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ACTION: For information to SC22 Member Bodies. This document will be discussed at the SC22 Plenary meeting.

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Subject: Coordination of Programming Language and Cross Language Standards

Source: U.S.A.

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Introduction:

This contribution recommends an action plan for ISO/IEC JTC1/SC22 to make the "(Programming) Language-Independent" and "Cross (Programming) Language" standards currently being developed in SC22/WG11 effective.

Background:

In 1987-8, SC22 assigned to Working Group 11 (Language Bindings) three projects:

- Language-Independent Procedure Calling Mechanisms (CLIP, JTC1.22.16),
- Language-Independent Data types (CLID, JTC1.22.17)
- Language-Compatible Arithmetic (LIA, JTC1.22.28) (Note: this project has recently been redesignated Language-Independent Arithmetic Part 1: Integer and Real Arithmetic.)

The current status of these projects is the following:

- CLIP is expected to go to CD ballot this fall
- CLID (CD 11404) has recently completed the first CD ballot
- LIA Part 1 (CD 10967-1) has recently completed the first CD ballot

During 1991, NP proposals for two additional parts to the LIA standard were approved and additional "language-independent" project proposals are expected this year.

In a related area, the POSIX community (WG15) has been actively involved in an independent Language-Independent Specification effort, with active liaison and coordination between WG15 and WG11. We will use the term "cross language" to refer to the above standards, similar work of WG11, WG15, and the anticipated future work of WG20.

Discussions in SC22 in Vienna, in the language groups, in WG11 and in WG15 indicate, however, that there is a lack of common understanding of how these "Cross Language" (XL) standards are to be used. This determination cannot be left to WG11 (or to WG15), because it affects many projects in SC22 and other SCs. SC22 itself must therefore

determine the expected use of the XL standards, whether by or with (programming) language standards and whether by or with system service standards. That is, SC22 must make clear to standards developers and users alike what form the "implementation" of XL standards is expected to take. In effect, SC22 must formally define the concept of "conformance to XL standards".

It is important for the SC22 policy to be developed at this time, for the following reasons:

a) The WG11 and WG15 XL standards are rapidly progressing to DIS. Corrections to the XL standards themselves, which may be needed to support the SC22 policy, should be made before the documents reach IS.
b) The language standards development bodies need such a policy, so that the relationship of the XL standards to the languages can be determined, the impact of the XL standards on the language standards can be fairly assessed, and technical problems arising therefrom can be resolved before the XL standards documents reach IS.
c) Several SC22 language standards are now being revised, and appropriate changes to the language standards to support or reference the XL standards can be a part of this revision process.
d) Interoperability of languages, systems and environments in the distributed computing environment of the 1990s is now a critical concern to many users.

Recommendations:

1. SC22 should develop a Policy for the Application of XL Standards.

   The scope of the policy should include all XL standards, XL specifications, and XL binding projects, and all SC22 programming language projects.

   The policy should ensure that all XL standards and XL specifications are appropriately addressed by all SC22 programming languages, and that XL standards and XL specification projects are undertaken with this requirement in mind. (In particular, national bodies should consider the impact on language-development resources before agreeing to XL projects, and the scopes of XL projects should be carefully set.)

   The policy should address:

   a. what an XL standard is;

   b. whether it is useful to categorize XL standards so that different policies may apply to each category;

   c. when a binding between an XL standard or specification and a programming language should be created;

What is an XL Specification

d. which binding methods may be appropriate for XL-to-language bindings (see attachment 1, Binding Methods);

e. how the appropriate binding method for each instance shall be selected;

f. which WG should define the binding, and how consistency of the binding with the intents of the XL and language WGs shall be assured;

g. what kinds of conformance requirements are appropriate for XL standards;

h. what SC22 involvement in management of inter-related projects should be.

2. SC22 should create an Ad Hoc Group for XL Standards Coordination, with the following four tasks:

a. Propose a Policy for the Application of XL Standards, along the lines given above, for submittal to the SC22 Plenary.

b. Obtain input from all SC22 WGs to identify expected interactions between individual languages and the XL standards (see attachment 2, Survey Questionnaire). This task should produce a list of XL Application instances to which the policy can be immediately applied.

c. Apply the Policy to the Application instances, and produce the list of recommended revisions to SC22 standards needed to effect the implementation of the XL standards in a coordinated way. (The list of revisions will become a plan for the "implementation" of the XL standards in the SC22 programming languages, but the formulation of the Plan, in terms of timetable and resources, is outside the charter of the Ad Hoc Group.)

d. Coordinate SC22 XL Standards activities with Applications in other SCs, notably SC21 (Databases, OSI interfaces) and SC24 (Graphics).

3. Since neither the policy nor the determinations of the ad hoc will be complete before the 1993 SC22 Plenary and several projects' documents may well reach DIS by then, the following action should be taken immediately following the 1992 JTC1/SC22 plenary meeting:

Attachment 2 is a proposed Survey Questionnaire to be completed for all SC22 programming language and cross language projects. Survey responses should be returned to the ad hoc group for XL Standards Coordination and made available to the SC22 national bodies as soon as possible in order that the results can be useful during ballots that occur before the 1993 SC22 plenary

meeting.

The Survey Questionnaire should be completed for programming language projects in the following working groups:

WG2	Pascal
WG3	APL
WG4	COBOL (except the correction amendment)
WG5	Fortran
WG8	BASIC
WG9	Ada
WG13	Modula-2
WG14	C
WG16	LISP
WG17	Prolog
WG18	FIMS (CLIP, CLID only)
WG21	C++

for the following cross language projects:

22.16	CLIP
22.17	CLID
22.28	LIA
22.21.01	POSIX LIS

The Survey Questionnaire should be completed by the next project milestone or by March 1, 1993, which ever is earlier. (One effective approach would be for the WGs, together with WG11, to create enough of a binding to demonstrate use, implications and feasibility of the relevant XL proposal.)

Attachment 1: Binding Methods

Binding methods described in TR 10182

a. Revision or extension to the language syntax in order to support the XL facility (as by the programming language compiler or interpreter).

b. Embedding "alien" syntax in the program text to support the XL facility (as by a preprocessor).

c. Use of definition (as by another extension facility) provided by the programming language standard to support the XL facility (as by a standard header file).

d. Addition of library functions or procedures to support the XL facility using mechanisms provided by the programming language standard.

e. Support of the XL facility by mapping to the structures and services of the language environment (as by support of file structures or data types).

Attachment 2: Survey Questionnaire

The following questions are to be addressed for each programming language standard by the responsible working group.

1) Identify the programming language.

2) What natural mechanisms are provided by the programming language to support the language bindings?

3) How do conformance requirements of the language standard affect bindings to this programming language standard?

4) Are there guidelines available for the development of bindings to this programming language?

5) Are you indicating ``Future Directions'' in your project re reserving name space, etc., for future revisions of your standard so other cross-language/binding groups know what to avoid?

Questions 6 through 17 are to be addressed for each cross language (XL) project.

6) Identify the XL standard being addressed.

7) Is a binding useful between the programming language and the XL standard? If not, why not.

8) Is a binding feasible between the programming language and the XL? If not, why not.

9) Is work being done to develop a binding for this language? If so, what milestone has it reached? What is its expected completion date?

10) What modifications to the XL are necessary for it to be compatible with your project?

11) What modifications to the XL would make it a more natural fit for users of your language?

12) What modifications would you have to make to the programming language to accommodate the XL? Are you prepared to do the work for these modifications? If so, how long would it take?

13) Are there any parts of the XL you cannot accommodate at all for technical reasons, or would much prefer to not accommodate for either philosophical or technical reasons? If so, which and why?

14) **Which binding method should be used? (see attachment 1, Binding Methods)**

15) **Who do you think should define the binding? If you had to do the binding, by when could you produce it?**

16) **Would it be appropriate to include the binding in your standard? If not, why not?**

17) **If the binding had to appear in your next revision or addendum, how would that affect your delivery schedule?**

The following questions are to be addressed for each cross language (XL) standard by the responsible working group. (one time only)

1) Identify the XL standard being addressed.

2) What is the purpose of this XL standard?

3) What are the conformity requirements of this XL standard?

4) Does the value of this XL standard depend on its widespread support by programming language standards?

5) Does the value of this XL standard depend on a common binding method being used for all programming language bindings?

Questions 6 through 16 are to be addressed for each programming language.

6) Identify the programming language standards being addressed.

7) Is a binding useful between the XL and the programming language standards? If not, why not.

8) Is a binding feasible between the XL and the programming language? If not, why not.

9) Is any programming language working group developing a binding for this XL standard? If so, what milestone(s) has it reached? What is its expected completion date?

10) What modifications to the programming language standard are necessary for it to be compatible with this XL standard?

11) What modifications would you have to make to the XL standard to accommodate the programming language standard? Are you prepared to do the work for these modifications? If so, how long would it take?

12) Are there any parts of the programming language standard you cannot accommodate at all for technical reasons, or would much prefer to not accommodate for either philosophical or technical reasons? If so, which and why?

13) Which binding method should be used? (see attachment 1, Binding Methods)

14) Who do you think should define the binding? If you had to do the binding, by when could you produce it?

15) Would it be appropriate to include the binding in your standard? If not, why not?

16) If the binding had to appear in your next revision or addendum, how would that affect your delivery schedule?