Compiler support for Fortran 2003 and 2008 standards
Ian Chivers & Jane Sleightholme Fortranplus
ian@fortranplus.co.uk  jane@fortranplus.co.uk
www.fortranplus.co.uk
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A bit about us

Ian & Jane
• Worked in the university sector
• Now freelance computer programming language trainers
  – working internationally with scientists and engineers in public and private sectors
• Written a number of introductory programming language books
• Ian editor of Fortran Forum newsletter
  – Published 3 times/year
  – By Special Interest Group on Programming Languages (SIGPlan)
  – Association of Computing Machinery (ACM) - www.acm.org
• Have been part of UK delegation on WGs
  – International technical group for Fortran standardization
• Aim to teach standard Fortran
  – Otherwise point out potential future problems
Importance of programming language standards

- Portability between different platforms
  - Otherwise locked in to hardware
    - RAF: Boeing - very old IBM hardware & IBM Fortran 66 compiler with extensions
    - Cable and Wireless: HP OpenVMS & VMS Fortran 77 compiler with extensions
- Known reference point
- Time spent learning a standard language pays off
- Using different compilers
  - Recommend testing code with at least 2 different compilers

A bit of Fortran history

**Fortran 90/95**
- Up to 2004 Fortran 90/95 was the current standard and compilers had all these features and sometimes more
- Number of compiler vendors starting to decline

**Fortran 2003**
- Fortran 2003 was a big update to the language
  - Standard published in November 2004
- Compiler vendors were slow to start offering these new features
  - Led to confusion amongst users & for us as trainers
- Fewer vendors
  - Vendors responding to customers’ requests, instead of standard conformance

**Fortran 2008**
- Fortran 2008 standard published in October 2010
Why the table?

2006/2007

• Compiler vendors were slow to start offering Fortran 2003 features
  – Led to confusion amongst users & for us as trainers
• Email sent to J3 (technical committee for Fortran standards development)
  – Asked for information about compiler support for new features of Fortran 2003
  – Based on list of features in a report (N1579) written by John Reid (chair WG5)
    - Updated report N1648
    – 6 responses giving details for 4 compilers
      - Cray, gfortran, g95 and NAG
• Created a table listing Fortran 2003 features from N1648 and compiler support
  – Table published as an article in Fortran Forum, April 2007 (3 pages)
    - The article asked compiler vendors if they wanted to be included in future versions

How the table has developed as a regular Fortran Forum article

August 2007 – revision 1

• 2 new compiler vendors added
  – Intel (release 10) & IBM (IBM XL Fortran Enterprise Edition for AIX)

August 2008 – revision 2

• 1 new compiler vendor added
  – Sun
• Corrections
How the table has developed as a regular Fortran Forum article continued

August 2009 - revision 4 (6 pages!)
- New features added to table – suggested by Richard Maine (WG5 editor of Fortran 2003)
  - Allocatable scalars
  - Allocatable character length
- Fortran 2008 features added
  - Based on paper N1729 written by John Reid - update N1828
- Compilers that support Fortran 95 standard
- Compilers that supported Fortran 90 but no longer under development

Fortran 2008 standard published on 6 October 2010 (a special birthday!)

Table published on Fortranplus website [www.fortranplus.co.uk/fortran_info.html]
- 1 revision behind

Summary: original table --> revision 9

Original table
- 55 Fortran 2003 features
- 4 compilers

Revision 9
- 58 Fortran 2003 features
- 60 Fortran 2008 features
- 11 compilers

- There are other compiler vendors
  - we've emailed them but they haven't responded
### Summary: Fortran 2003 supported features

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### Summary: Fortran 2008 supported features

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Users can’t assume a Fortran compiler has all the features of the latest standard!
Summary: Our experience as Fortran trainers

We teach with NAG Fortran compiler if possible

- Good error messages
- Object Oriented features
- OpenMP support
- Fortran Builder (IDE)

Intel compiler is also used

Platforms

- Windows, Linux, Apple MacBook (OS X Snow Leopard)
- IBM Power 7 (Slovakia)

Modern features users are interested in

- MPI
- OpenMP
- OO