

LIBRARY ARCHITECTURE IN ARPEGE/ALADIN (CY36T2).
K. YESSAD
METEO-FRANCE/CNRM/GMAP/ALGO

ARPEGE, ALADIN, ALARO, HIRALD, AROME.

One code, but several models shared between different European (and also some non-European countries) :

- ARPEGE : spectral global model for METEO-FRANCE applications.
- IFS : spectral global model for ECMWF applications.
- ALADIN : spectral limited area model (mesh-size often between 5 km and 10 km).
- ALARO : cf. ALADIN but for some ALADIN partners, (mesh-size around 5-7 km).
- AROME : non-hydrostatic spectral limited area model for METEO-FRANCE applications (mesh-size 2.5 km) ; in operations since 2008.
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ENTERING THE ARPEGE LIBRARY.

- On “merou”, under CLEARCASE : `cc_getview -u public -r CY36T2`
- Available views ... : `select arp_public_CY36T2_bf`
- Root : merou : `/home/marp001/dev` : several directories (ald, arp, ...) containing the “projects”.

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AVAILABLE PROJECTS.

Used in forecasts :

- ARP : ARPEGE or common ARPEGE-ALADIN routines.
- ALD : specific LAM routines (LAM, not used at ECMWF).
- TFL : spectral transforms for spherical geometry.
- TAL : spectral transforms for plane geometry.
- XRD : some application routines (IO on files, DM environment).
- XLA : linear algebra, minimizers other than CONGRAD.
- SUR : ECMWF surface scheme.
- BIP : Bi-periodicisation package (LAM models).
- MPA : upper air MESO-NH/AROME physics (now also used in ARPEGE and ALADIN).
- MSE : surface processes in MESO-NH/AROME (interface for SURFEX).
- SURFEX : surface processes in MESO-NH/AROME.

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AVAILABLE PROJECTS (CONT'D).

Used in assimilation :

- AEO : package for pre-processing satellite lidar wind data.
- BLA : package for blacklisting.
- OBT : statistics of observation feedback data (only used at ECMWF).
- ODB : ODB (Observational DataBase software).
- SAT : satellite data handling package.
- SCT : QUICKSCAT scatterometre handling.

Miscellaneous utilities :

- UTI : utility package, containing for ex. PROGRID (not used at ECMWF).
- SCR : scripts used at ECMWF.

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ARPEGE or common ARPEGE-ALADIN routines.

A subset of these directories are also in ALD.

- `adiab` : adiabatic dynamics, adiabatic diagnostics, SI scheme, horizontal diffusion.
- `c9xx` : specific configurations 901 to 999 routines.
- `canari` : routines used in the CANARI optimal interpolation.
- `climate` : some specific ARPEGE-CLIMAT routines.
- `control` : control routines, like CNT4 or STEPO.
- `dfi` : routines used in the DFI.
- `dia` : diagnostics other than FULL-POS.
- `fullpos` : FULL-POS software.
- `function` : functions (in includes).
- `kalman` : Kalman filter.
- `module` : all the types of modules.

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PROJECT ARP/IFS (CONT'D).

A subset of these directories are also in ALD.

- mwave : micro-wave observations (SSM/I) treatment.
- namelist : all namelists.
- nmi : routines used in the NMI.
- obs_error : treatment of the observation errors in the assim.
- obs_preproc : observation pre-processing.
- ocean : oceanic coupling, for climatic applications.
- onedvar : 1D-VAR assimilation scheme used at ECMWF.
- op_obs : observation horizontal and vertical interpolator.
- parallel : parallel environment, communications between processors.
- phys_dmn : physics parameterizations used at METEO-FRANCE.
- phys_ec : ECMWF physics.
- phys_radi : some ECMWF radiation physics routines.

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- pp_obs : vertical interpolator (FULL-POS, obs interpolator).
- prism : OASIS coupler (for climate applications).
- programs : main programs.
- sekf : simplified extended Kalman filter.
- setup : setup routines not linked with a very specific domain.
- sinvect : singular vectors calculation (configuration 601).
- transform : hat routines for spectral transforms.
- utility : miscellaneous utilities (lin. algebra, dealloc).
- var : routines involved in the 3DVAR and 4DVAR assimilation.

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Spectral transforms.

- build (in TFL) : contains procedures.
- external : routines which can be called from another project.
- interface : not automatically generated interfaces.
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Auxiliary library.

- bufr_io : BUFR format files reading and writing.
- cma : CMA format files reading and writing.
- ddh : DDH diagnostics.
- eclite : routines coming from an old ECLIB package.
- fa : ARPEGE (FA) files reading and writing.
- grib_io : ECMWF GRIB format files reading and writing.
- grib_mf : METEO-FRANCE GRIB format files reading and writing.
- include : not automatically generated interfaces.
- lfi : LFI format files reading and writing.
- misc : miscellaneous decks.
- module : all the types of modules ; mpl...F90 modules for parallel environment.
- parallel : parallel environment.
- programs : main programs.
- support : miscellaneous routines.
- svipc : contains only svipc.c.
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Upper air MESO-NH/AROME physics.

Code imported from MESO-NH (MESO-NH DOCTOR norm).

- programs : main programs.
- first layer of directories : chem (chemistry), conv (convection), micro (microphysics), turb (turbulence).
- externals : routines which can be called from another project.
- include : all the "include" decks.
- interface : not automatically generated interfaces.
- internals : other non-module routines.
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- aux : auxiliary actions (mostly file I/O).
- canopy : surface boundary layer prognostic scheme.
- dummy : empty versions of some routines.
- flake : lake model.
- ideal : idealised configuration.
- include : all the “include” decks.
- isba : ISBA vegetation model.
- pgd : PGD climatologic file preparation.
- prep : initial surface file preparation.
- sea : ocean and sea model.
- surf_atm : coupling between surface and atmosphere.
- teb : town model.
- trip : rivers and floodings model.
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Package for blacklisting.

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Utility package.

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- addozaer : program to add ozone and aerosols constants in ARPEGE files.
- addsurf : programs to add fields in ARPEGE files.
- combi : combination of perturbations in an ensemble forecast (PEARP).
- ctpini : routines for CTPINI applications (inversion of potential vorticity fields).
- gobptout : PROGRIB.
- pinuts : PINUTS applications, for example to create ALADIN domains.
- pregpsol : surface GPS processing.
- progrid : PROGRID.
- progrid_cadre : cf. progrid ?
- rdc : former configuration 911 (makes dilatation/contraction matrices).
- sst_nesdis : program to read the SST on the BDAP.

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GROUPS OF PROJECTS INVOLVED TO MAKE EXECUTABLES.

We should be able to make executables with only the following subsets of projects (\Rightarrow restrictions about the interdependencies) :

- ARP+TFL+XRD+XLA+MPA+MSE+SURFEX : for ARPEGE forecasts with METEO-FRANCE physics.
- ARP+ALD+TFL+TAL+XRD+XLA+BIP+MPA+MSE+SURFEX : for ALADIN or AROME forecasts.
- ARP+TFL+XRD+XLA+SUR : for IFS forecasts with ECMWF physics.
- ARP+TFL+XRD+XLA+MPA+MSE+SURFEX+BLA+ODB+SAT : for ARPEGE assimilations with METEO-FRANCE physics.
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- Tricky to list extensively ; mentioned in some documentation.
- There is a sort of hierarchy, saying that some projects can or cannot call routines of other projects, or saying that modules of other projects can or cannot be used.
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MORE DOCUMENTATION.

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