BIBLIOGRAPHY ON PROVING THE CORRECTNESS OF COMPUTER PROGRAMS

by

Ralph L. London

Technical Report #64

October 1969

Computer Sciences Department
1210 West Dayton Street
Madison, Wisconsin 53706
Preface and Acknowledgments

As this bibliography shows, there is considerable research interest in the topic of proving the correctness of computer programs. Included in the bibliography are all published or unpublished papers, books, reports, theses, etc., known to me that are at all related to the topic. Material cited encompasses very abstract papers dealing with the transformation and equivalence of program schemata; proposals and methods for proving individual programs correct; papers proving the correctness of specific algorithms and programs; and work that has proofs as an incidental part of the paper. In other words, the range is from the very abstract to the very practical. An item is included unless it appeared obvious to me that it did not belong. Thus material of marginal relevance is included.

A complete citation was impossible to obtain for a few items. The best available information is given. An item is in the same language as that of the title, unless otherwise indicated at the end of a citation. Note that the contents of the Russian publication Problemy Kibernetiki appears in English translation as Problems of Cybernetics; similarly Kibernetika appears as Cybernetics. I would be most interested in learning of corrections and additional citations to update the bibliography.

An earlier version of this bibliography appeared in June, 1969. The current version will be published in Machine Intelligence 5.

This work was supported by the National Science Foundation under Grant GP-7069 and the Mathematics Research Center, United States Army under Contract Number DA-31-124-ARO-D-462. The contributions of D. C. Cooper,
J. W. de Bakker, D. I. Good, L. Green, Z. Manna, R. Milner, C. S. Wells and D. Wood to compiling the bibliography are acknowledged without in any way holding them responsible for what has been included, excluded or omitted.
BIBLIOGRAPHY ON PROVING THE CORRECTNESS OF COMPUTER PROGRAMS

Compiled by Ralph L. London, Computer Sciences Department
University of Wisconsin, Madison, Wisconsin 53706


Rahm, J.L., Graph Models of Computations in Computer Systems, Department of Engineering Report No. 68-46, University of California at Los Angeles, October, 1968.


Rasu, S.K., Transformation of Program Schemes to Standard Forms, IEEE Conference Record of the Ninth Annual Symposium on

BASU, S.K., TRANSFORMATION OF PROGRAM SCHEMES TO STANDARD FORMS, TECHNICAL REPORT, CARNEGIE-MELLON UNIVERSITY, FEBRUARY, 1968.


REST, S.F., A PROOF THAT A DEMONSTRATION PROGRAM WORKS, JULY, 1967.


COOPER, D.C., THE EQUIVALENT OF CERTAIN COMPUTATIONS, COMPUTER JOURNAL,


CUOPER, D.C., BOHM AND JACOPINI'S REDUCTION OF FLOW CHARTS, LETTER TO EDITOR, COMMUNICATIONS OF ACM, VOL. 10, NO. 8, AUGUST, 1967, PP. 463-473. SEE ALSO BOHM, C. AND JACOPINI, G.


DE BAKKER, J.W., SEMANTICS OF PROGRAMMING LANGUAGES, ADVANCES IN INFORMATION SYSTEMS SCIENCE, VOL. 2, TOUT, J.T., (Ed.), PLENUM PUBLISHING CORPORATION, (TO APPEAR).

DIJKSTRA, E.W., SOLUTION OF A PROBLEM IN CONCURRENT PROGRAMMING CONTROL, COMMUNICATIONS OF ACM, VOL. 8, NO. 9, SEPTEMBER, 1965, P. 569. SEE ALSO KNUTH, D.E.


FARLEY, J.C., GENERATING A RECOGNIZER FOR A BNF GRAMMAR, TECHNICAL REPORT, CARNEGIE-MELLON UNIVERSITY, JUNE, 1965.

ELGOT, C.C., ABSTRACT ALGORITHMS AND DIAGRAM CLOSURE, PROGRAMMING LANGUAGES, GENUYS, F., (ED.), ACADEMIC PRESS, LONDON AND NEW YORK, 1968, PP. 1-42.


ENGELER, E., FORMAL LANGUAGES, AUTOMATA AND STRUCTURES, MARKHAM PUBLISHING, CHICAGO, 1968.

ENGELER, E., APPROXIMATION BY MACHINES, FORSCHUNGSINSTITUT FÜR MATHEMATIK, ETH, ZUERICH, 1969.

ENGELER, E., ALGORITHMIC APPROXIMATIONS, FORSCHUNGSINSTITUT FÜR MATHEMATIK, ETH, ZUERICH, UNDATED.
ENGELER, E., PROOF THEORY AND THE ACCURACY OF COMPUTATIONS, (TO APPEAR).


ERSHOV, A.P., OPERATOR ALGORITHMS III (ON THE OPERATOR SCHEMES OF YANOV), PROBLEMY KIBERNETIKA, 20, NAUKA, MOSCOW, 1967, pp. 181-200, (RUSSIAN), ALSO PROBLEMS OF CYBERNETICS, IN PRESS.


GLEBOV, N.I., O STROENII KLASA R-KRITERIEV ZKVIVALENTNOSTI, PROBLEMY


GOOD, N.I., PROVING THE CORRECTNESS OF COMPUTER PROGRAMS, UNPUBLISHED RESEARCH, UNIVERSITY OF WISCONSIN.


IANOV, Y.I., ON THE EQUIVALENCE AND TRANSFORMATION OF PROGRAM SCHEMES, COMMUNICATIONS OF ACM, VOL. 1, NO. 10, OCTOBER, 1958, PP. 8-12.

IANOV, Y.I., ON MATRIX PROGRAM SCHEMES, COMMUNICATIONS OF ACM, VOL. 1, NO. 12, DECEMBER, 1958, PP. 3-6.


IANOV, Y.I., ON TRANSFORMATIONS OF PROGRAM FLOW-DIAGRAMS, JOINT PUBLICATIONS RESEARCH SERVICE, 6868, OFFICE OF TECHNICAL SERVICES, MARCH, 1962.


IGARASHI, S., EQUIVALENCE-THEORETICAL TREATMENT OF VERIFICATION CONDITIONS, WG2.2 (UNDER TC2 OF IFIP) MEETING, VIFNNA, APRIL, 1969.


ITO, T., NOTES ON THEORY OF COMPUTATION AND PATTERN RECOGNITION, ARTIFICIAL INTELLIGENCE MEMO NO. 61, STANFORD UNIVERSITY, MAY, 1968.

TUHRIAGA, R., CONTRIBUTIONS TO MECHANICAL MATHEMATICS, PH. D. THESIS, CARNEGIE-MELLON UNIVERSITY, 1967.

IVERSON, K.E., A PROGRAMMING LANGUAGE, JOHN WILEY AND SONS, NEW YORK, 1962.


KARP, R.M., SOME APPLICATIONS OF LOGICAL SYNTAX TO DIGITAL COMPUTER PROGRAMMING, PH. D. THESIS, HARVARD UNIVERSITY, 1959.

KARP, R.M., A NOTE ON THE APPLICATION OF GRAPH THEORY TO DIGITAL COMPUTER PROGRAMMING, INFORMATION AND CONTROL, VOL. 3, NO. 2, JUNE, 1960, PP. 179-190.


KING, J.C., A PROGRAM VERIFIER, UNPUBLISHED RESEARCH, CARNEGIE-MELLON UNIVERSITY.

KNUTH, D.E., ADDITIONAL COMMENTS ON A PROBLEM IN CONCURRENT PROGRAMMING CONTROL, LETTER TO EDITOR, COMMUNICATIONS OF ACM, VOL. 9, NO. 5, MAY, 1966, PP. 321-322. SEE ALSO DIJKSTRA, E.W.


LUCKHAM, D.C., INVESTIGATION OF THE THEORY OF ALGORITHMS WITH EMPHASIS ON PROGRAM SIMPLIFICATION, BOLT BERANEK AND NEWMAN INC., REPORT NO. 1225, 1965.


Manna, Z., Formalization of Properties of Programs, Artificial Intelligence Memo No. 64, Stanford University, July, 1968.


Martynyuk, V.V., O proverke zhivavnostnosti operatornykh skhem, Tezisy kratkikh nauchnykh soobshcheniy mezhduunarodnomu kongressu matematikov 1966 g. (Sektsiya 14), Moskva, 1966.


MCCARTHY, J., (ED.), PAPERS IN THEORY OF COMPUTATION, (REPRINTED PAPERS), STANFORD UNIVERSITY, MARCH, 1966.


MILNER, R., A PARTIAL DECISION PROCEDURE FOR P # Q, WHERE P, Q ARE PROGRAM SCHEMES WITH NON-INTERSECTING LOOPS, COMPUTATION SERVICES DEPARTMENT MEMORANDUM NO. 1, UNIVERSITY COLLEGE OF SWANSEA, WALES, OCTOBER, 1968.
MILNER, R., SOME EQUIVALENCE RELATIONS ON PROGRAM SCHEMES, COMPUTATION SERVICES DEPARTMENT MEMORANDUM No. 5, UNIVERSITY COLLEGE OF SWANSEA, WALES, MARCH, 1969.


MUNTEANU, E., ANALYSE LOGIQUE DES ALGORITHMES(1), MATHEMATICA, VOL. 9(32), 1, 1967, PP. 111-128.

NAUR, P., PROOF OF ALGORITHMS BY GENERAL SNAPSHOTS, BIT, VOL. 6, NO. 4, 1966, PP. 310-316.


ORGASS, R.J., PROBLEMS IN THE THEORY OF PROGRAMMING, IBM RESEARCH PAPER RC-2236, MARCH, 1968.


PATERSON, M.S., EQUIVALENCE PROBLEMS IN A MODEL OF COMPUTATION, PH. D. THESIS, UNIVERSITY OF CAMBRIDGE, AUGUST, 1967.


PERLIS, A.J., UNPUBLISHED NOTES ON PROOFS OF THREE NUMERIC ALGORITHMS, UNIVERSITY OF MICHIGAN SUMMER SESSION, JUNE, 1963.


RUTLEDGE, J.D., ON TANNOY PROGAM SCHEMATA, JOURNAL OF ACM, VOL. 11,
RUTLEDGE, J.D., THE PROBLEM OF CORRECT PROGRAMMING, UNDATED.


SANDERSON, J.G., MATHEMATICAL MODELS OF PROGRAMMING LANGUAGES, JOURNAL OF ACM, (TO APPEAR).


STARK, R.H., ON MEANS TO RECORD ALGORITHMS TO FACILITATE GENERATION OF ERROR-FREE PROGRAMS, COMPUTING CENTER REPORT 68-1, WASHINGTON STATE UNIVERSITY, 1968.

THIELE, H., WISSENSCHAFTSTHEORFTISCHE UNTERSUCHUNGEN IN ALGORITHMISCHEN SPRACHEN I, VEB DEUTSCHER VERLAG DER WISSENSCHAFTEN, BERLIN, 1966.

THORELLI, L.E., AN ALGORITHM FOR COMPUTING ALL PATHS IN A GRAPH, HIT, VOL. 6, NO. 4, 1966, PP. 347-349.

TOBEY, R.G., RATIONAL FUNCTION INTEGRATION, PH. D. THESIS, HARVARD
UNIVERSITY, 1967.

TUNDYAN, R.N., LOGICHESKIE SKHEMY ALGORITMOV Iikh ZKVIVALENTNYE
PREOBRAZOVANIYA, PROBLEMY KIBERNETIKI, VOL. 14, 170-V0 NAUKA,
MOSKVA, 1964.

VAN WIJNGAARDEN, A., NUMERICAL ANALYSIS AS AN INDEPENDENT SCIENCE, RIT,
VOL. 6, NO. 1, 1966, PP. 66-81.

VAN WIJNGAARDEN, A., MAILLoux, B.J., PECK, J.E.L., AND KOSTER,
C.H.A., FINAL DRAFT REPORT ON THE ALGORITHMIC LANGUAGE ALGOL
68, MATHEMATISCH CENTRUM REPORT MR 100, AMSTERDAM, 1968.

WAGNER, R.A., SOME TECHNIQUES FOR ALGORITHM OPTIMIZATION WITH
APPLICATION TO MATRIX ARITHMETIC EXPRESSIONS, PH. D. THESIS,
CARNEGIE-MELLON UNIVERSITY, 1968.

WALDINGER, R.J. AND LEE, R.C.T., PROW: A STEP TOWARD AUTOMATIC PROGRAM
WRITING, PROCEEDINGS OF THE INTERNATIONAL JOINT CONFERENCE
ON ARTIFICIAL INTELLIGENCE, WALKER, D.E. AND NORTON, L.M.,
(EDS.), 1969, PP. 241-252.

WALTERS, D.A., A REPRESENTATION SYSTEM FOR PARSEING PROCEDURES, RCA
LABORATORIES SCIENTIFIC REPORT NO. 1, 1968, ALSO PH. D. THESIS,
UNIVERSITY OF PENNSYLVANIA, 1968.

WIRTH, N., ON CERTAIN BASIC CONCEPTS OF PROGRAMMING LANGUAGES,
COMPUTER SCIENCE TECHNICAL REPORT NO. CS65, STANFORD
UNIVERSITY, MAY, 1967.

WOOD, D., A PROOF OF HAMBLIN'S ALGORITHM FOR TRANSLATION OF ARITHMETIC
EXPRESSIONS FROM INFIX TO POSTFIX FORM, BIT, VOL. 9, NO. 1,
1969, PP. 59-68.

WOOD, D., THE THEORY OF LEFT FACTORED LANGUAGES, COMPUTER JOURNAL, VOL.
12, 1969, (TO APPEAR).

YANOV, YU.I. SEE IANOV, Y.I.

YUHE, J.M., COMPUTER PROGRAMMING FOR ACCURACY, MATHEMATICS
RESEARCH CENTER TECHNICAL SUMMARY REPORT NO. 866,
ZAMA, N., ON MODELS OF ALGORITHMS AND FLOWCHARTS, COMMENTARII
MATHEMATICI UNIVERSITATIS SANCTI PAULI, VOL. 14, NO. 2, 1966,
PP. 123-134.

ZAMA, N., ON A GENERALIZATION OF ALGORITHMS AND ONE OF ITS APPLICATIONS
(I), COMMENTARII MATHEMATICI UNIVERSITATIS SANCTI PAULI, VOL.

ZAMA, N., ON SOME ALGEBRAIC FORMULATION OF ALGORITHMS, COMMENTARII
MATHEMATICI UNIVERSITATIS SANCTI PAULI, VOL. 17, NO. 1, 1969,
PP. 53-62.

ZASLAVSKII, I.D., GRAPH-SHEMES WITH MEMORY, MATEMATYCHESKOGO INSTUTA
IMENI V. A. STEKLOVA, LXII, PP. 99-192, (RUSSIAN).

******************************************************************************

OCTOBER 6, 1969