

# **Finalizing Fortran 2018**

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# Abstract

The Fortran 2018 standard has finalized, subject to a final vote that ends on Nov. 8.

The changes were all minor. I will describe the most significant one.

I will provide a summary of the new features.

For details, see N2161 on the WG5 site,

<https://wg5-fortran.org/>

I will also mention the “Geezers” meeting.

# Final draft standard

The country voting on the Draft International Standard (DIS) for Fortran 2018 was completed at the beginning of June.

No negative votes, but 77 comments, all considered during the June meeting.

The changes made were all minor.

A new draft standard is out for Final DIS ballot, which allows only very minor corrections, such as typos.

It is expected to be published before the year end.

# Initial random numbers

Three problems were found in Fortran 2008 with the use of the random number generator:

- 1 . Each image might have its own pseudorandom sequence or there might be a single sequence that the images access in turns.
2. Some processors always initialize the seed in the same way. Others purposely initialize it randomly.
3. Even with separate sequences, all images might or might not initialize them to the same value.

# Single sequence

Having a single sequence works well on a shared-memory processor without too many images.

An old generator, with nice properties, can be reused and keep all its properties.

However, it would give a serious bottle-neck on many images.

The subgroup tried hard to allow implementations to choose whether to use a single sequence.

It finally abandoned the attempt.

# Separate sequences

Each image has its own sequence that can be initialized by

**call random\_init (repeatable, image\_distinct)**

**repeatable** Whether the initial value is the same for every call from the same image.

**image\_distinct** Whether the initial value varies from image to image.

# **Further coarray features: Image failure**

There is provision for image failure because of the huge numbers of images likely to be in use.

# New IEEE standard

A large number of detailed changes have been made for conformance with the new IEEE standard for floating-point arithmetic.

# Minor changes

Lots, with these most significant

- Specification of locality within **do concurrent**
- For entities accessed from a module, allow specification of the default for **public/private**
- **random\_init (repeatable, image\_distinct)**
- Procedures are recursive by default

# New Obsolescences and Deletions

## Deleted:

- Arithmetic IF
- Shared DO termination and DO termination other than **end do** or **continue**

## Obsolete:

- **equivalence, common & block data**
- Labelled DO loops
- Specific names for intrinsic functions
- **forall** construct

# Old Geezers' Meeting

Before the June meeting there was a short meeting of “old geezers”. I mention it to make the point that the standards exist only because of the hard work of real people.

It was a happy reunion of old friends. The atmosphere at meetings has always been friendly even when there were serious technical disagreements. I learned the importance of this (and much else about chairing) from Jeanne Adams, who was chair when I joined.

I began in 1980. Six of the geezers were there then.

# **Loren Meissner, Stan Whitlock, Mallory North, Andy Johnson, John Reid**



# David Muxworthy, Stan Whitlock



# **Richard Maine, Jeanne Martin, Malcolm Cohen**



# Dick Henderson, Steve Lionel



Jeanne Martin, Andy Johnson,  
Jerry Wagener, Steve Lionel



# Malcolm Cohen, Miles Ellis



# Larry Rolison, Malcolm Cohen, Makki Takata



# Bill Long, Tom Clune, Dan Nagle



# Rex Page



# Van Snyder

