Report of a Visit to Discuss Common Programming Languages in Czechoslovakia and Poland, 1963

JOHN A. GOSDEN (*Editor*), ROGER E. GAY, JOHN L. JONES, JACK N. MERNER, CHRISTOPHER J. SHAW

Background

Early in June 1963 there was a meeting in Berlin [1] of the Subcommittee for Programming Languages, SC5 of TC97, the Technical Committee for Standardization of Computers and Information Processing [2]. Taking advantage of the proximity of Poland and Czechoslovakia, who are interested in the subject but have not actively participated in SC5, a small group representing the Secretariat of SC5 visited those countries. The major purpose of the visit was to discuss such topics as the state of the art of programming languages in each country—both development and use, any national standardization activity, participation in international standardization, and the present state and future prospects of international standardization. A formal report was made to SC5 in Berlin after the visit. The present report is not an official report of the visit. It is a private report of the group, intended for public dissemination. It includes some material not directly relevant to the official purpose of the visit and omits some of the material pertinent only to the official ISO activity, or parts of the discussions which it would be premature or discourteous to publish at this time.

Members of the Group. The following listing of the group identifies each member, and notes those areas for which each was particularly responsible. For the roles of various committees, see [2].

ROGER E. GAY, Managing Director, American Standards Association: head of the group and official liaison with national standardization bodies (ASA is responsible for the Secretariat of SC5)

JOHN A. GOSDEN, Auerbach Corporation; USA delegate to SC5: general status of standardization, program of work, member ASA X3.4, X3.4.1 and X3.4.5 (Secretariat of SC5)

JOHN L. JONES, Directorate of Data Systems, AFLC; USA Delegate to SC5: specialist on COBOL, joint chairman of CODASYL Maintenance Committee, member ASA X3.4

JOHN N. MERNER, Burroughs Corporation; USA delegate to SC5: specialist on ALGOL, member ASA X3.4.2 and IFIP TC 2.1

CHRISTOPHER J. SHAW, Systems Development Corporation; USA delegate to SC5: specialist on surveys of programming languages, member SC5-WGA (ASA X3.4.5)

Spoken Language. In contrast to the translation problems reported by Ware [3], we enjoyed an excellent environment in which no translators were involved. All discussions were held entirely in English, which is spoken extremely well by all the technical people involved in programming languages. We not only had the advantage of communicating directly, but avoided the disadvantage of the delays involved in translation. Our only problems were in getting used to the dialects involved. Our colleagues who are struggling with the various interpretations of some common words within the various English-speaking communities will understand our problem. The Englishman in our party was intrigued to recognize terminology that could be traced back to Cambridge (EDSAC) and Manchester. Perhaps the Algolists had the least problems with semantics, but more with syntactics.

Incidental Information. Because our visit was short and devoted almost exclusively to an exchange of information concerning common programming languages, we did not concern ourselves directly with other aspects of computer technology. However, there are some items of general interest that do not fall directly within the scope of this report.

In particular, we found that Blachman's report [4] was most useful and helpful as a short, but precise, digest of the background data. It is no reflection on his report that we choose to correct his statements rather than to revise and repeat them here:

(1) The design of the Czechoslovakian EPOS computer does not now include duplication of the arithmetic unit and relies upon the special arithmetic circuits to detect and automatically correct errors. The arithmetic is based upon residual classes and is described by Svoboda and Valach [5].* The computer is in the process of checkout and some limited program testing of one compiler has been started. The photograph in Blachman's report [4] of the SAPO computer shows three people who are (from left to right) Ing. J. Oblonsky, Dr. Antonin Svoboda and (?) Mrs. Kveta Korvasova.

(2) The report on the Polish ZAM 3 [4] is essentially correct except that the word size used for measuring capacity is 24 bits. This usage is contrary to the American practice of using the 48-bit word for a measure and calling the 24-bit word a half-word. Therefore, the module size is apparently 4,096 24-bit words or 2,048 48-bit words. ZAM 3 is a prototype and the second model [4], which will be called ZAM 4, is the production model. ZAM 4 is expected to operate at about 50,000 instructions per second and to have drum storage of up to 64,000 24-bit words.

Several ZAM 2 computers have been delivered and about six are being used in Polish universities.

Czechoslovakia

GENERAL TIMETABLE. Sunday, 26 May: arrived Prague airport about 2100 hours and were met by Mr. Kuchar and Dr. and Mrs. Sysel. Monday, 27 May: at 0830 hours, Mr. and Mrs. Gay visited Mr. Krovina of the National Standards Organization; at 0900 hours, general meeting held with members of Research Institute: Mr. Gay joined the meeting later and remained for lunch; the meeting continued until 1600 hours; then the whole party

* A copy of [5] is held by each member of the group and one is deposited in the ACM library.

took a tour of the city with Ing. Gregor, Ing. Kloucek and Mr. Outrata.

PEOPLE MET:

Kuchar[1] (Mr.) Krovina[1] (Mr.), (President) Stiamfesd, Dr. Sysel, Mr. & Mrs.[1]	Urad pro normalisaci a Mereni, Vaclavske namesti c. 19, Praha 1, Nove Mesto
Gregor, Vratishlaw (Ing.) (Director) Vlcek, Joroslav (Dr.) (Deputy Director) Fabian, Vaclav (Dr.) Filsak, Zdenek Fuka, Miroslav Hajek, Otomar Imlauf, Josef (Ing.) Kindler, Evzen Kloucek, Josef (Ing.) Korvasova, Kveta (Mrs.) Oblonsky, J. (Ing.) Outrata, Eduard Sedlak, Jan (Ing.) Svoboda, Antonin (Dr.)	Research Institute of Mathematical Machines (VUMS), VY'ZKUMNY' U'STAV MATEMATICKY'CH STROJU, LORETA'NSKE NA'M.3 PRAHA 1.

Blama, K. (Ing.), Research Institute of Metallurgy and Chemistry
Blazek, L., Research Institute of Metallurgy and Iron
Brand, Isak (Ing.), Math. Center, State Railways
Bures, Pavel, UTIA
Culik, Karel, High Schools Techn. Math. Lab.
Hucl, Cyril, Ministry of Machinery
Kral (Ing.), UTIA
Langhammer, Rudolf, Central Lab. Ministry of Railways
Marek, Jindrik, Ministry of Machinery
Raichl, Jiri, Head, Math. Dept., Charles University
Vencovsky, Jiri, Math Center, State Railways

CZECHOSLOVAKIAN NATIONAL ACTIVITY:

Common Programming Languages Now in Use. Currently none is in active use on computers.

Development of New Languages. Three separate projects were reported. First, a restricted but useful version of ALGOL 60 is being prepared for the new EPOS computer; some debugging is now being done as the computer is becoming available. The major limitations are that recursion is limited, call-by-name only applies to identifiers, labels are not localized, and identifiers are only examined for the four leftmost and two rightmost characters.

Second, there is a research study to design a commercial language based on ALGOL with developments from FACT, NEBULA and COBOL. It includes a data division and special operations on a file, including sort.

Third, there is a compiler well under way for a complete ALGOL 60 on a small computer. No integer labels are allowed and three extra features are added: special library facilities, a special preset variable, and entry into machine language. Part of the objective of this compiler is to examine the problems of efficiency versus completeness; because floating point is a subroutine the problem does not seem to be serious.

National Standards. No current activity was reported.

[1] Not at technical meeting.

Poland

GENERAL TIMETABLE. Tuesday, 28 May: arrived at Warsaw airport about 1600 hours and were met first by Mr. Planeta and Mr. Plominski, then by members of the Institute of Mathematical Machines; Mr. and Mrs. Gay were entertained by Mr. Planeta for dinner. Wednesday, 29 May: a tour of the city in the morning, then mid-day refreshment was taken with Mr. Planeta; a technical meeting was held from 1500 to 1800 hours; a dinner given by the Institute at 2000 hours.

PEOPLE MET:

Planeta (Mr.), Polski Komitet Normalizacyjuy (Polish Standards Committee)
Plominski (Mr.), Ul. Swietokrzyska 14, Warszawa 51, Poland

Lukaszewicz, Leon (Professor, Director) Jaskolski, Stanislaw Mazurkiewicz, Antoni Swianiewicz, Jerzy Pietrzykowski, Tomasz (Dr.)	Institute of Mathematical Machines, Polish Academy of Sciences, Warszawa, Ul. Koszykowa 79, Poland

POLISH NATIONAL ACTIVITY:

Common Programming Languages Now In Use. The SAKO language is now in use at many Polish computing centers, at some of which it is used exclusively. In fact, the language is a *de facto* standard for all users of ZAM 2 computers. Lukaszewicz [6] has described the language in detail. It is of the same general design as FORTRAN and ALGOL, but is pragmatically closer to FORTRAN. It has been available for two years.

Development of New Languages. SAKO is being developed in three different but compatible directions, oriented toward mathematical, commercial and logical data processing, respectively. They are closely following the designs of FORTRAN, COBOL and ALGOL and are not developing entirely new languages. Emphasis is being placed upon languages that are easy to learn and efficient to implement. ALGOL will be supported as a general publication language and it is intended that translation between SAKO, FORTRAN, ALGOL and any new versions would be straightforward, if not completely mechanized (see also [7]). The new developments are for the ZAM 4, which is intended more for general data processing rather than scientific work.

National Standards. A working group has been in existence for six months studying the problems of national standardization, but no formal report has been completed.

Arrangements were made to include Polish languages in the surveys and a communication channel with CODASYL was arranged.

Conclusion

A short visit of this type, which is limited in its objective, cannot lead to any strong conclusions. Within this limitation it is fair to say that there is a great interest in the overall progress of common languages and their specifica-

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ALGORITHM 216
SMOOTH

RICHARD GEORGE*
Argonne National Laboratory, Argonne, Ill.

* Work supported by the U. S. Atomic Engergy Commission.

```
procedure SMOOTH (Data) which is a list of length: (n);
  integer n; real array Data;
  begin
    comment This procedure accomplishes fourth-order smoothing of a list using the method given by Lanczos, Applied Analysis (Prentice-Hall, 1956). This algorithm requires only one additional list for temporary storage;
    real Factor, Top; integer Max I, I, J; array Delta [1 : n];
    Factor := 3.0/35.0;
    Max I := n - 1;
    for I := 1 step 1 until Max I do
      Delta [I] := Data [I+1] - Data [I];
    for J := 1 step 1 until 3 do
      begin
        Top := Delta [1];
        Max I := Max I - 1;
        for I := 1 step 1 until Max I do
          Delta [I] := Delta [I+1] - Delta [I]
      end;
    Max I := n - 2;
    for I := 3 step 1 until Max I do
      Data [I] := Data [I] - Delta [I-2] × Factor;
    Data [1] := Data [1] + Top/5.0 + Delta [1] × Factor;
    Data [2] := Data [2] - Top × 0.4 - Delta [1]/7.0;
    Data [n] := Data [n] - Delta [n-3]/5.0 + Delta [n-4] × Factor;
    Data [n-1] := Data [n-1] + Delta [n-3] × 0.4 - Delta [n-4]/7.0
  end;
```

CERTIFICATION OF ALGORITHM 8
EULER SUMMATION [P. Naur et al. *Comm. ACM* 3, May 1960]

HENRY C. THACHER, JR.*
Argonne National Laboratory, Argonne, Ill.

* Work supported by the U. S. Atomic Energy Commission

The body of *euler* was tested on the LGP-30 computer using the Dartmouth SCALP translator. No errors were detected.

The program gave excellent results when used to derive the coefficients for the expansion of $ln\ (1+x)$ in shifted Chebyshev polynomials from the first ten terms of the power series. For $n = 0, 1, 2, 3, 4$, the coefficient of x^i in the power series was multiplied by the coefficient of $T_n^*(x)$ in the expression of x^i in terms of the $T_n^*(x)$. The product, for $i = 1, 2, \cdots, 10$ was used as $fct(i)$ in the program. Results for $n = 0$ were as follows:

i	$fct(i)$	ds	sum
1	+0.50000000	—	—
2	−0.18750000	+0.07812500	+0.3281250
3	+0.10416667	+0.05729166	+0.3854167
4	−0.068359375	−0.005940758	+0.3794759
5	+0.049218750	−0.001928713	+0.3775471
6	−0.037597656	−0.001357019	+0.3761900
7	+0.029924665	+0.0001742393	+0.3763642
8	−0.024547577	+0.0000571311	+0.3764212
9	+0.020607842	+0.0006395427	+0.3764607
10	−0.017619705	−0.0000055069	+0.3764551
True Value[1]			+0.3764528129.....

[1] Clenshaw, C. W., *Chebyshev Series for Mathematical Functions.* National Physical Laboratory Math Tables, Vol. 5, London, H.M.S.O. (1962).

Errors less than 0.2×10^{-5} were also found for $n = 1, 2, 3, 4, 5, 6, 7, 8$ and 9.

This technique appears to be a useful supplement to direct telescoping (Algorithms 37 and 38) and to the methods recommended by Clenshaw[1], for slowly convergent power series.

REMARK ON ALGORITHM 77
INTERPOLATION, DIFFERENTIATION, AND INTEGRATION [P. E. Hennion, *Comm. ACM 5*, Feb. 1962]

P. E. HENNION
Giannini Controls Corp., Berwyn, Penn.

It was brought to my attention through the CERTIFICATION OF ALGORITHM 77 AVINT (V. E. Whittier, *Comm. ACM*, June, 1962) that restrictions on the upper and lower limits of integration existed, i.e., (1) $xlo \leqq xa(1)$, (2) $xup \geqq xa(nop)$. To remove these restrictions the following two changes should be made.

1. Replace the two lines starting at line *L*12: and ending after the statement *ib* := 2; with the following code:

```
L12: sum := 0; sy1 := xlo; ib := 2; ju1 := nop;
     for ia := 1 step 1 until nop do begin
     if xa [ia] ≧ xlo then go to L17; ib := ib + 1; end;
L17: for ia := 1 step 1 until nop do begin
     if xup ≧ xa [ju1] then go to L18; ju1 := ju1 - 1; end;
L18: ju1 := ju1 - 1;
```

2. Change line *L*13: to read

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L13: if jm ≠ ib then go to L14;
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tions. Currently there appears to be no rival to COBOL—only variations seem to be considered; broadly speaking, Czechoslovakia tends towards ALGOL and Poland towards FORTRAN for a scientific language. In particular, we found that the Poles were well acquainted with most of the latest developments in the West and made frequent short and some extensive visits to computing centers in Europe and America.

Acknowledgments. We wish to thank the national standardization bodies of Czechoslovakia, Poland and America for the arrangements that were made for our visit, and the research institutes for the preliminary preparation and valuable discussions held with them.

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