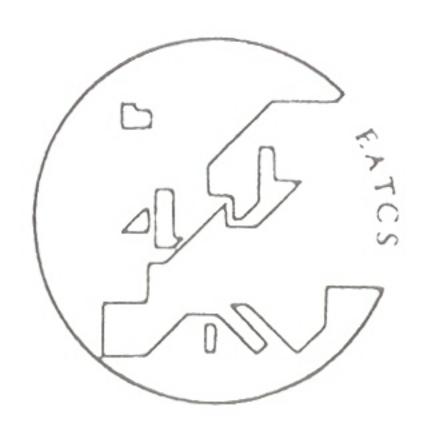# BULLETIN

of the

## European Association for

## Theoretical Computer Science

# EATCS



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In spite of the success of the Congress there are signs indicating that situation in IFIP is far from satisfactory. The first one is the number of participants at IFIP Congresses - far bellow the number attended by some more specialised meetings that can have even 5000 participants. The most striking feature

has been for me the low level of using information processing technologies for conferencing during the Congress. This also reflects the fact that IFIP by itself has not been at frontiers in using information processing technology.

IFIP has a new president, B.Sendov (Bulgaria - the chairman of Bulgarian Academy of Sciences). His professional interests are within computational mathematics. His election is hopefully a sign that there is a strong desire within IFIP to move more forward science.

An important step for the development of theoretical computer science, and also for IFIP, has been made just after IFIP'89 Congress. The decision has been made by General Assembly of IFIP to establish Specialist Group for Foundations of Computer Science within IFIP. Its main goal is to help to speed up, to broaden, to deepen, to support and to unify the development of theoretical computer science all over the world. At the same time quite a broad interpretation of the term "theoretical computer science" has been sugested to cover the whole range of theoretical issues related to information processing.

December 1989                                                    Jozef Gruska

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## Report on the 14th International Symposium on Mathematical Foundations of Computer Science (MFCS'89), Porabka Kozubnik, Poland, Aug 28-Sep 01 1989.

The 1989 MFCS is the fourteenth in the series of MFCS symposia organized alternatively in Czechoslovakia and Poland. For the first time after the institution of martial law in 1981 the meeting returned to Poland. The conference was held at the HPR Center at Porabka-Kozubnik, an industrial holiday resort consisting of a number of appartment houses, pubs, restaurants, meeting rooms and sporting equipments in the foothills of the Silezian mountains about 20 km from Bielsko-Biala.

The meeting was organized by a committee from the Institute of Informatics of the Warsaw University consisting of K. Diks, M. Grabowski. A. Kreczmar, A. Szalas and, last but not least, Grazyna Mirkowska. Transport and lodging arrangements were arranged using the intermediate services of Sport Tourist, the representatives of which formed a very visible non-scientific presence at the conference, always involved in arranging things and businesses. Interaction with other visitors of the HPR Center was non existent; the closest town was Bielsko-Biala, and it was quite hard to go there privately (the ladies program included a shopping trip there).

Given the state of affairs in Poland it should be considered a major achievement that the conference was held; that it moreover went reasonably smooth from the perspective of the participants was a big surprise and a true miracle. Needless to state that a lot of work was being done behind the scenes by the organizing committee.

The conference resort is located nicely in the mountains, but there was little opportunity to enjoy the landscape. For four days rain was pouring down; in particular on the excursion day the rain was very heavy and one obtained the impression that the entire valley where the conference site is located was going to be flooded. As a consequence the mountain vilage excursion had to be canceled, leaving an excursion to Auschwitz as the unique choice for the social outing. This trip contributed substantially to the impressions this conference has left with your reporter.

With hindsight I also must conclude that this trip (following my attendance to the FCT'89 meeting in Szeged) will turn out to have been my last visit to Communist Eastern Europe as we have known it ffor several decades. At the time of the conference change was in the air but the extent of what was going to follow was still unexpected. Poland was in the process of building its first non-communist government, and a large group of GDR citizens were gathering in Hungary hoping to escape to the West. At the time I am writing this report the GDR, Czechoslovakia, Hungary, Poland, and Romania have lost their communist dominated government.

Another strong impression was the experience of an economy in a ongoing state of collapse. The few things we could buy were available at a ridiculous low price, given the by that time legalized black market exchange rate of 1$ = 7600 Zl. When I left you should add another 1000 Zl.; by the time I am writing this report this exchange rate has become the official and only rate, and one can only guess at what must have happened to the prices in Poland ... . One of the standard topics for conference gossip was the struggle of those participants who had arrived to Poland with a car collecting gas; due to a forthcoming price increase supplies were low and lines were forming everywhere. For a while the safe returning home of Juris Hartmanis seemed to depend on the success in canibalizing the gas from the wrecked car to be mentioned below, an occasion at which even the agent of Sport Tourist provided evidence of some creative thinking. Even greater were the troubles of the poor group of Dutch computer scientists who had the bad luck of wrecking their rented car in a ditch during the rainstorms about 30 km from the conference site. Driving 20 km/h they succeeded in making it to Porabka but that was as far as the car could go. After a lot of organizational troubles they were liberated on Friday night by a Dutch tow truck; its driver became in this way the first participant of an MFCS to arrive after the last talk and still obtain a warm welcome.

As told above the social event of the conference was an excursion to Auschwitz. The trip was made against the background of pouring rain and of the commemoration of the 50th aniversary of the German invasion which started WW II. A majority of the participants of the conference went to the former concentration camp, consisting of colleagues from various participating countries; the descendants of the former victims sharing the experience with the descendants from those who may have been involved with the other side. For me the most impressive experience of the excursion was seing the camp and experiencing its size; no film, photograph or explanation from books can replace the experience of really seeing how huge and aweful the site is, in particular the Birkenau part of the camp.

Illustrative for the atmosphere at this conference was the statement read by two GDR representatives before their presentations, apologizing the fact that they were Germans and thanking for the opportunity to be in Poland and working together with Polish colleagues in the conference, 50 years after the start of WW II. At the time of the meeting reading such a statement had to be understood as trespassing beyond the official politics of their country, since it might be construed

to refer to an unified German entity .... (the change in the GDR government was still to come at this time).

Let me concentrate on the scientific part of the program. We had the usual combination of invited presentations in the morning sessions, accepted contributions in the afternoon, and the traditional wildcat sessions. An evening session on Tuesday was dedicated to the theme *LOGLAN vs. Modula 7 ?* and a series of short presentations was held on Friday afternoon after the closing of the official program.

The first invited talk was by Hartmanis; it dealt with the problem of space constructability and its consequences for low space bounds in the range between loglog(n) (below which nothing happens) and log(n) (where life becomes easy). As the rumor goes, his main problem by now seems to have been solved, and the solution may be presented at the next ICALP.

Harel showed how communication, together with nondeterminism and parallellism represents a third dimension in a lattice structure yielding interesting exponential succinctness results in the finite automata setting and even higher exponential bounds in other contexts.

Mehlhorn spoke about the ongoing LEDA project at Saarbrücken, where a program library of efficient data structures is created; the design and specification of this library leading to the inescapable problem of describing the semantics of pointers ...

Trakhtenbrot was the first in a series of invited talks on the emerging understanding of concurrency being represented by the semantic operation of intersection, conjunction, join or other equivalent variation of this fundamental concept; the three presentations of Friday (Olderog, Mazurkiewicz and Cherkasova (replacing Kotov)) arrived at a similar conclusion within different semantic settings. It is a positive sign to see this emergence of consensus on this fundamental notion after all those years of confusion. Having missed the presentations of Agafonov and Courcelle I can not provide comments on the reamining two invited talks.

Among the submitted papers my attention was drawn to McKenzie's paper on combinatorial lower bounds for a problem on semigroups - it seems clear that classical adversary arguments can be applied here, something for the authors to look after. Rovan presented a paper on the ongoing research on a strengthened version of the alternating machine which becomes even more powerfull by throwing in communication or synchronization as a computational primitive. B. Just (who also was responsible for bringing a conference baby to Porabka) presented another application of the $L^3$ algorithm. One of the more provocative papers was presented by Josselin who proposed to arrange computer memories according to the pattern of the Caley graph of a non-commutative group, thus opening the way to a direct translation-invariant embedding of complete binary trees. The Pinwheel scheduling problem presented by Rosier has as its most surprising feature the fact that it is not an NP problem due to the fact that the schedules one tries to optimize are exponentially large compared to the size of the input description - a phenomenon seldomly encountered in true-life combinatorial problems. Wiedermann presented a method for turning symmetric neural nets into effectively acyclic ones ( a trick which I have seen since in a survey paper on Neural nets written by Parberry without reference, indicating that it may have been a folk theorem). As a last paper I mention Ablayev's result who has established that Freivald's O(nloglogn) upperbound for probabilistic Turing machines recognizing a nonregular language is tight since he has obtained a matching lowerbound; this new result is however not in the proceedings of the conference.

The theme of the Loglan vs. Modula 7 ? evening session was the extent to which the Loglan language deveopment project which originated from Salwicki's group in Warsaw in the 70-ies has anticipated ideas which have become well accepted elements in object oriented programming as we know it today.

The proceedings of the 1989 MFCS have appeared as volume 379 in the Springer Lecture Notes in Computer Science series.

Since the program of the conference has not yet appeared in the EATCS bulletin I include it in this report.

Peter van Emde Boas

MFCS'89 - Scientific program.

Monday August 28  Morning - Invited lectures
Chair:       A. Blikle (replacing B. Monien)

9.45 - 10.--   Opening of the symposium

10.-- - 10.45  J. Hartmanis & D. Ranjan (New York): *Tape bounded computations: review and new separartion results.*

11.30 - 12.15  D. Harel (Rehovot): *A thesis for bounded concurrency.*

Afternoon:   Contributions
Session A
Chair:       M. Chytil
15.-- - 15.20  L.A. Hemachandra (Rochester) A. Hoene, D. Siefkes (Berlin West): *Polynomial-time functions generate SAT: on P-splinters*

15.30 - 15.50  D.A. Mix-Barrington (Amherst) & P. McKenzie (Montreal): *Oracle branching programs and Logspace versus P*

16.-- - 16.20  V.A. Stetsenko (Moscow): *One more method for proving lower bounds on the formula complexity of boolean functions*

16.50 - 17.10  K. Diks & W. Rytter (Warszawa) & T. Hagerup (Saarbrücken): *Optimal parallel algorithms for the recognition and coloring outerplanar graphs*

17.20 - 17.40  J. Dassow (Magdeburg), J. Karhumäki (Turku) & J. Hromkovic, B.Rovan & A. Slobodová (Bratislava): *On the power of synchronization in parallel computations*

Session B
Chair:       P. Mosses
15.-- - 15.20  B. Steffen (Edinburgh): *Optimal data flow analysis via observational equivalence*

15.30 - 15.50  J.N. Kok (Utrecht): *An iterative metric semantics for nondeterministic dataflow*

16.-- - 16.20 F.S. de Boer & J. Rutten (Amsterdam), J.N. Kok (Utrecht) & C. Palamidessi (Pisa): *Control flow versus logic: a denotational and declarative model for Guarded Horn Clauses*

16.50 - 17.10 E.M. Schmidt & M.I. Schwartzbach (Århus): *An imperative type hierarchy with partial products*

17.20 - 17.40 J. Farrés-Casals (Edinburgh): *Proving correctness of constructor implementations*

## 19.00 WELCOME PARTY

## Tuesday August 29 Morning - Invited lectures

Chair:     J. Hartmanis

9.-- - 9.45   K. Mehlhorn & S. Näher (Saarbrücken): *Reusable efficient software (RES)*

10.-- - 10.45 B. Trakhtenbrot (Tel-Aviv): *Understanding Nets*

## Contributions
## Session A

Chair:     L. Pacholski (replacing Langmaack)

11.30 - 11.50 B. Just (Frankfurt/Main): *Integer relations among algebraic numbers*

15.-- - 15.20 A. Saoudi (Paris): *Pushdown automata on infinite trees and Omega-Kleene closure of context-free tree sets*

15.30 - 15.50 C. Caldude (Buchharest): *Ehrenfeucht's theorem and Hilberts basis theorem: a constructive glimpse* (canceled)

16.-- - 16.20 U. Heuter (Aachen): *Generalized definite tree languages*

16.50 - 17.10 M. Zaionc (Kraków): *How to define functionals on free structures in typed* $\lambda$-*calculus*

17.20 - 17.40 A. Weber (Frankfurt/ Main): *On the lengths of values in a finite transducer*

## Session B

Chair:     D. Harel

11.30- 11.50 M.G. Gouda & E. Rosier (Austin) & R.R. Howell (Manhattan): *System simulation and the sensitivity of self-stabilization*

Chair:     A. Maggido - Sekettini

15.-- - 15.20 R. van Glabbeek (Amsterdam) & U. Goltz (Sankt Augustin): *Equivalence notions for concurrent systems and refinement of actions*

15.30 - 15.50 J-J.Ch. Meyer & E.P. de Vink (Amsterdam): *Pomset semantics for true concurrency with synchronization and recursion*

16.-- - 16.20 E. Badouel (Rennes): *Algebraically closed theories*

16.50 - 17.10 J. Knoop (Kiel) & B. Steffen (Edinburgh): *Finite constants: characterization of a new decidable set of constants*

17.20 - 17.40 C. Josselin & J-P. Moskowitz (Limeil-Brévannes): *Memory and Algebra*

*Evening session on LOGLAN or Modula 7 ?*
presentations by A. Salwicki, A. Kreczmar, U. Milewska, L. Banachowski & A. Litwinink

## Wednesday August 30

## Contributions
## Session A

Chair:     K. Mehlhorn

9.-- - 9.20   R. Holte, L. Rosier, I. Tulchinsky & D. Varvel (Austin): *Pinwheel scheduling with two distinct numbers*

9.30 - 9.50   M Slusarek (Kraków): *A coloring algorithms for interval graphs*

10.30 - 10.50 J. Wiedermann (Bratislava): *On the computational power of symmetric neural networks*

11.-- - 11.20 B. Chlebus, K. Diks, W. Rytter & T. Szymacha (Warszawa): *Parallel complexity of lexicographically first problems for tree-structured graphs*

11.30 - 11.50 V. Palko, O. Sykora & I. Vrto (Bratislava): *Area complexity of merging*

## Session B

Chair:     M. Protassi

9.-- - 9.20   Ch. Elkan (Austin): *a rational reconstruction of nonmonotonic TMSs*

9.30 - 9.50   J.H. Andrews (Edinburgh): *Proof-theoretic characterizations of logic programming*

10.30 - 10.50 D. Szczepanska (Warszawa): *The Hoare-like verification system for a language with exception handling mechanism*

11.-- - 11.20 U. Petermann (Leipzig): *An extended Herbrand theorem for first-order theorie with equality interpreted in partial algebras*

## AFTERNOON - EXCURSION

## Thursday August 31 Morning - Invited lectures

Chair:     B. Trakhtenbrot (replacing W. Wechler)

9.-- - 9.45   V.N. Agafonov (Kalinin): *From specification languages to specification knowledge bases*

10.-- - 10.45 B Courcelle (Talence): *Monadic second-order logic and context free grammar*

## Contributions
## Session A

Chair:     P. van Emde Boas

11.30 - 11.50 M. Regnier (Le Chesnay): *Knuth-Morris-Pratt algorithm : an analysis*

15.-- - 15.20 Ch. Meinel (Berlin/GDR): *Switching graphs and their complexity*

15.30 - 15.50 S. Iwanowski (Berlin-West): *Testing approximate symmetry in the plane is NP-hard*

16.-- - 16.20 W. Kowalczyk (Warszawa & Amsterdam): *Complexity of decision problems under incomplete information*