Lecture Notes in Computer Science 1181
Edited by G. Goos, J. Hartmanis and J. van Leeuwen

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Perspectives of System Informatics

Second International
Andrei Ershov Memorial Conference
Akademgorodok, Novosibirsk, Russia
June 25-28, 1996
Proceedings

Springer

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Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Perspectives of system informatics : proceedings / Second International Andrei Ershov Memorial Conference, Akademgorodok, Novosibirsk, Russia, June 25 - 28, 1996. Dines Bjørner ... (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Budapest ; Hong Kong ; London ; Milan ; Paris ; Santa Clara ; Singapore ; Tokyo : Springer, 1996
(Lecture notes in computer science ; Vol. 1181)
ISBN 3-540-62064-8
NE: Bjørner, Dines [Hrsg.]; International Andrei Ershov Memorial Conference <2, 1996, Akademgorodok>; GT

CR Subject Classification (1991): F.3, F.4, D.2, I.1, I.2

ISSN 0302-9743
ISBN 3-540-62064-8 Springer-Verlag Berlin Heidelberg New York

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Printed in Germany

Typesetting: Camera-ready by author
SPIN 10550455 06/3142 - 5 4 3 2 1 0 Printed on acid-free paper

Preface

This volume comprises the papers presented at the Second International Conference "Perspectives of Systems Informatics" held in Akademgorodok, Novosibirsk, Russia, June 25 - 28, 1996. The main goal of the conference was to present an overview of a number of research directions which are very important for the growth of such a dynamic research area as system informatics.

From the early days of computing when the problems of the technical implementation of hardware and the low level program coding demanded all the attention of the leading computing scientists to now, we have seen drastic changes, especially in recent years. We have seen the steps from sequential computing to parallel computing and from stand-alone machines to computer networks. Nowadays computers serve the purposes of data communication and visualization in addition to the traditional purposes of data computation and storage. Software systems have become larger, more complex, and more powerful.

Modern computer science is a rapidly growing discipline with many applications. In its numerous fields it has accumulated a large number of models, concepts, and approaches which are often uncorrelated and misunderstood by specialists in other fields of computer science.

System informatics provides the basis for all the different applications; nevertheless, it still has a variety of directions and suffers under the same problem of diversity. Some nonuniformity of the topics of this conference was deliberately chosen by the organizers and encouraged by the international programme committee. We hope this will improve the mutual understanding between specialists in various fields of system informatics and help to discover common threads in its fundamental concepts.

This conference was the second one in the line. The First International Conference "Perspectives of System Informatics" was held in Novosibirsk, Akademgorodok, May 27 - 30, 1991. It gathered a wide spectrum of specialists and was undoubtedly very successful.

The second conference included many of the subjects of the first one, such as theoretical computer science, programming methodology, and new information technologies, which are the most important components of system informatics. The promising field of artificial intelligence was covered much more widely. The style of the first conference was preserved to a certain extent: whereas the first conference consisted exclusively of invited papers, the second one, being more conventional in its style, contained a considerable number of invited papers – about one quarter of the total – in addition to contributed papers.

The conference, like the first one, was dedicated to the memory of A.P. Ershov, the real and recognized leader in Soviet (and Russian) informatics.

The late Academician Andrei P. Ershov was a man for all seasons. He commanded universal respect and received affection all over the world. His view of programming was both a human one and a scientific one. He created at

Akademgorodok a unique group of scientists, some now in faraway regions of the world: a good example of "technology transfer", although perhaps not one that too many people in Russia are happy about.

Many of his disciples and colleagues continue to work in the directions initiated or stimulated by him, at the A.P. Ershov Institute of Informatics Systems, named after him, which was the main organizer of the conference.

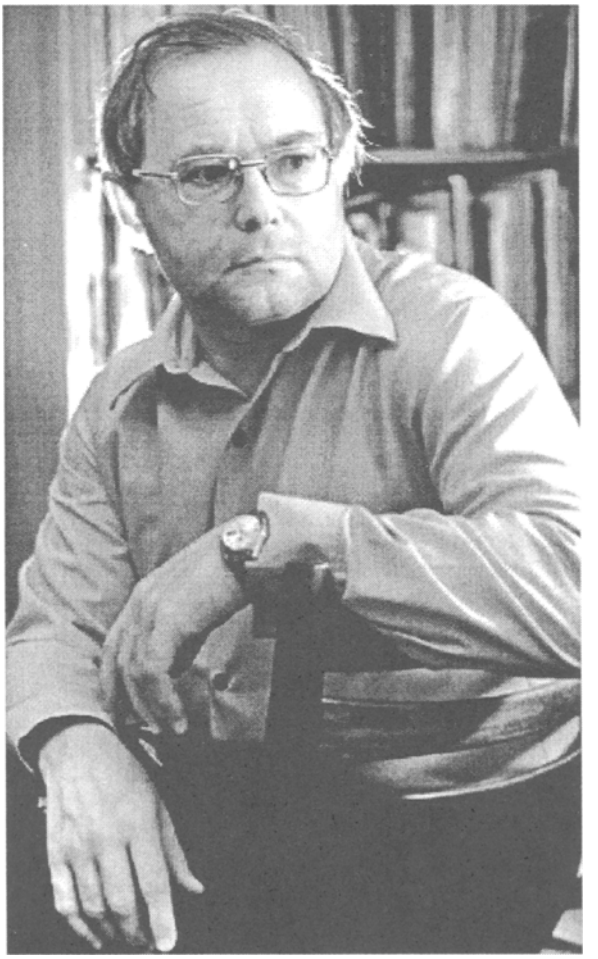
This volume includes complete versions of the papers presented at the conference. Extended abstracts of the papers have been published in the preliminary proceedings distributed during the conference. Unfortunately, D. Bjørner and A. Stepanov did not have time to prepare final versions of their papers, so this book comprises only their short abstracts.

A poster session was organized during the conference, and the list of posters is also included.

We are glad to express our gratitude to all the persons and organizations who contributed to the conference; to the sponsors for their moral, financial, and organizational support, and to the members of the local Organizing Committee for their mutual efforts to make this event a success. We are especially grateful to A. Zamulin, N. Cheremnykh, and T. Yakhno for their selfless labor when preparing the conference.

September 1996

D. Bjørner
M. Broy
I. Pottosin



Academician Andrei Petrovich Ershov was one of the early Soviet pioneers in the field of theoretical and systems programming, a founder of the Siberian School of Computer Science. His significant contributions to establishing informatics as a new branch of science and a new phenomenon of the social life are widely recognized in our country and abroad.

A.P.Ershov's fundamental research on program schematology and theory of compilation inspired a large number of his students and successors. He investigated a broad spectrum of systems programming problems: implementation of DO statement in programming languages; hash-addressing with application to the common subexpression elimination; program schemata over distributed memory; the theory and algorithms for global memory optimization, etc.

Ershov's book "A Programming Programme for the BESM Computer" was one of the world's first monographs on automatic programming.

For major contributions in the theory of mixed computation he was awarded the Academician A.N.Krylov Prize: it was the first time that a programmer received the most prestigious mathematical award of the USSR Academy of Sciences.

A.P.Ershov's works on software engineering formed the basis of this research direction in the Soviet Union.

The ALPHA programming language and optimizing ALPHA compiler, the first Soviet time-sharing multiprocessor system AIST-0, the CAI system Shkol' nitsa, the electronic publishing system RUBIN and the multiprocessor workstation MRAMOR — all these projects have been initiated and directed by A.P.Ershov.

Since 1959 Andrei P. Ershov was with the Siberian Division of the USSR Academy of Sciences. He played an active role in the foundation of the Novosibirsk Computer Center. In the 60s his popular lectures greatly affected the establishment of programming as a profession.

Due to the breadth of his vision and unique ability to see the perspectives, A.P.Ershov was one of the first men in our country to recognize a key role of computerization in the progress of both science and society. He generated a wealth of seminal ideas which became a basis of research automation, parallel programming and artificial intelligence in our country. More then 20 years ago A.P.Ershov began to experiment with teaching programming in secondary school. Initially unrecognized, these attempts evolved into the notion of computer literacy and resulted in establishing a course on informatics and computing machinery in Soviet schools.

A.P.Ershov was an outstanding organizer and active contributor of many important international conferences; he served as an Editor or a member of Editorial Board of Mikroprotsessornye Sredstva i Sistemy, Kibernetika, Programmirovanie (all in Russian), Acta Informatica, Information Processing Letters, Theoretical Computer Science, etc. In 1974 A.P.Ershov was appointed Distinguished Fellow of the British Computer Society; in 1981 he received the Silver Core Award for services rendered to IFIP.

A.P.Ershov's seminal speeches on both professional and general themes were always in the focus of public attention. Especially notable was his lecture on "Aesthetics and the human factors in programming" presented at AFIPS Spring Joint Computer Conference in 1972 that greatly influenced the world scientific community. The title of another paper, "Programming, the second literary", has become a popular metaphor which is now widely used without any reference to the author. His kind mind, coupled with remarkable power of observation and penetrating analysis made a great impact on everything he did.

Andrei Ershov was not only an extremely gifted scientist, teacher, and fighter for his ideas, but also an outgoing and many-sided person. He wrote poetry, translated the works of R.Kipling and other English poets. He enjoyed playing the guitar and singing. He possessed the rare gift to care about the concerns of others. Everybody who had the pleasure of knowing and working with professor A.P.Ershov will always remember his great visions, eminent achievements and generous friendship.

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We gratefully acknowledge tye following outside reviewers for their assistance in evaluating the submitted papers.

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