

**OOPS technical meeting of December 5th 2012**  
**IFS cleaning and re-factoring (post CY39): Part 3**

Participants (MF) : Claude Fischer, Karim Yessad, Ryad El Khatib, Stéphane Martinez

Participants (EC) : Deborah Salmond, Tomas Wilhelmsson, Glenn Carver

### 1. Introduction

This was an EC/MF tele-conf to discuss come code cleaning items outstanding from the previous video-confs.

### 2. Actions from Cleaning Document V8d to be done for CY40

Appendix L: Activation of new GPHPRE. EC (Deborah) agreed to put in as many possible of the remaining instances in the list marked 'ECMWF'. MF (Karim) will put in the instances in the list marked 'MF' and 'MF or ECMWF'.

Appendix C: Simplification of Calling Tree.

C1: The observation pre-processing routines listed will be superseded by COPE so should not be changed.

C2: EC (Deborah) will inline the GEMS deallocates.

Appendix F: Modules which can be gathered with other ones. It was decided that the various optimisation switches related to machine architecture (e.g. LOPT\_SCALAR, LOPT\_RS6K, N\_VMASS, LVECADIN etc.) should be rationalised. It was not decided whether they should all be together in one module or whether there should be separate switches which reside with the code that they relate to. It was agreed to look in more detail at this - as it would be relevant for the migration work and general portability of the code. Deborah agreed to make a start on the analysis of the optimisation switches and forward to MF for their input.

Appendix G: New derived types: For his work to isolate the geometry object for OOPS, Tomas had identified some variables which code be put together in derived types. These were in the modules YOMLAP, YOMGEM (remaining variables related to transformed sphere).. Ryad pointed out that the variables in YOMLAP could more conveniently be obtained by on inquire from the transform package and this could be done in other places in the code – as had already been done in FullPos-2. Ryad agreed to start an investigation on where TRANS\_INQ should be used instead of storing variables in modules and forward to EC for input.

CDCONF cleaning: Karim had done the cleaning of the CDCONF in the direct transforms in CY39T1 and hoped to be able to do the inverse transforms too. The main requirement for OOPS is to remove CDCONF if tests from the low-level code. EC(Deborah) agreed to remove the 'now useless' CDCONF(4:4)=='T' in the EC physics routines.

### 3. Actions from Cleaning Document V8d to be done for CY40

Glenn Carver had written a short document with some recommendations for rationalising the use of include files for INTERFACE blocks. Following some discussions it was concluded that the following would be desirable:

- The INTERFACE and END INTERFACE statements would be moved from the \*.F90 files into the (non-autogenerated) \*.h files containing interface blocks

- As many interface block include files as possible would be auto-generated by the compilation systems and would still be called \*.intfb.h.
- The remaining (non-auto-generated) interface block include files would still be called \*.h
- Other include files would be renamed to indicate their contents:
  - \*.nam.h for namelist
  - \*.func.h for statement functions

Glenn agreed to provide a branch for CY39R1 to do the move of the INTERFACE statements into the .h files and rename namelist and function \*.h's.

#### 4. Fortran 2003 features

EC had provided a list of 5 'post-Fortran95' features that they considered could be usefully included in the IFS-Arpege code during the re-factoring work:

1. Data Pointer Assignment to include bounds specifications and remapping to define the subscript extents:

```
REAL, TARGET :: DATA(10000)
REAL, POINTER :: Z(:), SQUARE(:, :)
INTEGER :: FIRST
FIRST=10
Z(0:) => DATA(FIRST:FIRST+10)
SQUARE(1:100,1:100) => DATA
```

2. Derived type data definition to include ALLOCATABLE

```
TYPE :: MY_TYPE
  INTEGER, ALLOCATABLE :: P(:)
END TYPE MY_TYPE
```

3. Dummy arguments may have ALLOCATABLE attribute

```
SUBROUTINE CALC(A)
REAL, ALLOCATABLE :: A(:)
```

(The corresponding actual argument must be ALLOCATABLE too.)

4. Protected Attribute

```
MODULE M
  INTEGER, PROTECTED :: I
  CONTAINS
    SUBROUTINE SET(VAL)
      INTEGER, INTENT(IN) :: VAL
      I=VAL !only allowed here
    RETURN
  END SUBROUTINE SET
END MODULE M
```

## 5. Default values in Type Definition

```
TYPE TEMPERATURES  
  REAL :: LOW=0.0  
END TYPE TEMPERATURES
```

There had been an exchange of emails on this subject and Ulf Andrae had agreed to coordinate the comments and suggestions from the (9) HIRLAM countries. Claude would coordinate any suggestions from the (16) Aladin partners.

MF had tested the five cases on the NEC SX-9 – and only 2 and 5 were OK. - so 1,3, and 4 could not be introduced in before early 2014 – i.e. before CY41. For other compilers ifort V.12 and gfortran 4.6 were OK with all 5.

Glenn agreed to make a start on the list of compilers and their limitations relevant to IFS and forward to MF for input.

### 5. **Aeolus in IFS/Arpege source code repositories.**

It was agreed that the (very large) test data files could be removed from the source code repository.

Ryad suggested that we should investigate whether the whole aeolus source could be removed from the IFS repository and treated as an external – like GRIB\_API etc. In general aeolus has caused problems with compilation at each cycle – and in any case was licenced and versioned differently from IFS. Claude and Deborah agreed to consult the aeolus experts in EC and MF to see if this was possible.

### **List of Actions :**

1. GPHPRE:EC (Deborah) agreed to put in as many possible of the remaining instances in the list marked 'ECMWF' and MF (Karim) will put in the instances in the list marked 'MF' and 'MF or ECMWF'.
2. Deborah will inline the GEMS deallocates.
3. Deborah agreed to make a start on the analysis of the optimisation switches and forward to MF for their input.
4. Ryad agreed to start an investigation on where TRANS\_INQ should be used instead of storing variables in modules and forward to EC for input.
5. EC(Deborah) agreed to remove the 'now useless' CDCONF(4:4)=='T' in the EC physics routines.
6. Glenn agreed to provide a branch for CY39R1 to do the move of the INTERFACE statements into the \*.h files and rename namelist and function \*.h's
7. Glenn agreed to make start on the list of compilers and their limitations relevant to IFS and forward to MF for input.
8. Claude and Deborah agreed to consult the aeolus experts in EC and MF to see if externalisation from IFS-Arpege source was possible.