SIMULATION NEWS EUROPE

EUROSIM

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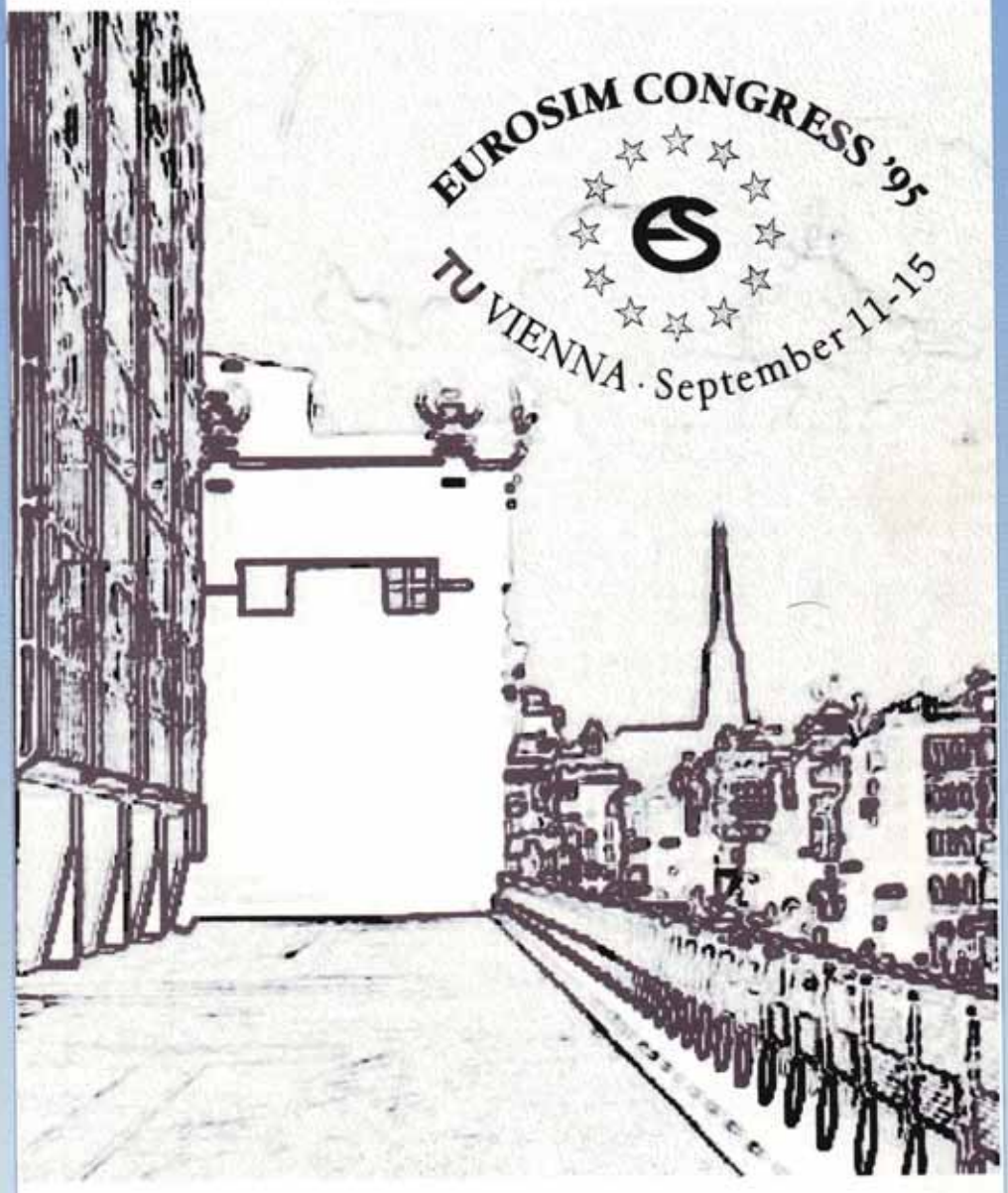

Number 12 November 1994

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.

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If you have any contributions, remarks, suggestions, etc. please contact the editors. Deadline for the next issue will be February 6, 1995.

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EUROSIM - Simulation News Europe

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

Editors: F. Breitenecker, I. Husinsky
ARGE Simulation News

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Editorial

The title page of this issue of **EUROSIM - Simulation News Europe** shows a view of TU Vienna towards the center of Vienna. We hope that this will motivate our readers to think about visiting Vienna next September when the EUROSIM Simulation Congress will take place here. Details can be found on page 22 and 23.

On-line information about the Congress, about this journal, and about EUROSIM is now available via Internet (see page 4). According to the usual scope you find in this issue an essay, news from EUROSIM, reports from EUROSIM member societies and from international societies, book reviews, industry news, and a calendar of events. Solutions for the software comparisons and the parallel comparison complete the contents. We would like to thank all who have contributed to this issue.

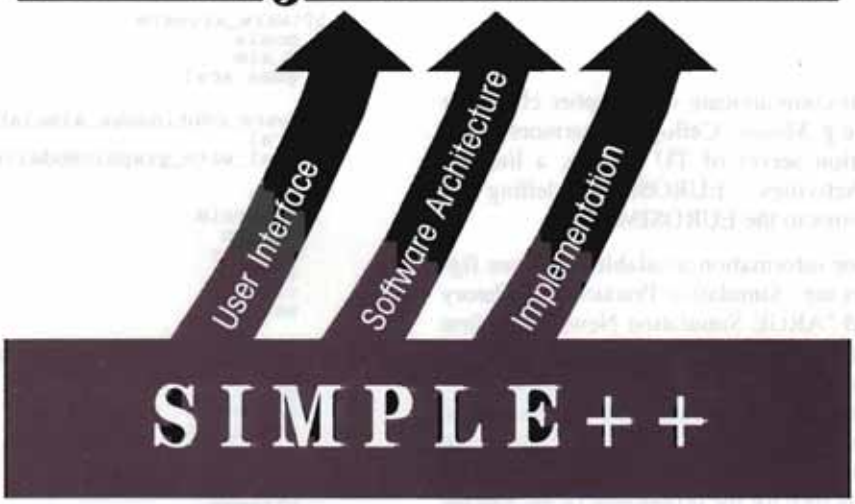
F. Breitenecker, I. Husinsky

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**
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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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Contact now

Peter Gangl
Phone (+49-711) 16 35 90
Fax (+49-711) 1 63 59 99
AESOP GmbH, Königstraße 82
D-70173 Stuttgart
Germany

AESOP

EUROSIM informs via Internet

The start of "EUROSIM goes Internet" (announced in SNE 11) was successful. After a testing period, where the information was available within the information server of the Technical University Vienna, we can now offer all information on our own EUROSIM information server.

We are running a gopher server with the "Uniform Resource Allocator" (URL):

`gopher://eurosim.tuwien.ac.at`

which is able to communicate with gopher clients or WWW clients (e.g. Mosaic, Cello). Furthermore, within the information server of TU Vienna, a link (in "International Activities", "EUROSIM Modelling and Simulation") points to the EUROSIM server.

There is more information available now (see figure). New items are "Simulation Practice and Theory (SIMPRA)" and "ARGE Simulation News". The first lists the contents of EUROSIM's scientific journal "Simulation Practice and Theory" and gives general information on the journal and instructions for authors. The latter reports on the activities of the working group "ARGE Simulation News". This working group provides the infra structure for the production of the journal *EUROSIM - Simulation News Europe*, compares and collects simulation software (EUROSIM comparisons, software demos), develops experimental simulation systems (the continuous simulation system mosis with features for parallel simulation, and the discrete simulation system D_SIM based on Petri nets), and organizes seminars. Information on these items can be found in this new entry on the EUROSIM information server.

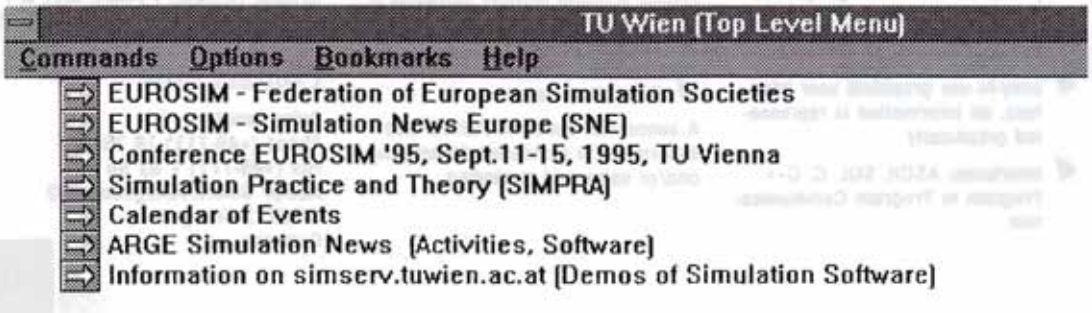
The entry point "Information on `simserv.tuwien.ac.at`" informs about the contents of the ftp server `simserv.tuwien.ac.at`. This server offers demos of continuous simulation software, discrete simulation software, and related software tools as well as the simulation software developed and maintained by the "ARGE Simulation News" (mosis, D_SIM, etc.). The server is an anonymous ftp server with the URL: `ftp://simserv.tuwien.ac.at`.

Software demos are provided by distributors, developers, etc., also in connection with the EUROSIM comparisons. At present the following items are available:

```
software_argesim
    mosis
    d_sim
    goma_acsl

software_continuous_simulation
    acsl
    acsl_with_graphicModeller
    esl
    idas
    powersim
    simnon
    simul_r
    stem
    vissim
    xanalog

software_discrete_simulation
    gpssh
    gpssh_ed
    m_gpss
    micro_saint
    promodel
    siman
    taylor
    witness

software_tools
    maple
    matlab
    mandarin
    origin
    palisade
    proof
    sigma_plot
    simstat
```

Usually the entries are zipped files corresponding to one or more (installation) disks. New software demos are welcome. Please send diskettes to the editors or transfer the files to the `incoming` directory (please notify per e-mail).

In case of problems or questions send e-mail to: `argesim@simserv.tuwien.ac.at`.



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.

At present EUROSIM has eight full members: 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). Furthermore, AES - Asociación Española de Simulación (Spain) - joined EUROSIM as observer member.

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" (SIMPRA)**, EUROSIM's scientific journal, publishes high quality contributions on modelling and simulation.

At the last board meeting (Zurich, August 1994) AES, the Spanish Simulation Society, was welcomed as observer member. It is planned that AES becomes a full member within the next two years. Furthermore, an observer membership of SLOSIM (Slovene Simulation Society) and CROSSIM (Croatian Simulation Society) was discussed. Decisions are planned for 1995.

In the former Soviet Union simulation groups and societies are becoming active. They sent letters to EUROSIM asking for information and support. EUROSIM will help them to establish their societies and to intensify contacts within Europe. With the Chinese Association for Systems Modelling CASS a cooperation agreement was signed. Similar agreements with other International Societies are being discussed.

It is with deep regret that we note the sudden death of Mr. Milan Kotva, Chairman of CSSS, on October 9, 1994.

Letter from the President

Dear simulationist,

I would like to draw your attention to further developments in EUROSIM. I am happy to welcome AES, the Spanish Simulation Society, as a member of EUROSIM. At time AES is observer member. I hope to welcome AES as full member in the near future.

This issue of EUROSIM - Simulation News Europe (SNE) gives information on the new ways how EUROSIM and SNE spread information on simulation: gopher information server, ftp software server.

We are preparing the congress EUROSIM 1995. Amongst all facilities usually provided at such a congress, this congress offers special interest sessions and an industry session of a new kind. The special interest sessions concentrate on topics which will be included in publications e.g. SNE, SIMPRA, or other journals (in special issues) and which will be for instance a base for further comparisons in SNE. To encourage more people from industry to come to the conference a special industry session will be organized. The session will include only papers involving industrial firms and concentrate in subsessions to only one specific subject. More time will be allowed for discussion of the papers to encourage active audience participation. The session will be organized during the first two days of the congress (this will assist those who wish to participate only in these parts of the congress). Furthermore, the contributions will be reviewed by the organizers, but it will not be necessary, but still possible, to publish the presented papers in the proceedings.

The social programme will include a Welcome Party, an Heurigen Evening, an Organ Concert, a Conference Dinner, and a Closing Party. For accompanying persons special tours will be organized.

Detailed information on the congress can be found on page 22 and 23, a folder of the 2nd Call is mailed with SNE. Most recent information will be provided also on the EUROSIM server. There details on user groups, tutorials, etc. will be given as soon as they are available. On the server you also find the conference poster, showing St. Steven's Cathedral in an old view.

I hope to see you all at the EUROSIM congress 1995 in Vienna.

F. Breitenecker

Simulation in the Service of Industry

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Abstract

In spite of success stories and the growing market for simulation software and services sometimes it seems that simulation is a kind of neglected child in the industry. Apart from those application areas, where simulation is a well established technology (for example microelectronics), there are a lot of fields where simulation is not used to that extent which is possible and desirable. This short paper analyzes the role of simulation in the engineering process and gives some hints to what kind of changes we need from my point of view.

1. Simulation in the Engineering Process

Simulation is of course well accepted as the one (and sometimes only) method of verifying and analyzing designs in a multitude of application areas. Accordingly simulation is well grounded in the classical engineering process (figure 1) in different engineering steps, for example for design evaluation or production planning.

Usually each engineering step follows the preceding one in a strictly sequential way - mostly there are special "milestones" to be reached before it is allowed to start with the next step. Consequently the simulation tasks related to different steps are disconnected and the simulation models have nothing in common. In addition the simulation tools used for different tasks are more or less isolated and specialized tools. Sometimes the resulting situation has been compared to a company where the results from each engineering step are "thrown over the wall".

2. Evolution of the Engineering Process

There are two needs to change the classical engineering process:

- Time to market is increasingly becoming the most critical point for successful products and services.
- Managing the growing complexity of systems is more and more the only key to meet the increasing requirements of customers.

In addition there is a strong pressure to reduce costs for products, services and the engineering process itself. To overcome this situation the engineering process has been developed from sequential engineering to concurrent and simultaneous engineering (figure 2).

- Concurrent engineering (CE) means that mixed teams (for example composed of scientists, engineers, salesmen, business managers etc.) deal with different engineering tasks concerning one project at the same time.
- Simultaneous engineering (SE) means that there is no longer a kind of "master plan" for the work to be done. All decisions are made "on-the-fly" according to the status the project has reached so far.

This improvement of engineering methods has a tremendous impact on the requirements for computer aided engineering (CAE) environments. Information and information flow are the most critical resources in large engineering projects. The concepts of CE and SE presume that the right information is always available at the right time within the project.

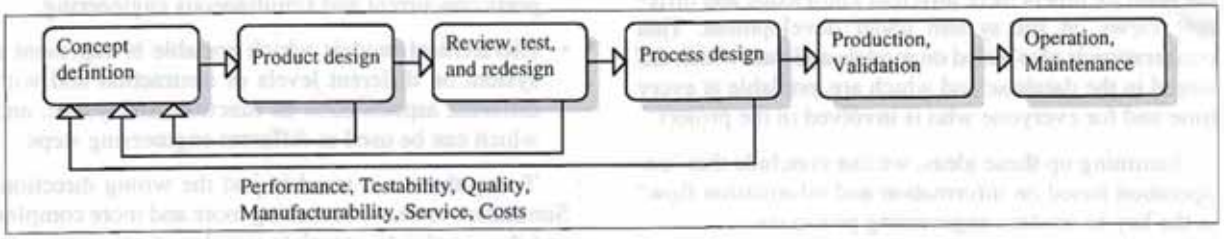

Fig. 1: Sequential Engineering Process

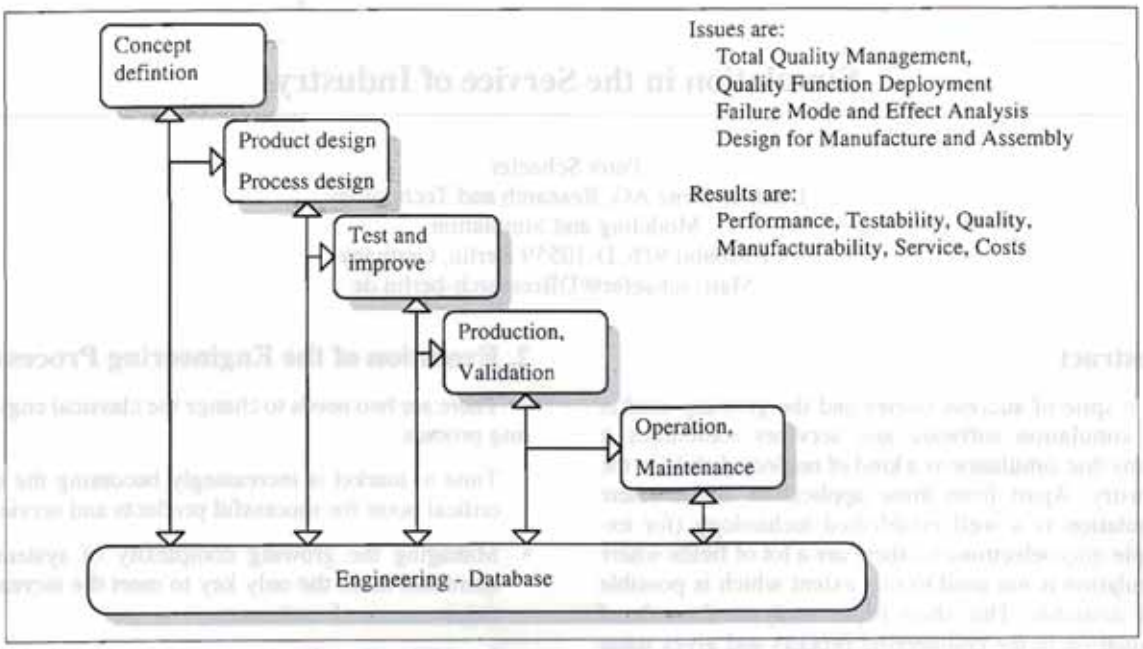

Fig. 2: Concurrent Engineering Process

A powerful CAE environment consists of three main components:

- Modern software tools for all engineering tasks beginning with acquisition and sales support to design, construction and production and ending with operation and maintenance.
- A powerful engineering database to store and maintain all models and data concerning the system under development.
- A framework to put the things (database, tools and, user interface) together.

Modern engineering tools cooperate based on models and data stored in the engineering database. The resulting interoperability of the tools is essential for the information flow that is needed for managing the complexity of large projects.

Cooperation of tools however is only one side of the story. The other is cooperation of mixed teams where the team members have different knowledge and different views on the system under development. This cooperation is also based on models and data which are stored in the database and which are available at every time and for everyone who is involved in the project.

Summing up these ideas, we can conclude that "cooperation based on information and information flow" is the key to modern engineering processes.

The status of using CE and SE is of course different in different areas of the industry. For instance, in microelectronics the use of framework-based design environments is state-of-the-art. But in other areas - for example automation industry, railway enterprises and automobile industry - we are at the beginning of the process. The situation today is that the concepts of CE and SE are on the right way in some application areas. We should learn how to accelerate the process in those areas where we are behind the leading edge of information technology.

3. Conclusions for Simulation Tools

What are the conclusions for simulation technology and simulation tools?

First I think we should accept the fact that from the industrial viewpoint the main topics of interest in many application areas are not simulation methods, man-machine-interfaces or simulation hardware but

- Cooperation of simulation tools with other engineering tools in an environment which especially supports concurrent and simultaneous engineering.
- Hierarchical models which are able to represent a system on different levels of abstraction and with different aspects such as function, safety, etc. and which can be used in different engineering steps.

Today there is a trend in just the wrong direction: Simulation tools are becoming more and more complex and they evolve to complete simulation environments. Most of the vendors of simulation tools try hard to fulfill all requirements of users - and everyone does it

in his own manner independently from other vendors. The result is a sea of simulation tools (for example nearly 100 entries in the directory of the SCS). Each tool appears with its own graphical model editor, pre- and postprocessors for graphical input and output of data, its own model database and so on. To decide for a new tool generally means to decide for a new complete environment.

Industry needs is another way to go. Simulation tools should concentrate on their original task, namely to simulate. As depicted in figure 3 there are horizontal and vertical engineering tools. Horizontal tools are typically used in various engineering steps. They are common to all vertical tools - in that sense they are part of the Engineering framework. Vertical engineering tools however are specialized for one task in the engineering process, for example for systems analysis, configuration or simulation. In common they have interfaces, animation facilities and a database, which is perhaps the most important element of the integrated environment.

Another important topic in the whole business are standards. May be the real thing we are missing is a standard for representing models and knowledge on models. The results of several groups working on standards are promising but I feel simulation industry, universities, and users should concentrate on the goal of an integrated engineering environment.

Summarizing one can conclude the requirements:

- Consistence and uniformity in modeling and simulation of systems.
- Reusability of models for different simulation levels and for different engineering steps.
- Cooperative simulation tools which are open for real interoperable work in integrated CAE environments.

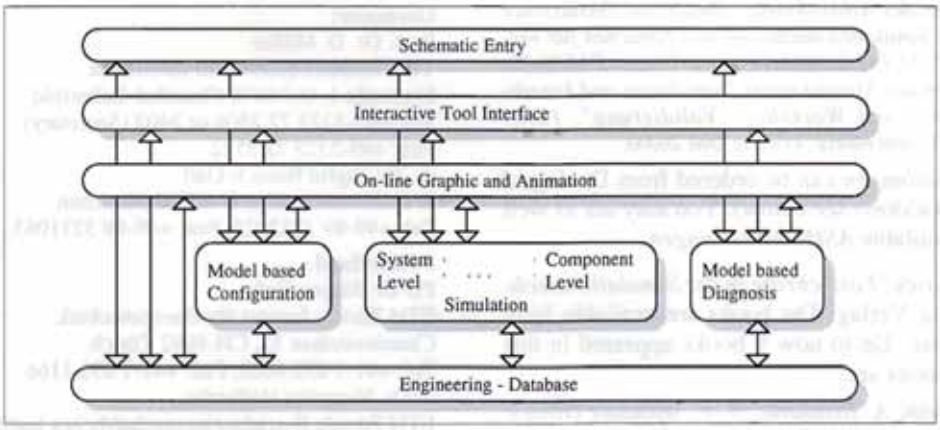

Fig. 3: Simulation Tools in a Concurrent Engineering Environment

Classes on Simulation

December 1994

12-14 **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: +44-1276 671671, Fax: +44-1276 670677

14 **Seminar on SIMPLE++**, Vienna, Austria.
Contact: Irmgard Husinsky, Computer Center, Technical University of Vienna, Wiedner Hauptstr. 8-10, A-1040 Vienna, Austria, Tel: +43-1-58801-5484, Fax: +43-1-5874211.

January 1995

9-13 **MODSIM II + SIMOBJECT**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

18-20 **NETWORK II.5**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above)

Seminar on Parallel Simulation, Vienna, Austria.
Contact: Irmgard Husinsky, Computer Center, Technical University of Vienna, Wiedner Hauptstr. 8-10, A-1040 Vienna, Austria, Tel: +43-1-58801-5484, Fax: +43-1-5874211.

February 1995

6-8 **COMNET III**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above).

9-10 **COMNET III EXT**, CACI Training Course, Camberley, U.K.
Contact: CACI Products Division (see above).

ASIM

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

ASIM Publications

ASIM currently publishes and is involved in different publications to support and inform its members.

1) *ASIM-Mitteilungen* are reports from ASIM working groups. Until now 44 *ASIM-Mitteilungen* have been published. Two new issues are:

Heft 40: Treffen der Arbeitskreise "Simulation Technischer Systeme" und "Simulationsmethoden und Sprachen für verteilte Prozesse", 31.1.-1.2.1994, TU Wien. Price is DM 20,00.
Heft 44: Treffen des Arbeitskreises "Simulation und künstliche Intelligenz" und Workshop "Validierung", 13.4.-15.4.1994 in Braunschweig. Price is DM 20,00.

ASIM-Mitteilungen can be ordered from Dr. Ingrid Bausch-Gall (address see below). You may ask as well for a list of available *ASIM-Mitteilungen*.

2) Book Series "*Fortschritte in der Simulationstechnik*" at Vieweg Verlag. The books are available from every bookstore. Up to now 9 books appeared in this series. New books are:

Band 7: A. Kuhn, A. Reinhardt, H.-P. Wiendahl (Hrsg.): Simulationsanwendngen in Produktion und Logistik.
Band 8: J. Biethan, H. Hummeltenberg, B. Schmidt, Th. Witte (Hrsg.): Simulation als betriebliche Entscheidungshilfe.
Band 9: G. Kampe, M. Zeitz (Hrsg.): Simulationstechnik, 9. Symposium in Stuttgart, Oktober 1994.

3) In 1989 it was decided that ASIM gets involved into the publication of *EUROSIM - Simulation News Europe*. The editors, F. Breitenecker and I. Husinsky, are members of the ASIM board.

ASIM and Members from Industry

ASIM continues to support the exchange of information between members from university and members from industrial firms. The last ASIM conference had an excellent mix of participation. ASIM working groups often meet at industrial sites.

ASIM is aware that it might be difficult for members from industry to publish or give talks at ASIM conferences or meetings. Therefore ASIM offers members from industry the possibility to give a talk at a conference without publishing the paper. Certainly a publication will be possible if the paper is accepted by the program committee and if desired by the author.

At the next EUROSIM congress (EUROSIM '95) a special industry session will be organized. One of the issues will be "Model Exchange, Simulator Backplane, VHDL-A", another issue will be "Simulation in Mechatronics". Persons interested should contact Dr. Ingrid Bausch-Gall on more information.

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Email: hrdliczka@bwi.bepr.ethz.ch

ASIM Meetings to come

February 20-21, 1995: Meeting of the Working Group "*Simulation Technischer Systeme*" at DASA in Hamburg.

March 13-15, 1995: "*5. Symposium Simulation als betriebliche Entscheidungshilfe, neuere Werkzeuge und Anwendungen aus der Praxis*", Braunlage.

March 22-23, 1995: Meeting of the working group "*Simulation in der Fertigungstechnik*": "*Simulation - Anwendung und Nutzen*", Nürnberg/Erlangen.

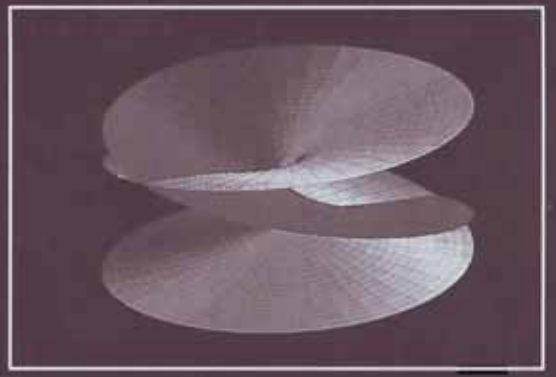
April 5-6, 1995: 8th Workshop "*Simulation und Künstliche Intelligenz*" TH Darmstadt.

September 11-15, 1995: EUROSIM Congress at TU Vienna.

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

MATLAB®

Die Software für math.-techn. Berechnungen



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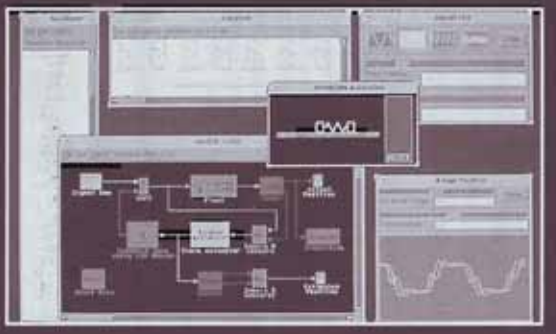

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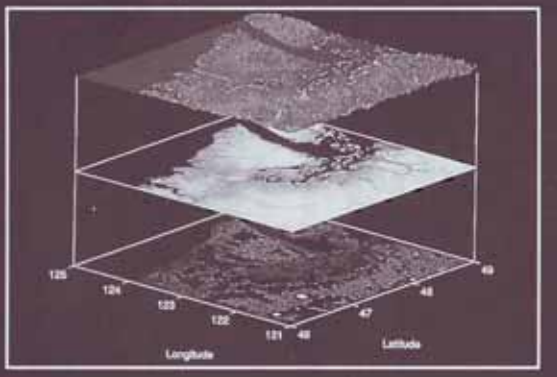
- Teilmodelle, Zahl der Hierarchie-Ebenen praktisch unbegrenzt, viele Standardblöcke verfügbar
- Eigene Blöcke in MATLAB-, C- oder Fortran-Code
- Speicherung in lesbarem MATLAB-Code

Systemuntersuchung:

- Bestimmung des eingeschwungenen Zustands
- Linearisierung nichtlinearer Modelle
- Parameteroptimierung, Reglerentwurf, Signalanalyse mit MATLAB-Toolboxen
- Generierung von C-Quellcode: C Code Generator

TOOLBOXEN

Anwendungsspezifische Ergänzungen für MATLAB



TOOLBOXEN (TB) zur Ergänzung von MATLAB und SIMULINK mit leistungsfähigen, fachspezifischen Zusatzfunktionen.

Signalverarbeitung: Signal Processing TB

Regelungstechnik und Systemidentifikation: Control System TB, Nonlinear Control Design TB, Robust Control TB, u-Analysis and Synthesis TB, System Identification TB, State Space Identification TB

Simulation mechanischer Systeme: MECHMACS (Ergänzung zu SIMULINK)

Meßdatenerfassung, -vearbeitung, Steuerung, Regelung in Echtzeit: ECHTZEIT-ERWEITERUNG (Ergänzung zu MATLAB und SIMULINK)

Universell einsetzbar: Optimization TB, Neural Network TB, Chemometrics TB, Spline TB, Statistics TB, Image Processing TB, Symbolic Math TB

Software mit Zukunft

scientific COMPUTERS

D-52064 Aachen, Franzstraße 107, Tel. 0241/260 41, Fax 0241/449 83

Geschäftsstelle München:
D-85744 Unterföhring, Firkenweg 7, Tel. 089/99 59 01-0, Fax 089/99 59 01-11

Meetings with ASIM Participation

Report on *Simulation und Integration '94* (March 16-18, 1994):

Magdeburgs Spring Simulation Conference focused on methods, ideas and ways integrating simulation into the normal problem solving process for a majority of people in different application areas. More than 80 participants from the U.S. and European countries came to Magdeburg to discuss these subjects. Twenty three papers, subdivided into four sections (Methods and strategies of integration, Integration and decision support, Simulation in process control, and Integration in training and education), are published in *ASIM Mitteilungen Heft 42*.

Some of these aspects discussed were: Interfaces between simulation and standard software; Interfaces for simulation and animation; Integration of simulators in the control of manufacturing; Integration of simulation and animation into courseware/teachware.

Integration of Pictures, Models and Texts, March 2-3, 1995:

Organized by: Department of Simulation and Graphics, Department of Logistics and Materials Handling, University of Magdeburg, and Fraunhofer Institute of Factory Operation and Automation, Magdeburg, supported by ASIM and the special interest group 4.1.4 "Graphical Simulation and Animation" of the German Society of Computer Science.

The conference takes up current trends of simulation technology, computer graphics and picture processing. Papers will be expected to contain theoretical concepts, implementations and applications of this subject. The following subtopics are suggestions for the contents of the papers: Pictures as Sources of Simulation Models * Picture-Supported Model Validation * Image Sequence Analysis and Simulation * 2D- and 3D-Animations Generated from Models * Adaptive Graphics Presentation.

We invite proposals, abstracts and papers in the mentioned areas and related topics. There will also be the opportunity to demonstrate commercial and non-commercial software. The proceedings of the conference will be produced for distribution at the conference (*ASIM-Mitteilungen*). Deadline for the submission of extended abstracts (2 pages, 5 copies): December 2nd, 1994; Author notification: December 23rd, 1994; Camera-ready copy (max. 12 pages): February 6th, 1995

Information: Otto-von-Guericke University of Magdeburg, FIN-ISG, PSF 4120, D-39016 Magdeburg, Germany, Department of Simulation and Graphics, Ms. Steffi Fritz, Tel.: +49-391 55 92 28 58.

Working Groups

"Simulationsmethoden und Sprachen für parallele Prozesse"

Dr. Fuss was speaker of the working group since its foundation. In August he announced that he will resign at the next conference, due to retirement. At the ASIM conference Dr. Peter Schwarz of FHG Dresden was elected as new speaker. Dr. Fuss will continue to assist as vice-speaker. ASIM thanks Dr. Fuss for his activities and his continuous work in the ASIM board.

Speaker: Dr.-Ing. Peter Schwarz, Fraunhofer-Institut IIS / EAS Dresden, Zeunerstraße 38, D-01069 Dresden, Tel: +49-351-4640-730, Fax: +49-351-4640-703, Email: schwarz@eas.iis.fhg.de
Vice-speaker: Dr. Hans Fuss, GMD, D53731 St. Augustin. Tel: +49-2241 143125, Fax: +49-2241 143006, Email: fuss@gmd.de

"Simulationssoftware und -hardware"

After reorganization of the working group the first meeting was held in March at TU Clausthal, Computer Science Department. More than 50 experts in simulation participated in this meeting, where Prof. D.P.F. Möller, TU Clausthal, was elected as speaker and Prof. Dr. F. Breitenecker, TU Wien, as vice-speaker.

As a result of interesting discussions at this meeting it was decided

- to deal also with high performance scientific computation,
- to intensify contacts with industry,
- and to cooperate with the ARGE Simulation News in evaluating the EUROSIM software comparisons.

The next meeting will be held in spring 1995 at an industrial site. For more information please contact:

Speaker: Prof. Dr.Ing. Dietmar P.F. Möller, TU Clausthal, Institut für Informatik, Erzstraße 1, D-38678 Clausthal-Zellerfeld, Tel: +49-5323 72 2402 or 72 2504, Fax: +49-5323 72 3572
Vice-speaker: 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, Email: fbreiten@email.tuwien.ac.at

"Simulation und künstliche Intelligenz"

The 8th Workshop *"Simulation und Künstliche Intelligenz"* will take place at Technische Hochschule Darmstadt, April 5-6, 1995. Main topic will be "*Virtuelle Realität in der Simulation*".

For more information please contact: Dr. Gregor Lux, TH Darmstadt, FB Informatik, FG Praktische Informatik, Magdalenenstr. 11c, D-64289 Darmstadt, Tel: +49-6151 16 5110, Fax: +49-6151 16 5472, Email: lux@isa.informatik.th-darmstadt.de.

Speaker: Prof. Dr. Helena Szczerbicka, Universität Bremen, Fachbereich 3 - Informatik, Postfach 330440, D-28334 Bremen, Tel: +49-421 218 7389, Fax +49-421 218 7285,
Email: helena@informatik.uni-bremen.de.

"Simulation in Medizin, Biologie und Ökologie"

The 6th Ebernburg Workshop took place last April. The 7th Ebernburg workshop is planned to be held in April 1996. In between a working group meeting is planned for spring 1995.

During a meeting at the ASIM Conference in October Prof. Dr. Richter, Universität Braunschweig, was

elected as new speaker of the working group, Prof. Gottwald was reelected as vice-speaker.

Speaker: Prof. Dr. Otto Richter, Universität Braunschweig, Institut für Geographie und Geoökologie, Langer Kamp 19c, D-38106 Braunschweig, Tel: +49-531 391 5627, Fax: +49-531 391 8170.
Vice-speaker: Prof. Dr. Björn Gottwald, Universität Freiburg, Fakultät für Biologie, Schänzlestraße 1, D-79104 Freiburg, Tel.: +49-761 203 2891 Fax: +49-761 203 2894.

"Simulation technischer Systeme"

The annual workshop of the working group will be held at Deutsche Aerospace Airbus (DASA) in Hamburg on February 20 and 21, 1995. Topics will be Hardware-in-the-Loop Simulation, Man-in-the-Loop Simulation, Overview on New Simulation Tools as well as reports of group members on Simulation Applications. A tour of the airplane A321 production line will be organized. Details are available from the speaker. In the morning of February 20 an ACSL User Group meeting will take place.

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

"Simulation in der Fertigungstechnik"

The next working group conference "*Simulation - Anwendung und Nutzen*" will take place at the University of Nürnberg/Erlangen, Germany, on 22nd and 23rd of March, 1995. The program will contain different sections concerning factory segmentation and organization, machines and facilities, interpretation methods and integration aspects of simulation methods in planning and operation.

In order to obtain an invitation and a program of the event, please contact: Dipl.Ing. E. Stief, Lehrstuhl für Fertigungsautomatisierung und Produktionssystematik, Universität Erlangen-Nürnberg, Egerlandstr. 7, D-91058 Erlangen, Email: stief@faps.uni-erlangen.de

Speaker: Prof. Dr.-Ing. A. Kuhn, Fraunhofer-Institut (IML), Joseph-von-Fraunhofer-Straße 24, D-44227 Dortmund. Tel: +49-231 974 3132, Fax: +49-231 974 3234.

"Simulation in der Betriebswirtschaft"

The "*5. Symposium Simulation als betriebliche Entscheidungshilfe, neuere Werkzeuge und Anwendungen aus der Praxis*" will take place on 13. - 15. March 1995, in Braunlage.

For more information please contact: Barbara Hollenbach, Institut für Wirtschaftsinformatik, Georg-August-Universität Göttingen, Platz der Göttinger Sieben 5, D - 37073 Göttingen, Tel: +49-551 394440, Fax: +49-551 399679.

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

"Simulation von Verkehrssystemen"

The working group met on September 20, 1994 in Ulm. The discussion concluded to work on a report on special models of the members of the working group. The papers should include a detailed description of the model.

Currently these models are being collected. Those who are interested to supply a model should contact Dr.-Ing. Thomas Benz, Benz Consult GmbH, Kaiserstraße 23, D-76131 Karlsruhe, Tel: +49-721 34580. The collection will be discussed on the next meeting of the working group on February 22 to 23, 1994 in Magdeburg.

ASIM Mitteilungen Heft No. 38 "Simulation von Verkehrssystemen" was a big success.

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

Ingrid BauschGall

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 80 individual members of Czech, Slovak, Hungarian and German nationality.

Activities

From September 6 to 8, 1994, the traditional CSSS colloquium - workshop on Selected Problems of Simulation Models was held in Brno with thirty-nine participants and twenty-eight contributions.

The preparation of the **9th SCS European Simulation Multiconference ESM'95** continues successfully. Within CISS'94 (Zurich, August 22-25, 1994), the Call for Papers of ESM'95 was for the first time available. Afterwards, it was sent to simulationists in all European and also in some non-European countries. Those who are interested in participation at ESM'95 and did not receive the Call for Papers can contact

Philippe Geril,
SCS Europe 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.

or Milan Kotva, General Conference Chair,
Zeleny pruh 32, CZ-147 00 Praha 4, Czech Republic
Tel.: +42.2.7992145, Fax: +42.2.7992318
E-mail: simul@utia.cas.cz or
testcom@earn.cvut.cz.

Extended Abstracts of submitted papers are due to arrive before the end of December 1994, at

Milan Sujansky,
General Program Chair,
Technical University Kosice, EF-KPI,
Letna 9, SK-O4O 2O Kosice, Slovak Republic
Tel.: +42.95.53573,
Fax: +42.95.247480,
E-mail: Milan.Sujansky@tuke.sk

Contact Addresses

Milan Kotva (Chairperson of CSSS) - see above

Mikolas Alexik (Vice-Chairman of CSSS)
VSDS-KTK, Velky Diel,
SK-O1O 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 languages 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 notion "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 adaption of appropriate hard- and software resources for the purpose of system simulation.

DBSS tries to achieve the preceding by:

- actively contributing to the organisation of congresses, workshops, etc.
- encouraging the organisation of working 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,- of 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. +31-15 78 5698, Fax: +31-15 78 3787
E-mail: Zuidervaart@rc.tudelft.nl

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

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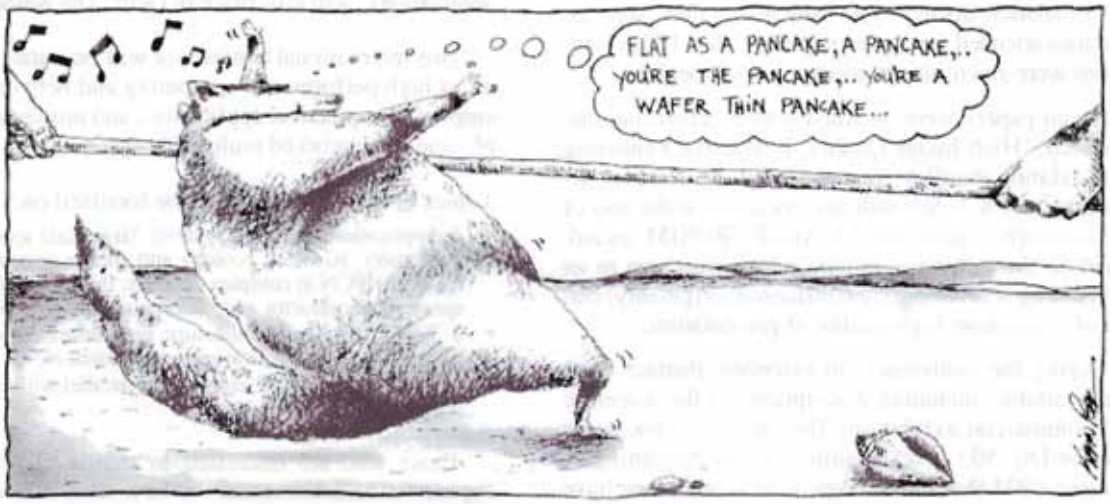

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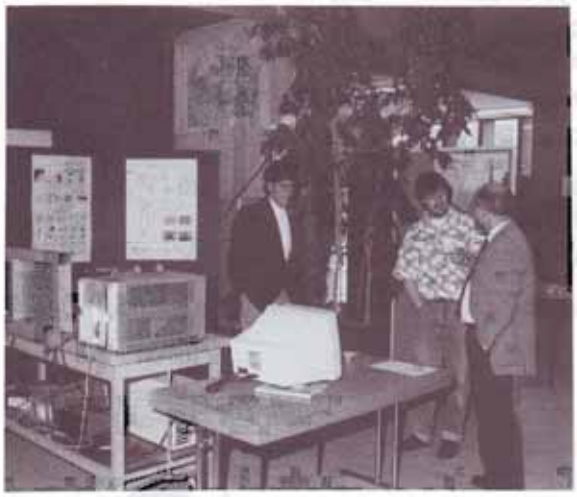
Meeting Reports

June 21-23, 1994 the International EUROSIM Conference "Massively Parallel Processing Applications and Development" took place in Delft, The Netherlands. This conference was organized by the Dutch Benelux Simulation Society. 160 participants from appr. 20 countries attended the conference. More than 100 presentations were given, among them 5 invited speakers.

Seven papers were awarded with a certificate, one of which, "High Image Quality, Interactive Rendering on Scalable Parallel Systems", by R. Herken, R. Hödicke and K.J. Schmidt was awarded at the end of the conference with the Elsevier/EUROSIM award, based on the following criteria which were met in an outstanding way: impact and influence; originality; clarity of exposition; high quality of presentation.

During the conference an extended abstract book was available, including descriptions of the scientific and commercial exhibition. This abstract book is for sale for Dfl. 50,- (excl. mailing). In the beginning of October 1994 the proceedings of the conference have been published, including among others

- the opening speech of Mr. H. Forster, Head of HPCN & Microelectronics European Commission,
- the Dutch HPCN programme,
- reports on scientific and commercial exhibition.



During the conference a poll took place among the participants. The organizing committee would like to thank the participants who filled out the questionnaire and will take into consideration for the next conference the negative and positive remarks made by the participants. Based a.o. upon the positive outcome of the above mentioned poll, DBSS decided to organise a successor EUROSIM conference in 1996.

Coming Events

June 10-12, 1996, the international EUROSIM conference "HPCN challenges in telecomp and telecom: parallel simulation of complex systems and large-scale applications" will take place in Delft, The Netherlands.

This international conference will be a state-of-the-art of high performance computing and networks with emphasis on practical applications and implementation of local or networked multi CPU systems.

Topics of the conference will be focussed on:

- 1. Applications: complex systems; large scale applications in industry, business, ecology and energy systems; reliability of HPCN in complex systems; fluid dynamics; high speed semiconductor and interconnection devices; etc.
- 2. Tools: computer architecture; programming tools; data base processing; performance evaluation; etc.
- 3. Modelling: parallel algorithms; parallel software; load balancing; etc.

Those who are interested to receive the Call for Papers/1st Announcement - to be mailed in November of this year - are kindly requested to contact:

Congress Office ASD
P.O. Box 40
2600 AA Delft, The Netherlands
Tel: +31-(0)15 120234
Fax: +31-(0)15 120250
E-mail: G.vanderWindt@math.tudelft.nl

J.C. Zuidervaart

FRANCOSIM

FRANCOSIM has its legal seat in Roanne, France. It was founded in July 1991.

Contact:
Michel Lebrun or Nathalie Sarles
c/o IMAGINE
Esplanade Diderot
F - 42300 Roanne, France
Tel: +33-77 70 80 80
Fax: +33-77 70 80 81

FRANCOSIM's annual meeting took place on July 20 in the region of Paris at ESIEE School. A new Board of Directors was elected, financial questions were discussed, and actions aiming to the promotion of FRANCOSIM through contacts with other scientific organisations in the field of simulation were considered.

Michel Lebrun, University of Lyon (F), was elected President

Francis Lorenz, LORENZ Consulting, Angleur (B), Vice President in charge of the relations with EUROSIM.

Y. Hamam, ESIEEE School, Noisy le Grand (F), Vice-President, is in charge of the group "Simulation of Continuous Event Systems".

H. Pierreval, IFMA School, Clermont Ferrand (F), Vice President, is responsible for the Discrete Event System Simulation Group.

Mr. Dupont, Sciences Industriel Conseil, Versailles (F), was elected Secretary.

Mr. Guerin, IMAGINE, Roanne (F), was reelected as our Treasurer.

Representation of FRANCOSIM in EUROSIM

Financial support will be given to encourage the relations with EUROSIM via the various meetings. Mr. Lorenz will be trying to attend in the future more systematically.

Fees

From now on new fee possibilities will be offered:

- The fee for individual members is still FF 275.
- An institutional fee will be created for organisations, schools, universities, laboratories or even companies and will allow for participation of up to 5 members. Its rate is FF 1000.
- Special rate for students, including issues of *EUROSIM - Simulation News Europe*. It costs FF 50.

Activities

The beginning of this year has been very active.

The Bond Graph School took place in Roanne. It was animated by Prof. Lebrun, Prof. Scavarda of Lyon. The quality of the course and practicals was greatly appreciated by the participants. The bond graph software PLUS M has been presented by Mr. Goffard.

ACSL User Group: About 25 people attended the meeting on September 20 on the premice of EDF/DER in Chatou. No date has yet been decided for the next meeting.

MATRIXx User Group took place in Noisy le Grand, ESIEE School on September 27. A date for the next meeting is going to be planned very soon.

Next events to come

Journees 2-AO: Computer Aids in System Control is to be held on November 17-18. It is going to take place at ESIEE School, 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.

Contact: 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

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.

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 and of the Proceedings will be English.

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

Contact Address:

Prof. Dr. András Jávor (Chairman)
KFKI Research Institute for Measurement and Computing Techniques
H-1525 Budapest, P.O.Box 49, Hungary
Tel: +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

The ISCS is still in a transition phase from the past to the new Steering Committee.

On July 27, 1994 in Rome there was a meeting of this Committee composed of the past president G. Iazeolla, the elected members, F. Cennamo (University of Naples), F. Maceri (University of Rome 'Tor Vergata'), R. Vaccaro (University of Naples), M. Savastano and A. Giordano (IRSIP-CNR, Research National Council of Naples), and the past treasurer V. Grassi (University of Rome 'Tor Vergata'), unanimously coopted in the Committee. This meeting was the occasion to distribute the administrative offices of the ISCS for the period 1994-1996.

In consequence of the repeated invitations coming from all the members that wanted to confirm G. Iazeolla as ISCS chairman, he reminded that the ISCS statutes do not allow this nomination. Nevertheless, Professor Iazeolla declared to feel inclined to continue to serve in the Steering Committee as past president.

Therefore, the Steering Committee unanimously designated:

Franco Maceri	(chairman)
Felice Cennamo	(vice-chairman)
Vincenzo Grassi	(treasurer)
Mario Savastano	(secretary)

Moreover, F. Maceri and M. Colajanni were designated ISCS representative in the EUROSIM Board of Directors and responsible for the ISCS corner of this bulletin, respectively.

In addition, the Steering Committee decided to discuss and promote the future activities of the society in occasion of the next annual meeting of ISCS members that will be held at the end of this year. More details on the scientific activities will be reported after the annual meeting.

Until that time, 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 - .4486
Fax: +39 6 2020519
E-mail: {iazeolla, grassi}@info.utovrm.it

M. Colajanni

SIMS

The Scandinavian Simulation Society, SIMS, has at present nearly 300 members from Denmark, Finland, Norway and Sweden. For 36 years SIMS has served as the regional 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.

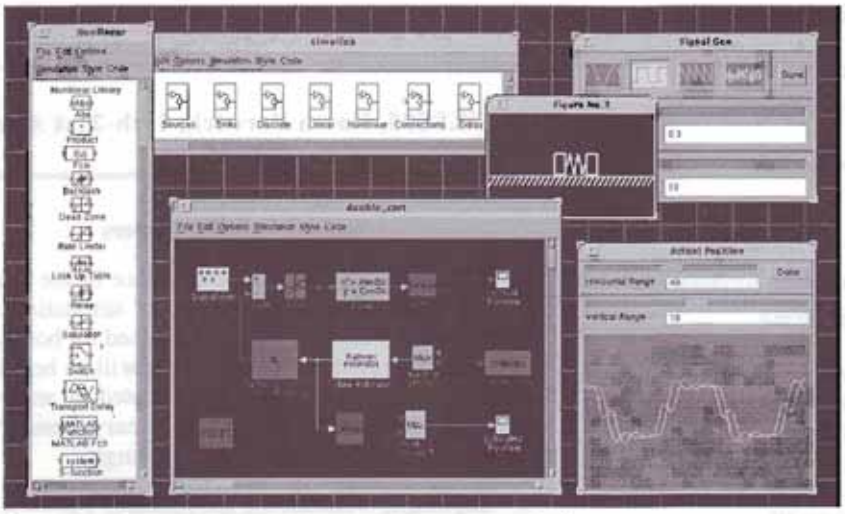
How to join SIMS

Just send an informal application or recommendation for membership to the SIMS secretariat:

SIMS
c/o 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 in Stockholm

The largest of the SIMS Simulation Conferences ever took place at the Berns Salonger in Stockholm on August 17-19, 1994. The Conference, organized by COMSOL, was a success both scientifically and socially. There were altogether 70 scientific papers, both invited and contributed, and some 300 participants, mainly from the Nordic countries. The invited papers were presented in the morning sessions and the contributed papers in three simultaneous sessions in the afternoons.



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- μ-Analysis and Synthesis
- Neural Network
- Optimization
- Nonlinear Control Design

New Toolboxes for Nonlinear Optimization and Real-time Code

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SIMULINK Highlights

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- Custom icon editor
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- Discrete-time, continuous-time, and hybrid
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- Hierarchical modeling
- Write equations in Fortran, C or MATLAB

Simulation and Analysis

- 7 integration methods for fixed, variable-step and stiff systems
- Interactive simulations with live displays
- Batch simulations from MATLAB command line
- Monte Carlo simulations
- Access to MATLAB's extensive toolboxes
- Trimming: determine stable equilibrium points
- Linearization

SIMULINK 1.3/MATLAB 4.2 is now available on Unix workstations and MS-Windows-based personal computers. For a list of new features and further details:

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or
Email:radata@ibmpcug.co.uk

The MATH WORKS Inc

RAPID DATA

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Contact: Jan Schnitger

The themes of the afternoon sessions were

- systems for dynamic simulation,
- simulation of mechanical systems,
- factory planning,
- simulation of industrial processes,
- flow simulation,
- discrete event simulation,
- simulation with ordinary differential equations,
- simulation with partial differential equations
- simulation in electrical engineering.

The annual meeting of SIMS was also held during the SIMS'94 Conference. Niels Houbak was elected as the new chairman of the SIMS board. The members of the SIMS board are at present:

Niels Houbak (chairman)	Denmark
Paul Rathje	Denmark
Odd Falmyr	Norway
Torleif Iversen	Norway
Lars Langemyr	Sweden
Johan Lennblad	Sweden
Sakari Kaijaluoto	Finland
Eija K. Puska (secretary)	Finland

Kaj Juslin and Niels Houbak are the delegates of SIMS in EUROSIM, and Lars Lidner continues as the treasurer of SIMS.

SIMS'95 in Lyngby

The SIMS'95 Simulation Conference 'Simulation in Theory and Practice', will be held at the Technical University of Denmark, Lyngby (near Copenhagen), June 28-30, 1995. The aim of this conference is to cover broad aspects of simulation and scientific computation and will thus be of interest for model builders, simulator personnel, scientists, process engineers, mechanical engineers, vendors, etc.

The scientific program will consist of technical sessions with submitted and invited papers, and is open for poster sessions and vendor demonstrations. A technical visit will be organized. For further information and call for papers, please contact:

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Fax: +45-45930663
Email:Niels.Houbak@lfe.dtu.dk

E.K. Puska

UKSS

UKSS95, North Berwick, 19th-21st April 1995

Second Call For Papers

This is the 2nd biennial conference of the Society. 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 the Marine Hotel, North Berwick, situated in an area of Britain of great natural beauty. With easy access, North Berwick is just 25 miles from Edinburgh.

Especially welcome are Introductory Tutorials, State-of-the-Art reviews, Special Sessions and Exhibitors.

Accepted papers will be published in the Proceedings of the Conference.

Although a National Event, presenters and participants from any country are welcome, especially EUROSIM member countries.

The registration cost is 150 pounds sterling for members of EUROSIM Societies and includes the Proceedings, meals and Conference Dinner.

Abstracts to the Programme Chair:

Prof Russell Cheng,
Institute of Mathematics and Statistics,
The University of Kent at Canterbury,
Canterbury, Kent, CT2 7NF, U.K.

The Conference Chairman is

Mr. Rob. Pooley,
Department of Computer Science,
University of Edinburgh, Kings Buildings,
Mayfair Road, Edinburgh, EH9 3JZ, U.K.

Extended Deadlines:

Abstract (four copies 2 pages A4):
15th December 1994
Notice of Provisional Acceptance:
7th January 1995.
Camera Ready Copy and Registration Fee:
15th February 1995.

Macleod Institute Centres for the UK

The UK's first Macleod Institute for Simulation Sciences Centre has been created at the University of Edinburgh. It joins nine other Centres supported worldwide by the Society for Computer Simulation

International. The Current UKSS Chairman, Rob Pooley, is the Director.

A further Centre is planned at De Montfort University, Leicester. This coincides with the return to the UK of Paul Luker, Editor of Transactions of the SCS, to head the School of Computing at De Montfort.

One Day Meeting Report

The last one day meeting of the UKSS was held at the Department of Computer Science, Edinburgh University. The meeting focused on various aspects of interactive and distributed simulation, with the aim of bringing these areas together in the minds of practioners.

There were talks from researchers in the areas of distributed discrete event simulation, distributed virtual reality systems, distributed object oriented databases within simulation and interactive simulation tools.

The most exciting aspect of the day for many was the bringing together of simulation experts from academic backgrounds with industrial workers in the Distributed Interactive Simulation Field.

The Membership Secretary is:

Mrs Elizabeth Rimmington, Computer Centre
University of Brighton
Lewes Road, Brighton BN2 4GJ U.K.

AES

AES, Asociación Española de Simulación (Spanish Simulation Society), is being established now and became an Observer Member of EUROSIM.

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E-mail: gironsi@dia.ucm.es

EUROSIM

FEDERATION OF EUROPEANSIMULATION SOCIETIES

Second Call for Papers

EUROSIM

Simulation Congress

September 11 - 15, 1995

Technical University of Vienna

Vienna, Austria

Contact Address:

EUROSIM '95
Computing Services / E020
Technical University of Vienna
Wiedner Hauptstr. 8-10
A - 1040 Vienna, Austria
Tel.: +43-1-58801-5386 or -5374 or -5484
Fax: +43-1-5874211
E-mail: eurosim95@email.tuwien.ac.at

The EUROSIM Simulation Congress EUROSIM '95 is organized on behalf of EUROSIM by ASIM (*Arbeitsgemeinschaft Simulation*), the German speaking Simulation Society, in cooperation with AES, 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: CASS (Chinese Association for System Simulation), CROSSIM (Croatian Society for Simulation Modelling), IFAC Advisory Board Austria, IMACS (International Association for Mathematics and Computers in Simulation), JSST (Japanese Society for Simulation Technology), LSS (Latvian Simulation Society), OCG (Austrian Computer 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)

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

EU Activities in connection with the Congress:

COMMET Course "Simulation and Automation Techniques"
(organized by D. Murray-Smith and F. Breitenecker)
September 18 - 22, 1995

ESPRIT Basic Research Working Group "Simulation in Europe"
(organized by E. Kerckhoffs, G.C. Vansteenkiste)
Special Session during the congress.

Scientific Committee:

F. Breitenecker (Austria), Chairman

H. Adelsberger (D), M. Alexik (SQ), W. Ameling (D), S. Balsamo (I), I. Bausch-Gall (D), S.W. Brok (NL), F.E. Cellier (USA), V. Ceric (HR), L. Dekker (NL), J. Dongarra (USA), V. De Nitto (I), H. Ecker (A), G. Feichtinger (A), P. Fishwick (USA), J.M. Giron-Sierra (E), H.J. Halin (CH), N. Houbak (DK), R. Huntsinger (USA), I. Husinsky (A), T. Iversen (N), A. Jávor (H), K. Juslin (FIN), G. Kampe (D), E. Kerckhoffs (NL), W. Kleinert (A), P. Kopacek (A), M. Kotva (CZ), W. Kreutzer (NZ), M. Lebrun (F), F. Lorenz (B), F. Maceri (I), D. Maclay (GB), H. Mang (A), Y. Merkuryev (LV), Z. Minglian (VRC), I. Molnar (H), D.P.F. Möller (D), D. Murray-Smith (GB), F.J. Pasveer (NL), R. Pooley (U.K.), W. Purgathofer (A), P. Schäfer (D), T. Schriber (USA), A. Seila (USA), W. Smit (NL), F. Stanciulescu (RO), A. Sydow (D), H. Szczerbicka (D), S. Takaba (J), I. Troch (A), G.C. Vansteenkiste (B), W. Weisz (A), J. Wilkinson (GB), R. Zobel (GB), B. Zupancic (SLO)

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
Monte Carlo Methods in 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 are planned. Although different in format from other sessions at the Congress a full refereeing process, involving three referees, will also be applied to papers in these Special Sessions. After the Congress features on these topics will be included in publications, e.g. *EUROSIM - Simulation News Europe*, Journal *Simulation Practice and Theory*.

- Parallel Simulation Techniques and Software Comparisons in *EUROSIM-Simulation News Europe* (W. Weisz, D. Murray-Smith; F. Breitenecker, I. Husinsky)
- Modelling and Simulation in Education (J. Wilkinson)
- AI Techniques for Modelling and Simulation (H. Szczerbicka)
- Business Administration and Industrial Management and OR (H. Adelsberger, G. Feichtinger)
- Trends in Computational Mechanics (H. Mang, H. Ecker)
- Mathematical Modelling (I. Troch)
- Simulation Methodologies and Applications (R. Huntsinger)

Invited Speakers:

- B. Buchberger (A): Mathematical Software Systems - Current State of Technology
- E.R. Carson (GB): Metabolic Modelling: Past, Present and Future
- M. Gervautz (A): Animation - Current Status and Trends
- D.P.F. Möller (D): Fuzzy Systems in Modelling and Simulation
- D. Murray-Smith (GB): Advances in Simulation Model Validation: Theory, Software and Applications
- T. Schriber (USA): How Discrete-Event Simulation Software Works
- P. Sloot (NL): Modelling for Parallel Simulation: Possibilities and Pitfalls
- O. Steinhauser (A): Biomolecular Modelling and Simulation

Session "Simulation in Industry": To encourage papers from industry special "industry sessions" will be organized (I. Bausch-Gall, K. Juslin, F. Lorenz, D. Maclay, D.P.F. Möller, P. Schäfer, W. Smit).

Each session will include only papers involving industrial firms and will cover only one specific subject. The industry sessions will be organized during the first two days of the congress. It will be possible, but not necessary, to publish the presented papers in the conference proceedings.

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**. Please send abstracts (not exceeding one page, to be published in the poster book) not later than June 15, 1995. Notification of acceptance or rejection will be given by June 30, 1995.

User Groups for simulation languages and tools will meet on Monday. Meetings of the User Groups of ACSL, GPSS/H, and MATLAB are scheduled. 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:

- HDL-A, VHDL-based analog and mixed signal modeling description language
- Optical Processing and Networking
- Communications Network Planning Through Object-Oriented Simulation
- Object-Oriented Simulation of Discrete Systems with Applications
- Animation and Visualization

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.-

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

On-line information is available on the EUROSIM information server `eurosim.tuwien.ac.at`, or via anonymous ftp from `simserv.tuwien.ac.at`, change to directory `eurosim95`.
`URL: gopher://eurosim.tuwien.ac.at`
`ftp://simserv.tuwien.ac.at`

CROSSIM

The Croatian Society for Simulation Modelling

Report

16th International Conference
Information Technology Interfaces ITI '94
Pula, Croatia, June 14-17, 1994

ITI '94 is an annual international conference devoted to exchange of experience in research on computing, information systems, software engineering, artificial intelligence, modelling and simulation, information technology, statistics and related fields. This year 79 papers from authors from 16 countries from Europe and North America were presented and published in conference proceedings (ISSN 1330-1-12, edited by V. Ceric and V. Hljuz Dobric). 18 sessions were held, and two of them were devoted to modelling, simulation and optimization with a total of 10 papers. Best papers from the conference will be published in extended form in the international journal on *Computing and Information Technology*. The Croatian Society for Simulation Modelling (CROSSIM) is one of the cooperating institutions of the conference.

Two invited lectures were this year devoted to simulation modelling. Professor Mike Pidd from Lancaster University presented a lecture on *Some reflections on the validation of computer simulation models*, while Dr. Brian Dangerfield from Salford University presented a lecture on *An overview of strategy and tactics in system dynamics optimisation*.

A special guest of the conference was Professor Felix Breitenecker from Technical University of Vienna, current president of EUROSIM federation. Professor Breitenecker gave the address to the conference on behalf of EUROSIM, in which he described the structure and main activities of EUROSIM as well as the key directions of simulation development today.

The next ITI conference will be held in Pula, Croatia, in mid-June 1995.

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V. Ceric

IMACS

IMACS-SAS '95
5th International IMACS-Symposium
on System Analysis and Simulation
June 26-30, 1995
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

SLOSIM

General Information

SLOSIM (The Slovenian Society for Simulation and Modelling) was founded in May, 1994 as a scientific non-profit organization. Currently the majority of members come from two universities and some institutes. In the future efforts will be undertaken to include people from industry too.

The board of SLOSIM consists of 9 members (chairman, vice-chairman, secretary, treasurer and 5 members). These members come from areas with good

tradition in the area of modelling and simulation. They also cover the interests of several groups.

Activities

Beside the common directions of similar societies, beginning activities are the following:

- identification of propulsive modelling and simulation groups from various fields,
- presentations of groups,
- acquisition of new members,
- transfer of knowledge between groups,
- dissemination of news,
- activities on organization of conferences, seminars, workshops,
- activities of affiliation in EUROSIM.

SLOSIM was the co-organizer of the 4th Electrotechnical and Computer Conference ERK'94 which took place in Portoroz on the Slovenian coast from Sept. 26 to Sept. 28. Our society organized the section Modelling, identification, simulation with seven papers. Besides there were some invited lectures quite interesting for our members (virtual reality, mechatronic systems, design of user interfaces, calculation parallelisms in linear systems) given by international experts, as well as some additional technical events as video corner, demonstration of tools, technics in education, computer in education, mainly prepared by one of our members.

In October we shall begin with presentations of modelling and simulation groups in Slovenia. The first one will be given by the modelling and simulation group of the faculty of electrical and computer engineering, Ljubljana. This group, which was also the initiator of SLOSIM foundation, will try to set up a template for presentations.

After beginning activities SLOSIM will send an application for obtaining the Observer status in EUROSIM.

Membership

At present SLOSIM has 70 members. The membership fee (per annum) is equivalent to 25 German marks for regular members and 5 German marks for students.

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Email: slosim@fer.uni-lj.si

Borut Zupancic

USCS

Ukrainean Society for Computer Simulation

Chairman is Prof.Dr.-Ing. Anatolij Wezlan,
Ukrainean Academy of Science, Kiev

Vice-chairman is Prof.Dr.-Ing. Vladimir Sviatnyi,
Technical University Donezk,
Artjomstr. 58, 340000 Donezk, Ukraine.

Obituary for Arthur Benjamin Clymer

New York Times: Sunday, July 31st

A. Ben Clymer, Distinguished Futurist

A. Ben Clymer, of Ocean Township, New Jersey and formerly of Columbus, Ohio passed on Wednesday July 20th, 1994. He was 73 years old. Ben Clymer was born August 7th, 1920 in Cleveland, Ohio to William Ruhl and Lulu Jackson Clymer. He obtained a BA in Arts-Physics from Oberlin College in 1941, a MS in Engineering Physics at Ohio State University in 1946, and an MS in Applied Mathematics at MIT in 1948.

Mr Clymer was a retired consulting engineer who had been in private practice specializing in simulation and simulators. He was a pioneer in this field beginning with his employment at Ford Instrument Co. from 1942 to 1945. As a junior design engineer, he designed mechanical analog computers used in naval fire-control systems for 5-inch guns and up, and an aircraft flight simulator.

During his long career he was employed by Sperry Corp. , MIT Dynamic Analysis and Control Lab, Owens Illinois Glass Co., Bituminous Coal Research, and North America Aviation, prior to going into private practice in 1961 as a Consulting Analytical Engineer. He served over 40 organizations nationwide in this capacity, specializing in mathematical modeling and simulation. In 1972 he went to work for the Ohio Environment Protection Agency, and in 1977 moved to New Jersey and worked at Electronic Associates, Inc., and later Autodynamics prior to forming his own engineering company in 1938.

He was a member of many technical and professional societies, listed in *Who's Who in Engineering* and *Who's Who in the Computer Field*, and a Fellow of the Society for Computer Simulation. The recipient of numerous awards, he most recently was the first individual to receive the *John McLeod Founder's Award for Distinguished Service to the Profession*, this being the Society for Computer Simulation's highest honor.

Mr. Clymer wrote dozens of technical papers for presentation and/or publication As Chairman of *Mission Earth* for the Society for Computer Simulation, Mr. Clymer was dedicated to bringing scientists the world over together to explore and promote the roles of world simulation as a tool for global planning and the development of a sustainable world system. In this pursuit, he was chairing the recent *Mission Earth* Symposium at the 1994 Summer Computer Simulation Conference in LaJolla, CA at the time of his death, with plans to lead Mission Earth Symposia later this year in Zurich Switzerland and Istanbul, Turkey.

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 series will be continued. Furthermore, a special comparison of parallel simulation techniques has been defined. Definitions of the comparisons are available from the editors or via Internet (simserv.tuwien.ac.at).

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 preliminary 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 EUROSIM'95 conference. A collection of results will be available in 1995. 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).

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.

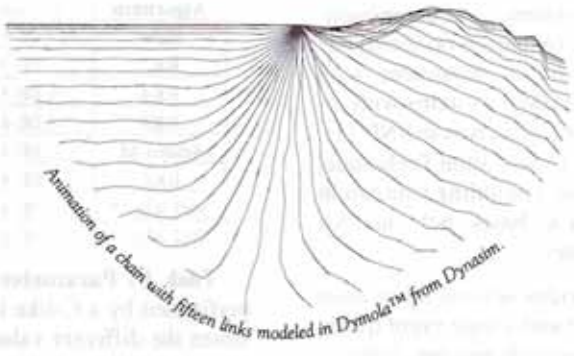
The following table shows the number of solutions published in each issue of EUROSIM - Simulation News Europe (SNE) for the different comparisons.

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
12	1	-	1	-	-	-	2	3
Total	23	21	12	8	4	6	19	6

Dymola

Dynamic Modeling Language

Dymola – for combined continuous/discrete modeling



Animation of a chain with fifteen links modeled in Dymola™ from Dynasim.

Scalable modeling methodology

- Organizes modeling knowledge – object-oriented
- Reuse of models – model libraries available
- High-level language for model composition – physically oriented connections
- Allows input of general equations
- Produces efficient simulation code
- Treats combined continuous/discrete models properly
- Unified language constructs – multi-disciplinary models

```
model robot ( Model of 6 degree-of-freedom robot.)
  submodel (Inertial)  i(g=9.81, ng3=-1)
  submodel (RevoluteS) r1(n3=1), r2(n1=1), r3(n1=1)
  submodel (RevoluteS) r4(n3=1), r5(n1=1), r6(n3=1)
  submodel (Bar)       p3(r3=0.5), p5(r3=0.73)
  submodel (Body) m1(I33 = 1.16)
  submodel (Body) m2(m=56.5, r1=0.172, r3=0.205,
                  I11=2.58, I22=2.73, I33=0.64, I31=-0.46)
  submodel (Body) m3(...), m4(...), m5(...), load(m=10, r1=0.1)

  connect
    i to r1 to r2 to p3 to r3 to r4 to p5 to r5 to r6 to load,
    m1 at r1:b, m2 at r2:b, m3 at r3:b, m4 at r4:b, m5 at r5:b
end
```

Example of how models are described in Dymola – industrial robot.

Typical use of Dymola, modeling of industrial robot.

Capabilities

- Causality analysis – graph theoretical algorithms
- Symbolic solution of equations
- Finds minimal systems of simultaneous equations (algebraic loops)
- Code to solve systems of linear equations either symbolically or numerically
- Code to solve systems of nonlinear equations – including symbolic Jacobian
- Automatic index reduction of DAE – symbolic differentiation
- Simplification of expressions (partial evaluation)
- Automatic generation of code for handling of time- and state-events
- Output of models for the simulation programs ACSL, Desire, Simnon and SIMULINK
- Generation of FORTRAN subroutines according to the DSblock format designed at DLR (German Aerospace Research Establishment)

Applicable

- Mechatronic systems
- Robot simulations – trajectory optimization
- Power electronics simulation
- Chemical systems
- Education – unified modeling methodology

Available

- On PC/Windows, Macintosh, UNIX (SparcStation, HP 9000, IBM RS/6000), VAX/VMS
- Library for tree structured multi-body systems from DLR (German Aerospace Research Establishment)
- Library of electrical components
- Control block library
- Bond graph library

Additional information

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Dynasim AB
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E-mail: Info@Dynasim.se

Dynasim

Comparison 1 - mosis

mosis (modular simulation system) is an experimental CSSL simulation language (equation-oriented) designed for modular simulation development with features for parallelization on MIMD-systems with distributed memory (see Parallel Comparison in SNE 11). mosis (developed at the Dept. of Simulation Technique, TU Vienna) is a general purpose compiling simulation language of CSSL-type on a C basis, not only for parallel programming techniques.

The simulation kernel provides several integration algorithms, a state event finder and a time event queue (all calculations in double precision number format). The runtime system also contains a powerful interpreter language where even complex algorithms can be programmed, furthermore graphical output and some routines for frequency domain analysis.

At runtime several instances of models can be connected and simulated as one big model. These instances can be created on the same processor ("serial simulation") or at different processors ("parallel simulation"), where communication is performed automatically .

mosis can be freely copied and used for non-commercial purposes (the complete and unlimited version can be obtained from the simulation server `simserv.tuwien.ac.at` at the TU Vienna by "anonymous ftp"; commercial use on request). It has been implemented on PCs, UNIX-workstations under PVM and X Window and the Cogent XTM transputer system.

Model description: The model `lithium` is defined in the file "lithium.m", translated, compiled and linked to the runtime-system; state variables and parameters must be defined explicitly:

```
model lithium() {
state r,m,f;
param kr=1.0,kf=0.1,lf=1000.,dr=0.1,dm=1.;
param f0=9.975, m0=1.674, r0=84.99, p=0.0;
preinitial {ialg=3;tend=10.;dt=cint=0.001;}
 derivative {
 r`=-dr*r+kr*m*f                    ,r0;
 m`=dr*r-dm*m+kf*f*f-kr*m*f         ,m0;
 f`=dr*r+2*dm*m-kr*m*f-2*kf*f*f-lf*f+p,f0;}}
```

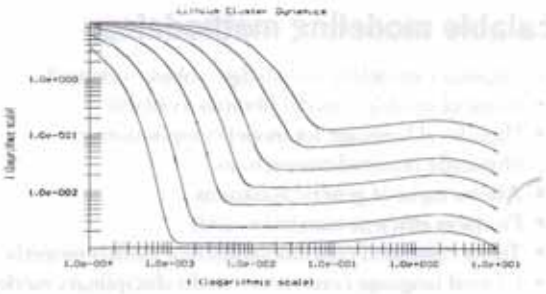
The following runtime commands instance the model `lithium` once (on an arbitrary processor, indicated by "-1"), identifying the instance with the handle `lit`, choose the integration algorithm, and simulate the model (`run`) with storing the state f (`watch`):

```
int lit; lit=instance("lithium",0);
l.ialg=8; // stiff integration algorithm
watch(l.f); run(l);
```

Task a) Integration algorithms: mosis offers various integration algorithms. The simulation results for these algorithms are summarized in the following table (* ... no stepsize control, ** semi-implicit extrapolation method by Bader and Deuflhard); results computed on a 486/33 processor, 8MB, 32-Bit version.

Algorithm	Stepsize	max.abs. error	Time
Euler	1.0E-3	*	2.3 sec
RK2	1.0E-3	*	4.5 sec
RK4	1.0E-3	*	4.1 sec
RK4	1.0E-4	*	41.3 sec
Adams-M.	1.0E-4	1.0E-8	2.58 sec
RKF	1.0E-4	1.0E-8	2.52 sec
Stiff Alg.**	1.0E-4	1.0E-8	0.089 sec
Stiff Alg.**	1.0E-4	1.0E-6	0.058 sec

Task b) Parameter study: A parameter study is performed by a C-like loop command, where an array stores the different values for the parameter `lf`. Seven runs are stored and then plotted:



```
double x[7]= { 100, 200, 500, 1000, 2000,
               5000, 10000 };
watch(lit.f);$scalex=$scaley=1; //log.scales
for(i=0;i<7;i++) { lit.lf=x[i]; run(lit);}
drawcurve(lit.f);
```

This parameter loop could be done in parallel, if a multiprocessor system is available (with nearly linear speed up). The model `lithium` has to be instanced seven times on different processors (no. 0 - 6) and run in parallel:

```
int lita[7]; double x[7]= { 100, 200, 500,
                1000, 2000, 5000, 10000 };
for(i=0;i<7;i++) {lita[i]=
   instance("lithium",i); watch(lita[i].f);}
for(i=0;i<7;i++)   {lita[i].lf=x[i];
                    run(lita[i]);}
for(i=0;i<7;i++) drawcurve(lita[i].f);
```

Task c) Steady state calculation: mosis offers a trim command (with various parameters for accuracy, etc.) The commands `lit.p=0; trim(lit); lit.p=10000; trim(lit);` give results summarized in the following table.

	f	m	r
p = 0	2.720E-17	1.533E-11	-1.734E-10
p = 10000	10	10	1000

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Comparison 3 - SIMNON

SIMNON is an easy-to-use modular simulation language of CSSL-type. It was developed to support especially the analysis of non-linear systems, consisting of continuous and discrete (sampled data) submodels connected via input/output relations. The given problem demonstrates quite well advantages as well as disadvantages of SIMNON.

Task a): As there are no functions implemented dealing with the calculation of eigenvalues, it is not possible to fullfill task a).

Task b): The combination of the extremely stiff system of ODEs and the short rise/fall time of the resistor leads to complications in SIMNON. The best solution is the use of an explicit algorithm with constant stepsize, which has to be chosen very small, of course (Euler algorithm). In this way a minimal rise/fall time of TRF = 1E-11 could be realized.

However, the modular concept of SIMNON has been very useful for modelling the resistor: Using the parallel running discrete subsystem ampd the magnitude of the resistor in the continuous subsystem ampc is controlled. Through this, the switch-points can be reached exactly. Realizing R(t) by IF-THEN-ELSE constructs or as a table function results in more problems for the integration. Both systems communicate through the connecting system ampconn. Figure 1 shows the time-curves of the state variables x1,x2,x3,x4 as well as IR(t) and VL.

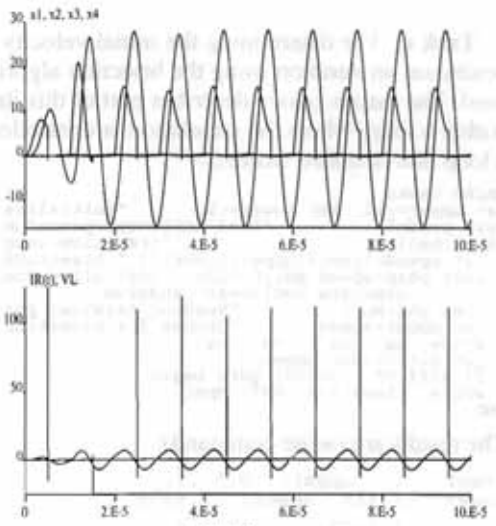

Figure 1

Task c): SIMNON offers powerful features at runtime. Experiment variables are able to store values from previous simulation runs, to recalculate it and to use the values in further simulation runs. This feature is used for transferring the final values of task b) to initial values for task c). A loop command varies the parameters, performs the simulation runs and plots the results (into the same plot windows). Figure 2 shows the solution VL3 as a function of IL3 and the curves of IR(t) and VL over the time interval [0, 9E-6]. Only the curve belonging to the parameter TRF = 1E-7 can be distinguished from the others.

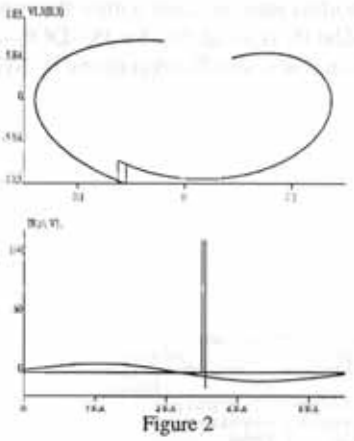
Figure 2

```
CONTINUOUS SYSTEM ampc
INPUT a b td
STATE x1 x2 x3 x4
DER dx1 dx2 dx3 dx4
TIME t
R = a*(t-td)+b+5E-2
dx1 = (-x2 + VDC)/L1
dx2 = (x1 - x2/R - x3)/C2
dx3 = (x2 - RL*x3 - x4)/L3
dx4 = x3/C4
h1 = x2/R
h2 = x3*RL
VDC: 5
L1: 79.9e-6, ...
END

DISCRETE SYSTEM ampd
OUTPUT a b td
STATE x
NEW nx
TIME t
TSAMP ts
up=(5E6 - 5E-2)/trf
down=(5E-2 - 5E6)/trf
a=IF (nx<1) THEN 0 ELSE (IF nx<2 THEN up
   ELSE (IF nx<3 THEN 0 ELSE down))
b=IF((nx>1 AND nx<3) OR (nx>2 AND nx<4))
   THEN (5E6-5E-2) ELSE 0
k=IF (((nx>0) AND (nx<2)) OR ((nx>2) AND
   (nx<4))) THEN trf ELSE (5E-6 - trf)
nx = MOD(x+1,4)
ts=t+k
td=t
trf: 1E-9
END

CONNECTING SYSTEM ampconn
a[ampc] = a[ampd]
b[ampc] = b[ampd]
td[ampc] = td[ampd]
END
```

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Comparison 7 - SIMNON

SIMNON ("Simulation of Nonlinear Systems") offers modular modelling of continuous and discrete systems which may be connected via connecting systems. Experimentation within a relatively powerful runtime interpreter allows the use of experiment variables, calculations, conditions, loops, etc. In SIMNON also different models may be used within the runtime interpreter. SIMNON is available for PC-DOS (also realtime), PC-Windows, and Workstations (UNIX).

Model description: SIMNON offers no state event handler but a state-dependent break of the simulation run (`cterm`-condition). Switching between the different phases of the pendulum is caused by terminating the simulation run, if the pendulum hits the pin, or vice versa. The change of the length and the calculation of the new angle velocity are performed within the runtime interpreter.

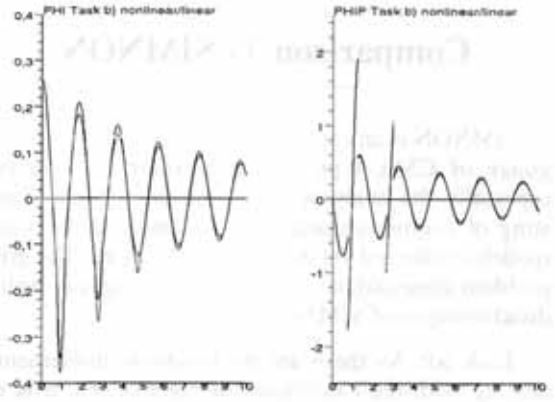
```
CONTINUOUS SYSTEM pendnl
STATE phi phip          " States
DER dphi dphip          "Derivates
dphi=phip                "Equations
dphip=-g*sin(phi)/l-d*phip/m
"state-dependent termination
 stl=if phip > 0 then cterm(phi>phinagel )
 st2=if phip < 0 then cterm(phi<phinagel)
lnagel:  0.3 ...   " Parameter values
END
```

Task a): The following macro `taska1` controls the switching between the "two" pendulums in a loop. After the conditional break the `disp`-command stores the actual values of e.g. states into experimental variables (denoted by a first capital letter) for recalculation of the velocity and initializing the following simulation of the (e.g. shortened) pendulum (`init`-, `par`-command), and so on:

```
MACRO taska1
syst pendnl       .....        " load model
init phi:0.5236 phip:0   "initial values
par d:0.2 l:1           "parameter values
plot phi          "plot during simulation
simu 0 10     "simulate until 1st hitting
label lcontl    "loop for consec. models
"Readout states, recalculate dphi
  disp phi/Mphi phip/Mphip t/TheTime
  let Nphip.=Mphip./0.3
"Initalize states and length
  par l:lnagel
  init phi:Mphi. phip:Nphip.
  simu TheTime. 10  "sim.until "leaving"
"Readout states, calculate dphi
  disp phi/Mphi phip/Mphip t/TheTime
  let Nphip.=Mphip.*0.3
"Initalize states and length
  par l:lnormal
  init phi:Mphi. phip:Nphip.
  simu TheTime. 10     "sim.until hitting
goto lcontl     "loop for consec. models
```

The results are the same as presented by other languages. For task a) ii) only the parameter values and the initial logic have to be changed.

Task b): Although nonlinear and linear model could be described in one model, for demonstration purposes working with consecutive different models is used. The linear model `pendl` only differs from `pendnl` in the line: `dphip=-g*phi/l-d*phip/m`.



The macro `taskb` simulates two times first the nonlinear pendulum (with a loop as before), and then the linear one. The graphic display is splitted into two regions, where in the first pair of simulation runs the angles are plotted into the first region, and in the second pair of simulation runs the angle velocities into the second region, see figure:

```
MACRO taskb
let count=1              "counter for runs
split 1 2                  "split display
label begin       "loop for pair of runs
 syst pendnl      "load nonlinear model
 if count EQ 2 goto secondnl
  area 1 1       " plot phi into 1st area,
  plot phi       " if count=1
 goto simstartnl
 label secondnl
  area 1 2       "plot dphi into 2nd area,
  plot phip      " if count=2
 label simstartnl
    ....simulate nonlinear pendulum
 if count EQ 2 goto secondl
  ..   . decide plot area as before
  ......simulate linear pendulum
if count EQ 2 goto theend
let count=2
goto begin
label theend
END
```

Task c): For determining the initial velocity of the pendulum an iteration using the bisection algorithm is used. The macro `taskc` describes part of this iteration within a loop, where the simulation is controlled with a loop like in macro `taska1`.

```
MACRO taskc
let upper=-10. let lower=-1.       "initialize
syst pendnl          "load nonlinear pendulum
label begin                    "iteration loop
  let speed=lower+(upper-lower)/2 * bisection
  init phip:speed phi:0.5236  "initialize run
    .... simulate nonlinear pendulum
  disp phi/Mphi          "Readout terminal phi
  let upper=speed        "Choose for bisection
  write 'ug: 'ug '  og: 'og
  let diff=lower-upper
  if diff GT 0.000001 goto begin    "iter.loop
  write 'Iteration: PHI: Mphi.' (-PI/2='mpih')'
END
```

The results are (write command):

```
lower: -1.  upper: -5.5 ...
lower: -2.125  upper: -2.6875
  ..............................
lower: -2.22779  upper: -2.22779
Iteration: PHI: -1.5708     (-PI/2=-1.5708)
```

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Comparison 7 - mosis

mosis (modular simulation system) is an experimental CSSL simulation language (equation-oriented) designed for modular simulation development with features for parallelization on MIMD-systems with distributed memory (see Parallel Comparison in SNE 11). mosis (developed at the Dept. of Simulation Technique, TU Vienna) is a general purpose compiling simulation language of CSSL-type on a C basis, not only for parallel programming techniques.

The simulation kernel provides several integration algorithms, a state event finder and a time event queue. All calculations are done in double precision number format. The runtime system also contains a powerful interpreter language where even complex algorithms can be programmed, furthermore graphical output and some routines for frequency domain analysis.

mosis can be freely copied and used for non-commercial purposes (the complete and unlimited version can be obtained from the simulation server `simserv.tuwien.ac.at` at the TU Vienna by "anonymous ftp"; commercial use on request). It has been implemented on PCs, UNIX-workstations under PVM and X Window and the Cogent XTM transputer system.

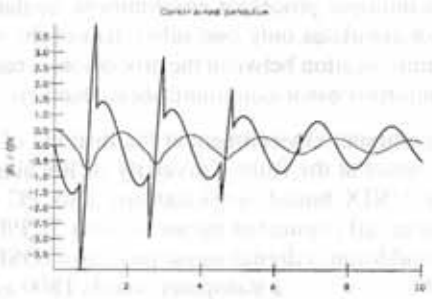
Model description: mosis offers a state event handler (based on regula falsi combined with bisection) for defining and calculating state-dependent events like hitting the pin. The following model description `pendulum` is a CSSL-type description (arbitrary C-code can be embedded with the `ccode` - element, here the special sign function of ACSL):

```
ccode
( double sign(double x1,double x2)
  { if(x2>0) return x1; else if(x2<0) return -x1;
else return 0; } )
model pendulum() {
 const PI=3.1415926535;
 double l=1.0,m=1.02,d=0.2,g=9.81;
 double phi0=0.3,dphi0=0,phip=0.2,lp=0.7;
 double ddphi,la,ls,signphip,signphi0;
 int swil,iter,linear; //iteration, model type
 state phi,dphi;
 double sign(double,double);
 preinitial{iter=linear=0;ialg=3; tend=10;}
 initial {  ls=l - lp;
  signphip=sign(1,phip); signphi0=sign(1,phi0);
  la=((phi0-phip)*signphip >=0)?ls:l;
  la=(signphip!=signphi0)?l:ls;                }
 dynamic {
  derivative { // "linear" determines model type
   dphi'=(-g/la)*(linear?phi:sin(phi))-
     - (d/m)* dphi, dphi0;
   phi'=dphi,phi0;                             }
   sevent(phi-phip,2,hit); // state event sched.
   terminate(iter && (dphi>=0));               }
  discrete hit {
    printf("state event hit: t=%.15g\n",t);
    swil=((phi-phip)*sign(1,phip)>=0);
    la=swil?ls:l;
    dphi=swil?(dphi*l/ls):(dphi*ls/l);    } }
```

Task a): At runtime level, the following commands are entered for instancing and simulating the model (`phi` and `dphi` are stored for successive plotting):

```
int pend; double pi=3.1415926535;
pend=instance("pendulum",-1);
pend.phi0=pi/6; pend.phip=-pi/12; pend.d=0.2;
watch(pend.phi); watch(pend.dphi); run(pend);
drawmc(2,pend.phi,1,pend.dphi,2);
```

The Runge-Kutta 4th order algorithm is used for simulation. The state events are found at the following values of t: 0.703459, 1.1517797, 2.590417, 2.990529, 4.542741, 4.867487, 6.648707 and 6.720384. The figure shows the results for `phi` and `dphi` for task a,i) plotted together. For task a,ii) only initial values have to be changed.



Task b) Comparison of linear and nonlinear model: The linear model is implemented similar to the ACSL solution of this comparison (consecutive simulations, parameter `linear` switches between linear and non-linear model). For comparison of the results, a very powerful feature of mosis can be used: the manipulation of function tables storing results from a simulation run:

```
watch(pend.phi);run(pend);
int sav; sav=ftnew(); // create new function table
ftcopy(sav,pend.phi); // store curve of phi in sav
pend.linear=1; run(pend); // sim. linear model
int dif; dif=ftnew();
// new function table storing the difference
ftcopy(dif,sav); ftadd(dif,pend.phi,-1.0)
// calc. difference of nonlin. and lin. model
drawmc(3,sav,1,pend.phi,2,dif,4);
// draw 3 curves simultaneously
```

Task c) Boundary value problem: Although mosis offers parameter optimization this task is solved by programming a simple fixpoint iteration (in order to compare to the ACSL solution) at runtime level, showing the power of the runtime interpreter. The initial angular velocity is found at -2.1846 after 11 iterations.

```
int signum=-1;double epsilon=1;double acc=1.0e-4;
double fabs(double f) { if(f<0) return -f;
      else return f; }
int pendelopt(int maxiter)
{ double error; int i,j,k;
  for(i=0;i<maxiter;i++)  {  // iteration loop
  run(pend);  // simulation run
  error=@pend.phi+pi/2.0;
  printf("Iter. %Dphi=%f error=%f\n",
      i,@pend.dphi0,error);
  if(fabs(error)<acc) break;
  pend.dphi0=@pend.dphi0+signum*epsilon*error;  }
  return i;  }              // iteration loop
```

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Comparison of Parallel Simulation Techniques
Heterogeneous MP-system / FSIMUL-P

The simulation package FSIMUL-P is a supplement of the well known block oriented simulation language FSIMUL and permits parallel simulation of very complex industrial processes by means of distributed computer environments. The goal of developing the package was to increase computer power for simulation. Therefore, all blocks of FSIMUL-P are distributed within a multiple processor environment, so that each processor simulates only one subsystem of the model. The communication between the processors is based on virtual interprocessor-communication-channels.

The computer environment at the Institute of Automatic Control at the Ruhr-University of Bochum consists of UNIX-based workstations and PC-based workplaces, all connected by means of a TCP/IP network. In addition, a digital signal processor (DSP) card TMS320C40 and three transputer boards T800 as plug-in-cards (AT-bus) are available for the PCs. The master program FSIMUL-P was developed on a 386/486-based PC-system as a protected mode application in 32-bit technology. The worker process was written in C and compiled for all existing computer systems. The user has not to care for the management of the heterogeneous components of the simulation hardware.

A comfortable window oriented user interface enables an efficient work with the package. An integrated structure editor enables a very attractive model building. The firmware of FSIMUL-P consists of about 150 different block operations. The number of blocks used for a simulation model depends on the available system memory only. The user can program his complex simulation model in 16 implemented simulation levels. For every level, the user can decide for one of the processors available as part of the computing network. It is also possible to select between different numerical integration algorithms in each simulation level. For special simulation problems an extensive macro archive (macro library) is available.

The **Monte-Carlo study** of a damped second order mass-spring system achieved a very good speed performance by FSIMUL-P parallel simulation, because the communication overhead is very small. In FSIMUL-P only a static load balancing is implemented. A performance-monitor gives the user a good overview of the load balancing in the parallel system (CPU-times, communication, etc.). Table 1 provides an overview of the CPU-times for 100 sequential simulation runs in the time interval t = [0;2]; integration step size h = 0.001 sec; RK4-algorithm in each processor system.

processor system	simulation time
Master-PC (486 DX 50)	216.36 sec
Worker-PC (486 DX 50)	188.72 sec
Worker-PC (486 DX 66/2)	183.73 sec
HP840-Workstation (too slow)	256.51 sec
HP705-Workstation	163.09 sec
DSP TMS320C40	172.51 sec
T800 Transputer (too slow)	357.26 sec

Table 1

The CPU-speeds of all processors in the heterogeneous MP-system are very different, so that only the fastest processor systems are used for parallel simulation. The 100 simulation runs are equally distributed (25 each) on the DSP, HP705 and the two Worker-PCs. The Master-PC is only used for communication management, visualization of the average responses and performance-monitoring. In this configuration, 100 simulation runs are executed in 49.97 sec. Using 216.36 sec (see Table 1) as reference-value to calculate a speed-up factor, the resulting factor is f = 4.32. With respect to the necessary synchronisation of all processes, in FSIMUL-P, the T800-transputers would slow down the speed in parallel simulation.

For the **coupled predator-prey population** model the five populations are distributed on 3 or 5 processor-systems, so that every processor calculates only one or two populations. The Master-PC calculates the population v besides the simulation management and visualization of all population results because the population v has connection to all other populations. In the first configuration, the two Worker PCs, the DSP and the Workstation simulate particularly one of the other populations w, x and y, z. In the second case, one Worker-PC simulates the populations w and x, while the second Worker-PC simulates the populations y and z.

In addition we will examine the influence of the communication overhead through the parallelization. Table 2 shows the speed-up factors depending on communication intervals and configuration models.

configuration model	h	2h	5h	10h	20h
5 processor system	0.19	0.38	0.83	1.32	1.86
3 processor system	0.14	0.27	0.62	1.06	1.65

Table 2

The second order **partial differential equation** of a swinging rope is solved by discretization in 800 finite element modules. In FSIMUL-P, it would be possible to create a macro of one discretized section of rope. However, in this case, one would receive a system of order 1600 and a very big simulation structure of about 2400 blocks. Therefore, to solve this problem of the swinging rope by ordinary differential equation (ODE), a special block operation is implemented in FSIMUL-P.

Thus, one defines only the length 'L' of the rope-section, the number 'N' of discretization steps and the wave-propagation-speed factor 'a' of the rope. The ODE block solves the calculation of the swinging rope. The inputs of these blocks are the amplitudes u(0) and u(N) on both sides of the discretized sections; the multiplexed outputs are u(1), u(N/2), u(N/4), u(3N/4) and u(N-1).

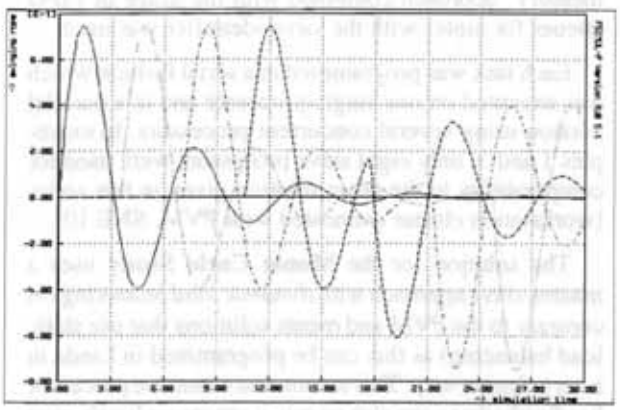

Figure 1: Parallel simulation of the swinging rope

Figure 1 shows the correct parallel simulation of the swinging rope problem (f = 3.85 with 4 Worker-PCs).

Figure 2 shows the effect that, by the parallelization of simulation models at the interconnection points, a loss of system dynamic is possible. This may happen if the communication interval is much bigger than the integration interval. The same probem occurs if an integration algorithm is used that needs to calculate intermediate values within the integration interval.

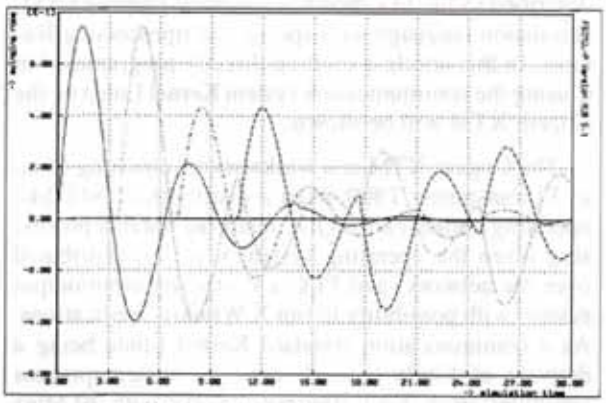

Figure 2: Parallel simulation with two processors, loss of system dynamic at interconnection point.

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Comparison of Parallel Simulation Techniques
Cogent XTM / Linda, C

In this series of comparisons a solution with the simulation system mosis on the Cogent XTM has been described (SNE 11). mosis is a general purpose CSSL simulation language with special multiprocessing features. In this article a solution directly programmed in C using the communication system Kernel Linda on the Cogent XTM will be shown:

The Cogent XTM is a workstation consisting of up to 32 transputers T800 under a distributed UNIX-like operating system called QIX, featuring parallel processing (even the operating system kernel is distributed over the network) and PIX, a PostScript input/output system with possibility to run X Window applications. As a communication standard Kernel Linda being a derivate of Linda is used, even for system process communication. Each transputer works with 20 MHz and is equipped with 4 MB of local memory. The main console (the minimum configuration) of a XTM workstation consists of two transputers that are linked to the graphical I/O system and that control the hard disk access. This system can be expanded to a maximum number of 32 by connecting to a "resource server" containing up to 15 boards with 2 transputers each. For inter-processor communication two different media can be used: Usually messages are sent via the transputer-unique so-called "Links" (serial, 20 MBit/s transfer rate). For short messages a very fast bus system is installed.

Description of Linda: Linda is a programming model for parallel algorithms that was initially developed by David Gelernter at Yale University. In this model, all processes communicate with each other by accessing a common "tuple space" which is logically like reading from a shared memory area, but physically implemented by message passing. A message can be sent to another process by putting a "tuple" into the tuple space (function "out") that can be read by any other process that has access to this tuple space ("in" reads the tuple and deletes it; "rd" reads the tuple without destroying it). The tuple contains an identifier (usually a name or an integer number) and a data area.

Within the tuple space several tuples with the same identifier may be defined. In this case, at the "rd" or "in" operation that was written first, is read. All tuples with the same identifier are located in a FIFO queue, which can be also used for message passing.

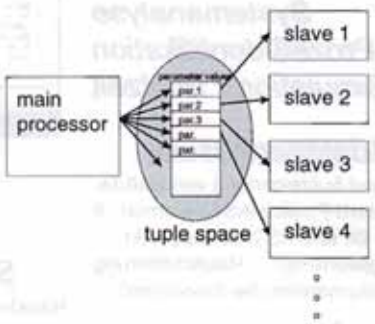
Kernel Linda is an implementation of this programming paradigm by Cogent Research for the Cogent XTM where the source files of parallel programs need not be passed through a preprocessor.

Solution of the Comparison Examples

All tasks were solved by using the Runge-Kutta fourth order algorithm, with fixed stepsizes, depending on the particular problem. All floating-point variables were defined as "double". For the solutions the "shared memory" approach combined with the usage of FIFO queues for tuples with the same identifier was used.

Each task was programmed in a serial fashion which was executed on one single processor and in a parallel version using several concurrent processors. In examples 1 and 3, only eight slave processors were used for comparability to the other solution given in this series (workstation cluster connected with PVM, SNE 10).

The solution for the **Monte Carlo Study** uses a master-slave approach with *dynamic load balancing* (in contrary to the PVM and mosis solutions that use static load balancing) as this can be programmed in Linda in a very elegant way. This means that when one processor has finished one simulation run, it can immediately start with the next one (using a different parameter value). At the main processor, after creation of several (eight) similar processes on different processors, the desired number of random numbers is created and written into a FIFO queue in the current tuple space. Each processor reads (and deletes) one tuple and performs the simulation run. As soon as this has completed, the next tuple is fetched until no value can be found in the queue. Then the sum of all simulation runs within this processor is evaluated and sent to the main task (by putting into the tuple space) which calculates the average of all runs. The following figure illustrates the distribution of tasks:



As a calculation base, 1000 simulation runs were performed by 8 slave processors. The achieved speed-up factor was f=7.8. For this homogenous system, static load balancing would probably produce similar results.

The distributed simulation of the **Coupled Predator-Prey model** resulted in a "speed-up" factor of less than one, i.e. the parallel version was significantly

slower than the serial one. Communication is done via "global variables" (tuples in the environment) containing the current state of the coupled model. The five tasks representing the various populations were simulated on different processors.

The resulting "speed-up" factor was f=0.08 which could be improved to f=0.60 by communicating only each 10th integration interval h (c_{int}=10.h). This problem seems to be not yet suitable for parallel processing with distributed memory, shared memory structures may give better results.

The third test example, the parallelization of the **partial differential equation** (PDE) proved again to succeed in terms of calculation speed. The model was calculated using N=600 and N=800 discretisation lines for the PDE; the latter produced even better speed-up factors. The model was simulated in the same way as in the solution on a workstation cluster under PVM (SNE 10, p.24) with eight concurrent processors (each calculating 75 or 100 lines of the PDE) and produced speed up factors summarized in the following table.

# Lines / communication	$c_{int} = h$	$c_{int} = 4\,h$
N = 600	f = 6,78	f = 7.54
N = 800	f = 6,88	f = 7.62

Communicating only each fourth integrating step improved the results up to an almost linear speed-up.

Summary of the Results: The solutions directly programmed in C and Kernel Linda produce slightly better results than those programmed in C and PVM on an RS6000-cluster and those on the Cogent XTM using mosis; on one side this is because the ratio of communication by calculation speed is higher than on the workstation cluster (faster communication, slower calculation), on the other side the C-programs do not have to poll for incoming messages (which makes the simulation with mosis slower, but which will be improved).

But the advantage in simulation speed must be paid by much higher development cost: A mosis model needs only be compiled and run on the parallel computer system, but the implementation of this model took quite a long time (approx. one week for implementation, testing and simulation), although the existing PVM models could be used and had only to be transformed to Linda programs.

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Comparison of Parallel Simulation Techniques
Cogent XTM / SIMUL_R PARALLEL

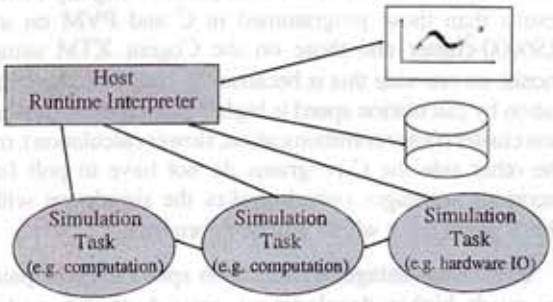

Fig. 1: The **SIMUL_R PARALLEL** system.

The Language

SIMUL_R PARALLEL is the parallel computing version of the simulation language **SIMUL_R** which has been introduced in former comparisons (see comparison 1-7). **SIMUL_R PARALLEL** allows a hardware independent implementation of parallel simulation models. Submodels can be distributed to different tasks (see figure 1). The user can specify on which processor a task is placed (or the system selects it). This distribution can be optimized using **SIMUL_R**'s **DOPTCONPAR** command.

Simulation models can be distributed and started from within the Host (Runtime Interpreter), which offers the usual **SIMUL_R** desktop (optionally menu driven) with some additional commands:

start &; start a simulation run in background.
wait; wait till all simulation runs in background are finished.
send, receive send and receive model and system data to/from tasks.

If one model has to be parallelized (the submodels simulate in parallel) the **SIMUL_R** translator checks which variables have to be exchanged. Nevertheless, the user is free to write easy-to-use **#SEND** and **#RECEIVE** (macro) commands to the models to explicitly exchange data values between submodels.

Task 1, Monte-Carlo study: The model for task 1 is very simple (see fig. 2)

```
parallel_1 {
  CONSTANT tend=2;
  CONSTANT m=450, k=9000, d=1000, dx0=0,
       x0=0.1;
  km=k/m;
  dm=d/m;
  DYNAMIC {
    DERIVATIVE {
      x=INTEG(dx,x0);
      dx=INTEG(-km*x-dm*dx,dx0);
    }
    TERMINATE t=tend;
  }
}
```

Fig. 2: The model for the first example

We want to use 1, 2, 4, 8, 16 tasks parallel performing 1008 simulation runs. The runtime commands - including that one for perfoming the statistics (!) - are shown in fig. 3 .

```
#set NNN=1008#
act_mod=parallel_1;        " set activated
                             model parallel_1 "
cint=0.001;                " set communication
                             width "
ialg=1;                    " set RK-4 integration
                             algorithm "
simdat_name='';            " no data file -
   sampling in memory ==> much faster "
prepare-;                  " empty sampling list "
prepare x;                 " sample x "
#loop N=1,2,4,8,16#        " use N tasks parallel
                             at once "
 #for task=1,N #
  send dict;               " start tasks and send
                             system infos "
 #end
 #for c=1,NNN/N #          " NNN/N * N tasks
                             parallel "
  #for task=1,N #
   d=unif_dis(0)*400+800; " compute
                             distributed d "
   send d;                 " send d to task "
   start &;                " simulation run in
                             background "
  #end
  wait -1;                 " wait till all runs
                             have finished "
  #for task=1,N #          " statistics "
   receive dict, prepare;
   #if c==1 && task==1#
    out_prep 'sum.dat';
   #else
    op2_prep '+','sum.dat','help.dat',0;
        " add the values of the new
          data file and the sum file "
    SYS 'cp help.dat sum.dat';
   #end
  #end
 #end
#end
"-> now sum.dat contains the sum of all values"
 simdat_name='sum.dat';
 op1_prep '/',NNN,'mean.dat',0;
```

Fig. 3: Runtime commands for task 1.

If *N* is the number of parallel tasks, *NNN / N* groups of tasks are started. Data is sampled in memory, which is much faster than sampling on disk. With **receive prepare** we receive these values and add them to an accumulator file *sum.dat by* **op2_prep**. **op1_prep** then divides the data values by *NNN* to get the result. As told above, this model and these commands can be started on any hardware which is supported by **SIMUL_R PARALLEL** (there is even an emulator version under MS-Windows: parallel processes communicating by Windows messages). The computations in this case are performed on the Multi-Transputer workstation Cogent™ XTM using the *Kernel Linda* system.

Number of processors	Simulation speed up	Statistics speed up
1	1.00	1.00
2	1.93	1.00
4	3.57	1.00
8	6.27	1.01
16	9.99	1.01

Fig. 4: Results for task 1

The first speed up values in fig. 4 show the simulation and model handling time relative to the 1-processor version, the second the results for accumulating data and computing the mean: here no profit can be reached.

This is a very important point, which often is not taken into account: You do not only need time for the real parallel work, but also for collecting data and displaying and storing it - and in nearly all cases displaying and storing is done on a bottle-neck single processor device (as is at the Cogent XTM)!

Task 2, coupled predator-prey population:

The coupled predator-prey population model (cint=0.01, RK4) results in a "speed-up" of 0.04. No profit can be reached using parallelization with this small model: the integration routines of **SIMUL_R** are very optimized, therefore computation goes on too fast - compared to the slow communication.

Task 3, partial differential equation:

The partial differential equation model can be modelled very easily using **SIMUL_R**'s PDE support: special macros which can translate the PDE - written down similarly to the original PDE notation $u_{tt}(x,t) = u_{xx}(x,t) / a$ - into a method for solving PDEs (e.g. the method of lines - discretization is done automatically !).

Number of processors	1	2	4	8
Speedup factor	1.00	1.79	2.75	2.35

Fig. 5: Results for task 3

The result for 8 processors is considerably bad - the Kernel Linda overhead may be the reason (generally it is not easy for the user to detect on which processor which tuple of a Linda object is placed).

Conclusions

The examples show how easy **SIMUL_R PARALLEL** can be used (hardware independently) for parameter variation tasks and parallelizing models. Some special algorithms of **SIMUL_R PARALLEL**, like the evolution strategies optimization tool **GENOPT**, can be simply used without any task start&'s and send's. **GENOPT** parallelizes itself, depending on the active tasks.

The results are not typical for **SIMUL_R PARALLEL** in general, but for the implementation on this special machine. Results for other parallel or distributed computer versions of **SIMUL_R PARALLEL** will be presented later, too.

R. Ruzicka, SIMUTECH, Hadikgasse 150, A-1140 Vienna, Austria. Tel: +43-1-894 75 08, Fax: +43-1-894 78 04.

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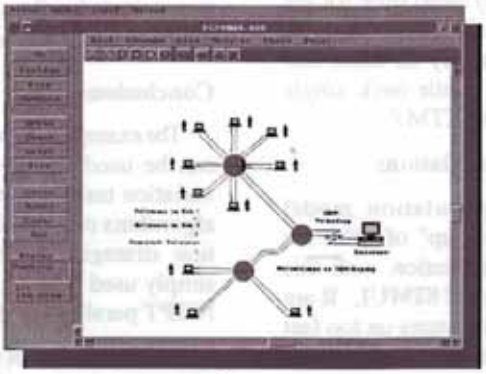

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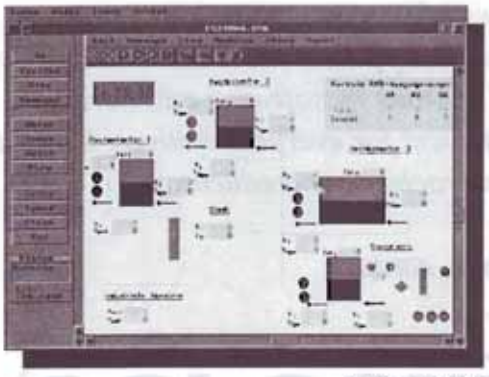

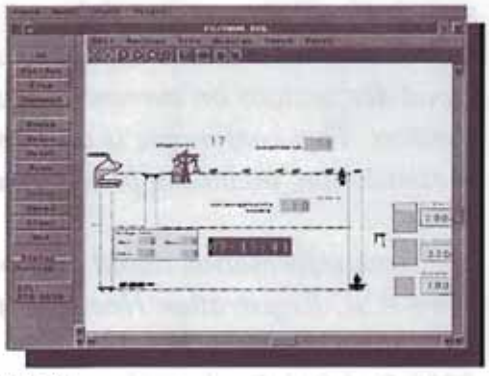

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To obtain further information simply contact Wilfried Krug, Michael Schebesta DUAL Zentrum GmbH, Gillestraße 2, 01219 Dresden, Tel.: +49 351 477910, Fax: +49 351 477 9199 or
Systems Modeling Corporation, The Park Building, 504 Beaver Street, Sewickley, PA 15143, USA, Tel.: 412/741/3727; Fax 412/741/5635.

AutoSimulations releases AutoSched 4.0 and version 7.5 of AutoMod

AutoSimulations, Inc. (ASI) announced the release of version 4.0 of AutoSched, its industry-leading scheduling software used to model the allocation of resources in the manufacturing environment. AutoSched 4.0 improves reports with the ability to automatically collect three times more statistical information than in previous versions. AutoSched 4.0 includes features allowing part-specific steps to be created within a routing. AutoSched also includes a Backward Allocation function, enabling users to answer the "When to launch?" question.

AutoSimulations, Inc. has announced the release of AutoMod 7.5, its 3-D graphical simulation product with more than 30 new features to enhance modeling productivity. This latest version combines the power, flexibility, and true 3-D graphics of AutoMod with improved user functions and tools. New to AutoMod 7.5 is an Edit Label Graphics window, which makes it much easier for users to create labels in their model. Improved command statements are also included with AutoMod 7.5, allowing users to write less logic for their model, while continuing to get the same accurate results. AutoMod 7.5 also includes a new 'AutoPlot' function for plotting graphs. AutoMod 7.5 also features a new Defined Entities windows, making it easier for users to write AutoMod procedural logic. Version 7.5 now supports laptop computers running with VESA mode 0.

For information contact Karen Stanley at AutoSimulations, Inc., P.O.Box 307, 655 E. Medical Drive, Bountiful, Utah 84011, USA or call +1-801 298-1398, ext. 300.

New Simulation Software allows users to create their own specific modeling enviroment

Systems Modeling Corporation announced the release of the latest addition to its line of simulation software: the Arena Professional Edition. With Arena, a simulation model is built by selecting a module that contains the complete characteristics of a process, then placing it in a window and answering questions in its dialog box. There is no need for programming. Once the modules are placed and the questions answered, Arena runs a fully animated model of the actual or proposed process.

Contact Caroline Collins Zenkevich, Systems Modeling Corp., The Park Building, 504 Beaver Street, Sewickley, PA 15143, USA, Tel: +1-412 741-3727, Fax: +1-412 741-5635.

FORTRAN Partner

The Solutions Foundry Ltd. announce that the demonstration copy of the FORTRAN Partner, FPT, with full tutorial documentation, is now available on CD for DOS, VMS and UNIX platforms as well as 3 1/2" disk for PC. FPT is widely acknowledged as the premier toolkit for FORTRAN users, and can assist in: Quality Assurance - detects errors not normally detected by compilers and performs interprocedural analysis of a complete application; Multi-host Migration - makes systematic modifications to port code between hosts; Error Correction - can correct errors automatically and document changes; Optimization - faster execution of performance critical code; Standardization - reformats code to a user's chosen style; User Interfaces - trouble-shoots and debugs code interactively or runs in batch mode for screening or as part of a built procedure; Security - can protect source code by making it unintelligible, while preserving its integrity as compilable FORTRAN.

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CACI the leading simulation products company which was established in 1962 has two European offices whose representatives will be happy to assist any member of EUROSIM. Your points of contact are:

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Contact: Vincent Hebert, Marketing Communications, ComputerBoards, Inc., 125 High Street #6, Mansfield, MA 02048, USA, Tel: +1-(508) 261-1123, Fax: +1-(508) 261-1094.

Book Reviews

User Interface Software

L.Bass and P. Dewan (Eds.), Series "Trends in Software" (Ed. B. Krishnamurthy). J. Wiley & Sons, 1993, 201 pages. ISBN 0 471 93784 3

The series "Trends in Software" publishes three times a year an issue on a special topic in the software field. Each issue consists of few selected contributions by specialists in the particular topic. It is promised that the information presented captures the state-of-the art. The issue "User Interface Software" deals with the development in the field of interfaces to users in any application, e.g. in simulation software, where the design and implementation of the user interface have become both the primary determinants of user satisfaction and the primary cost derivers for software.

The first four papers provide a context relevant to all user interfaces. The first contribution "Formative Evaluation: Ensuring Usability in User Interfaces" (D. Hix, H. R. Hartso) deals with evaluation of user interfaces underlining the importance of software evaluation. The other papers concentrate on the design of user interfaces ("Architectures for Interactive Software Systems: Rationale and Design" by L. Bass; "Making User Interfaces Easy-to-Build" by M. A. Linton; "A multi-threaded Higher-oder User Interface Toolkit" by E. R. Gansner and J. H. Reppy), where state-of-the-art and trends especially of graphical user interfaces are discussed.

The following five contributions present very recent developments, as animation, virtual reality, multiuser interaction and multimedia interaction. The contribution "Animation in User Interfaces: Priciples and Techniques" (J. T. Stasko) shows how animation (initially used mainly for code understanding) can now be used as a part of the user interface in 2D and 3D form. The paper "Virtual Reality: Perspectives, Applications and Architecture" (C. Esposito) provides an overview of the state-of-the-art in implementing virtual reality systems allowing to distinguish also between the technical issues and the promotional claims in this area. Multiuser user interfaces have the potential for solving the problems raised by todays distributed organizations. This field is discussed in "Designing Software for a Groups Needs: A Functional Analysis of Synchronous Groupware" (G. M. Olson et al.). The paper "Tools for implementing Multi-user Interfaces" (P. Dewan) complements the fore-mentioned paper by identifying, overviewing, and comparing tools for implementation. The closing paper "Multimedia Computing: Applications, Designs and Human Factors" (S. M. Stevens) discusses multimedia not only in technical terms but also in terms of how multimedia will allow different types of interaction.

To conclude, this book gives an interesting overview on state of-the-art and trends in the field of user interface software and can be recommended to software developers and people with general interest. As progress in this area is so fast, the only question is, when will the state-of- the-art become history, and the recent developments will become state-of-the-art. In this context the book should be read as soon as possible.

F. Breitenecker

Artificial Life And Virtual Reality

Nadia Magnenat-Thalmann, Daniel Thalmann (Eds.) John Wiley & Sons, New York, 1993; ISBN 0-471-95146-3, 228 pages;

This book is the result of a workshop dealing with Artificial Life and Virtual Reality, which took place in November 1993 at the University of Geneva (Switzerland). Thalmann and Thalmann, who are well-known in the area of computer-animation, present fourteen contributions in a related topic, written by authors of different scientific domains.

An introducing chapter by the Thalmanns settles the topics of the book. They describe in a vivid manner the importance of behaviour, intellegence, memory, autonomy and others for creating artificial life and virtual reality. Of course a detailed explanation of the used terms is present. So the reader learns the difference between Artificial Life, which is an computer-generated actor in a virtual world, and Virtual Reality, where a human being acts in a virtual world. Besides that Thalmann & Thalmann present principles which have to be obeyed, when human being and Artificial Life act together in a virtual world.

Among the fourteen other contributions the paper of Guy Kirsch Unpredictability- another word for freedom ... and if machines were free?" is one of the most interesting. He deals with the very important property for Artificial Life, named freedom". His starting point are two developments which have taken place in the recent past. On the one hand vertical structured monocentral hierarchies of planned economies have collapsed and on the other hand computer systems with a vertical structure tend to create problems than solve them. Kirsch points out that such systems failed in the missing possibility to interfer with novelties. After defining the term freedom of Human actor and Non-Human actors, he shows why the monocentral structure collapse and polycentral are able to develop. These facts are important for the development of an economical system, and also of fictional systems, where artificial life or non-human actors act in virtual worlds.

A further article deals with simulating life of virtual plants, fishes or butterflies, where creatures and their behaviour in a determined environment is discussed, e.g. a butterfly in a flower field. Another main topic is autonomy (three papers), for which different approaches are shown to equip an Artifical actor with this important property.

In virtual reality a new technique to get three dimensional hand-gestures is presented and the problems of realism in virtual reality are discussed.

The book shows many interesting aspects of developing artificial life and some new points of view in virual reality. Some of them will be a constructive contribution for the following development of creating artificial life in virtual realities.

J. Schuch, ARGE Simulation News, c/o TU Vienna, Wiedner Hauptstr. 8-10, A-1040 Vienna, Austria, Email: argesim@simserv.tuwien.ac.at.

Calendar of Events

December 1994

7-9 **SSIT 94**. Second International Conference on Social Science Information Technology. Amsterdam, The Netherlands
Contact: SSIT 94 Organizing Committee, iec ProGRAMMA, P.O. Box 841, 9700 AV Groningen, The Netherlands, Tel: +31-50-636900, Fax: +31-50-636687, Email: gamma.post@gamma.rug.nl

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, Email: 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: +49-711 397-3740 or -3741, Fax: +49-711 397-3763

March 1995

2-3 **Integration of Pictures, Models and Texts**, Magdeburg, Germany.
Contact: Ms. Steffi Fritz, Otto-von-Guericke University of Magdeburg,Dept. of Simulation and Graphics, FIN-ISG, PSF 4120, D-39016 Magdeburg, Tel.: +49 391 55922858.

13-15 ***5. Symposium Simulation als betriebliche Entscheidungshilfe, neuere Werkzeuge und Anwendungen aus der Praxis***, Braunlage, Germany.
Contact: Barbara Hollenbach, Institut für Wirtschaftsinformatik, Georg-August-Universität Göttingen, Platz der Göttinger Sieben 5, D-37073 Göttingen, Tel: +49-551 394440, Fax: +49-551 399679.

22-23 **ASIM-working group conference *"Simulation - Anwendung und Nutzen"***, Nürnberg, Germany.
Contact: Dipl.Ing. E. Stief, Lehrstuhl für Fertigungsautomatisierung und Produktionssystematik, Universität Erlangen-Nürnberg, Egerlandstr. 7, D-91058 Erlangen, Email: stief@faps.uni-erlangen.de

April 1995

5-6 **8th Workshop *"Simulation und Künstliche Intelligenz"***, Darmstadt, Germany.
Contact: Dr. Gregor Lux, TH Darmstadt, FB Informatik, FG Praktische Informatik, Magdalenenstr. 11c, D-64289 Darmstadt, Tel: +49-6151 16 5110, Fax: +49-6151 16 5472, Email: lux@isa.informatik.th-darmstadt.de

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

11-12 **Media Comm 95**. International Conference on Multimedia Communications. Southampton, U.K.
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

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

27-28 ***"Simulation - Anwendung und Nutzen"***. ASIM Workshop. Erlangen, Germany
Contact: Dipl.-Ing. Elke Stief, FAPS, Universität Erlangen-Nürnberg, Egerlandstr. 7-9, D-91058 Erlangen, Tel: +49-9131-85 7967, Fax: +49-9131-302528, Email: stief@faps.uni-erlangen.de

27-29 IAESTED International Conference **Modelling and Simulation**. Pittsburgh, USA:
Contact: IAESTED Secretariat - MS'95, 1811 West Katella Avenue, Suite 101, Anaheim, CA 92804, USA, Tel: +1-800 995 2161, Fax: +1-714 778 5463, Email: iaested@orion.oac.uci.edu

May 1995

1-5 **System Modelling Control**. Zakopane, Poland.
Contact: Beata Ostrowska, Institute for Computer Science, Technical University of Lodz, ul. Sterlinga 16/18, PL-90-217 Lodz, Poland, Tel: +42-329757, Fax: +42-368522, Email: beaostro@lodz1.p.lod.edu.pl

22-24 **4th European Cars/Trucks Simulation Symposium**. Schliersee, Germany.
Contact: Moshe R. Heller, ASIMUTH GmbH, Planegger Str. 26, D-81241 München, Germany, Tel: +49-89-8345073, Fax: +49-89-8347575.

31-June 2
AARTC'95. 3rd IFAC/IFIP Workshop on Algorithms and Architectures for Real-Time Control. Ostend, Belgium.
Contact: BIRA Belgian Institute for Automatic Control, Desguinlei 214, B-2018 Antwerp, Belgium,
Tel: +32-3-2160996, Fax: +32-3-2160689, Email: 100045.2621@CompuServe.COM

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

7-9 **IWANN'95**. International Workshop on Artificial Neural Networks. Torremolinos, Spain.
Contact: F. Sandoval, IWANN'95, Dept. Tecnologia Electronica, Universidad de Malaga, Plaza El Ejido, s/n, E-29013 Malaga, Spain Tel: +34-5 2131362, Fax: +34-5 2131447, Email: iwann95@ctima.uma.es

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

26-30 **16th International Conference on Application and Theory of Petri Nets**. Torino, Italy.
Contact: Prof. Gianfranco Balbo, Dipto. di Informatica, Universita di Torino, Corso Svizzera 185, I-10149 Torino, Italy, Tel: +39-11-7429 211, Fax: +39-11-751603, Email: PN95@di.unito.it

28-30 **SIMS'95 Simulation Conference 'Simulation in Theory and Practice'**, Lyngby, Denmark.
Contact: Niels Houbak, Laboratory for Energetics, Build 403, DTU, DK-2800 Lyngby, Denmark, Tel: +45-45933757, Fax: +45-45930663, Email: Niels.Houbak @lfe.dtu.dk

July 1995

11-13 **LSS'95**. 7th IFAC/IFORS/IMACS Symposium on Large Scale Systems: Theory and Applications. London, U.K.
Contact: LSS'95 Secretariat, Control Engineering Centre, City University, Northampton Square, London EC1V 0HB, Tel: +44-71 477 8133, Fax: +44-71 477 8568, Email: lss95@city.ac.uk.

August 1995

22-24 **BICSC'95**. The Third Beijing International Conference on System Simulation and Scientific Computing. Beijing, China.
Contact: Prof. Zhang Minglian, Chinese Association for System Simlation, 37 Xueyuan Lu (College Road), Beijing 100083, P.R China.

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

June 1996

10-12 **HPCN challenges in telecomp and telecom**: parallel simulation of complex systems and large-scale applications. The Netherlands.
Contact: Congress Office ASD, P.O. Box 40, 2600 AA Delft, The Netherlands, Tel: +31-15 120234, Fax: +31-15 120250.

September 1996

23-26 *ASIM 96, 10. Symposium Simulationstechnik*, Dresden, Germay.

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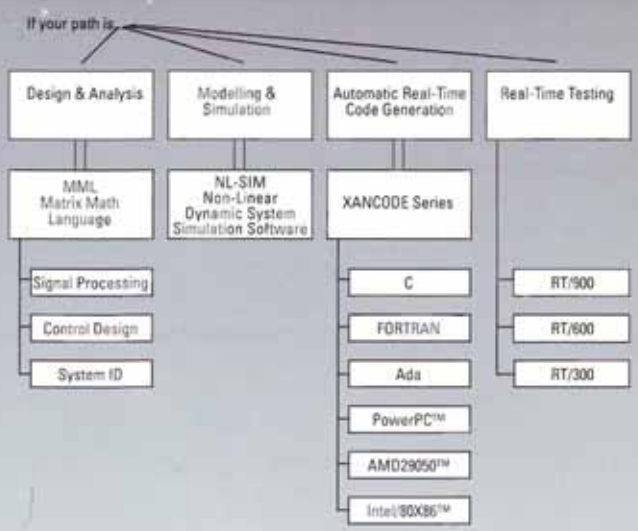

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