
For late registration ATS 500.- will be added.
Students (attendance only) ATS 500.-

Venue: The congress will take place at the Technical University of Vienna, located in the centre of Vienna.

Language: The official language is English.

Social Programme: Welcome Party, Organ Concert, Reception by the Mayor (Conference Dinner), *Heurigen*-Evening, Closing Party

User **Groups** for simulation languages and tools will meet on Monday (e.g. ACSL, GPSS/H, MATLAB) If you would like to organize a meeting please contact the Organization Committee.

During the Congress there will be an **Exhibition** of hardware and software related to modelling and simulation. Enquiries about the exhibition facilities are welcome.

Tutorials will be held on state-of-the-art topics. Proposals for tutorials are welcome.

On-line information is available from the Information server `info.tuwien.ac.at` of TU Vienna, choose entry point "International Activities" or by direct access with URL
`gopher://info.tuwien.ac.at:4322/11/EUROSIM`
or via anonymous ftp from `simserv.tuwien.ac.at`, change to directory `eurosim95`.

Comparison of Simulation Software

EUROSIM - Simulation News Europe features a series on comparisons of simulation software. Based on simple, easily comprehensible models special features of modelling and experimentation within simulation languages, also with respect to an application area, are compared.

Features are, for instance: modelling technique, event handling, numerical integration, steady-state calculation, parameter sweep, output analysis, animation, complex strategies, submodels, macros.

Seven comparisons have been defined in previous issues of EUROSIM - Simulation News Europe, the seris will be continued. Furthermore, a special comparison o parallel simulation techniques has been defined. Definitions of the comparisons are available from the editors or via Internet (see also page 4).

Comparison 1 (Lithium-Cluster Dynamics under Electron Bombardment, November 1990) deals with a stiff system of 3rd order. This comparison tests features for integration of stiff systems, for parameter variation, and for steady state calculation. A summary can be found in SNE 6, November 1992.

Comparison 2 (Flexible Assembly System, March 1991, comments July 1991) for discrete simulation languages compares features for submodel structures, control strategies, and optimization of process parameters. A preliminary evaluation can be found in SNE 4.

Comparison 3 (Analysis of a Generalized Class-E Amplifier, July 1991) focusses on simulation of electronic circuits and requires features for table functions, eigenvalue analysis, and complex experiments.

Comparison 4 (Dining Philosophers, November 1991) is a more general task involving not only simulation but also different modelling techniques like Petri nets. The comparison concentrates on the modelling technique in case of concurrency and on different strategies (priority levels) in case of deadlocks.

Comparison 5 (Two State Model, March 1992, revised July 1992) primarily addresses simulation tools with very high accurracy. It checks integration and state event handling with high accurracy.

Comparison 6 (Emergency Department - Follow-up Treatment, November 1992) addresses discrete simulation languages and tests features for modelling, concepts of availability, and complex control strategies.

Comparison 7 (Constrained Pendulum, March 1993) for continuous simulation languages, checks features for model comparison, state events, and boundary value problems.

We invite all institutes and companies developing or distributing simulation software to participate in this comparison. Please, simulate the model(s) and send a report to the editors in the following form (on diskette, any word processing format, or per e-mail):

- short description of the language
- model description (source code, diagram, ...)
- results of the tasks with experimentation comments max. 1 page

For publication in EUROSIM - Simulation News Europe all contributions that exceed one page will be modified by the editors to fit into one page. A summary and detailed comparison is planned for a special interest session at the forthcoming conference EUROSIM'95.

We also invite you to prepare demo programs, test versions, and animations on diskette. Please send diskettes to the editors. The demos will be made available on an ftp server (simserv.tuwien.ac.at, see also page 4).

Parallel Comparison (March 1994). This new type of comparison deals with the benefits of distributed and parallel computation for simulation tasks. Three test examples have been chosen to investigate the types of parallelisation techniques best suited to particular types of simulation tasks. Reports of solutions should not be more than one and a half page in length. Opportunities for the publication of more extended discussions will be provided at the forthcoming EUROSIM Congress in Vienna in a special interest session on these comparisons.

The following table shows the number of solutions published in each issue of EUROSIM - Simulation News Europe for the different comparisons.

SNE No.	Comparison							
	C1	C2	C3	C4	C5	C6	C7	CP 1
0	Def							
1	5	Def						
2	4	4	Def					
3	4	3	3	Def				
4	1	5	5	3	Def			
5	4	-	1	1	2			
6	-	2	-	2	1	Def		
7	1	2	1	2	-	1	Def	
8	-	1	-	-	-	1	3	
9	-	-	-	-	-	2	3	
10	1	2	-	-	-	2	2	Def / 1
11	2	2	1		1			2
Total	22	21	11	8	4	6	8	3

MODSIM II

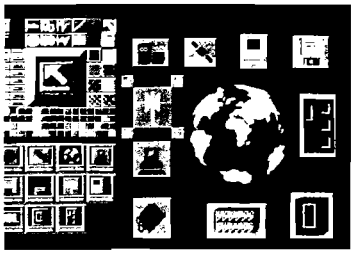
Simulation Modelling With Objects

OBJECT ORIENTATION

Object orientation is becoming accepted as the best way to develop complex software systems. MODSIM II fully supports the object paradigm; encapsulation, message-passing, polymorphism and multiple inheritance. This means that problems analysed using OOA techniques map simply onto MODSIM II code. Thus it opens the way to large-scale software re-use through class libraries, and permits developers to achieve the benefits of evolutionary development – delivering the system the user wants, not just the system the user specified.

SIMULATION

Discrete-event simulation is probably the most powerful decision-support technique currently available. MODSIM II facilities the timely production of simulation models by providing full support to the process view of simulation.



Uniquely among simulation languages, MODSIM II permits an object to perform several activities concurrently in simulation time. It also provides ready-made class libraries and procedures to implement stacks, queues and resources, the collection of statistics, and timing and interrupting simulation processes. Through the mechanism of multiple inheritance, programmers can re-use, extend and tailor the functionality of the class to suit their own application.

GRAPHICS

SIMGRAPHICS II, provided with all MODSIM II systems, is a powerful graphical editor that can create menus, dialogue boxes, icons and output charts with no need of programming. The graphics thus created are easily associated with MODSIM II objects, which can be animated as the simulation program executes.

BENEFITS

- ☑ Complex model building is simplified through object orientation.
- ☑ Software re-use is easily achievable through module and library management.
- ☑ Users can easily visualize the modelled system through the use of animated graphics.
- ☑ Run the same model on PCs or workstations – source code and graphics are portable between platforms.

THE NEXT STEP

MODSIM II is available to your organisation for a free trial on PCs and Workstations. We provide everything needed for a complete evaluation on your computer including software, documentation, sample models and immediate support if you need it. There is no risk to you or your organisation.

We also provide training courses in our offices in Europe and the USA. These are available on both a pre and post sale basis. Please contact us for further information.

CACI Products Company
3333 North Torrey Pines
La Jolla, California 92037
USA
Tel +1 619 457-9681
Fax +1 619 457-1184

CACI Products Company
MECC Business Centre
Gaetano Martinolaan 85
6229 GS Maastricht
Netherlands
Tel +31 43 670 780
Fax +31 43 670 200

CACI Products Company
Coliseum Business Centre
Watchmoor Park
Camberley GU15 3YL
United Kingdom
Tel +44 276 671 671
Fax +44 276 670 677

CACI
Products Company

Comparison 1 - SABER

Description of SABER

SABER is a well known Simulator for analog electronic systems, but is also useful for simulating analog or analog/digital systems of non-electrical or mixed type.

SABER is a product of Analogy Inc. and was published first in February 1987. The last release 3.2 was introduced in September 1993. The MAST modeling language is a de-facto standard for Analog HDL.

Model Description with MAST:

```
# EUROSIM Comparison 1
# Lithium-Cluster Dynamics under
# Electron Bombardment
#-----------------------------------------
# Language MAST (R), MAST is a registered
# Trademark of Analogy Inc.
# ----------------------------------------
# prepared by Rainer Mayer,
# Robert Bosch GmbH, Stuttgart, 25.4.94
# ----------------------------------------
#
number  kr = 1.0,
        kf = 0.1,
        lf = 1000,
        dr = 0.1,
        dm = 1.0,
        p  = 0
var nu  r, m, f
equations {
 r: d_by_dt(r) = -dr*r + kr*m*f
 m: d_by_dt(m) = dr*r - dm*m + kf*f*f -
                 kr*m*f
 f: d_by_dt(f) = dr*r + 2*dm*m - kr*m*f -
                 2*kf*f*f -lf*f + p
}
```

Task a) Comparison of integration algorithms:

All calculations have been done on a Sun SPARCstation 10 Model 402. SABER can be used in Graphical or in Command Mode. First an operating point (t=0) has to be defined, followed by a transient analysis (example with GEAR-algorithm):

```
dc (hold f 9.975 m 1.674 r 84.99

tr (te 10, ts 1m, terr 0.0001, terrn 6,
      steps VAR, meth gear, ord 2
```

The CPU-times for different integration algorithms are:

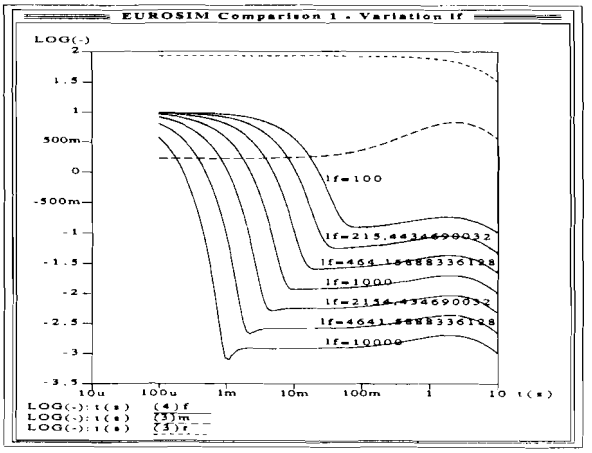
Algorithm	tstep	CPU
Gear 2nd Order	var	0.33 sec
Gear 1st Order	var	0.75 sec
Trapez	var	0.75 sec
Gear 2nd Order	0.0005	47.30 sec
Gear 2nd Order	0.0010	21.20 sec

Task b) Variation of lf:

SABER offers a loop command for parameter variation, logarithmic scales are generated by postprocessing:

```
vary lf from 100 to 10000 log 7
        tr (tend 10, ts 1m, terr 0.0001
        end

extract / (pfile xlog, dfile tr, xs
     from 0.0001 to 10 log 300
```



Task c) Calculation of steady states:

Steady state was calculated by a second DC-Analysis with the operating point as a start value.

```
dc (dcip dc, dcep ep
display ep
alter p=10000
tr (dcip dc, dcep ep
display ep
```

The results are:

p=0:	f=0,	m=0,	r=0
p=10000:	f=10,	m=10,	r=1000

Dipl.-Ing. Rainer Mayer, Robert Bosch GmbH, D-70442 Stuttgart

Comparison 1 - SIMNON

SIMNON is a simulation software for both continuous and discrete systems, which translates programs, very quickly, directly into memory (available for UNIX,VMS and PC [DOS and Windows 3.1]). Additionally, SIMNON provides "connecting systems" to establish interconnections between various subsystems, which makes it quite easy, when dealing with larger systems, to decompose them into subsystems. There exists a real-time version where subsystems may be hardware-in-the-loop modules.

The concept of SIMNON also includes the possibility to handle model parameters and terminal values of model variables within a relatively powerful experiment language with built-in macro functions.

In order to overcome problems with the stiff system and to obtain a logarithmic scale, a transformation like in [1] has been made.

Model description:

SIMNON uses an equatio oriented model description, where state variables and derivative variables have to be defined explicitely:

```
CONTINUOUS SYSTEM MOL
" Lithium Cluster Dynamics - EUROSIM Comparison 1
" States, derivates and time:
STATE R M F
DER derR derM derF
TIME tau
" Equations:
"Test for stationarity:
test = ((abs(derR)<eps) AND (abs(derM)<eps))
st = IF sttest THEN CTERM((abs(derF)<eps) AND test ) ELSE 0
ln10 = ln(10)
const = ln10/10^tau0
derR = (-dr*R + kr*M*F)*tt
derM = (dr*R - dm*M + kf*F*F - kr*M*F)*tt
derF = (dr*R + 2*dm*M - kr*M*F -2*kf*F*F - lf*F + p)*tt
tt = IF sttest THEN 1 ELSE const*10^tau
lgR = (ln(R)/ln10)
lgM = (ln(M)/ln10)
lgF = (ln(F)/ln10)
" Parameter values:
kr: 1
kf: 0.1
lf: 1000
dr: 0.1
dm: 1
tau0: 3
p: 0
sttest: 0
eps: 1e-3
"Initial values:
F: 9.975
M: 1.674
R: 84.99
END
```

Task a) Comparison of integration algorithms:

SIMNON has only four integration algorithms, there exists in particular no implicit algorithm, which is of course a disadvantage in the case of a stiff system like the one discussed here. For time measurements the program above, which contains the logarithmic transformation, was used. The following table shows the results.

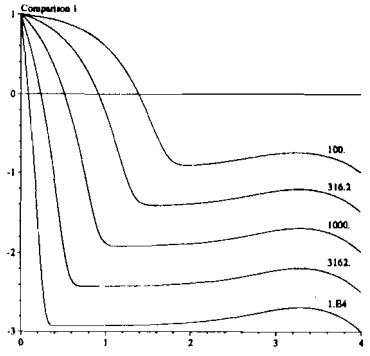
algorithm [time(min:sec)]	'286 (16 Mhz)	'386/7 (40 MhZ)	'486 (66 MZz)
RKF45	4:46,9	0:8,2	0:2,7
RKF23	6:26,3	0:12,1	0:4,2
DOPRI45R	6:39,2	0:12,0	0:3,9
EULER	--	0:31,0	0:9,8

RKF23/RKF45: Runge-Kutta-Fehlberg algorithm of orders 2/3 and 4/5
DOPRI45R: Runge-Kutta algorithm due to Dormand and Prince
(all with automatic stepsize adjustment)
EULER: Euler-algorithm with fixed stepsize

Task b) Variation of lf:

SIMNON offers parameter variation and programming with experiment variables at runtime level. The following commands load the model (SYST), change accuracy parameters, draw titles and axes and perform the parameter variation in a loop (`FOR lflog ... NEXT lflog`) where SIMU starts a simulation run:

```
SYST mol
ERROR 1e-7
PLOT lgf
AXES H 0 4 V -3 1
FOR lflog=2. TO 4. STEP 0.5
LET lf2 = 10^lflog
WRITE lf2
PAR lf: lf2
SIMU 0 4
MARK :lf2
NEXT lflog
```



Task c) Calculation of steady states:

Although there is no built-in steady state finder in SIMNON, it is nevertheless possible to "simulate" a steady-state finder using a combination of infinite simulation (SIMU INF) and conditional termination (CTERM), which produces acceptable results:

P	r	m	f
10000	998.93	9.9903	10.
0	9.9973E-3	1.1108E-3	3.2105E-6

The commands (for P=10000) are:

```
PAR lf: 1000
PAR p: 10000
PAR sttest: 1
SIMU 0 INF          "Infinite simulation
DISP F M R tau
```

Reference: [1] G.A. and T.M. Korn, Comparison 1 - DESIRE, EUROSIM SNE, No 4 March 1992, P. 30

M.Bracke, S.Schnitter, A.Schreiber, Insitut für Informatik, TU Clausthal, Erzstr.1, D-38678 Clausthal-Zellerfeld

Comparison 2 - CASSANDRA 3.0

Introduction

In **SNE** 4, March 1992, we already have reported the solution of the problem using an earlier version CASSANDRA 2.1. Here a qualitatively higher level solution using the entirely new version is presented. Beyond the new graphic I/O interface and animation two basic aspects should be mentioned. 1) The experiments can be controlled by intelligent demons finding the optimum determined by the user automatically [1] (see Fig. 1) 2) The models are represented internally by Knowledge Attributed Petri Nets (KAPN) [2] enabling the individual workpieces to carry the technological prescriptions and state of manufacturing with them in a naturally and easily describable way.

The experiment

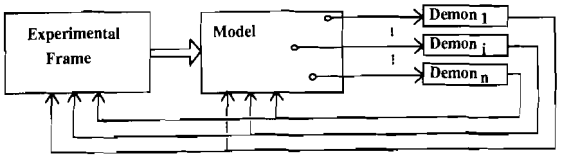


Figure 1

The graphic representation of model is shown in Fig. 2. together with the demon supervising the experiment. (Internally the models are represented by KAPN subnetworks.)

Two versions of the demon controlled experiment are presented. In the first experiment the demon was

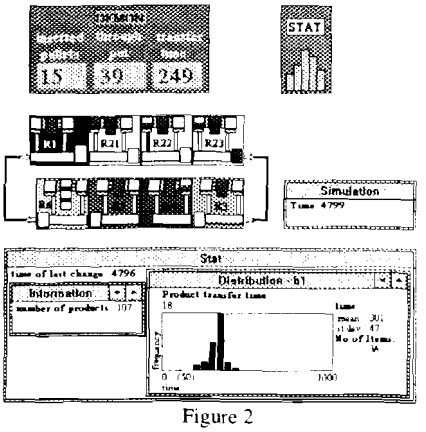


Figure 2

instructed to increase the number of pallets step by step and the throughput, transfer time, as well as the standard deviation of the product transfer time were recorded. The results can be seen in Fig. 3.

In the next experiment the starting point was that we have no knowledge in advance about the system para-

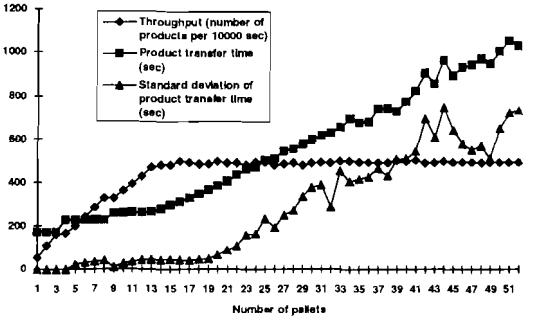


Figure 3

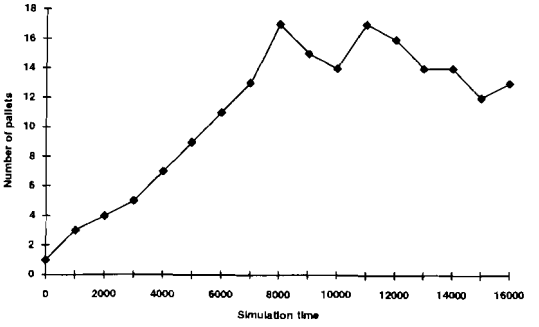


Figure 4

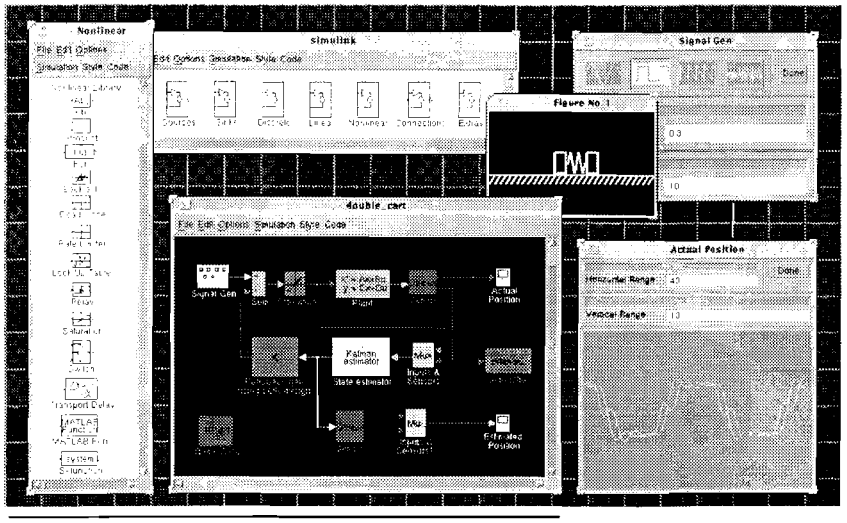
meters which can be obtained. The demon was instructed to find a complex measure regarded as an optimum as follows: "Find the maximum throughput and decrease it until the value of 90 % in order to reduce the product transfer time!" In case we regard this as an optimum the value of 13 pallets has been obtained as can be seen from the results of the search procedure shown in Fig. 4. Obviously the demon(s) in the system can be instructed the obtain various optimums of the weighted values of different system parameters.

References

[1] Jávor, A., Benkő, M., Leitereg, A., Moré, G., AI Controlled Simulation of Complex Systems. Computing & Control Engineering Journal (in publication)

[2] Jávor, A., Knowledge Attributed Petri Nets. Systems Analysis, Modelling, Simulation, 13(1993)1/2, 5-12.

For information and comments, please phone or fax or write to: *Prof. Dr. A. Jávor, KFKI Research Institute for Measurement and Computing Techniques of the Hungarian Academy of Sciences, H-1525 Budapest, P.O.Box 49, Hungary, Tel: +36 1 1699499, Fax: +36 1 1553894, E-mail: h7023jav@ella.hu*



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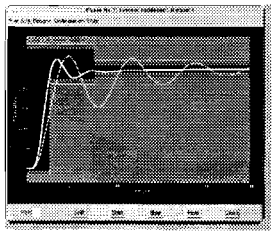

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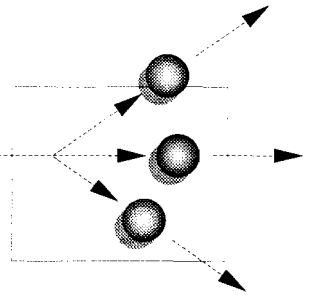

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Giovanni Chiola

Dipartimento di Informatica
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I-10149 Torino, ITALY
chiola@di.unito.it

Enrique V. Kortright

Computer Science Dept.
Nicholls State Univ.
Thibodaux, LA 70310
U.S.A.
ek@reality.nich.edu
(from North America)

KEY DATES

September 15, 1994	Five (5) copies of full papers received
October 1, 1994	Extended deadline for email full paper submission
November 12, 1994	Sendout of reviewers comments to authors (email only)
November 19, 1994	Authors statement for program committee (email only)
December 10, 1994	Notification of acceptance/rejection
January 20, 1995	Full camera-ready papers

Comparison 2 - DSIM

The simulation system DSIM has been developed at the Dept. Simulation Techiques at Technical University Vienna, supported by a grant of the "Bundesministerium für Wissenschaft und Forschung" of Austria.

DSIM is a discrete simulation system working in an windows environment (PC) and consists of the three modules SIMSHELL, SIMPAINT, and SIMSTAT.

The module SIMSHELL offers graphical modelling of a process flow and menu-driven control of experiments and the storage of results. Icons represent subprocesses, connections between the icons show the flow of entities (workpieces, information, etc., fig. 2). The description of the subprocesses is stored in one or more model libraries; these submodels are defined in terms of coloured, time dependent Petri nets. An expert user may modify or define subprocesses and libraries within the module SIMPAINT. Control or routing strategies may be defined either by means of Work Tables at runtime in SIMSHELL (centralized control) or by means of decisions in the Petri net description in SIMPAINT.

The simulator itself scans the Petri net description and schedules immediately an action, if necessary (time event); two versons are available: one with and one without deadlock detection and deadlock handling. Analysis of the stored data may be performed within the module SIMSTAT, which offers basic display features and interfaces for postprocessing (e.g. EXCEL).

DSIM is free software and available from the server `simserv.tuwien.ac.at`. Further developments will include e.g. optimization with genetic algorithms.

Model description

In modelling the investigated process for the stations Ai submodels of a predefined library were modified slightly, for the load/unload station a new subprocess was defined. Fig.1 shows the representing icon and parts of the Petri net description developed in SIMPAINT.

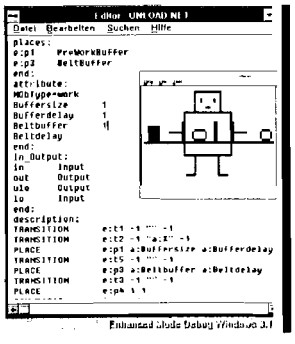


Figure 1

Within SIMSHELL the model was build up by subprocesses of the model library (fig.2, six simple stations, one intelligent station, and the load/unload station with a delay element). When opening the icons, specific parameters for the subprocesses and initial values, e. g the number of pallets, can be chosen. During a simulation run (menu Simulate) relevant selected data are stored, additionally a simple animation is offerred: bar charts with absolute values or average values show the status of the stations.

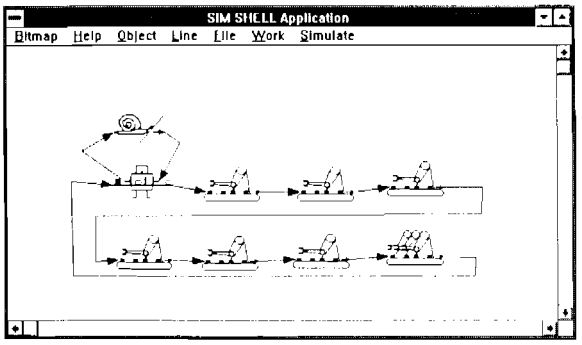


Figure 2

The table shows the results for different number of pallets:

pallets	throughput [pallets]	av. cycletime [s]	av. time in system [s]
15	1344	21,43	278,58
20	1425	20,20	409.06
30	1416	20,34	549,36
40	1370	21,02	706,55

Postprocessing of the stored data can be performed within SIMSTAT by displaying the data (fig.3) or interfacing to programs like EXCEL.

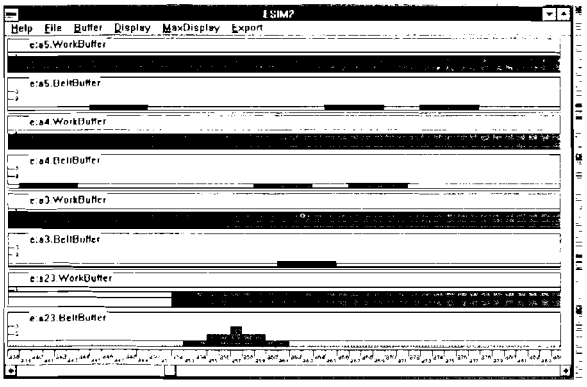


Figure 3

F. Breitenecker, B. Gabler, H. Hlavacs, H. Strauss, P. Wagner, W. Wriesnegger, Dept. Simulation Techniques, Technical University of Vienna, Wiedner Hauptstrasse 8-10, A-1040 Wien

Comparison 3 - PSIMOS

Short Description of PSIMOS

PSIMOS is a CAE-tool for various purposes such as identification, system analysis, controller design and simulation. Models for linear and nonlinear systems can be built in a block oriented way either textual by editing a structure and a parameter file, or graphically using the PSIMOS graphical interface for model building.

Activating the PSIMOS process connecting real-time-interface (PRI), simulations can easily be connected to plants via special blocks for realtime applications. Supported is e. g. the standard plug-in board DAS-1600.

Model description

Modelling can be easily done using the graphical interface. The time dependent resistance is generated in a Fortran subroutine which is coupled to the model via the PSIMOS User-Access block. Figure 1 shows the model for the generalized class-E amplifier.

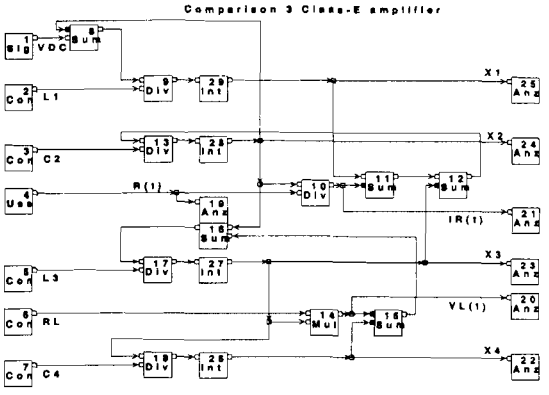


Fig. 1: Block diagram for the class-E amplifier

Results

Task a): To get the eigenvalues two different ways inside PSIMOS can be chosen: i) The eigenvalues can be calculated directly from the given state-space representation of the investigated system or ii) result from the identification of the simulation results.

Eigenvalues ON-state: R(t) = 0.05 Ohm	Eigenvalues OFF-state: R(t) = 5.0E6 Ohm
-1.117E9	-5.823E4-5.328E5 j
-1.130E5-6.584E5 j	-5.823E4+5.328E5 j
-1.130E5+6.584E5 j	-5.471E4-1.041E6 j
-6.258E2	-5.471E4+1.041E6 j

Task b): Figure 2 shows the curves of R(t), IL(t) and VL(t) in the time interval [0,100E-6] sec, with a rise/fall time TRF=1.0E-15 sec.

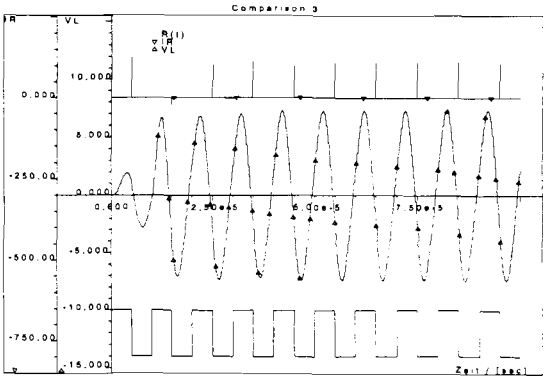


Fig. 2: TRF=1.0E-15sec, time intervall [0,100E-6] sec

Task c): Figure 3 and 4 show the results for the desired variation of the rise/fall time TRF. Only the curve with TRF=1.0E-7 sec can be seen to differ from the others with TRF=1.0E-9, 1.0E-11, 1.0E-15 sec.

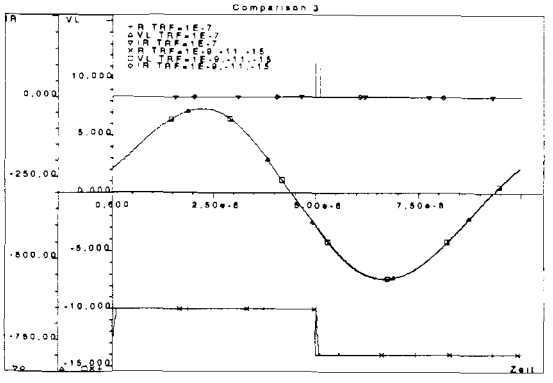


Fig. 3: Variation TRF, time interval [0,10E-6] sec

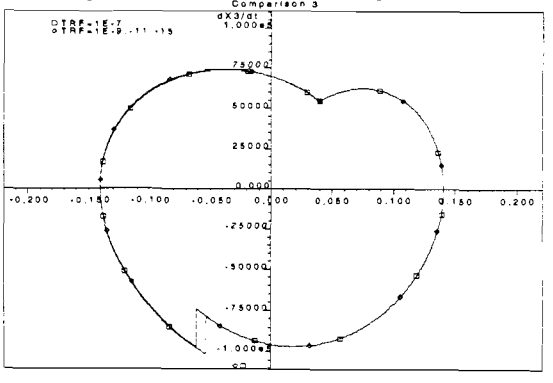


Fig. 4: Variation TRF, phase plane dx_3/dt versus x_3

S. Delzer, A. Huber, ITK-Ingenieurbüro für Technische Kybernetik, Ritterstr. 51, D-79541 Lörrach, Tel.: +49-(0)-7621-5045, Fax: +49-(0)-7621-56605

Comparison 5 - TKSL

The best-known and most accurate method of calculating a new value of a numerical solution of a differential equation

$$y' = f(t,y) \quad y(t_o) = y_o$$

is to construct the Taylor series in the form

$$y_{n+1} = y_n + h * f(t_n,y_n) + h^2/2! * f^{[1]}(t_n,y_n) + \ldots + h^p/p! * f^{[p-1]}(t_n,y_n)$$

where h is the integration step.

The simulation language TKSL/386 (an implementation of the Taylor Kunovsky Simulation Language on an Intel 80386 based personal computer) has been created to test an algorithm of the Modern Taylor Series Method. The main idea behind the Modern Taylor Series Method is an automatic integration method order setting, i.e. using as many Taylor series terms for computing as needed to achieve the required accuracy *eps*.

TKSL/386 has a user friendly environment (Turbo Vision), adjustable computation accuracy, adjustable method order, computation with variable integration step h, exact detection of discontinuities.

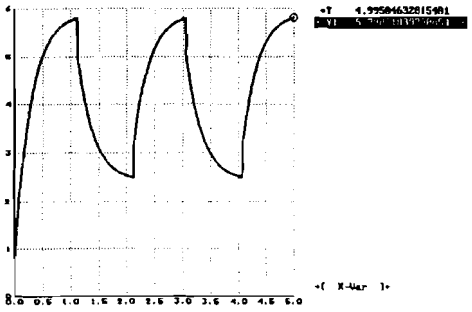


Figure 1: Task a)

The two typical windows when task a) is solved can be seen in Fig.1. In the right-hand part of Fig.1 the corresponding values of the variables y1 and time T are printed. In the left-hand part of Fig.1 the required graph is shown.

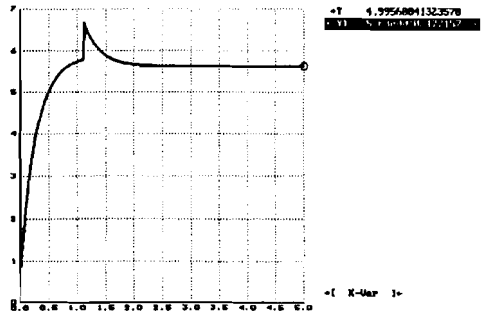


Figure 2: Task d)

Task d) can be solved by changing constants in the above TKSL model. The results are in Fig.2. In the right-hand part of Fig.2 the corresponding values of y1 and T are printed.

Programming in TKSL/386 is very easy. The menu system in TKSL/386 is very similar to that in TURBO PASCAL 6.0. The corresponding source text in TKSL/386 is:

```
var    y1,y2;
const  level=5.8,tmax=5,eps=1e-18,
       c2=0.4,c4=5.5;
system y1'=2.7e6*(y2+c2-y1) &4.2;
       y2'=3.5651205*(c4-y2) &0.3;
       case y1 of
       >level: level=2.5;
                    c2=-0.3;c4=2.73;
        { c2=1.3;c4=4.33;.. task d) }
       else level=5.8;
                    c2=0.4;c4=5.5;
       esac;
sysend.
```

All variables that will be needed are declared in the line starting with **var**. All necessary constants are declared in the line starting with **const** (**tmax** is the maximal computation time, **eps** is the required accuracy - the Modern Taylor Series Method used in the simulation language TKSL increases the method order automatically, i.e. the values of the terms

$$h^p/p! * f^{[p-1]}(t_n,y_n)$$

are computed for increasing integer values of p until adding the next term doesn't improve the accuracy of the solution). The equations are declared in block mode (between system and sysend). The initial condition for each differential equation is written in the form *& initial condition*;

The positions of each of the five discontinuities obtained from solving the problem are in Table 1. The results of the computation shown in the table are of course produced with the full accuracy, as it is characteristic of TKSL.

1.1083061677721695
2.12968535515772928
3.0541529070076332
4.07553209439319275
4.99999964623928239

Tab.1.

Similarly, TKSL/INMOS (an implementation of the Taylor Kunovsky simulation language on transputers - based on OCCAM 2 toolset) has been completed. The source text corresponds to the block structure notation.

More information about TKSL is available with: *Jiri Kunovsky, Department of Computer Science and Engineering, Faculty of Electrical Engineering, Technical University of Brno, Bozetechova 2, 612 66 Brno, Czech Republic, E-mail: kunovsky@dcse.vutbr.cz.*

Comparison of Parallel Simulation Techniques Parsytec Transputer Supercluster / SLIM

Part I

Introduction

Following the recent announcement in EUROSIM SNE 10 of the proposed series on comparisons of parallel simulation methods, some work has been undertaken at Glasgow University to port a continuous system simulation tool (SLIM) to the SIMD/MIMD environment provided by a Parsytec Supercluster. This is a T800 transputer based parallel system with Parix operating system. This note provides a brief account of the way in which the SLIM simulation language has been implemented on the Parsytec system using a master-slave approach. Results are presented for the Monte Carlo study that forms the first test example for the comparison series. Part II will report on other solutions on the Parsytec Supercluster.

SLIM

The Simulation Language for Introductory Modeling (SLIM) is a continuous system simulation tool developed within the Department of Electronics and Electrical Engineering at the University of Glasgow to provide students with an introduction to the main concepts of simulation languages before they attempt to use industry-standard software such as ACSL. It was developed for a PC/DOS based environment but has been ported successfully to other platforms such as VAX/VMS and SUN/SunOS.

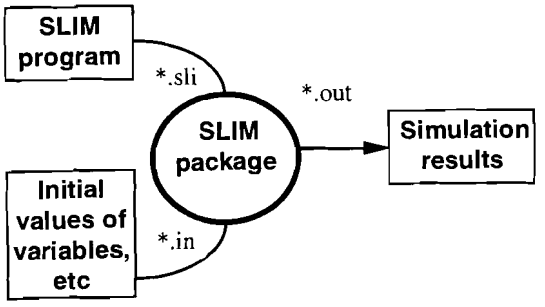


Figure 1: Context diagram of SLIM package

The facilities provided within SLIM are a subset of the CSSL'67 recommendations and the syntax of this language therefore appears to the user to be a reduced version of that found in many other widely used simulation tools. Figure 1 shows the operations carried out when a SLIM program is run. The process is essentially interpretative. Two files are normally provided by the user. One of this is the simulation application program written in the SLIM language, while the second is a file that may involve values of parameters and initial values of state variables. The SLIM code for the Monte Carlo study is very simple and is not included in this note due to space limitations. It can be made available to anyone interested on request to the authors.

The Master - Slave approach

Since we did not wish to make significant changes in the structure of SLIM it was decided to adopt an approach involving a master program running on one processor that would distribute tasks among a number of slaves. In this example the slave programs are complete SLIM programs, with only very minor changes compared with the original version of the software. This master-slave approach is well suited for the solution of simulation problems involving experiments on a number of similar models that differ in terms of parameters or initial conditions.

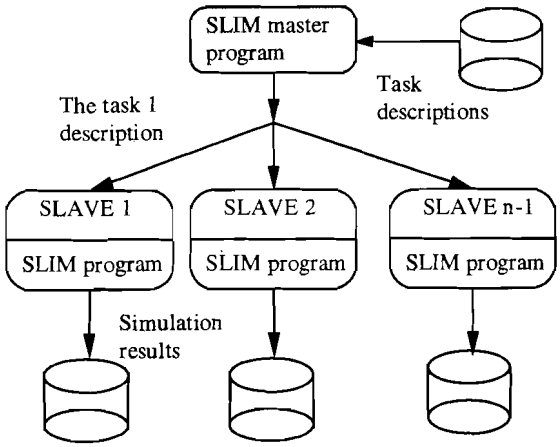


Figure 2: Master-slave model of SLIM package

The preparation of the SLIM master program and the changes within the SLIM slave program took about three man weeks to complete for someone without previous experience of the Parsytec system. Preparation of the SLIM application program for Monte Carlo Study took approximately five minutes.

Task 1) - The Simulation process

Our simulations took place on the array of transputers (T800/25Mhz/4MB RAM) connected to SUN IPX workstation as a front end computer. We executed our test problem on various numbers of transputers. The results are depicted in Tab. 1.

Due to limitations of the operating system and/or this specific FORTRAN compiler, we could execute the simulation on a maximum of 17 processors. As can be seen from Table 1 the speedup of the task execution

is almost linearly dependent on the number of participating processors and for 17 processors it is nearly 14.5 times. In a configuration up to 8 transputers the difference between theoretical linear speedup relative to the result for two processors and actual results is almost zero, but in configurations 16 and 17 the relative error is 7-9%. Our assumption is that when in configurations with 10 or more transputers, the front-end system forms a bottleneck, because of the large amount of calculated data transferred from a transputer array to the main memory of the front-end processor.

Proc #	Expected Time[sec]	Elapsed Time[sec]	Diff %	Speed-up factor f
1	---	1708.59	---	---
2	---	1719.86	---	---
3	859.93	861.93	0.23%	1.99
4	574.43	577.27	0.49%	2.98
5	429.97	435.21	1.22%	3.95
6	343.97	349.57	1.63%	4.91
7	287.22	293.90	2.33%	5.85
8	245.94	254.58	3.51%	6.74
9	214.98	222.54	3.52%	7.71
16	115.23	123.63	7.29%	13.87
17	108.35	117.54	8.48%	14.57

Table 1: Elapsed time on different configurations (speed-up factor added by the editors)

How to improve results

The SLIM package and the system parameters could be tuned up in several ways to achieve even better results. We could change the format of an output file from the ASCII to binary, since this would reduce the amount of data transferred from the transputer array to the front-end computer and thus raise the level of saturation of the front-end. In similar way we could change the size of disk cache, to get a better response from a front-end system, but in that way we can gain only a small profit that depends upon physical computer configuration and the model executed.

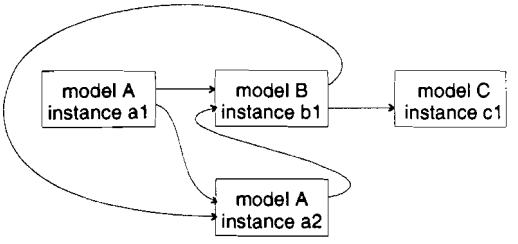
A much better, but also more demanding task, would be to change the syntax of the SLIM language and consequently the structure of the SLIM package itself, so it can support partially parallel execution of sequential SLIM programs. We can achieve parallelism in two ways: internally and externally. Internally, hidden from users' eyes we could change the way in which the program is executed. Externally we could change syntax of the language, so it would be able to support several transputers in parallel.

Matjaz Ostroversnik, Prof. Dr. David Murray-Smith, Department of Electronics and Electrical Engineering, University of Glasgow, Glasgow G128QQ, Scotland, U.K.

Comparison of Parallel Simulation Techniques
Cogent XTM / "mosis"

"mosis" (modular simulation system) is a CSSL-simulation system specially designed for submodel structures and mapping them on multiprocessor systems with distributed memory, like transputer systems, workstation clusters etc. It has been developed at the Dept. Simlation Technques of TU Vienna on the basis of "C" and has most features of other simulation languages based on differential equations (various integration algorithms, event handling) with the possibility to expand the system by user functions. It is designed to work on many different hardware platforms, not only on parallel, but also on serial machines like single workstations and PC's (multitasking!) where the user interface (except from windowing etc.) is everywhere the same independent from the hardware. It can also be used (without the parallel features) as an all-purpose simulation language.

"mosis" consists of a "mosis"-to-"C" compiler and a run-time system in object code to link user models. The run-time system contains I/O routines, graphics, a "C"-like interpreter language and an object oriented simulation kernel. For a simulation study, at run-time first instances of the models (submodels) must be generated (containing all the data, allocated at run-time) and connected together, if necessary (see figure); then the simulation can be started (before that the user can set parameter values, etc). This concepts allows instancing and simulating simultaneously different models.



In "mosis" it is possible to split a bigger model into several smaller models that can be simulated on different processors (and connect them via special unidirectional "mosis"-links; see figure). The connections have to be done at run-time (without having to re-compile the whole system). At each communication interval the data of the output values in one instance are sent to the corresponding input signals of the other instance.

Models are compiled to "**C**"-files and linked to the run-time system. At this level, the user can access models ("A", "B") in the following way:

```
int a1; int b1;
a1=instance("A",2); b1=instance ("B",1);
```

The second parameter tells the system on which processor the instance should be created (on parallel computer systems). Two instances are linked together with the "connect" command. When one instance is started, all other instances depending on this instance, are also started automatically. The values of a variable depending on the time are saved with the "watch" command:

```
connect(a1.ova11,b1.i);
watch(a1.x); run(a1);
```

All simulations are done in the background (also on PC's); during the calculation it is possible to view values of variables continuously, to stop or start instances or to enter any other command.

"mosis" has been currently implemented on the following systems: PC's (Borland C), 386+ (Watcom C/32), UNIX workstations with X Window and PVM, and the transputer workstation Cogent XTM ("mosis" version 1.0 α). "mosis" is free software; it may be copied for non-commercial use and will be available with the first distributed test version 1.0 β on the simulation server "simserv.tuwien.ac.at" via anonymous ftp (from Sept.'94 on).

The Cogent XTM consists of 20 Transputers T800 with 20MBit-Links and a faster bus connection for short messages. Each transputer has 4 MB of local memory (without swapping). For communication, "Kernel Linda" is used which simulates some kind of a shared memory pool for all processes. The operating system is QIX. The system is dynamically scalable.

All simulations within "mosis" have been done using double precision (standard); the Kernel Linda calls are used to simulate a message passing mechanism between the tasks. "mosis" and all comparison examples were compiled using the same ANSI-C compiler on the Cogent. As requested, in all of the comparisons the RK4 algorithm was used (different stepsizes).

a) Monte-Carlo Simulation: This problem was solved with 8 transputers with a static load balancing: Every transputer had to simulate 125 times the system and store the simulation results. In the last run, the sum of all simulated values is sent to the main process. In this case, this is the best solution, as all processors have the same speed and all are exclusively used by this calculation. Therefore all processes need nearly the same time to simulate their tasks (speed variation < 0.5 %).

Although the conditions were nearly ideal for this comparison, the resulting speed-up factor for eight processors was only f=4.4. The reason of this relatively bad value is probably that the polling for received

signals during the simulation run takes much time. In the first distributed version of "mosis" this overhead will be significantly reduced.

Model description:

```
model mcarlo()
{ /* parameter declarations etc. */
  initial { /* initialisation  */ }
  dynamic { derivative {
        x'=xp,0.1;
      xp'=(-dgauss*xp-kx*m)/m,0.0;
    } } }
```

Commands at run-time :

```
int i; int p[8];
for(i=0;i;i++) p[i]=instance("mcarlo",i+1);
/* on processor i+1 */
for(i=0;i;i++) run(p[i]);
/* start all 8 instances simultaneously */
```

b) Coupled predator-prey population: Parallelisation of this example was not successful (because of calculation speed >> communication speed). First, with communication performed at every integration step (cint = h = 0.01, RK4), the parallelisation resulted in a "speed-up"-factor of f=0.06; with reduced communication (cint=10h) f increased to f=0.3 (3.3 times slower). Increasing the communication interval to cint=20h led to a factor of f=0.61 (1.61 times slower). All five tasks were located on different processors, therefore the communication overhead was very high.

c) Partial differential equation: This example was simulated with a discretisation into N=800 lines; 8 processors were used here, each of them held 100 lines or 200 state variables; at each communication point the boundary values were interchanged between neighbouring blocks (8 tasks; 14 connections).

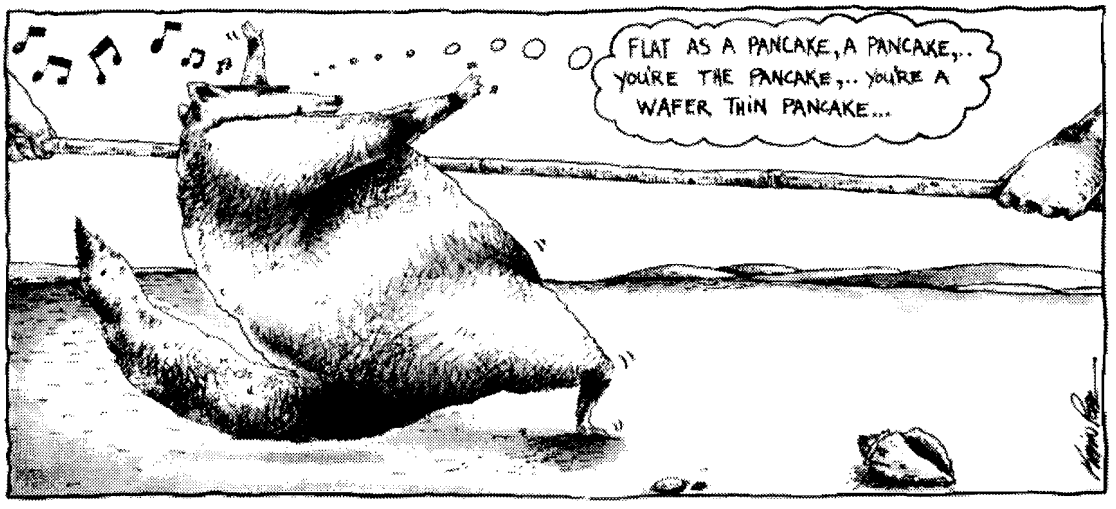
Experiments were done by varying the communication interval from cint=h (0.005) to cint=8h; the resulting speed-up factors (results with cint>8h unstable):

cint	h	2h	4h	8h
f	4.33	4.56	5.64	6.04

The time used for developing the parallel versions was the same as for the serial solution, as they could easily transformed into one another and the message passing algorithms are hidden to the user: he/she can use the I/O signals like common variables; input and output is automatically done by the simulation system.

G. Schuster, F. Breitenecker, Dept. Simulation Techniques, Technical University Vienna, Wiedner Hauptstraße 8-10, A-1040 Wien, Austria.

THE WOLVERINE'S FLEXIBILITY CONTINUES TO AMAZE USERS



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Book Review

Biomedical Modeling and Simulation on a PC
R.P. van Wijk van Brievingh, D.P.F. Möller (Eds.)

A Workbench for Physiology and Biomedical Engineering. Advances in Simulation (Eds.P.A.Luker, B.Schmidt), vol.6, Springer-Verlag New York, 1993; ISBN 0-387-97650-7, 520 pages

This book addresses mainly lecturers in this area and students who want to become familiar with this application area. Thirty authors wrote an interesting collection of contributions, demonstrating the value of simulation in physiology and bioengineering. Software (six diskettes) delivered with the book offer an easy to use simulator (BIOPSI) and various models.

The contributions start with an overview on state-of-the-art and future aspects of modeling and simulation in physiology and biomedical engineering, on computer simulation as educational tool, on artificial intelligence and simulation, on simulation as general design tool, and on experience in teaching with the help of models.

The second part of the book deals with specific models and computer experiments with these models. The models pertain the following fields: electrophysiology, circulation, respiration, clearance, compartmental analysis, physiological, endocrine and neuronal control systems.The learning objectives for a particular model are described with references to relevant background information. In describing a model only those mathematical relations are given which are indispensable for the explanation.

The last part of the book deals with guidelines for teachers and for the use of the simulator BIOPSI interfacing to all described models.

To sum up, the book has to be highly recommended for teachers and for students who want to become familiar with (modeling of) physiological processes.

F. Breitenecker, TU Vienna

Industry News

AutoSimulations announces AutoMod on SVGA Platform

AutoSimulations, Inc. (ASI), a front runner n the 3-D graphical simulation industry, announces the release of the Super Video Graphics Adapter (SVA) version of their AutoMod and AutoSched products. The new platform provides users with a lower cost solution when utilizing ASI's simulation and scheduling applications. The SVGA version allows models to be built and run without the aid of a graphics accelerator card.

For product information contact Rich Farr at AutoSimulations, Inc., P.O. Box 307, 655 E. Medical Dr., Bountiful, Utah 84011, USA, Tel: +1-298 1398 131.

Taylor II Simulation Software

F&H Simulations introduces the proven simulation software Taylor II to the European market. Taylor II is a simulation package, based on the philosophy that the operations research specialist and manfacturing engineer must be able to use the software without the need to be a programmer. Taylor II is a menu driven simulation environment, allowing the user to build, run and analyse models of existing or future manufacturing lines, material handling systems or other processes in hours rather than months. Taylor II will show bottlenecks, leadtimes, utilization rates, throughput capacity, etc, and let the user interactively change the system design. The system offers modelling, simulation, analysis and animation. The animation can range from simple schematic representation using icon libraries to sophisticated 3D process visualisation. Besides this F&H releases three new Taylor II modules: Advanced Statistics (for input and output analysis), 3D Shaded Animation and the Runtime Development Kit (to create applications with their own user interface).

For more information: F&H Simulations B.V., Spoorlaan 424, 5038 CG Tilburg, The Netherlands, Tel: +31-13 366 344, Fax: +31-13 427 516

DESIRE/W and /NEUNET/W extended-DOS versions for 486- and Pentium-based personal computers

DESIRE/W and DESIRE/NEUNET/W are new extended-DOS versions of DESIRE for 486- and Pentium-based personal computers. These programs are written in Watcom 32-bit ANSI C and 32-bit assembly-language with Pentium optimizations. The necessary runtime DOS extender is included without charge.

DESIRE/W and DESIRE/NEUNET/W bring the programming features of our flagship UNIX workstation programs DESIRE/X and DESIRE/NEUNET/X to 486 and Pentium machines. They will solve up to 2000 ordinary differential equations in scalar or vector form with a variety of fixed- and variable step Runge-Kutta

Simulation : A planning tool for extended process efficiency and effectiveness in the future.

ARENA™ is a new development from the Systems Modeling Corporation USA (developer of SIMAN/CINEMA). DUAL Zentrum GmbH are the German representatives for ARENA, whose aim is to extend the widespread usage of ARENA simulation software. ARENA offers the following advantages.

- ❒ Simulation processes that are independant from application and project orientation
- ❒ Intuitive simulation, modelling and animation.
- ❒ Low knowledge of complex programming languages required by utilising the innovative "Application Solution Template" (AST) methodology.
- ❒ System flexibility that can be adapted to specific process solutions using AST technology.

The following examples represent actual processes that have been examined and modeled by DUAL-Zentrum using ARENA.

Example 1 : *An Industrial Computer Network*

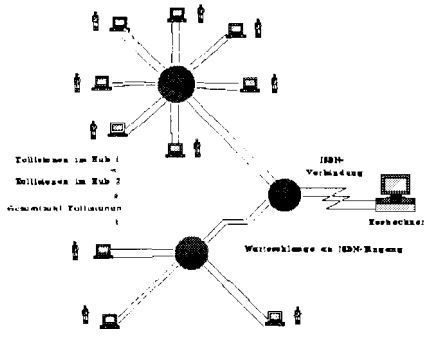

Diagram showing the completed simulated model.

Aims : To build upon the existing network by increasing utilisation and develop processes within the future. Plus to evaluate the validility of installing a telephone system within the LAN.
Simulation Tasks : ARENA modeling for various networks such as Ethernet, Token Ring and Star Connection. Also ARENA will produce and analyse statistical data that will evaluate the incorporation of a telephone network within the LAN.

ARENA Results : Including increased efficiency of the existing network, ARENA has justified the telephone within a Token Ring network. A completed analysis of optimised configurations concerning user requirements for extended process possibilities in the future.

Example 2 :*Water Works (storage and provision)*
Aims : To reduce enrgy costs and optimise the water distribution service that will guarantee the supply of water to users. Also to provide the ability for fast rection times to arising problems in the water supply process.
Simulation Tasks : To examine and model the complete water provision service.
ARENA Results : ARENA usage discovers that energy costs can be reduced by 17%, and provides a new water strategy that considers both storage and provision. The capability for fast solutions to unexpected problems in the storage and supply of water.

Example 3 : *An Assembly process.* Partners: TU Dresden, Lehrstuhl für Montage-und Handhabungstechnik
Aims : To increase the efficiency of the overall assembly process with consideration to lead times, batch sizes and the quality of the end product.
Simulation Tasks : The development of the entire assembly process, using a simulation model that will provide a standard production technique for the components passing through the work stations.
ARENA Results : ARENA enables the rate of production to be increased by 10% with a 15% reduction in work shifts. Plus the stabilisation for the introduction of autonomous work groups.

Example 4 : *Foundry Process (die/sand casting)*
Aims : To increase the current production level by 100% and maximise labour utilisation. To provide optimised and standardised casting moulds and models.
Simulation Tasks : Examination, modeling and analysis of the existing die casting process to allow the simulated manipulation of information to achive overall aims.
ARENA Results : With only a 25% increase in labour, ARENA has allowed Production output to increase threefold, by examining and justifying the shift work practices. Plus to optimise the relationship between the casting moulds and models, and to stabilise the introduction of autonomous work groups.

The extensive experience of DUAL-Zentrum in the discrete event, continuous and combined use of simulation systems has led to a thourough understanding how we can provide you with greater flexibility and a faster reaction to continually changing technological and market forces. To obtain further information and/or ARENA DEMO version simply contact us at the above address.

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routines. DESIRE/NEUNET/W simulates neural networks with up to 20,000 connections in addition to the differential-equation systems. DESIRE/NEUNET is especially well suited to simulate fuzzy-logic control, with or without neural networks.

For more information: G.A. and T.M. Korn, Industrial Consultants, RR 1, Box 96 C, Chelan, WA 98816, USA, Tel: +1-509 687 3390.

Solutions Foundry installs modelling software at Royal Ordnance

The Solutions Foundry, a simulation and modelling consultancy based in Kettering, Northants, has just completed a contract to install ESL software at the Royal Ordnance. The Royal Ordnance will use the software in the design of cotrol systems for projectiles, airframes and ground vehicles, including tanks, and chose the Solutions Foundry's software after stringent tests. The Solutions Foundry was established early in 1993 by Anona and Martin Hawkins and was asked to market ESL by its developers, Professor John Hay and Dr. John Pearce of Salford University.

ESL has been developed over the past twenty years with the European Space Agency. The Space Agency has used ESL for many projects including the design of Giotto and solar panels. British users include British Aerospace and British Gas. However ESL also is used in other areas.

More information about ESL can be obtained from Anona and Martin Hawkins at the Solutions Foundry, 3 Chase Farm, Geddington, Kettering, Northants, Tel/Fax: +44-536 742549.

DS2301: 300 MFlops for Intelligent Signal Generation

dSPACE introduces a new subsystem for intelligent signal generation. This PC/AT compatible board provides six programmable DSPs and six analog outputs. The signal generation works very fast and allows time resolutions in the range of a very few micro-seconds. Any parameter of the output signal can be changed while the signal generation is running.

This DS2301 board is based on six TI TMS320C31 DSPs, which provide 50 MFlops peak computing performance each. The signals generated by the DSPs can be output through the high-speed D/A converters or directly digitally. Each signal processor has a 4 K x 32 bit dual-port RAM, which can be accessed by the PC/AT host or the master DSP for program loading or parameter changing. The main application is the test of electronic control units (ECU) using hardware-in-the-loop simulations.

Further information: dSPACE GmbH, An der Schönen Aussicht 2, D - 33098 Paderborn, Germany, Tel: +49-5251 1638 0, Fax: +49-5252 66529

SIMUL_R

The new software SIMUL_R-DB is an extension to the SIMUL_R system. It comprises of PROSIMUL_R (continuous and discrete simulation), SIMUNIT (usage of units and dimensions in models) and some new features, e.g. character and string variables.

The SIMUL_R-DB desktop now offers the possibility of adding new menus (replacing the usual one), creating dialog boxes and tool bars in an easy-to-use resource definition way. This can be done hardware independently (Windows, OS/2, or OSF-Motif).

The new SIMDB command allows easy access to data bases. It offers a data base independent way to define interactions between data bases and simulation. This interface is open and so extendable by the user. The default data base is Oracle™.

For information contact SIMUTECH, Hadikgasse 150, A-1140 Vienna, Austria. Tel. +43-1-894 75 08, Fax +43-1-894 78 04.

MATLAB/SIMULINK

Rapid Data is pleased to announce the release of MATLAB 4.2 on PC, SUN and HP machines. New Features include Dynamic Data Exchange (DDE) whith other Windows applictions. SIMULINK has been updated to version 1.3 to include new blocks, vectorized

blocks, scalar expansion, and optional C Code Generator and Neural Network support.

Existing MATLAB toolboxes such as Signal Processing and Neural Network Toolbox have been significantly improved and a new Windows implementation of own Control Kit developed to continue to meet the user's need for increased performance and functionality. Additional new toolboxes are the Nonlinear Control Design Toolbox, a tool that uses simulation and optimization to automate tuning of controller parameters within nonlinear block diagrams, and the Frequency Domain Toolbox with specialized tools for the identification of linear systems from measurements.

For further details contact: Rapid Data Limited, Crescent House, Crescent Road, Worthing, West Sussex BN11 5RW, UK, Tel: +44-903 821266 or 202819, Fax: +44-903 820762, E-mail: radata@ibmpcug.co.uk

Classes on Simulation

September 1994

7-9 **COMNET III**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division, Coliseum Business Centre, Watchmoor Park, Riverside Way, Camberley, Surrey GU15 3YL, U.K. Tel: +44 276 671671, Fax: +44 276 670677

12 **ACSL User Conference**, Brighton University, U.K.
Contact: Rapid Data Ltd., Crescent Road, Worthing, West Sussex BN11 5RW, England, Tel: +44-903 202819, Fax: +44-903 820762, E-Mail: radata@ibmpcug.co.uk

12-14 **MODSIM II**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

14-16 **ACSL Class**, Eastbourne, U.K.
Contact: Rapid Data Ltd., Crescent Road, Worthing, West Sussex BN11 5RW, England, Tel: +44-903 202819, Fax: +44-903 820762, E-Mail: radata@ibmpcug.co.uk

20-21 ***Kurs zur Modellierung und Simulation mit ACSL***. München, Germany.
Contact: BAUSCH-GALL GmbH, Wohlfartstr. 21b, D-80939 Müchen, Fax: +49-(0)89 3231063

October 1994

5-7 **COMNET III**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

10 **ACSL User Group Meeting**, Stuttgart, Germany
Contact: I. Husinsky, Computer Center, TU Vienna, Wiedner Hauptstr. 8-10, A-1040 Wien, Tel: +43-1 58801 5484.

12-14 **MODSIM II**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

Calendar of Events

July 1994

18-21 **Summer Computer Simulation Conference** SCSC '94. La Jolla, CA, USA
Contact: SCS, P.O.Box 17900, San Diego, CA 92177, Tel: +1 619 277 3888, Fax: +1 619 277 3930,
E-mail: scs@sdsc.bitnet

August 1994

17-20 **SIMS '94 Simulation Conference**. Stockholm, Sweden
Contact: SIMS, c/o Lars Langemyr, Computer Solutions Europe AB, Björnnäsvägen 21, S-113 47 Stockholm, Sweden, Tel: +46-(0)8-153022, Fax: +46-(0)8-157635
E-mail: sims@comsol.se

22-25 **1st Joint Conference of International Simulation Societies. CISS**. Zurich, Switzerland
Contact: Dr. J. Halin, ETH Zurich, Institute for Energy Technology, Clausiusstrasse 33, CH-8092 Zürich, Tel: +41-(0)1 632-4608, Fax: +41-(0)1 262-2158

28- September 2
IFIP-GI-Jahrestagung. Hamburg. Germany.
Contact: Dr. I. Bausch-Gall, Wohlfartstr. 21b, D-80939 München, Fax: +49-(0)89 3231063.

September 1994

6-8 16th Workshop-Colloquium **Special Problems of Simulation Models** (in Czech or Slovak). Brno, Czech Republik
Contact: Jan Stefan, Technical University Ostrava, Dept. of Computer Science, tr. 17. listopadu, CZ-70833 Ostrava, Czech Republic. Fax: +42 (0)69 6919597,
E-mail: Jan.Stefan@vsb.cz

13-15 **Modelling, Simulation and Identification**. Wakayama, Japan.
Contact: Prof. Ishii, IAESTED MSI'94, Kinki University, Naga-Gun, Uchita-Chou, Nishimitani 930, Wakayama Prefecture 649-64, Japan, Fax: +81-736 77 4754

15-17 **20th ASUConference**. Prague, Czech Republic
Contact: J. Weinberger, Hermanova 30, CZ-17000 Praha 7

18-23 **KI-94**. *18. Deutsche Jahrestagung für Künstliche Intelligenz.* Saarbrücken, Germany.
Contact: Dr. Helena Szczerbicka, Universität Karlsruhe, Inst. f. echnerentwurf und Fehlertoleranz; Postfach 6980, D-76128 Karlsruhe, Tel: +49-(0)721 608 4216, Fax: +49-(0)721 370455, Email: helena@ira.uka.de

26-28 **Logistics Simulation of Industrial Systems**. 1st Intercontinental Symposium and Mathematical Modelling Workshop. Schliersee, Germany
Contact: Moshe R. Heller, ASMUTH GmbH, Planegger Straße 47, D-81241 München, Germany, Tel: +49-89 8345073, Fax: +49-89 8347575

October 1994

3-7 2nd International Workshop on **Massive Parallelism: Hardware, Software and Applications**. Capri, Italy
Contact: A. Mazzarella, Instituto di Cibernetica, Via Toiano 6, I - 80072 Arco Felice, Tel: +39 81 853 4123, Fax: +39 81 526 7654, E-mail: secyann@cib.n.cnr.it

9-12 **European Simulation Symposium ESS 94**. Istanbul, Turkey
Contact: Philippe Geril. SCS European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent. Tel/Fax: +32-92 234941, E-Mail: scsi@fland.rug.ac.be

10-13 **ASIM 94.** ***9. Symposium Simulationstechnik***. Stuttgart, Germany.
Contact: M. Kraus, Fachhochschule für Technik Esslingen, Flandernstr. 101, D-73732 Esslingen. Tel: +49-(0)711/397-3755, Fax: +49-(0)711/397-3763,
E-mail: kraus@ti.fht-esslingen.de

December 1994

11-14 **1994 Winter Simulation Conference**. Orlando, Florida
Contact: D. A. Sadowski, Systems Modeling Corp., 504 Beaver Street, Sewickley, PA 15143, USA, Tel: +1-412 741 3727, Fax: +1-412 741 5635, E-mail: 516-3072@mcimail.com

January 1995

16-18 **Object-Oriented Simulation Conference of the WMC 1995**, Las Vegas, USA
Contact: Charles Herring, U.S. Armay Construction Engineering Research Laboratories, P.O. Box 9005, Champaign, IL 61826-9005, USA. Tel. +1-217 352 6511 ext 260 or 233, Fax: +1-217 373 6724, Email: herring@lincoln.cecer.army.mil

February 1995

20-21 Meeting of the **ASIM Working Group "*Simulation Technischer Systeme*"**. Hamburg, Germany
Contact: G. Kampe, FHT Esslingen, Flandernstraße 101, D-73732 Esslingen. Tel: +49-(0)711/397-3740 or -3741, Fax: +49-(0)711/397-3763

April 1995

9-13 **28th Annual Simulation Symposium**. Phoenix, Arizona, USA
Contact: A. Ferscha, Inst. f. Angewandte Informatik, University of Vienna, Lenaugasse 2/8, A-1080 Vienna, Austria, Tel: +43-1 4086366 18, Fax: +43-1 4080450,
Email: ferscha@ani.univie.ac.at

19-21 **UKSS95, United Kingdom Simulation Society Conference**. North Berwick, Scotland.
Contact: Mr. Rob Pooley, Department of Computer Science, University of Edinburgh, Kings Buildings,Mayfair Road, Edinburgh, EH9 3JZ, U.K., Tel: +44 31 650 5123, Fax: +44 31 667 720, Email: rjp@uk.ac.ed.dcs

June 1995

5-7 **European Simulation Multiconference ESM '95**.
Prague, Czech Republic
Contact: Philippe Geril, SCS European Simulation Office, University of Ghent, Coupure Links 653, B-9000 Ghent, BelgiumTel.: +32.9.233.77.90, Fax: +32.9.223.49.41, E-mail: Philippe.Geril@rug.ac.be

26-30 **IMACS-SAS '95**. 5th International IMACS-Symposium on System Analysis and Simulation. Berlin, Germany
Contact: Secretariat SAS '95, GMD FIRST, Rudower Chaussee 5, Geb. 13.7, D-12489 Berlin, Tel.: +49-30 6392 1814,Fax: +49-30 6392 1805, E-mail: sas95@first.gmd.de

August 1995

28-30 **IMACS European Simulation Meeting on Simulation Tools and Applications**. Gyor, Hungary
Contact: A. Jávor, KFKI Research Institute for Measurement and Computing Techniques, H-1525 Budapest, P.O.Box 49, Hungary, Tel: +36-1 1699499, Fax: +36-1 169553, E-mail: h7023jav@ella.hu

September 1995

11-15 **EUROSIM '95 European Simulation Congress**. Vienna, Austria
Contact: EUROSIM95, Computing Services, Technical University of Vienna, Wiedner Hauptstr. 8-10, A-1040 Vienna, Austria. Tel: +43-1 58801 5386, 5484, 5374 Fax: +43-1 5874211, E-mail: eurosim95@email.tuwien.ac.at

April 1998

EUROSIM '98 European Simulation Congress.
Finland

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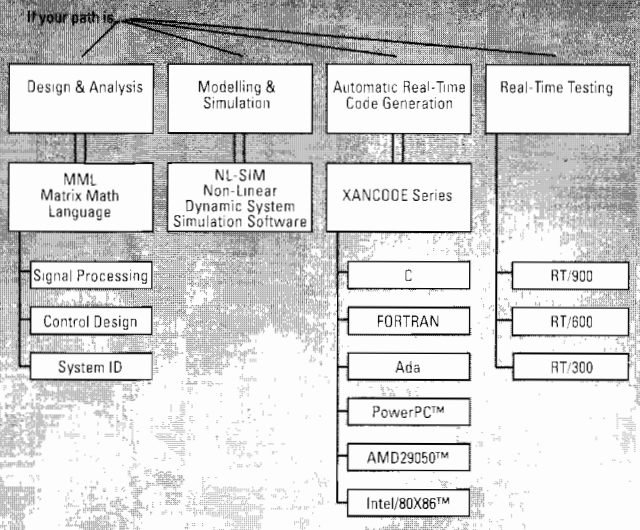

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For Germany, Austria, Switzerland, Benelux:

Scientific Computers GmbH
Postfach 18 65
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