OOPS technical meeting of January 17, 2013
Geometry object & reorganization of global variables

Participants (MF) : Claude Fischer, Karim Yessad, Alexandre Mary
Participants (EC) : Deborah Salmond, Tomas Wilhelmsson, Mats Hamrud
Participants (LAM): Daan Degrauwe (RMI/Aladin), Ulf Andrae (SMHI/Hirlam)

1. Introduction

This video-conference was dedicated to the important work of rearranging global variables, in view of defining geometry-related derived types ("Fortran objects"), how to compose them and prepare for the split of the set-up along the lines of the rearrangement.
Daan sent a technical note, in preparation of the meeting, where he summarized specific questions inspired by his work on extending the "fieldset" structure to LAM.

2. Geometry object, split of global modules and set-up

Tomas has well progressed with splitting the variables, and grouping those related to horizontal geometry and grid distribution (including MPI aspects) together. He has used Karim's note as a guidance, as well as email exchanges (November 2012). The Tomas' trick will be used to allow multiple instantiation when testing in the OOPS framework, for those variables that are extremely often used in the present IFS (so recoding of USE statements into derived types as arguments will have to be done little by little). This concerns for instance YOMDIM and YOMMP variables. On the opposite, the vertical geometry and distribution is pre-set, and thus it is assumed to be constant for all instantiations. This choice is sufficient to proceed in OOPS towards multi-incremental VAR, and a further re-factoring will have to be discussed later (that means, multiple vertical geometries in a same binary run).

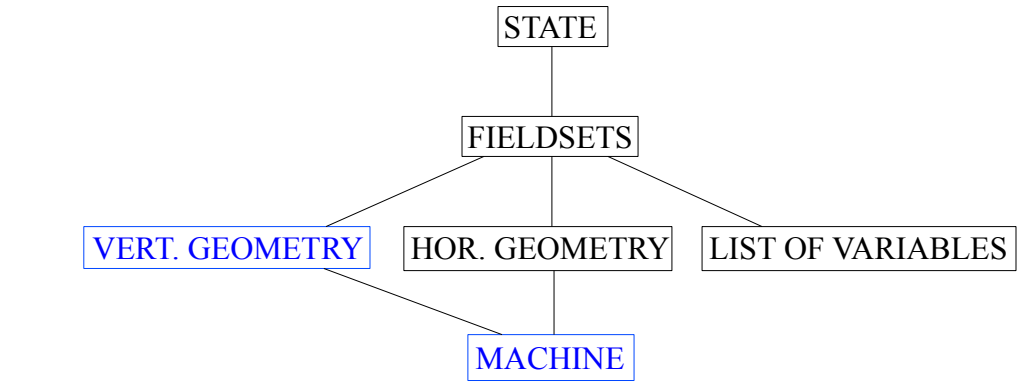
Next step for Tomas will be to split ALLOCATE statements (from SUALLO) and set-up routines, according to the new organization of the derived types. Moving the split set-up around in the IFS will be done at a later stage (after CY40), so at first, the set-up order itself should not be modified. This will ease validation and reduce the risks of difficult bugs.

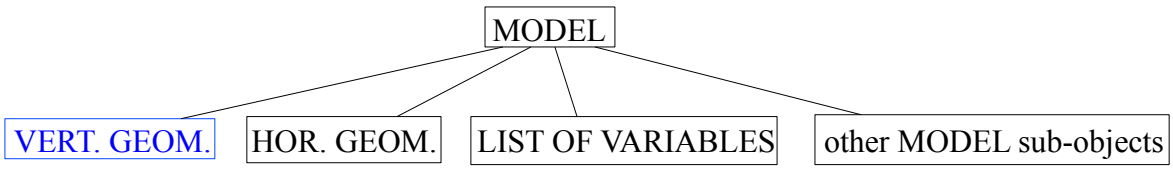
Mats is pruning a number of spectral parameters out of the IFS, but he will not proceed to a complete use of (only) the spectral transform package for initializing spectral space variables in the IFS (refer to a proposal by Ryad). This is because that would force to implement in TFL a number of spectral parameters that are not needed by the transforms themselves (Laplacian eigenvalues etc.). The next step will be to start passing only the geometry object in the IFS, instead of USEing spectral global variables.

Météo-France will now concentrate on evaluating the new code, with the primary goal of analyzing how LAM specificities can be adapted, and define a strategy for phasing (CY40). Tomas will send the code asap to MF (once the split of set-up is performed). The LAM-related analysis will involve Karim, Alexandre, Claude, possibly other GMAP staff for brainstorming or help for phasing. Partners will be associated (Daan and Ulf as participating to the discussions at least; possibly the one or other phasing staff in April/May).

Daan's note was addressed. Tomas explained the fieldset structure was meant as a component of the State object. The Geometry object would be another component of the State (but probably would also be included in other compound objects). A composition diagram could like the following (blue

for pre-set objects; lines represent use/depend relations):





Météo-France also mentioned that it has a simple Fortran code prototype that illustrates the Tomas' trick outside the IFS code. This can be a useful help for any partner, anywhere, for learning and testing this specific POINTER handling locally. Alexandre can make the code available, on demand.

3. AOB

Claude made a quick overview of other technical items planned for CY40 or CY41. Those have not given raise to any specific comment. Note that the new model field structure remains as an open issue, to be discussed later. Its inclusion in CY40 (in the radiation code for IFS) was not yet decided.

For a remainder, the list of items is:

- change of resolution of fields (IFS version, Tomas) : no comment.
- introduction of the new Model Field Structures (proposal by Alan Geer) : to be addressed later.
- GOM cleaning – neutral winds (Alan & Giovanna) : targeted for CY40 (only IFS)
- IFS physics cleaning (CALLPAR, Filip) : targeted for CY40 (only IFS)
- re-arrange vertical interpolations of observation operators (split preparation phase from the core vertical interpolation code) (Deborah and Mats) : targeted for CY41
- specific code cleaning taken from Karim's document (EC and MF) : in progress for CY40
- pruning of a few keys in the assimilation (MF) : targeted for CY40, except LOBSTL/L131TL that do have many side effects. These two keys probably will die away once OOPS has become the settled reference code for all applications.
- removal of command line options (MF) : started, but more likely for CY40T1, then CY41
- LAM-related action plan for OOPS (Claude) : in progress.

A short discussion about the possible re-factoring of time and time step information took place.

Météo-France was wondering whether these pieces of information should or would be grouped in any sort of object (C++ or only Fortran). Claude mentioned absolute time, timing relative to the start of the integration, time step numbering (various parameters exist), time step length δt (also various values: physics step, DFI backward step etc.). Mats indicated that there had been a discussion at ECMWF about whether time should be specifically known in the C++ layer, with no consensual conclusion so far. One point was that the OOPS/C++ code only should know about a given State (or set of States) valid at a given time, and in this case no specific time information would be needed. Time information also is present for instance in the LAM LBC code, which will be further cleaned and re-factored (a proposal by Karim, and work by Daan for the fieldsets in LAM). We agreed that this information should be considered as part of the Model object, unless any new analysis is made. Claude will forward Karim's note about further cleaning in the LAM coupling code to Daan & Ulf, for information. This proposal could become an action for an Aladin staff.

4. **Next video-conference**

Deborah and Ryad to agree on a date for discussing Ryad's new version of Full-POS (so-called Full-POS2). This meeting is tentatively scheduled for the beginning of February.

List of Actions :

1. Tomas will send the code with Geometry & global variables reorganization asap to MF (once the split of set-up is performed), so that MF can start evaluating the strategy for LAM insertion and phasing. MF to liaise with Aladin and Hirlam partners.
2. Alexandre will write a short note describing the prototype Fortran code for illustration of the Tomas trick, and have a tar file ready for any interested partner, on demand.
3. Claude will forward Karim's note about further cleaning in the LAM coupling code to Daan & Ulf, for information. This proposal could become an action for an Aladin staff.
4. Deborah and Ryad to agree on a date for discussing Ryad's new version of Full-POS (so-called Full-POS2). This meeting is tentatively scheduled for the beginning of February.