Support for Fortran Standards Development in 2019-2020

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Introduction

Fortran remains the language of choice for much scientific, engineering, and economic programming, particularly for use on supercomputers and for very large programs that have evolved over many years. In 2019-2020 Fortran has received significant boost because of increased maturity of the LLVM/Flang project, which attracts a lot of interest from major Fortran compiler vendors, such as ARM, AMD and PGI (NVIDIA) and from users. One manifestation of this interest was very high attendance (290 registrations) of FortranCon 2020 virtual conference https://tcevents.chem.uzh.ch/event/12.

UK members participate in the ISO Fortran committee (SC22/WG5), the BSI Programming Language committee (IST/5) and its Fortran panel (IST/5/-/5), and the US Fortran committee (PL22.3 aka J3). BCS has supported the UK contribution to the development of international Fortran standards since 2003. The initial case from 2002 is at https://fortran.bcs.org/2003/devrep03.htm and subsequent annual reports are linked from https://fortran.bcs.org/standards/stanhome.php. Historically BCS has contributed to the costs of members attending BSI and international meetings while much discussion of development work takes place continuously via email. The BSI Fortran panel and the BCS Fortran Specialist Group make every effort to represent the UK as a whole at international meetings.

Activity 2019-2020

Fortran development was rapid in the first half of the year, but inevitably slowed down due to Covid-19 restrictions.

J3 meeting #220

One member of the BSI Fortran panel attended J3 meeting #220, in OCT-2019, where a lot of work on progressing F202x features was done. Proposals UK-01 (C_F_POINTER modification), US-03 (ISO_FORTRAN_STRINGS), US-12 (arrays of coarrays), US-20 (reductions in DO CONCURRENT), US-23 (standard use of BOZ constants) have progressed substantially with some edits to F202x agreed. Many other features of F202x have progressed, such as put with notify, specifications for auto-allocating processor messages, formal specifications for true enumeration types,

J3 Fortran interp letter ballot #35 was completed with 14 out of 15 interps passing. Several members of hte BSI Fortran panel contributed opinions on these interps. The failed interp concerned example, in the standard, of using facilities for dealing with failed images. Too many problems were identified in this example under close examination to pass the suggested interp. This example was returned to J3 for more work.

J3 rejected adding BFLOAT16 variant of REAL16 to the standard.

J3 meeting #221

Two members of the BSI Fortran panel attended J3 meeting #221, in FEB-2020, the last meeting to take place in person.

The work on F202x features has progressed: specs for rank-agnostic array element and section denotation, edits for TYPEOF and CLASSOF, syntax for rank-independent bounds, edits for SIMPLE procedures, syntax for rank-agnostic allocation and pointer assignment, edits for US-14 (auto-allocate characters).

The work to collect candidate features for F202y (to follow F202x) has started.

WG5 2020 meeting

The WG5 convener decided to cancel the 2020 WG5 meeting. He wrote (SC22WG5 mailing list from 22-MAY-2020): "WG5 has no critical work at this time - the work list for Fortran 202X is closed and we are not yet discussing the work list for 202Y. A virtual meeting is possible, but difficult with members across many time

zones". Therefore the next WG5 meeting will be in 2021 in Manchester. The latest WG5 business plan and convener's report to JUL-2020 is in WG5 N2175.

J3 Fortran interp letter ballot #36

Letter ballot #36 opened in JUN-2020. Several members of hte BSI Fortran panel contributed opinions on these interps. Letter ballot #36 closed in AUG-2020 with all 4 interps passing.

AITS funding

In FEB-2020 John Reid was awarded BSI AITS funding to attend WG5, as the principal UK expert. With that meeting cancelled, the funding was not used. However, I still want to thank BSI for providing this vital funding which tangibly helps Fortran standardisation efforts.

Transition to virtual working practices

Although there is hope that the next WG5 meeting, in Summer 2021, will be held in person, significant changes have to be made to allow virtual work of J3 more efficient. The J3 web site now has a secure discussion forum, which is designed to partially replace in person subgroup discussions taking place in J3 in-person meetings.

The next J3 meeting, scheduled for 12-14-OCT-2020, will be fully virtual. Participation of members and observers from any location around the globe will be possible in principle, although time zone differences will invitably leave somebody out. For example, in the UK the meeting will happen between 2200 and 0100.

TR 24772-8 Vulnerabilities, Fortran

For many years UK members have participated in developing TR 24772-8 (Guidance to Avoiding Vulnerabilities in Programming Languages through Language Selection and Use, Part 8 Fortran). One of the resolutions of the WG5 Tokyo meeting was to request Dan Nagle, the editor of TR 24772-8, to progress this work. At J3 meeting #220 several WG23 members joined the meeting for 2 days and made a significant progress in TR 24772-8 (WG23 N0938).

Conclusion

The UK continues to play a major role in the development of the Fortran language. The UK continues to provide the project editor, a major undertaking, and the email administrator, plus (usually, but appointed on an ad hoc basis) the minutes secretary and the editor of the Technical Corrigenda. Fortran development papers, other than draft standards, are open to all interested. WG5 and J3 documents are available from https://wg5-fortran.org and https://j3-fortran.org respectively.

The Group is very grateful for the continuing BCS contribution to this project.