TOWARD FULLPOS IN OOPS

On the benefits to re-write the post-processing package in an object-oriented spirit

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INTRODUCTION

The so-called « OOPSification » of the post-processing package FULLPOS aims to execute the 4DVAR assimilation inside a single binary application.

![Diagram](image-url)
MOTIVATION?

We assume that we shall port the ARPEGE 4D-VAR into OOPS; though today:

- the precise timing of OOPS in IFS remains open (as it has drifted during the past years)
- the precise strategy in Meteo-France remains open:
  - 4DVar with external loops still in scripts?
  - Development of the 4DEnVar (in the OOPS context, anyway)

Nevertheless, several code refactoring actions will be necessary for IFS (namely: in-line post-processing on the model geometry) and a part of this task will be conducted by Meteo-France (ie: I/Os excluded)
There was a little risk of discouragement due to that lack of visibility of the future.

The proposed strategy against that risk is to progress via intermediate steps where the code refactoring enables innovations in the post-processing package to the benefit of flexibility and performance.

Here comes the configuration 903
THE CONFIGURATION 903

- Off-line FULLPOS for Interoperability purposes
- Testbed for Fullpos in OOPS
Configuration 903 used for Interoperability

Configuration 901

ECMWF GRIB2

Configuration 901

ECMWF GRIB2

FA ARPEGE

Configuration 901

IFS-903 LARPEGEF=T

FA ARPEGE

Configuration 901

IFS-903 LARPEGEF=F

ECMWF GRIB2

FA ARPEGE

FA ARPEGE

ALADIN

FA ARPEGE

ALADIN

((ECMWF) GRIB2

FULLPOS

FULLPOS

FULLPOS
Configuration 903 as post-processing server

The setup (I/O apart) is computed only once

Can apply to:
- Coupling files
- Interoperability
- Back-end post-processing

**Internal loop on files driven by namelist**
Performance of the post-processing server

Speedup by the post-processing server facility

Transformation from ARPEGE to AROME

- Fullpos trad.
- Fullpos server

Relative time cost

Number of files
Progressive externalization of Fullpos

CNT0
(GENERAL SETUP)
SU0YOMA
SU0YOMB
CPREP3
FULLPOS
INPUT DATA
OUTPUT FILE

CNT0
CPREP3
FULLPOS SETUP
INPUT DATA
FULLPOS COMPUTATION
OUTPUT DATA
OUTPUT FILE
Multi-frequency post-processing

Forecasting model

FULLPOS Setup
Tag LOW

FULLPOS Setup
Tag HIGH

FULLPOS computation
Tag LOW

FULLPOS computation
Tag HIGH

INPUT FILE

LOW FREQ. OUTPUT FILE

HIGH FREQ. OUTPUT FILE
Fullpos-in-OOPS of the poor: use files

Configuration 903 in mode «multi-resolutions testing»

**INPUT FILE nr 1**
Res. #1

**FULLPOS Setup**
resolution #1 to #3

**FULLPOS Setup**
resolution #2 to #3

**FULLPOS Tag resolution**
#1 to #3

**FULLPOS Tag resolution**
#2 to #3

**OUTPUT FILE nr 1**
Res. #3

**OUTPUT FILE nr 2**
Res. #3

METEO FRANCE
Configuration 903 used to test « pipelining »

Configuration 903 in « pipeline testing » mode

- **INPUT FILE**: Res. #2
- **FULLPOS Setup**: resolution #1 to #2
- **MODEL STATE**: Res. #2
- **FULLPOS**: Tag resolution #2 to #1
- **MODEL STATE**: Res. #1
- **FULLPOS Setup**: resolution #2 to #1
- **FULLPOS**: Tag resolution #1 to #2
- **OUTPUT FILE**: Res. #2
A test of simultaneous instances of Fullpos

Configuration 903 in server mode with 1 MPI task

THREAD # 1
ANALYSIS
TRANSFORMED ANALYSIS

THREAD # 2
GUESS
TRANSFORMED GUESS
Second generation post-processing servers

Multiple MPI communicators

#1                   #2                   #3          #4

Fullpos server for coupling files

Forecasting model

Fullpos server for back-end post-processing

I/O server

Reshuffled data

RAW DATA

Reshuffled data

RAW DATA

RAW DATA
Expected status in cycle 43T1

- Configuration 903 already available for use as basic off-line post-processing in cycle 43
- Configuration 903 in server mode ready for use
  - Robustness to be confirmed by intensive usage.
  - Documentation will be sent.
  - Not yet fully working with the I/O server

- Replacement of the configuration 901 coded ; to be validated (lacks expected here and there !)
- Interoperability in server mode not ready

- Refactoring for OOPS on its way ...
Thank you for your attention!