



# Recent and upcoming code evolutions

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- Coding Standards
- Explicit interface blocks
- Dr Hook function
- F90 structures
- Improvements in code management
- Miscellaneous
- FA library upgrade

# Coding Standards (1/3)

## Presentation

- Extensive update of the « DOCTOR » norm
- Recommendations on :

PRESENTATION   NORM   CONTROL   CONCEPTION

- Since (cleaned) cycle 28
- Manual released during Autumn 2003 :

[http://intra.cnrm.meteo.fr/gmod/modeles/Tech/coding\\_rules/tutorial/tutorial.html](http://intra.cnrm.meteo.fr/gmod/modeles/Tech/coding_rules/tutorial/tutorial.html)

[http://intra.cnrm.meteo.fr/gmod/modeles/Tech/coding\\_rules/tutorial.ps](http://intra.cnrm.meteo.fr/gmod/modeles/Tech/coding_rules/tutorial.ps)

<http://www.cnrm.meteo.fr/aladin/meetings/aladinNH/tutorial.pdf>

Ask me after this presentation



# Coding Standards (2/3)

## Main issues

- Conventional prefixes for F90 structures
- INTENT attribute for dummy arguments
- Explicit kinds use no macros  
(parkind.h replaced by USE PARKIND)
- Inefficiency of F90 array syntax
- Auto-generated explicit interface blocks
- « DRHOOK » function



# Coding Standards (3/3)

## Norms checking

- Partial cleaning on top of cycle 27 for what could be normed automatically
- Automatic Norms Checker on F90 procedures only, for norms automatically checkable
- Included in gmckpack since version 5.3 (non-fatal diagnostic at bottom of listing)
- No systematic manual cleaning planned



# Explicit interface blocks (1/2)

## Pros and Cons

- Absolute match between actual and dummy arguments (« lock » argument useless)
- Scope for more flexible code (optional attribute)
- Scope for more efficient code (implicit-shaped arrays)
- *Can be very dangerous, too !!!* (implicit-shaped arrays)

# Explicit interface blocks (2/2)

## Implementation

- Since cycle 28T0 for aladin
- Systematically used on arp/ and ald/ only
- Auto-generated and managed with an ECMWF-made tool
- Manual inclusion in the code, but automatic control of missing interfaces  
`#include « mysubroutine.intfb.h »`
- Included in gmckpack since version 5.3



# DR\_HOOK function (1/3)

## Presentation

- Instrumentation tool for :
  - Program calling tree
  - Performance profiling
  - Getting reliable traceback upon failure
- Callable from F90 or C routines
- Driven by environment variables
- Since cycle 28,  
and to be enhanced by ECMWF.

# DR\_HOOK function (2/3)

## Code instrumentation

- **USE YOMHOOK, ONLY : LHOOK, DR\_HOOK**
- **REAL(KIND=JPRB) :: ZHOOK\_HANDLE**
- *On top of subroutine body :*  
**IF (LHOOK) CALL DR\_HOOK('SUBNAME',0,ZHOOK\_HANDLE)**
- *At bottom of subroutine body :*  
**IF (LHOOK) CALL DR\_HOOK('SUBNAME',1,ZHOOK\_HANDLE)**
  
- Better not do it manually !
- No external automatic tool (yet) to add it
- Under control of the Norms checker
- Resides in « aux » library





# DR\_HOOK function (3/3)

## Example of use

Export DR\_HOOK=1

Export DR\_HOOK\_OPT=« cpuprof »

- Result in ./drhook.prof.\* (1 per MPI-task)

**Draft of the documentation available at this Workshop  
(By Sami Saarinen, ECMWF)**



# F90 structures (1/4)

## Introduction

- Definition : a variable declared as a F90 « derived types » (ie : a set of elementary variables)
- Structures can be statically or dynamically defined (allocatable)
- Makes the code much more « object-oriented » => improves modularity, reduces maintenance



# F90 structures (2/4)

## Famous derived types in arpege/aladin

- **GMV** : prognostic upper air variables involved in the semi-implicit (U, V, T, P<sub>hat</sub>, D<sub>hat</sub>)
- **GMVS** : prognostic surface variables involved in the semi-implicit scheme (Ln(P<sub>s</sub>))
- **GFL** : other upper air variables : Q, TKE, Microphysics, Chemistry ...
- **Remarks :**
  - **GFL are under user control (namelist !)**
  - **GMV(S) are NOT under user control : fixed and different derived types from GFL**



# F90 structures (3/4)

## History in the code

- Cycle 22 : « distributed\_vector » (ECMWF)
- Cycle 23 : « gridpoint\_buffers » (ECMWF)
- Cycle 24 : « fullpos\_descriptors » (Météo-France)
- Cycle 25 : « fluxes\_type » (Météo-France)
- Cycle 26 : « eggx structures » (Meteo-France)
- Cycle 27/28 : « GMV », « GMVS », « GFL »
- Incoming Cycle 28T1 : First use of GFL for non-advected fields in arpege/aladin (former « PNEBH »)
- More and more structures expected in the next cycles



# F90 structures (4/4)

## Documentation on GMV/GFL

- Revised data flow in IFS/Arpege,  
by Mats Hamrud
- A short description of physics/dynamics interface in the new data flow,  
by Martina Tudor.  
(... not the short, actually ! ☺)



# Improvements in code management (1/2)

## Code aspects

- **ODB** : a better understanding thanks to the extensive manual written by Sami Saarinen (300 pages !) – Released by the end of June, 2004.
- **ODB/UTI** : simplified management ClearCase vs. « packs » planned at Météo-France for cycle 28T1 to cycle 29 (Autumn 2004).
- **XRD** : 153 subroutines identified as useless and removed (cycle 28T0\_t1.4)
- **ALD** : Only one « duplicated » routine left : cnt4.F90 (cycle 28T0\_t1.4)



# Improvements in code management (2/2)

## Tools

- **ClearCase** : same cycle label for all vobs since cycle 25 (ie : CY25 matches AL25)
- **ClearCase** : new « cc\_commands » under developments to fuse all vobs corresponding to the same release : cf « packs ». Expected for cycle 28T1
- **Gmckpack** : Official version 5.3 handles explicit interface blocks and uses the norms checker.
- **Gmckpack** : Beta-version 5.4 (available) is fully portable. Final release expected with the next export version of Aladin.



# Miscellaneous

- Externalizations : expected to be under progress ...
  - Biperiodicization (« l'Arlésienne »)
  - Postprocessing after externalization of a package of low-level operators (... hard job !)
  - Jo, Surface Analysis, Jb
- Cleaning and rationalization of the NH code : starts now on the basis of cycle 28T0\_t1.4





(Last but not least)

## FA :library upgrade (1/2)

- Use of grib version 1 (Gribex)
  - + less internal « pre-treatment »
  - + compression possible
  - + « dolby » modulation : better accuracy
  - + autodocumentation improved
  - little loss in accuracy while packing (max)
  - old spectral field still problematic (autodocumentation, reordering)



(Last)

## FA library upgrade (2/2)

- Fully compatible with the existing files
- Grib version 0 can still be used
- Memory saved :
  - Arpege T385 : 20%
  - Aladin-France : 18 %
- Should be released with cycle 29