



Enabling the
information society

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

15th June 2012

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 WG5
 - 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
 - <ftp://ftp.nag.co.uk/sc22wg5/N1601-N1650/N1648.pdf>
 - 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
<ftp://ftp.nag.co.uk/sc22wg5/N1801-N1850/N1828.pdf>
- 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

Original table – 55 Fortran 2003 features		Revision 9 – 58 Fortran 2003 features	
4 compilers	no. of F2003 features	11 compilers	no. of F2003 features
Cray	51	Absoft	20
g95	33	Cray	57
gfortran	23	g95	36
NAG	37	gfortran	43
		HP	31
		IBM	57
		Intel	54
		NAG	56
		Oracle	29
		Pathscale	22
		PGI	50

Summary: Fortran 2008 supported features

Revision 9 – 60 Fortran 2008 features	
Absoft	1
Cray	35
g95	0
gfortran	39
HP	0
IBM	23
Intel	38
NAG	19
Oracle	2
Pathscale	3
PGI	4

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