

CURRENT DEVELOPMENTS IN FORTRAN

Sources of Information on Fortran 90

There have been many summary articles on Fortran 90 in the literature. One review of the language, which also includes a comparison with Fortran 77, C and C++, is available on WWW at URL: <http://csep1.phy.ornl.gov/pl/pl.html>. Compilers for Fortran 90 have been appearing regularly since the first, produced by NAG, was announced in August 1991 and there are now also a number of excellent text books. A good source of summary information on both of these is the list comp-fortran-90 at mailbase.ac.uk, which is accessible via gopher, telnet, e-mail, etc.

The mailing list comp-fortran-90 is used for discussion of Fortran queries, problems, etc, as is the usenetnewsgroup comp.lang.fortran.

Current Standards Developments

There have been three main Fortran standards, developed as follows.

<u>Informal name</u>	<u>Main period of technical development</u>	<u>Published</u>
Fortran 66	1962-1964	1966
Fortran 77	1970-1976	1978
Fortran 90	phase I: 1978-1986 phase II: 1986-1990	1991

Because the step from Fortran 77 to Fortran 90 introduced very many new features into the language, a number of clarification and interpretation issues have arisen as vendors have implemented the standard. The body with the technical responsibility of producing the standard, a working group of the International Standards Organization, has decided that a minor revision of Fortran 90 should be produced in 1995 with the primary purpose of incorporating corrections, clarifications and interpretations but also taking the opportunity to add a few features for which there is strong user demand, and possibly to proceed further with the removal of irregularities in the language.

Learning from past experience with the slow development of standards, WG5 has developed the model of continuously maintaining a register of requirements, of prioritizing them and of applying a strict guillotine in order to produce the final standard to schedule. The requirements for Fortran 95 will be finally decided at a WG5 meeting, which happens to be in Edinburgh, in August 1994. The work of developing the Fortran 95 requirements into language facilities and then into text to implement the requirement has been delegated to X3J3, the US Fortran committee; it in turn has delegated some tasks to the British and German Fortran committees.

Looking further ahead, it is proposed that a more substantial revision of the language should be made in the year 2000. Requirements for this are already being collected and those proposals which miss the 1995 revision will be carried forward for consideration for 2000.

Fortran 95

The ground rule for Fortran 95 is the following resolution agreed by WG5 in July 1993 (WG5-Nxxx numbers are references to working documents).

That WG5 confirms its intent, as stated in [1992] Resolution V9 and the Strategic Plan for Fortran Standardization, that the 1995 revision of Fortran will be a minor revision.

Accordingly, WG5 records its intent that the following items will be part of the final 1995 revision (consult WG5-SD5 for more detail on each item):

- A1. corrigenda and modest editorial improvements
- A2. FORALL statement
- A3. FORALL construct
- A4. PURE prefix on functions
- A5. add DIM parameter to MAXLOC and MINLOC intrinsic functions

Further, that WG5 records its desire that the following items will be in the requirements for the 1995 revision:

- B1.object initialization (WG5-N932)
- B2.remove conflicts with IEC 559 (IEEE 754, IEEE 854)
- B3.allocatable components in structures (WG5-N931)
- B4.Miscellaneous minimal and exact field width editing
specification of further obsolescent features (WG5-N917)
comments in namelist and list-directed input

Further, that WG5 recognizes that it does not have adequate information to decide on the inclusion of the following, and possibly other, items in the 1995 revision, and that WG5 therefore requests that, within the limits of its resources, X3J3 investigate the following items in order that as much information as possible will be available at the 1994 WG5 meeting so that a decision may be made at that time on the final requirements:

- C1.CPU-time intrinsic function
- C2.KIND parameters for derived types
- C3.allow some classes of user-defined functions in declarations
- C4.support IEC 559 conforming or similar hardware
- C5.exception handling
- C6.object oriented programming
- C7.derived type I/O

It is to be understood that each of the above lists the items are in order of decreasing priority. It is further understood that the results of the work of X3J3 on any of the above items may contribute to the final development of the 1995 revision. Finally, WG5 understands and expects that X3J3 may wish to delegate responsibility for some of these items.

Progress has been made since last July on all the A items and on B1, B2, B4, C1, C3 and C5. Progress has proved more difficult than expected on B3 and C2; drafts exist, but have not yet been agreed. For C4, the recommendation is that this requirement be addressed by a collateral standard. There has been little advance on C6 and C7. However, final decisions have yet to be made.

UK Requirements for Fortran 95 and Fortran 2000

The BSI Fortran Panel has been monitoring and collecting requirements for improvements to Fortran 90 from the UK. These fall into two main groups: there are needs which can best be met by extensions to the language, and needs for access to libraries and system facilities on the same basis as for users of some other popular languages. On the first matter, all items raised have been registered, or were already registered, in the WG5 or X3J3 Journal of Requirements. On the second matter, the question of standards for language-independent datatypes and procedure calls is being addressed urgently by standards bodies. It is to be hoped that vendors will respond with corresponding products. Any further requirements may be sent to the author of this note.

Journals of Requirements

International Journal of Requirements

The WG5 Journal of Requirements (WG5-SD5 mentioned above) may be obtained by anonymous ftp from directory sc22wg5 at ftp.ncsa.uiuc.edu, on the understanding that it is a working document of WG5 and is liable to change without notice; the present version is in file N970.Z. The contents are as follows.

<u>References</u>	<u>Status</u>	<u>Title</u>	
	1	Con	Change Initial Status of Pointers to Disassociated
B1	1a	Req 1995	Allow Pointer Initialization with a Target
B1	1b	Req 1995	Allow Initialization of Pointer Status
	2	Con	Controlling Pointer Bounds
B4b	3	Req 1995	Language Evolution
B4b	3a	Req 1995	Features to be declared obsolescent in F96
B4c	4	Req 1995	Namelist Comments
C5	5	Inv 1995	Exception Handling
C5	5a	Inv 1995	Exception Handling
C5	5b	Inv 1995	Condition Handling
C5	5c	Inv 1995	Exception Handling
	6	Con	Conditional Compilation

	7	Con	BlockComments
	8	Con	CONSTANT as a synonym for PARAMETER
B4a	9	Req 1995	Minimal Field Width Editing
B4a	10	Req 1995	Exact Field Width Editing
	11	Con	Aliasing Type Definitions
C1	12	Inv 1995	Process time from System Clock
A2	13	Dev 1995	FORALL statement
A2,A3	13a	Dev 1995	FORALL
C2	14	Inv 1995	Parameterised Derived Types
C2	14a	Inv 1995	Kind Parameters for Derived Types
	15	Con	Remove name class irregularities
B3	16	Req 1995	Allow ALLOCATABLE derived-type components
C7	17	Inv 1995	Derived Type I/O
C6	18	Inv 1995	Object Oriented Programming
	19	Con	Standardization of performance directives
	20	Con	Command Line Arguments and Environmental Variables
	21	Con	Bit Data Type, String
B1	22	Req 1995	Implicit Initialization of Structure Components
	23	Con 2000	Multi-threaded execution facilities
	24	Con	Remove the restriction on the maximum rank of arrays
	25	Con	Extend the semantics of the EXIT statement
	26	Con	Selecting subarrays of non-rectangular form
	27	Con	Parallel sections construct
A4	28	Dev 1995	PURE prefix on functions
A5	29	Dev 1995	Add DIM parameter to MAXLOC and MINLOC intrinsic functions
B2	30	Req 1995	Remove conflicts with IEC 559 (IEEE 754, IEEE 854)
C3	31	Inv 1995	Allow some classes of user-defined functions in declarations
C4	32	Inv 1995	Support IEC 559 conforming or similar hardware
	33	Con	Nesting of internal procedures
	34	Con 2000	Varying length character with declared maximum

where status is:

Con	For Consideration (with possible target date),
Dev	Being Developed for ___ Revision,
Inv	Being Investigated for ___ Revision,
Req	Requested for ___ Revision,
Acc	Accepted for ___ Revision, (not yet in use),
Rej	Rejected (reasons must be given; not yet in use).

US Journal of Requirements

The current version of the US Journal of Requirements may be obtained by anonymous ftp from directory x3j3 at ftp.ncsa.uiuc.edu; the present document is 94-004r3.Z for the full version or 94-004r3s.Z for the subset version. This directory can also be accessed via an e-mail archive server. To find out how to use it, send e-mail to archive-server@ncsa.uiuc.edu with the command "help" on a single line in the body of the message. The content, sorted by status, is as follows.

<u>Ref.</u>	<u>Status</u>	<u>Target</u>	<u>Title</u>
010	US		Nesting of Internal Procedures
020	US		User Defined Elemental Functions
004	US	1995	FORALL
015	US	1995	Conditional Compilation
024	US	1995	Nested WHERE Statements
025	US	1995	Pure User Functions and Subroutines
053	US	1995	Regularize KIND= Arguments Of Intrinsic Functions
012	US	2000	Condition Handling
017	US	2000	Bit Data Type, String
018	US	2000	Controlling Pointer Bounds
031	US	2000	Varying Length Character with Declared Maximum
044	US	2000	Unsigned INTEGER Data Type
048	US	2000	Improve Interoperability between Fortran and ANSIC
028	US	Coll	Binding to IEEE 754
049	X3J3	2000	Generalize Constructors Into Generic Procedures
002	Reg		Variant Derived Type

003	Reg	Array Components of Array Structures
013	Reg	PointerInitialization
014	Reg	LanguageManagement
016	Reg	1995 Command Line Arguments and Environmental Variables
019	Reg	Variant Derived Type, Untagged
021	Reg	Obsolesce Fixed Source Form
022	Reg	Keep It Simple, Make It Fine
023	Reg	User Defined Intrinsic Functions
027	Reg	Packaging Implementer Specific Intrinsics in MODULEs
030	Reg	Variable Rank Arrays
032	Reg	POSIX Binding to Fortran 90
033	Reg	Object Oriented Fortran, OOF
034	Reg	Variable Repeat Specifiers in Formats
035	Reg	Specifying Default Precisions
036	Reg	MAXLOC and MINLOC To Accept CHARACTER Arguments
037	Reg	Argument Passing Mechanism
038	Reg	Complete Set of Compiler Directives
039	Reg	SYSTEM Command
040	Reg	Obtain the Command Line
041	Reg	Obtain Program Startup Command
042	Reg	Indexed Files
043	Reg	OOP Capabilities
045	Reg	Unicode Character Set Support
046	Reg	Row Major Arrays
047	Reg	File Sharing Modes
050	Reg	Intrinsic and User-defined Specific and Generic Names
051	Reg	English Words As Function Names
052	Reg	Extend .EQ. And .NE. To Logical Values
054	Reg	Complete Set of Explicit Attributes
055	Reg	Array Organization Attributes
056	Reg	Ranges Specified by Start and Length
057	Reg	Explicit Scope Identification in References (Extend %)
058	Reg	Regularize Handling of Pointer Arguments
059	Reg	Pointers to Procedures
060	Reg	Pointer Association Classes
061	Reg	Composable FORALL Functionality
062	Reg	Composable WHERE Facility
063	Reg	Symmetric Linkage of Argument Attributes
064	Reg	Symbolic Names for Specification Expressions
065	Reg	POINTER Objects as Operands
066	Reg	Generic COUNT_RATE Argument for SYSTEM_CLOCK
067	Reg	255 Array Dimensions
068	Reg	Generic specification on the END INTERFACE statement
001	Arch	Bit Data Type, Non-string
005	Arch	DIAGONAL Function
006	Arch	PROJECT Function
007	Arch	REPLICATE Function
008	Arch	RANK Intrinsic Function
009	Arch	FIRSTLOC and LASTLOC intrinsics
011	Arch	Internal Procedure Names as Actual Arguments
026	Arch	Directives
029	Arch	Interline Optimization

where status is:

Reg	Received and assigned a number by the requirements editor,
X3J3	X3J3 approved and submitted for approval by the US TAG for forwarding to WG5,
US	US TAG approved; forwarded to WG5,
WG5	WG5 approved (WG5): Approved by WG5 with a target revision cycle, (not yet in use)
Sat	Satisfied: Substantially satisfied in a new revision of the Fortran, or a related, standard, (not yet in use)
Fail	Failed US TAG or Failed WG5 approval (not yet in use),
Arch	Archival: Withdrawn from active consideration by X3J3.

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