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ISO INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION

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Programming Languages
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REPORT OF THE FORTRAN EXPERTS GROUP MEETING

Jolly Hotel
Torino, Italy
1979 November 12, 13

Martin N. Greenfield

A FORTRAN Experts Group meeting was convened by Ms Jeanne Adams, Chair of the ANSI X3J3 FORTRAN Standards Committee.

The following delegations were in attendance

Austria	1
Canada	1
France	2
Germany	1
Japan	2
Netherlands	2
Sweden	1
United Kingdom	3
United States	12

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Mr. Martin N. Greenfield, Vice-Chairman of ANSI X3J3, was elected as the Chairman for the meeting.

Each of the delegations presented a FORTRAN National Activity report. The reports indicated that most of the countries had either adopted or were in stages of adoption of FORTRAN 77 as their national standard on FORTRAN.

Presentation were made by delegates from the United States, Canada, the Netherlands, and Sweden. The topics were on System Architecture, Core and Modules Concept, Macro Facilities, Control Structures, Command Language Interface, Real Time FORTRAN, Data Structures, and Array Processing. Discussions following the presentations covered the broad gamut of issues relating to the efforts of ANSI X3J3 that will eventually lead to a revision of the current FORTRAN Standard.

There was a concern within United States group as to whether the disproportionate size of its delegation might be viewed with disfavour. This concern was relieved by a statement from the delegation from the United Kingdom that was held in general agreement by the other delegations. The statement was to the effect that the size of the U.S. delegation was a strong tangible expression of the interest and desire of the ANSI X3J3 FORTRAN Committee to expose their work and solicit participation and feed back from the international community having an interest in FORTRAN.

Dr. Donald Deutsch, Vice-Chairman of the ANSI X3H2 Committee as Data Description Languages presented a status report to the group on the progress towards an ANSI Standard on DDL. Dr. Deutsch helped clarify the goals and relationships of this work towards the work on a FORTRAN Data Manipulation Language.

A Joint Session was held with the SC 5 Working Group 1 on Programming Languages for Industrial Processes. Discussions of the DP 6705 Industrial Computer System FORTRAN Procedures and of the need for future plans and liaison led to the formulation and passage of two resolutions.

A discussion was held on the proposal to reconstitute the FORTRAN Experts Group as an SC 5 Working Group. A vote of the delegations failed to achieve a resolution. As a result, no position or recommendation will come from the FORTRAN Experts Group to SC 5.

The delegates expressed a need to have a meeting held in about one year from now. Invitations to host such a meeting were presented by the Netherlands and Austria. The delegates felt that the meeting should have a duration of four days to allow adequate coverage of the areas of interest.

L. P. Meissner
26 Nov 1979

SC 5 -- Fortran Experts Group Meeting -- Turin, Italy -- November 1979

REPORT OF DISCUSSIONS

1. DISCUSSION OF BURKE PAPER: SYSTEM ARCHITECTURE FOR FORTRAN

Q. Is it possible to have an Application Module that depends only on the Core and does not need any extensions? A. Yes.

Q. Must the Extension Module be implemented as a whole ("all or none"), or can it be subdivided? A. Probably can be partial -- but X3J3 has not settled this yet.

Q. May an Application Module have an internal modular structure? A. Don't know. (Further discussion -- no conclusion reached.)

Q. Are criteria needed for combinations of Core with various extensions?
A. X3J3 is beginning work on a "sample" combination, to be called "Scarecrow". As a result, we may find the answer to this question and others.

Q. May Application Modules depend on Extension Module as well as on Core? May an Application Module define new syntax? A. The answer to both of these would appear to be Yes; these seem to be weak spots in the proposal.

Q. Must Extension Module be compatible with Obsolete Module? A. Some users may want both along with Core, but we have not yet come to a firm decision.

Q. How can Extension Module be used along with old programs? A. This is the crucial point -- still being worked on.

2. DISCUSSION OF AMPT PAPER: THE CORE AND MODULE CONCEPT

Q. Should intrinsic Functions (as a class) form a single Module?

A. Intrinsic Functions should not be a special class.

Q. Disagree with Application Module being just a collection of procedures -- it might also need special data structures or named constants. A. See Global Scope proposal in X3J3/121 (Appendix I).

Q. Data Base may need complicated Procedure Argument syntax such as lists or implied DO; and may need inter-argument checking. These seem to require special syntax in this particular Application Module. A. It may be possible to solve this, by requiring that a procedure which uses the Application Module must be compiled first (ahead of the Core program that calls it.) Clearly some mechanism is needed for a compilation to refer to information resulting from a previous compilation (e.g. Subschema).

Q. Is there a need to define new Operators in a Module? A. Do not add Operators to the Language unless important enough for Core.

Q. Does this proposal imply no more independent subprograms? Description of Module would be in Library, where user compilation could access it. Also, should there be one special Module for defining new Operators? A. Keep old subprogram facility with independence, but with restricted capability for checking and for new kinds of arguments. Portability requires standardization of Application Modules, plus a do-it-yourself Application Module capability for flexibility.

Q. X3J3 would not have to understand Applications, to permit special syntax in Application Modules. A. OK, but X3J3 must define the special Environment Module (see proposal in Ampt paper).

Q. Programmers must be aware of precompiled information to which compiler has access during compilation. A. Yes.

Q. Rules for writing an application program in Fortran must be clearly stated. A. Extended call mechanisms are needed; also statements that put a thing into a Module.

Q. But there are too many libraries already -- we should make it harder to put new things in libraries. A. No. Similar arguments would inhibit all progress. If the "elite" don't respond to user needs, the "masses" will do it themselves, and perhaps not as well.

Q. Will the mechanisms suggested (in Ampt paper) satisfy the needs presented in the CODASYL Fortran JOD? A. Don't know.

Q. Can Application Module development be managed by a committee like X3J3 with finite resources? A. Give the users a process for defining their own extensions.

Q. This would lead to unnecessary proliferation, not standardization. X3J3 should only standardize things that can't be written in Core Fortran; if they can't do it, the user would find it even harder. A. But users should create Application Modules with tools provided by X3J3.

Q. It seems wrong to keep adding limited Application Modules aimed at particular areas, rather than broader ones for a more general solution. This will depend on how people arrange their compilers. Any Extension should be a proper subset of one of a limited number of possibilities. The Language should have control, not the Applications. The architecture definition should not be too much oriented to one or a few specific applications.

Q. An architecture model would be easier to understand if it were constructed in the form of a directed graph, in which an arrow from module X to module Y indicates that module X requires module Y. A given implementation would start at some module required by the user, and would follow the directed graph to determine which other modules it requires for execution.

3. DISCUSSION OF MARTIN PAPER: MACRO CAPABILITIES

Q. This facility should be compared with other solutions to the same problem, e.g., internal procedures. Each has its advantages and disadvantages.

Q. Could Macros be used to implement an Extension Module? A. Certainly.

Q. Why not put text substitution in an Editor, rather in a Macro facility connected to Fortran? A. This is a good question -- there are advantages either way.

Integrating with the compiler gives it access to certain information that can be used quite advantageously in some situations. On the other hand, an Editor could be used across different languages.

Further Comment: A small "library" of macro definitions can be used by a local group of users to develop their own application-oriented extension. However, if users elsewhere want to use the same library, the question of portability again arises at the macro source level.

Q. How does a call to DATE work in a macro? A. Various conventions can be established -- one way is to have it a constant for a given compilation.

4. DISCUSSION OF HUMAR PAPER: CONTROL STRUCTURES

Canadian Standards group encourages X3J3 to maintain Fortran as a stable language.

Q. Is rarity of use a valid argument for not adding a construct to Fortran? Compare EXTERNAL, which is rarely used. A. But EXTERNAL is not redundant, whereas control structures can already be done in Fortran.

Q. Many EXIT and CYCLE examples can be done more cleanly with block-IF. A. Others, especially multi-level EXIT and CYCLE, can not.

Q. New forms are better than old ones, because they make provision for limiting control flow. A. But Canada would prefer a minimum of new syntax.

Q. An observation: We impose restrictions on the programmer, yet proliferate new syntactic constructs. Does this tend to divide programmers into the simple vs. the sophisticated?

Q. X3J3 hopes to provide a framework for future development. A. We are still trying to introduce Fortran 77. Elegance is not the only possible objective -- slightly less elegance might be preferable if it requires less new syntax.

Q. Will program reliability be better served by fewer charges or by "better" constructs? Experiments are needed. A. X3J3 seems to be considering each proposal without working out its interaction upon other issues.

5. DISCUSSION OF DAHLSTRAND PRESENTATION ON COMMAND LANGUAGE INTERFACE

Command Language group is making more progress than had been expected. One possibility is to define the effect of a JCL command by giving an equivalent program -- e.g., ERASE "MYFILE".

Groups working in this area include IFIP WG 2.7 (F. Hertweck, Chmn), ANSI X3H1 (Lois Frampton), CODASYL COSCL (Tom Harris), BCS WG on CL (Ian Newman), and perhaps a group in NNI. The first 3 of these will meet in Texas the week of 21 Jan 1980.

Q. The perspective needs to be broadened to include the idea of simultaneous Tasks. Work to date has concentrated on the interaction of a single Task (thought of as a Program) with its environment (The System); we also need the interaction of a Task with other Tasks. A. Agreed.

6. DISCUSSION OF REAL TIME FORTRAN

(Ampt:) Many groups are working on Standards for Real Time Fortran, including ISA (Gordon-Clark), Purdue TC1 (Caro), EWICS TC1 (Kneis), ISO SC5 PLIP (Gronke). There is considerable overlap in the membership among all these committees.

There is a strong need for bit handling facilities. Current standards are assuming this will be done "under the guise of Integer", but that may conflict with future Fortran features. Meanwhile, the need is immediate. Any interim standards should include a strong warning that a better long range solution is hoped for.

LATER: Joint meeting with PLIP (ISO SC5 WG1). It was noted that the draft of "IRTF" (Industrial Real Time Fortran) available at this meeting is already out of date. It is proposed to continue with processing of DP 6705, which has already been approved by SC5 letter ballot. Meanwhile, X3J3 is hoping to work toward integrating features into Fortran that will overcome many of the limitations of the current Function Call approach. X3J3 hopes to form a Task Group to integrate IRTF into a future Fortran standard or a collateral standard.

(See Resolutions passed by Fortran Experts Group.)

7. DISCUSSION OF MARSHALL PAPER: DATA STRUCTURES

Q. Is a FORM declaration required both for an actual argument and for a dummy argument? A. Yes, but see "Global" Form proposal by Wilkens (X3J3/121, Appendix I).

8. DISCUSSION OF HUMAR PAPER: ARRAY PROCESSING

Q. Is a "SET RANGE" statement also needed, to specify an upper left corner of a matrix, for example? A. This can be done with Triplets.

Q. (Meek) Strong disagreement with this proposal to specify sequential execution in case of overlap between left and right sides. Parallelism is the way of the future. "Most" scientific applications do not want updating to go on during array operations, e.g., division of a vector by its first element. Better to define array operations as parallel operations, and let the user write a DO loop if he wants it done sequentially.

Q. Compiler directives, "qualified" operators, or other mechanisms could make both possible with user selection. Can we get some ideas from APL?

9. DISCUSSION OF DATA DEFINITION LANGUAGE

Donald Deutsch, Vice Chairman of ANSI X3H2, described the work of his Committee. Work to date has been on DDL for Cobol. They want to synchronize with COBOL with regard to COBOL-oriented DDL, but are also exploring Fortran. Liaison with X3J3.1 is being undertaken by Steve Klein.

Q. Why should Subschema be different for each Host Language? The Data Base Administrator would prefer a common Subschema language. A. Conversion must take place somewhere; it just happens to have been set at that point.

10. DISCUSSION OF ISSUES OF CONCERN

Muxworthy: We are concerned about Numerical Analysis -- Precision declaration; Environmental Enquiries. A. Both of these topics are actively being studied by X3J3.

Humar: How has X3J3 proceeded in further definition of the CASE construct? A. See Minutes of 70th Meeting.

Muxworthy: Would like to discuss Permissive Standards vs. Portability; Regularity at "center" of language vs. Ad-Hockery at the "periphery".

11. DISCUSSION ON PROPOSAL FOR (ISO/TC 97/SC 5) FORTRAN WORKING GROUP

Some of those present felt that support for Fortran work would be easier to find, if the group were more formally established under ISO. Others would be less able to participate if a formal commitment were required. A straw vote was taken on the proposal to support establishment of an SC5 Working Group on Fortran. The vote was 3 in favor, 3 opposed, 2 abstaining. The final report of the 1979 Fortran Experts Group Meeting therefore states that no consensus was reached on this subject.

12. SUBSEQUENT MEETINGS

Some attendees felt that there had been insufficient time at this meeting to adequately explore the technical issues. It was suggested that we distinguish between two kinds of Fortran Experts Group meetings. (1) Those held in conjunction with SC5 meetings should have a shorter, less technically oriented agenda. They should include brief reports from X3J3 and others, and the main agenda item should be Fortran-oriented discussion of SC5 Issues. (2) Separate technical meetings of the Group should be held approximately once a year, and should provide about four full days for technical discussions.

The next SC5 meeting is planned for the week of October 5, 1981 in London. A possible schedule for Fortran Experts Group meetings would be:

- 1980 - November: Amsterdam, Netherlands (Technical meeting)
- 1981 - September: Vienna, Austria (Technical meeting)
- October: London, England (Shorter session at SC5 meeting)