SIREN

NEMO 3.6

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Contents

Chapter 1

About

SIREN is a software to set up regional configuration with NEMO.
Actually SIREN creates the input files you need to run a NEMO regional configuration.

SIREN allows you to create your own regional configuration embedded in a wider one.

To know how to install SIREN see Download.

You could find a tutorial for a quick start with SIREN in How To Use (Quick Start).
For more information about how to use each component of SIREN

- see create_coord.f90 to create fine grid coordinate file
- see create_bathy.f90 to create fine grid bathymetry
- see merge_bathy.f90 to merge fine grid bathymetry
- see create_restart.f90 to create initial state file, or other fields.
- see create_boundary.F90 to create boundary condition

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Chapter 2

Download

Download NEMO

to install SIREN, you should first download NEMO. see `NEMO quick start guide`

Compile SIREN

when NEMO is installed, you just have to compile SIREN codes:

1. go to ./NEMOGCM/TOOLS
2. run maketools (ex: ./maketools -n SIREN -m ifort_mpi_beaufix)

   Note

   to get help on maketools: ./maketools -h

Fortran Compiler

SIREN codes were succesfully tested with :

- ifort (version 15.0.1)
- gfortran (version 4.8.2 20140120)

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Chapter 3

How To Use (Quick Start)

SIREN is a software to set up regional configuration with NEMO.
Actually SIREN creates all the input files you need to run a NEMO regional configuration.

SIREN is composed of a set of 5 Fortran programs :

- create_coord.f90 to create regional grid coordinates.
- create_bathy.f90 to create regional grid bathymetry.
- merge_bathy.f90 to merge regional grid bathymetry with wider grid bathymetry at boundaries.

  Note

  the goal of this step is to avoid break in Bathymetry. This break may cause inconsistency between forcing fields at boundary and regional fields.
- create_restart.f90 to create initial state file from coarse grid restart or standard outputs.

  Note

  this program could also be used to refined other input fields from a wider configuations (as runoff, chlorophyll etc...)
- create_boundary.F90 to create boundaries conditions from wider configurations output fields.

Warning

SIREN can not:

- create global configuration.
- create configuarion around or close to North pole.
- change number of vertical level.

Here after we briefly describe how to use each programs, and so how to create your own regional configuration.

Note

As demonstrator for a first start a set of GLORYS files (global reanalysis on *ORCA025* grid), as well as examples of namelists are available here.

3.1 Create coordinates file

To create your own configuration, you first have to create a coordinates file on your domain of study.
SIREN allows you to create this coordinates file from a wider coordinates file.
The coordinates file created could simply be an extraction, or a refinment of the wide grid.

To create this new cooridnates file, you have to run :

```
./SIREN/create_coord.exe create_coord.nam
```

Here after is an example of namelist for *create_coord.exe*.
In this example, you create a coordinates file named *coord_fine.nc*.
This new coordinates file is refined from an extraction of *coordinates_ORCA025.nc*.

```
&namlog
/

&namcfg
   cn_varcfg = "PATH/NEMOGCM/TOOLS/SIREN/cfg/variable.cfg"
/

&namcrs
   cn_coord0 = "PATH/coordinates_ORCA025.nc"
   in_perio0 = 4
/

&namvar
/

&namnst
   in_imin0 = 1070
   in_imax0 = 1072
   in_jmin0 = 607
   in_jmax0 = 609

   in_rhoi = 2
   in_rhoj = 3
/

&namout
   cn_fileout = "PATH/coord_fine.nc"
/
```

Let's get describe this namelist.
First we have the **namlog** sub-namelist. This sub-namelist set parameters of the log file.
All the parameters of this sub-namelist have default value, so you could let it empty, as done here.
This will create a log file named *create_coord.log*

The **namcfg** sub-namelist defines where found SIREN configuration file.
This configuration file defines standard name, default interpolation method, axis,... to be used for some known variables.
Obviously, you could add other variables to those already list, in this file.

Note

You could find the generic version of *variable.cfg* in the directory *NEMOGCM/TOOLS/SIREN/cfg*.

The **namcrs** sub-namelist set parameters of the wide coordinates file,
as path to find it, and NEMO periodicity of the wide grid.

Note

the NEMO periodicity could be choose between 0 to 6:

in_perio=0 standard regional model

in_perio=1 east-west cyclic model

in_perio=2 model with symmetric boundary condition across the equator

in_perio=3 regional model with North fold boundary and T-point pivot

in_perio=4 global model with a T-point pivot.
example: ORCA2, ORCA025, ORCA12

in_perio=5 regional model with North fold boundary and F-point pivot

in_perio=6 global model with a F-point pivot
example: ORCA05

See also

For more information see NEMO periodicity

The **namvar** sub-namelist lists variables to be used.
By default all the variables of the wider coordinates file are used to create the new coordinates file.
The interpolation methods to be used are defined in the configuration variables file (see below). So you do not need to fill this sub-namelist too.

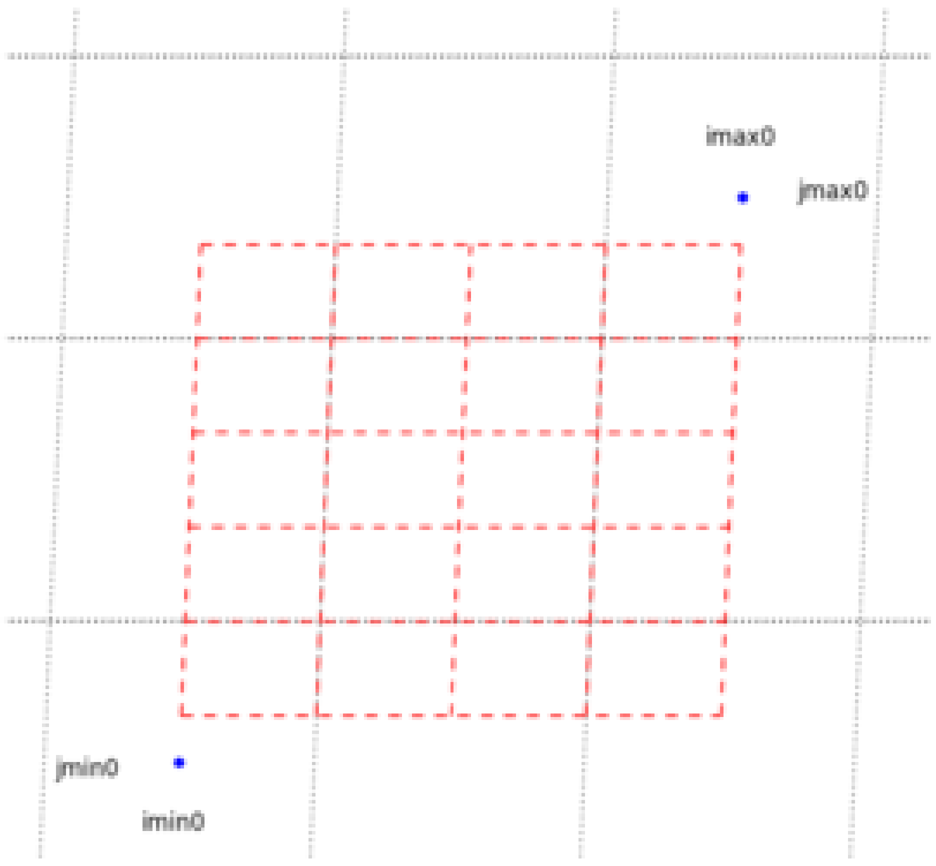
The **namnst** sub-namelist defines the subdomain to be used as well as refinment factor.

Note

Subdomain is defined by indices of the coarse/wide grid.

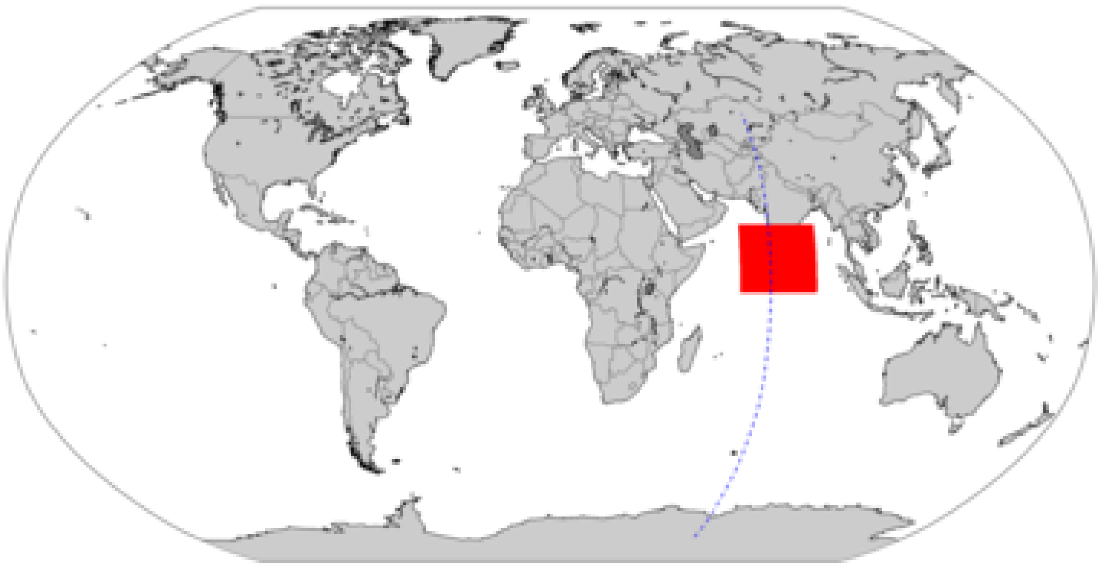
- you can select area quite every where (excepted too close from the North pole), and use the refinment factor you want.

```
&namvar
   in_imin0 = 1070
   in_imax0 = 1072
   in_jmin0 = 607
   in_jmax0 = 609

   in_rhoi = 2
   in_rhoj = 3
/
```



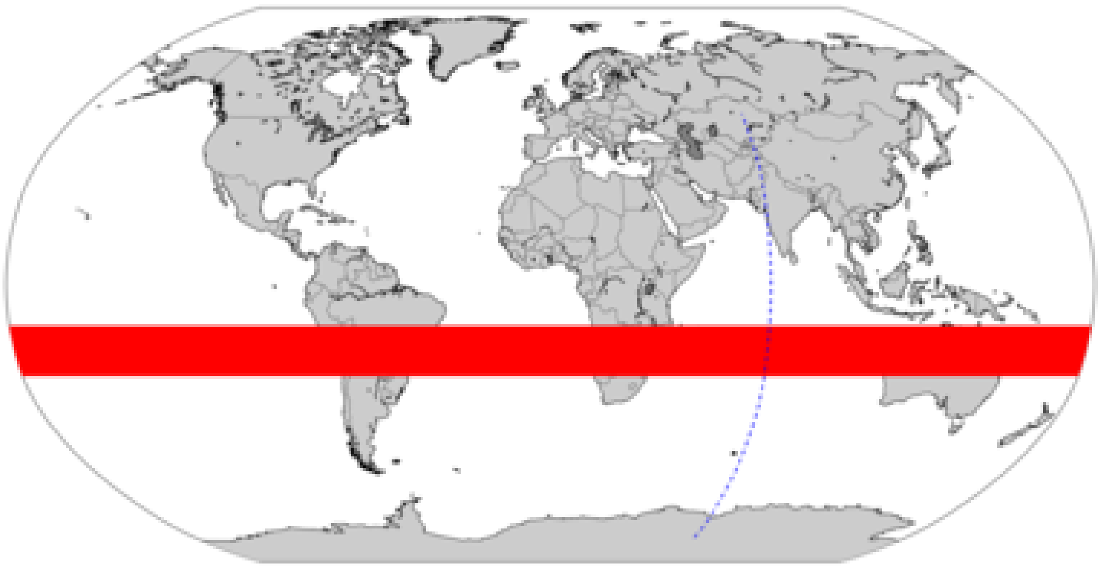
- you can select area crossing the east-west overlap of the global ORCA grid.

```
&namvar
   in_imin0 = 1402
   in_imax0 = 62
   in_jmin0 = 490
   in_jmax0 = 570

   in_rhoi = 5
   in_rhoj = 5
/
```



- you can select east-west cyclic area.

```
&namvar
   in_imin0 = 0
   in_imax0 = 0
   in_jmin0 = 390
   in_jmax0 = 450

   in_rhoi = 1
   in_rhoj = 1
/
```



Finally the **namout** sub-namelist defines the output file.

Note

All the output files created by SIREN include information about NEMO periodicity, as well as source file, indices and refinment used.

See also

For more information about how to create coordinates, see create_coord.f90

3.2 Create bathymetry file

Then you need a Bathymetry file.
SIREN allows you to create a Bathymetry extracted or refined from a wider Bathymetry grid.

To create this new bathymetry, you have to run :

```
./SIREN/create_bathy.exe create_bathy.nam
```

Here after is an example of namelist for *create_bathy.exe*.
In this example, you create a bathymetry file named *bathy_fine.nc*.
This new bathymetry file is refined from an extraction of *bathy_meter_ORCA025.nc*.
Moreover a minimum value of 5m is imposed to the output Bathymetry.

```
&namlog
/

&namcfg
   cn_varcfg = "PATH/NEMOGCM/TOOLS/SIREN/cfg/variable.cfg"
/

&namcrs
   cn_coord0 = "PATH/coordinates_ORCA025.nc"
   in_perio0 = 4
/

&namfin
   cn_coord1 = "PATH/coord_fine.nc"
/

&namvar
   cn_varfile = "Bathymetry:PATH/bathy_meter_ORCA025.nc"
   cn_varinfo = "Bathymetry: min=5"
/

&namnst
   in_rhoi = 2
   in_rhoj = 3
/

&namout
   cn_fileout = "PATH/bathy_fine.nc"
/
```

Let's get describe this namelist.

First as previously, we have the **namlog** and **namcfg** sub-namelist (see above for more explanation).

Then the **namcrs** sub-namelist set parameters of the wide coordinates file.

Note

in all SIREN namelist:
0 referred to the coarse/wide grid.
1 referred to the fine grid.

In the same way, the **namfin** sub-namelist set parameters of the fine coordinates file.

Note

in this namelist example, there is no need to set the variable *in_perio1* to define the NEMO periodicity of the fine grid.
Indeed, if this variable is not inform, SIREN tries to read it in the attributes of the file.
So if you created the fine coordinates with SIREN, you do not have to fill it. In other case, you should add it to the namelist.

The **namvar** sub-namelist lists variables to be used:

cn_varfile defines the variable name ("Bathymetry" here) and the input file associated with.

Warning

The domain of the input Bathymetry have to be larger than the output domain.

Note

- if the input file is at coarse grid resolution (same than *cn_coord0*), the ouptut Bathymetry will be refined on fine grid.
- if the input file is a wider bathymetry (already at fine grid resolution), the output Bathymetry will be extracted from this one.

cn_varinfo defines user's requests for a variable.

Note

Default interpolation method for the Bathymetry, is *cubic* interpolation.
So you may want to specify a minimum value to avoid negative value, or to change interpolation method.
example:

- cn_varinfo="Bathymetry: min=1"'
- cn_varinfo="Bathymetry: int=linear"

The **namnst** sub-namelist defines the subdomain refinment factor.
Of course those refinment factors have to be convenient with refinment from coarse grid *cn_coord0* to fine grid *cn_coord1*.

Note

subdomain indices are automatically deduced from fine and coarse grid coordinates.

Finally, this **namout** sub-namelist defines the output file.

Note

All the output files create by SIREN include information about source file, indices, refinment and interpolation method used.

See also

For more information about how to create bathymetry, see create_bathy.f90

3.3 Merge bathymetry file

The Bathymetry you build differs from the wider one.
To avoid issue with boundaries forcing fields, you should merge fine and coarse Bathymetry on boundaries.
SIREN allows you to do this.

To create this merged bathymetry, you have to run :

```
./SIREN/merge_bathy.exe merge_bathy.nam
```

Here after is an example of namelist for *merge_bathy.exe*.

```
&namlog
/

&namcfg
   cn_varcfg = "PATH/NEMOGCM/TOOLS/SIREN/cfg/variable.cfg"
/

&namcrs
   cn_bathy0 = "PATH/bathy_meter_ORCA025.nc"
   in_perio0 = 4
/

&namfin
   cn_bathy1 = "PATH/bathy_fine.nc"
/

&namnst
   in_rhoi = 3
   in_rhoj = 3
/

&nambdy
/

&namout
   cn_fileout = "PATH/bathy_merged.nc"
/
```

In this namelist, you find again the **namlog**, **namcfg** describe above.

Then the **namcrs** sub-namelist sets parameters of the wider grid. However this time, this is the coarse/wide grid Bathymetry wich have to be informed.

The **namfin** sub-namelist defines parameters of the fine grid Bathymetry.

Note

here again you could add the *in_perio1* parameter if need be i.e. if your fine grid Bathymetry was not created by SIREN.

The **namnst** sub-namelist defines the subdomain refinment factor.

The **nambdy** sub-namelist defines the subdomain boundaries.
By default SIREN tries to create boundaries for each side. Boundary exist if there is at least one sea point on the second row of each side.
So you could let this namelist empty.

See also

For more information about boundaries, see Create boundaries conditions

Finally, this **namout** sub-namelist defines the output file.

See also

For more information about how to merge bathymetry, see merge_bathy.f90

3.4 Create initial state

To run your configuration you need an inital state of the ocean.
You could start from a restart file (with all NEMO variables fields at one time step). Or you could start from "partial" information about ocean state (Temperature and Salinity for example).

Siren allows you to create both of those initial state.
To create the initial state, you have to run:

```
./SIREN/create_restart.exe create_restart.nam
```

Here after is an example of namelist for *create_restart.exe*.
In this example, you create an initial state split on 81 "processors", and named restar_out.nc.
The initial state is composed of temperature and salinity refined from an extraction of GLORYS fields.

```
&namlog
/

&namcfg
   cn_varcfg = "PATH/NEMOGCM/TOOLS/SIREN/cfg/variable.cfg"
/

&namcrs
   cn_coord0 = "PATH/coordinates_ORCA025.nc"
   in_perio0 = 4
/

&namfin
   cn_coord1 = "PATH/coord_fine.nc"
   cn_bathy1 = "PATH/bathy_merged.nc"
/

&namzgr
/

&namzps
/

&namvar
   cn_varfile = "votemper:GLORYS_gridT.nc",
                "vosaline:GLORYS_gridS.nc"
/

&namnst
   in_rhoi = 3
   in_rhoj = 3
/

&namout
   cn_fileout = "PATH/restart_out.nc"
   in_nproc = 81
/
```

Let's get describe this namelist more accurately.

As previously, we have the **namlog** and **namcfg** sub-namelists, as well as the **namcrs** sub-namelist to set parameters of the wide coordinates file (see above for more explanation).

Then the **namfin** sub-namelist set parameters of the fine grid coordinates and bathymetry.

The **namzgr** and **namzps** sub-namelists define respectively parameters for vertical grid and partial step.
By default, those parameters are defined the same way than in GLORYS (i.e. 75 vertical levels).
So you could let it empty.

Note

If you use forcing fields other than GLORYS, you have to be sure it uses the same vertical grid. In other case, you need to get information about the parametrisation use, and to put it in those sub-namelist (see create_restart.f90).

the **namvar** sub-namelist lists variables to be used.
Here we use *votemper* (temperature) get from *GLORYS_gridT.nc* file, and *vosaline* (salinity) get from *GLORYS_↩ gridS.nc* file.

Note

To get all variables of a restart file. You have to use:

```
cn_varfile = "all:PATH/restart.dimg"
```

The **namnst** sub-namelist defines the subdomain refinment factor, as seen previously.

Finally, this **namout** sub-namelist defines the output files.
Here we ask for output on 81 processors, with *restart_out.nc* as file "basename".
So SIREN computes the optimal layout for 81 porcessors available,
and split restart on output files named *restart_out_num.nc*, where *num* is the porc number.

Note

SIREN could also create the other fields you may need for your configuration.
To do so, you just have to run *create_restart.exe* with other variable(s) from other input file(s).
For example, to get runoff fields, you could use:

```
cn_varfile = "sorunoff:PATH/runoff_GLORYS.nc"
...
cn_fileout = "PATH/runoff_out.nc"
```

See also

For more information about how to create initial state or other fields, see create_restart.f90

3.5 Create boundaries conditions

Finally to force your configuration, you may need boundaries conditions.
NEMO read physical boundaries conditions from temperature, salinity, currents, and sea surface height.

To create the boundaries condition with SIREN, you have to run:

```
./SIREN/create_boundary.exe create_boundary.nam
```

Here after is an example of namelist for *create_boundary.exe*.
In this example, you create boundaries conditions named *boundary_out.nc* on each side of the domain.
The boundaries contain information about temperature, salinity, currents and sea surface height refined from an extraction of GLORYS fields.

```
&namlog
/

&namcfg
   cn_varcfg = "PATH/NEMOGCM/TOOLS/SIREN/cfg/variable.cfg"
/

&namcrs
   cn_coord0 = "PATH/coordinates_ORCA025.nc"
   in_perio0 = 4
/

&namfin
   cn_coord1 = "PATH/coord_fine.nc"
   cn_bathy1 = "PATH/bathy_fine.nc"
/

&namzgr
/

&namzps
/

&namvar
   cn_varfile="votemper:GLORYS_gridT.nc",
              "vosaline:GLORYS_gridS.nc",
              "vozocrtx:GLORYS_gridU.nc",
              "vomecrty:GLORYS_gridV.nc",
              "sossheig:GLORYS_grid2D.nc"
/

&namnst
   in_rhoi = 3
   in_rhoj = 3
/

&nambdy
/

&namout
   cn_fileout = "PATH/boundary_out.nc"
/
```

Let's get describe this namelist more accurately.

As previously, we have the **namlog** and **namcfg** sub-namelists, as well as the **namcrs** sub-namelist to set parameters of the wide coordinates file (see above for more explanation).

Then the **namfin** sub-namelist set parameters of the fine grid coordinates and bathymetry.

The **namzgr** and **namzps** sub-namelists define respectively parameters for vertical grid and partial step.
By default, those parameters are defined the same way than in GLORYS (i.e. 75 vertical levels).
So you could let it empty.

Note

> If you use forcing fields other than GLORYS, you have to be sure it uses the same vertical grid. In other case, you need to get information about the parametrisation use, and to put it in those sub-namelist (see create_boundary.F90).

the **namvar** sub-namelist lists variables to be used.
Here we get *votemper* (temperature) from *GLORYS_gridT.nc* file, *vosaline* (salinity) from *GLORYS_gridS.nc* file, *vozocrtx* (zonal velocity) from *GLORYS_gridU.nc*, *vomecrty* (meridional velocity) from *GLORYS_gridV.nc*, and sossheig (sea surface height) from *GLORYS_grid2D.nc*.

The **namnst** sub-namelist defines the subdomain refinment factor.

The **nambdy** sub-namelist defines the subdomain boundaries.
By default SIREN tries to create boundaries for each side (Boundary is created if sea point exist on the second row of each side).
So you could let this namelist empty.

Note

SIREN allows you to place boundaries away from the side of the domain. To do so you have to define your boundary.
That means you have to give on fine grid the index of the boundary (how far from the border your boundary is), the width of your boundary, and finally first and last point of your boundary (the length of your boundary).
So to define a north boundary, you have to add in the sub-namelist *nambdy*, the parameter:

```
cn_north="index,first:last(width)"
```

Finally, this **namout** sub-namelist defines the output files.
Here we ask for output with *boundary_out.nc* as file "basename".
So SIREN creates output files named *boundary_out_west.nc*, *boundary_out_east.nc*, *boundary_out_north.nc*, and *boundary_out_south.nc* depending if boundary exist or not.

See also

For more information about how to create boundaries condition, see create_boundary.F90

3.6 Create and run NEMO configuration

So now you created all the input files you need for your physical configuration, you have to create the "NEMO configuration".
To do so, go to the directory *NEMOGCM/CONFIG/*, and run:

```
./makenemo -n MY_CONFIG -d "OPA_SRC"
```

This creates your configuration "MY_CONFIG" in the directory *NEMOGCM/CONFIG*.
you could check the cpp_keys used in file *cpp_MY_CONFIG.fcm*, and re-run *makenemo* if need be.

Once *makenemo* has run successfully, the *opa* executable is available in directory *NEMOGCM/CONFIG/MY_CO←NFIG/EXP00*.
Then you just have to put all your input files in this directory, fill the namelist *namelist_cfg*, and run:

```
mpirun ./opa
```

Note

no surface forcing here. weighted function needed to do interpolation on the fly, could be created by WEIGHT tools already inside NEMO.

See also

For more information about how to create NEMO configuration see `NEMO Quick Start Guide`.

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Chapter 4

Support

How to get support

If you have questions regarding the use of SIREN, please have a look at the `NEMO configuration manager forum`.
If you don't find an answer in the archives, feel free to register and post your question.

How to Help

The development of SIREN highly depends on your input!
If you are trying SIREN let me know what you think of it (do you miss certain features?). Even if you decide not to use it, please let me know why.

How to report a bug

If you believe you have found a new bug, please report it.
Before submitting a new bug, first search through the database if the same bug has already been submitted by others

If you send only a (vague) description of a bug, you are usually not very helpful and it will cost much more time to figure out what you mean. In the worst-case your bug report may even be completely ignored.

Chapter 5

Coding Rules

The conventions used in SIREN coding are based on the NEMO coding rules (see `NEMO coding conventions`).
However some modifications were added to improve readibility of the code.
Some of the NEMO coding rules are reminded here, and extensions are described.

5.1 Fortran Standard

SIREN software adhere to strict **FORTRAN 95** standard.
There is only one exception. The use of functions *COMMAND_ARGUMENT_COUNT* and *GET_COMMAND_A↩ RGUMENT*.
There exist no equivalent for those Fortran 03 intrinsec functions in Fortran 95.
At least none convenient for compilers tested (see Download).

5.2 Free Form Source

Free Form Source will be used, however a self imposed limit of 80 should enhance readibility.

5.3 Indentation

Code as well as comments lines will be indented 3 characters for readibility.
Indentation should be write without hard tabs.

Example for vi :

```
:set expandtab tabstop=3 shiftwidth=3
```

5.4 Naming conventions : variable

All variables should be named as explicitly as possible.
The naming conventions concerns prefix letters of these name, in order to identify the variable type and status.
It must be composed of two letters defining type and status follow by an underscore.
table below list the starting letters to be used for variable naming, depending on their type and status.

=1mm spread 0pt [c]*11|X[-1]||

Type / Status byte (integer(1))
b short (integer(2))
s integer(4)
i integer(8)
k real(4)
r real(8)
d logical
l character
c complex
y structure
t

Type / Status byte (integer(1))
b short (integer(2))
s integer(4)
i integer(8)
k real(4)
r real(8)
d logical
l character
c complex
y structure
t

global
g bg_ sg_ ig_ kg_ rg_ dg_ lg_ cg_ yg_ tg_

global parameter
p bp_ sp_ ip_ kp_ rp_ dp_ lp_ cp_ yp_ tp_

module
m bm_ sm_ im_ km_ rm_ dm_ lm_ cm_ ym_ tm_

namelist
n bn_ sn_ in_ kn_ rn_ dn_ ln_ cn_ yn_ tn_

dummy argument
d bd_ sd_ id_ kd_ rd_ dd_ ld_ cd_ yd_ td_

local
l bl_ sl_ il_ kl_ rl_ dl_ ll_ cl_ yl_ tl_

loop control j?

5.5 Naming conventions : structure

The structure name should be written in capital letter, and start with **T**
Example: TTRACER
Variables inside the structure should be named as explicitly as possible.
For those variables, the prefix naming conventions only concern the type of variable.
It must be composed of one letter defining type follows by an underscore.
see table of variable conventions.

Example: **tl_type%i_year**
year is an integer(4) variable in a local strucure named *type*.

5.6 Naming conventions : function-subroutine

Functions or Subroutines are defined in a module.
Their name should start with the module name then with their "functional" name. So it will be easy to find it.
Example:
a function to realise addition written in a module **math** should be called **math_add**.

PUBLIC function or subroutine should used one undescrore: *math_add*
PRIVATE function or subroutine should used two undescrores: *math__add*

5.7 Precision

All variables should make use of kinds.
Numerical constant need to have a suffix of **kindvalue**

5.8 Declaration for global variable and constants

All global data must be accompanied with a comment field on the same line.
Note that using doxygen (see `header`*), we will use symbol !< instead of !: as separator*

5.9 Implicit none

All subroutines and functions will include an IMPLICIT NONE statement.

5.10 Header

SIREN use **doxigen auto documentation** tool.
Information could be find on `doxygen` web page.
Some basic tag are described `here`.

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Chapter 6

Change log

Release

Initial release (2016-04-11)

Changes

New Features

Bug fixes

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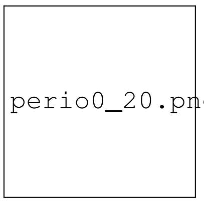
Chapter 7

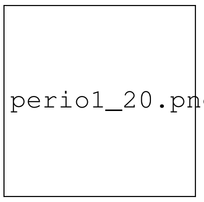
NEMO periodicity

NEMO periodicity is defined as follow :

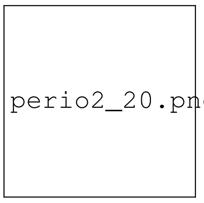
closed boundary (in_perio=0) ghost cells (solid walls) are imposed at all model boundaries.



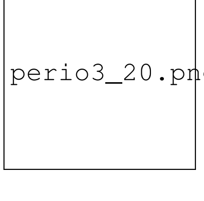
cyclic east-west boundary (in_perio=1) first and last rows are closed, whilst the first column is set to the value of the last-but-one column and the last column to the value of the second one.



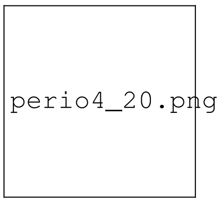
symmetric boundary condition across the equator. (in_perio=2) last row, and first and last columns are closed.



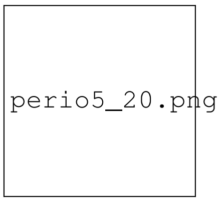
North fold boundary with a T -point pivot (in_perio=3) first row, and first and last columns are closed.



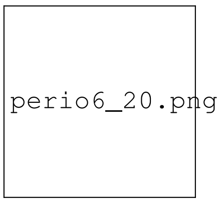
North fold boundary with a T -point pivot and cyclic east-west boundary (in_perio=4) first row is closed. The first column is set to the value of the last-but-one column and the last column to the value of the second one.



North fold boundary with a F -point pivot (in_perio=5) first row, and first and last columns are closed.



North fold boundary with a F -point pivot and cyclic east-west boundary (in_perio=6) first row is closed. The first column is set to the value of the last-but-one column and the last column to the value of the second one.



See also

For more information about NEMO periodicity, see *Model Boundary Condition* chapter in `NEMO documentation`)

Chapter 8

Todo List

Module boundary

add schematic to boundary structure description

Subprogram create_bathy

- check tl_multi is not empty

Subprogram create_coord_interp (td_var, id_rho, id_offset, id_iext, id_jext)

check if mask is really needed

Module date

- see calendar.f90 and select Gregorian, NoLeap, or D360 calendar

Module extrap

- create module for each extrapolation method
- smooth extrapolated points

Subprogram extrap::extrap_add_extrabands (td_var, id_isize, id_jsize)

- invalid special case for grid with north fold

Module iom

- see lbc_lnk
- see goup netcdf4

Module kind

- check i8 max value

Subprogram merge_bathy_get_boundary (td_bathy0, td_bathy1, td_bdy, id_rho, dd_refined, dd_weight, dd_fill)

improve boundary weight function

Subprogram vgrid::vgrid_zgr_bat (dd_bathy, dd_gdepw, dd_hmin, dd_fill)

add subroutine description

Chapter 9

Namespace Index

9.1 Namespace List

Here is a list of all documented namespaces with brief descriptions:

Chapter 10

Class Index

10.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 11

File Index

11.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 12

Namespace Documentation

12.1 att Module Reference

This module manage attribute of variable or file.

Data Types

- interface att_clean
- interface att_copy
- interface att_init
- interface att_print
- type tatt

Functions/Subroutines

- integer(i4) function, public att_get_index (td_att, cd_name)

    This function return attribute index, in a array of attribute structure, given attribute name.

- integer(i4) function, public att_get_id (td_att, cd_name)

    This function return attribute id, read from a file.

- subroutine, public att_get_dummy (cd_dummy)

    This subroutine fill dummy attribute array.
- logical function, public att_is_dummy (td_att)

    This function check if attribute is defined as dummy attribute in configuraton file.

12.1.1 Detailed Description

This module manage attribute of variable or file.

define type TATT:

```
TYPE(tatt) :: tl_att
```

the attribute value inside attribute structure will be character or real(8) 1D array.
However the attribute value could be initialized with:

- character
- scalar (real(4), real(8), integer(4) or integer(8))
- array 1D (real(4), real(8), integer(4) or integer(8))

to initialize an attribute structure :

```
tl_att=att_init('attname',value)
```

- value is a character, scalar value or table of value

to print attribute information of one or array of attribute structure:

```
CALL att_print(td_att)
```

to clean attribute structure:

```
CALL att_clean(td_att)
```

to copy attribute structure in another one (using different memory cell):

```
tl_att2=att_copy(tl_att1)
```

Note

as we use pointer for the value array of the attribute structure, the use of the assignment operator (=) to copy attribute structure create a pointer on the same array. This is not the case with this copy function.

to get attribute index, in an array of attribute structure:

```
il_index=att_get_index( td_att, cd_name )
```

- td_att array of attribute structure
- cd_name attribute name

to get attribute id, read from a file:

```
il_id=att_get_id( td_att, cd_name )
```

- td_att array of attribute structure
- cd_name attribute name

to get attribute name

- tl_att%c_name

to get character length or the number of value store in attribute

- tl_att%i_len

to get attribute value:

- tl_att%c_value (for character attribute)
- tl_att%d_value(i) (otherwise)

to get the type number (based on NETCDF type constants) of the attribute:

- tl_att%i_type

to get attribute id (read from file):

- tl_att%i_id

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- Fix memory leaks bug

September, 2015

- manage useless (dummy) attributes

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.1.2 Function/Subroutine Documentation

12.1.2.1 att_get_dummy()

```
subroutine, public att::att_get_dummy (
            character(len=*), intent(in) cd_dummy )
```

This subroutine fill dummy attribute array.

Author

J.Paul

Date

September, 2015 - Initial Version
Marsh, 2016

- close file (bugfix)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_dummy*	dummy configuration file

12.1.2.2 att_get_id()

```
integer(i4) function, public att::att_get_id (
            type(tatt), dimension(:), intent(in) td_att,
            character(len=*), intent(in) cd_name )
```

This function return attribute id, read from a file.

if attribute name do not exist, return 0.

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- bug fix with use of id read from attribute structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_att*	array of attribute structure
`in`	*cd_name*	attribute name

Returns

attribute id

12.1.2.3 att_get_index()

```
integer(i4) function, public att::att_get_index (
            type(tatt), dimension(:), intent(in) td_att,
            character(len=*), intent(in) cd_name )
```

This function return attribute index, in a array of attribute structure, given attribute name.

if attribute name do not exist, return 0.

Author

J.Paul

Date

Septempber, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_att*	array of attribute structure
`in`	*cd_name*	attribute name

Returns

attribute index

12.1.2.4 att_is_dummy()

```
logical function, public att::att_is_dummy (
            type(tatt), intent(in) td_att )
```

This function check if attribute is defined as dummy attribute in configuraton file.

Author

J.Paul

Date

September, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_att*	attribute structure

Returns

true if attribute is dummy attribute

12.2 boundary Module Reference

This module manage boundary.

Data Types

- interface boundary_clean
- interface boundary_copy
- interface boundary_init
- interface boundary_print
- interface seg__clean
- interface seg__copy
- type tbdy

  boundary structure
- type tseg

Functions/Subroutines

- character(len=lc) function, public boundary_set_filename (cd_file, cd_card, id_seg, cd_date)

  This function put cardinal name and date inside file name.
- subroutine, public boundary_get_indices (td_bdy, td_var, ld_oneseg)

  This subroutine get indices of each semgent for each boundary.
- subroutine, public boundary_check_corner (td_bdy, td_var)

  This subroutine check if there is boundary at corner, and adjust boundary indices if necessary.
- subroutine, public boundary_check (td_bdy, td_var)

  This subroutine check boundary.
- subroutine, public boundary_swap (td_var, td_bdy)

  This subroutine swap array for east and north boundary.

12.2.1 Detailed Description

This module manage boundary.

define type TBDY:

```
TYPE(tbdy) :: tl_bdy<br/>
```

to initialise boundary structure:

```
tl_bdy=boundary_init(td_var, [ld_north,] [ld_south,] [ld_east,] [ld_west,]
[cd_north,] [cd_south,] [cd_east,] [cd_west,] [ld_oneseg])
```

- td_var is variable structure
- ld_north is logical to force used of north boundary [optional]
- ld_south is logical to force used of north boundary [optional]
- ld_east is logical to force used of north boundary [optional]
- ld_west is logical to force used of north boundary [optional]
- cd_north is string character description of north boundary [optional]
- cd_south is string character description of south boundary [optional]
- cd_east is string character description of east boundary [optional]
- cd_west is string character description of west boundary [optional]
- ld_oneseg is logical to force to use only one segment for each boundary [optional]

to get boundary cardinal:

- tl_bdy%c_card

to know if boundary is use:

- tl_bdy%l_use

to know if boundary come from namelist (cn_north,..):

- tl_bdy%l_nam

to get the number of segment in boundary:

- tl_bdy%i_nseg

to get array of segment in boundary:

- tl_bdy%t_seg(:)

to get orthogonal segment index of north boundary:

- tl_bdy%t_seg(jp_north)%

to get segment width of south boundary:

- tl_bdy%t_seg(jp_south)%

to get segment first indice of east boundary:

- tl_bdy%t_seg(jp_east)%

to get segment last indice of west boundary:

- tl_bdy%t_seg(jp_west)%

to print information about boundary:

```
CALL boundary_print(td_bdy)
```

- td_bdy is boundary structure or a array of boundary structure to clean boundary structure:

```
CALL boundary_clean(td_bdy)
```

to get indices of each semgent for each boundary:

```
CALL boundary_get_indices( td_bdy, td_var, ld_oneseg)
```

- td_bdy is boundary structure
- td_var is variable structure
- ld_oneseg is logical to force to use only one segment for each boundary [optional]

to check boundary indices and corner:

```
CALL boundary_check(td_bdy, td_var)
```

- td_bdy is boundary structure
- td_var is variable structure

to check boundary corner:

```
CALL boundary_check_corner(td_bdy, td_var)
```

- td_bdy is boundary structure
- td_var is variable structure

to create filename with cardinal name inside:

```
cl_filename=boundary_set_filename(cd_file, cd_card)
```

- cd_file = original file name
- cd_card = cardinal name

to swap array for east and north boundary:

```
CALL boundary_swap( td_var, td_bdy )
```

- td_var is variable strucutre
- td_bdy is boundary strucutre

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- add boundary description

November, 2014

- Fix memory leaks bug

February, 2015

- Do not change indices read from namelist
- Change string character format of boundary read from namelist, see boundary__get_info

Todo add schematic to boundary structure description

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.2.2 Function/Subroutine Documentation

12.2.2.1 boundary_check()

```
subroutine, public boundary::boundary_check (
            type(tbdy), dimension(ip_ncard), intent(inout) td_bdy,
            type(tvar), intent(in) td_var )
```

This subroutine check boundary.

It checks that first and last indices as well as orthogonal index are inside domain, and check corner (see boundary↩_check_corner).

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_bdy*	boundary structure
in	*td_var*	variable structure

tbdy
tvar

Author

Date

Parameters

Parameters

12.2.2.3 boundary_get_indices()

```
subroutine, public boundary::boundary_get_indices (
            type(tbdy), dimension(ip_ncard), intent(inout) td_bdy,
            type(tvar), intent(in) td_var,
            logical, intent(in), optional ld_oneseg )
```

This subroutine get indices of each semgent for each boundary.

indices are compute from variable value, actually variable fill value, which is assume to be land mask. Boundary structure should have been initialized before running this subroutine. Segment indices will be search between first and last indies, at this orthogonal index.

Optionnally you could forced to use only one segment for each boundary.

Warning

number of segment (i_nseg) will be change, before the number of segment structure

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_bdy*	boundary structure
in	*td_var*	variable structure
in	*ld_onseg*	use only one sgment for each boundary

12.2.2.4 boundary_set_filename()

```
character(len=lc) function, public boundary::boundary_set_filename (
            character(len=*), intent(in) cd_file,
            character(len=*), intent(in) cd_card,
            integer(i4), intent(in), optional id_seg,
            character(len=*), intent(in), optional cd_date )
```

This function put cardinal name and date inside file name.

Examples : cd_file="boundary.nc" cd_card="west" id_seg =2 cd_date=y2015m07d16

function return "boundary_west_2_y2015m07d16.nc"

cd_file="boundary.nc" cd_card="west"

function return "boundary_west.nc"

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_file*	file name
in	*cd_card*	cardinal name
in	*id_seg*	segment number
in	*cd_date*	file date (format: y????m??d??)

Returns

file name with cardinal name inside

12.2.2.5 boundary_swap()

```
subroutine, public boundary::boundary_swap (
            type(tvar), intent(inout) td_var,
            type(tbdy), intent(in) td_bdy )
```

This subroutine swap array for east and north boundary.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_var*	variable strucutre
in	*td_bdy*	boundary strucutre

12.3 date Module Reference

This module provide the calculation of Julian dates, and do many manipulations with dates.

Data Types

- interface date_init
- interface operator(+)
- interface operator(-)
- type tdate

Functions/Subroutines

- character(len=lc) function, public date_print (td_date, cd_fmt)
  This function print the date and time with format YYYY/MM/DD hh:mm:ss.
- logical function, public date_leapyear (td_date)
  This function check if year is a leap year.
- type(tdate) function, public date_now ()
  This function return the current date and time.
- type(tdate) function, public date_today ()
  This function return the date of the day at 12:00:00.

12.3.1 Detailed Description

This module provide the calculation of Julian dates, and do many manipulations with dates.

Actually we use Modified Julian Dates, with 17 Nov 1858 at 00:00:00 as origin.

define type TDATE:

```
TYPE(tdate) :: tl_date1
```

default date is 17 Nov 1858 at 00:00:00

to intialise date :

- from date of the day at 12:00:00 :
  ```
  tl_date1=date_today()
  ```
- from date and time of the day :
  ```
  tl_date1=date_now()
  ```
- from julian day :

```
tl_date1=date_init(dd_jd)
```

  - dd_jd julian day (double precision)

- from number of second since julian day origin :

```
tl_date1=date_init(kd_nsec)
```

  - kd_nsec number of second (integer 8)

- from year month day :

```
tl_date1=date_init(2012,12,10)
```

- from string character formatted date :

```
tl_date1=date_init(cd_fmtdate)
```

  - cd_fmtdate date in format YYYY-MM-DD hh:mm:ss

to print date in format YYYY-MM-DD hh:mm:ss
CHARACTER(LEN=lc) :: cl_date

```
cl_date=date_print(tl_date1)
print *, trim(cl_date)
```

to print date in another format (only year, month, day):

```
cl_date=date_print(tl_date1, cd_fmt)
print *, trim(cl_date)
```

- cd_fmt ouput format (ex: cd_fmt="('y',i0.4,'m',i0.2,'d',i0.2)")

to print day of the week:

```
print *,"dow ", tl_date1\%i_dow
```

to print last day of the month:

```
print *,"last day ", tl_date1\%i_lday
```

to know if year is a leap year:

```
ll_isleap=date_leapyear(tl_date1)
```

- ll_isleap is logical

to compute number of days between two dates:

```
tl_date2=date_init(2010,12,10)
dl_diff=tl_date1-tl_date2
```

- dl_diff is the number of days between date1 and date2 (double precision)

to add or substract nday to a date:

```
tl_date2=tl_date1+2.
tl_date2=tl_date1-2.6
```

- number of day (double precision)

to print julian day:

```
print *," julian day",tl_date1\%r_jd
```

to print CNES julian day (origin 1950-01-01 00:00:00)

```
print *," CNES julian day",tl_date1\%r_jc
```

to create pseudo julian day with origin date_now:

```
tl_date1=date_init(2012,12,10,td_dateo=date_now())
```

Note

you erase CNES julian day when doing so

to print julian day in seconds:

```
print *, tl_date1\%k_jdsec
```

to print CNES or new julian day in seconds:

```
print *, tl_date1\%k_jcsec
```

Author

J.Paul

Date

November, 2013 - Initial Version

Note

This module is based on Perderabo's date calculator (ksh)
Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

Todo
- see calendar.f90 and select Gregorian, NoLeap, or D360 calendar

12.3.2 Function/Subroutine Documentation

12.3.2.1 date_leapyear()

```
logical function, public date::date_leapyear (
             type(tdate), intent(in) td_date )
```

This function check if year is a leap year.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_date*	date strutcutre

Returns

true if year is leap year

12.3.2.2 date_now()

```
type(tdate) function, public date::date_now ( )
```

This function return the current date and time.

Author

J.Paul

Date

November, 2013 - Initial Version

Returns

current date and time in a date structure

12.3.2.3 date_print()

```
character(len=lc) function, public date::date_print (
            type(tdate), intent(in) td_date,
            character(len=*), intent(in), optional cd_fmt )
```

This function print the date and time with format YYYY/MM/DD hh:mm:ss.

Optionally, you could specify output format. However it will be only apply to year, month, day.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_date*	date strutcutre
in	*cd_fmt*	ouput format (only for year,month,day)

Returns

date in format YYYY-MM-DD hh:mm:ss

12.3.2.4 date_today()

```
type(tdate) function, public date::date_today ( )
```

This function return the date of the day at 12:00:00.

Author

J.Paul

Date

November, 2013 - Initial Version

Returns

date of the day at 12:00:00 in a date structure

12.4 dim Module Reference

This module manage dimension and how to change order of those dimension.

Data Types

- interface dim_clean
- interface dim_copy
- interface dim_print
- interface dim_reorder_2xyzt
- interface dim_reorder_xyzt2
- interface dim_reshape_2xyzt
- interface dim_reshape_xyzt2
- type tdim

Functions/Subroutines

- integer(i4) function, public dim_get_index (td_dim, cd_name, cd_sname)

  This function returns dimension index, given dimension name or short name.
- integer(i4) function, public dim_get_id (td_dim, cd_name, cd_sname)

  This function returns dimension id, in a array of dimension structure, given dimension name, or short name.
- type(tdim) function, public dim_init (cd_name, id_len, ld_uld, cd_sname, ld_use)

  This function initialize a dimension structure with given name.
- type(tdim) function, dimension(ip_maxdim), public dim_fill_unused (td_dim)

  This function fill unused dimension of an array of dimension and return a 4 elts array of dimension structure.
- subroutine, public dim_reorder (td_dim, cd_dimorder)

  This subroutine switch element of an array (4 elts) of dimension structure from disordered dimension to ordered dimension
- subroutine, public dim_disorder (td_dim)

  This subroutine switch dimension array from ordered dimension ('x','y','z','t') to disordered dimension.
- subroutine, public dim_get_dummy (cd_dummy)

  This subroutine fill dummy dimension array.
- logical function, public dim_is_dummy (td_dim)

  This function check if dimension is defined as dummy dimension in configuraton file.

12.4.1 Detailed Description

This module manage dimension and how to change order of those dimension.

define type TDIM:

```
TYPE(tdim) :: tl_dim
```

to initialize a dimension structure:

```
tl_dim=dim_init( cd_name, [id_len,] [ld_uld,] [cd_sname])
```

- cd_name is the dimension name
- id_len is the dimension size [optional]
- ld_uld is true if this dimension is the unlimited one [optional]
- cd_sname is the dimension short name ('x','y','z','t') [optional]

to clean dimension structure:

```
CALL dim_clean(tl_dim)
```

- tl_dim : dimension strucutre or array of dimension structure

to print information about dimension structure:

```
CALL dim_print(tl_dim)
```

to copy dimension structure in another one (using different memory cell):

```
tl_dim2=dim_copy(tl_dim1)
```

to get dimension name:

- tl_dim%c_name

to get dimension short name:

- tl_dim%c_sname

to get dimension length:

- tl_dim%i_len

to know if dimension is the unlimited one:

- tl_dim%l_uld

to get dimension id (for variable or file dimension):

- tl_dim%i_id

to know if dimension is used (for variable or file dimension):

- tl_dim%l_use

Former function or information concern only one dimension. However variables as well as files use usually 4 dimensions.
To easily work with variable we want they will be all 4D and ordered as following: ('x','y','z','t').
Functions and subroutines below, allow to reorder dimension of variable.

Suppose we defined the array of dimension structure below:

```
TYPE(tdim), DIMENSION(4) :: tl_dim
tl_dim(1)=dim_init( 'X', id_len=10)
tl_dim(2)=dim_init( 'T', id_len=3, ld_uld=.true.)
```

to reorder dimension (default order: ('x','y','z','t')):

```
CALL dim_reorder(tl_dim(:))
```

This subroutine filled dimension structure with unused dimension, then switch from "disordered" dimension to "ordered" dimension.
The dimension structure return will be:
tl_dim(1) => 'X', i_len=10, l_use=T, l_uld=F
tl_dim(2) => 'Y', i_len=1, l_use=F, l_uld=F
tl_dim(3) => 'Z', i_len=1, l_use=F, l_uld=F
tl_dim(4) => 'T', i_len=3, l_use=T, l_uld=T

After using subroutine dim_reorder you could use functions and subroutine below.

to use another dimension order.

```
CALL dim_reorder(tl(dim(:), cl_neworder)
```

- cl_neworder : character(len=4) (example: 'yxzt')

to switch dimension array from ordered dimension to disordered dimension:

```
CALL dim_disorder(tl_dim(:))
```

to fill unused dimension of an array of dimension structure.

```
tl_dimout(:)=dim_fill_unused(tl_dimin(:))
```

- tl_dimout(:) : 1D array (4elts) of dimension strcuture
- tl_dimin(:) : 1D array (<=4elts) of dimension structure

to reshape array of value in "ordered" dimension:

```
CALL dim_reshape_2xyzt(tl_dim(:), value(:,:,:,:))
```

- value must be a 4D array of real(8) value "disordered"

to reshape array of value in "disordered" dimension:

```
CALL dim_reshape_xyzt2(tl_dim(:), value(:,:,:,:))
```

- value must be a 4D array of real(8) value "ordered"

to reorder a 1D array of 4 elements in "ordered" dimension:

```
CALL dim_reorder_2xyzt(tl_dim(:), tab(:))
```

- tab must be a 1D array with 4 elements "disordered". It could be composed of character, integer(4), or logical

to reorder a 1D array of 4 elements in "disordered" dimension:

```
CALL dim_reorder_xyzt2(tl_dim(:), tab(:))
```

- tab must be a 1D array with 4 elements "ordered". It could be composed of character, integer(4), or logical

to get dimension index from a array of dimension structure, given dimension name or short name :

```
index=dim_get_index( tl_dim(:), [cl_name, cl_sname] )
```

- tl_dim(:) : array of dimension structure
- cl_name : dimension name [optional]
- cl_sname: dimension short name [optional]

to get dimension id used in an array of dimension structure, given dimension name or short name :

```
id=dim_get_id( tl_dim(:), [cl_name, cl_sname] )
```

- tl_dim(:) : array of dimension structure
- cl_name : dimension name [optional]
- cl_sname: dimension short name [optional]

Author

J.Paul

Date

November, 2013 - Initial Version
Spetember, 2015

- manage useless (dummy) dimension

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.4.2 Function/Subroutine Documentation

12.4.2.1 dim_disorder()

```
subroutine, public dim::dim_disorder (
            type(tdim), dimension(:), intent(inout) td_dim )
```

This subroutine switch dimension array from ordered dimension ('x','y','z','t') to disordered dimension.

Example: (/'x','y','z','t'/) => (/'z','x','t','y'/)

Warning

this subroutine change dimension order

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_dim*	array of dimension structure

12.4.2.2 dim_fill_unused()

```
type(tdim) function, dimension(ip_maxdim), public dim::dim_fill_unused (
            type(tdim), dimension(:), intent(in), optional td_dim )
```

This function fill unused dimension of an array of dimension and return a 4 elts array of dimension structure.

output dimensions 'x','y','z' and 't' are all informed.

Note

without input array of dimension, return a 4 elts array of dimension structure all unused (case variable 0d)

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015

- Bug fix: use order to disorder table (see dim_init)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_dim*	array of dimension structure

Returns

4elts array of dimension structure

12.4.2.3 dim_get_dummy()

```
subroutine, public dim::dim_get_dummy (
            character(len=*), intent(in) cd_dummy )
```

This subroutine fill dummy dimension array.

Author

J.Paul

Date

September, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_dummy*	dummy configuration file

tdim

Note

Author

Date

Parameters

Parameters

`in`	*td_dim*	dimension structure
`in`	*cd_name*	dimension name or short name
`in`	*cd_sname*	dimension short name

Returns

dimension id

12.4.2.5 dim_get_index()

```
integer(i4) function, public dim::dim_get_index (
            type(tdim), dimension(:), intent(in) td_dim,
            character(len=*), intent(in) cd_name,
            character(len=*), intent(in), optional cd_sname )
```

This function returns dimension index, given dimension name or short name.

the function check dimension name, in the array of dimension structure. dimension could be used or not.

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- do not check if dimension used

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_dim*	array of dimension structure
in	*cd_name*	dimension name
in	*cd_sname*	dimension short name

Returns

dimension index

12.4.2.6 dim_init()

```
type(tdim) function, public dim::dim_init (
             character(len=*), intent(in) cd_name,
             integer(i4), intent(in), optional id_len,
             logical, intent(in), optional ld_uld,
             character(len=*), intent(in), optional cd_sname,
             logical, intent(in), optional ld_use )
```

This function initialize a dimension structure with given name.

Optionally length could be inform, as well as short name and if dimension is unlimited or not.
By default, define dimension is supposed to be used. Optionally you could force a defined dimension to be unused.

Author

J.Paul

Date

November, 2013 - Initial Version
February, 2015

- add optional argument to define dimension unused

July, 2015

- Bug fix: inform order to disorder table instead of disorder to order table

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_name*	dimension name
in	*id_len*	dimension length
in	*ld_uld*	dimension unlimited
in	*cd_sname*	dimension short name
in	*ld_use*	dimension use or not

Returns

dimension structure

tdim

Author

Date

Parameters

Parameters

Returns

12.4.2.8 dim_reorder()

```
subroutine, public dim::dim_reorder (
            type(tdim), dimension(:), intent(inout) td_dim,
            character(len=ip_maxdim), intent(in), optional cd_dimorder )
```

This subroutine switch element of an array (4 elts) of dimension structure from disordered dimension to ordered dimension

Optionally you could specify dimension order to output (default 'xyzt') Example: (/'z','x','t','y'/) => (/'x','y','z','t'/)

Warning

this subroutine change dimension order

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- allow to choose ordered dimension to be output

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_dim*	array of dimension structure
`in`	*cd_dimorder*	dimension order to be output

12.5 dom Module Reference

This module manage domain computation.

Data Types

- interface dom_copy
- interface dom_init
- type tdom

Functions/Subroutines

- subroutine, public dom_print (td_dom)

  This subroutine print some information about domain strucutre.
- type(tdom) function dom__init_file (td_file, id_imin, id_imax, id_jmin, id_jmax, cd_card)

  This function intialise domain structure, given open file structure, and sub domain indices.
- subroutine, public dom_add_extra (td_dom, id_iext, id_jext)

  This subroutine add extra bands to coarse domain to get enough point for interpolation...
- subroutine, public dom_clean_extra (td_dom)

  This subroutine clean coarse grid domain structure. it remove extra point added.
- subroutine, public dom_del_extra (td_var, td_dom, id_rho, ld_coord)

  This subroutine delete extra band, from fine grid variable value, and dimension, taking into account refinement factor.
- subroutine, public dom_clean (td_dom)

  This subroutine clean domain structure.

12.5.1 Detailed Description

This module manage domain computation.

define type TDOM:

```
TYPE(tdom) :: tl_dom
```

to initialize domain structure:

```
tl_dom=dom_init(td_mpp, [id_imin,] [id_imax,] [id_jmin,] [id_jmax],[cd_card])
```

- td_mpp is mpp structure of an opened file.
- id_imin is i-direction sub-domain lower left point indice
- id_imax is i-direction sub-domain upper right point indice
- id_jmin is j-direction sub-domain lower left point indice
- id_jmax is j-direction sub-domain upper right point indice
- cd_card is the cardinal name (for boundary case)

to get global domain dimension:

- tl_dom%t_dim0

to get NEMO periodicity index of global domain:

- tl_dom%i_perio0

to get NEMO pivot point index F(0),T(1):

- tl_dom%i_pivot

to get East-West overlap of global domain:

- tl_dom%i_ew0

to get selected sub domain dimension:

- tl_dom%t_dim

to get NEMO periodicity index of sub domain:

- tl_dom%i_perio

to get East-West overlap of sub domain:

- tl_dom%i_ew

to get i-direction sub-domain lower left point indice:

- tl_dom%i_imin

to get i-direction sub-domain upper right point indice:

- tl_dom%i_imax

to get j-direction sub-domain lower left point indice:

- tl_dom%i_jmin

to get j-direction sub-domain upper right point indice:

- tl_dom%i_jmax

to get size of i-direction extra band:

- tl_dom%i_iextra

to get size of j-direction extra band:

- tl_dom%i_jextra

to get i-direction ghost cell number:

- tl_dom%i_ighost

to get j-direction ghost cell number:

- tl_dom%i_jghost

to get boundary index:

- tl_dom%i_bdy
  - 0 = no boundary
  - 1 = north
  - 2 = south
  - 3 = east
  - 4 = west

to clean domain structure:

```
CALL dom_clean(td_dom)
```

- td_dom is domain structure

to print information about domain structure:

```
CALL dom_print(td_dom)
```

to get East-West overlap (if any):

```
il_ew=dom_get_ew_overlap(td_lon)
```

- td_lon : longitude variable structure

to add extra bands to coarse grid domain (for interpolation):

```
CALL dom_add_extra( td_dom, id_iext, id_jext )
```

- td_dom is domain structure
- id_iext is i-direction size of extra bands
- id_jext is j-direction size of extra bands

to remove extra bands from fine grid (after interpolation):

```
CALL dom_del_extra( td_var, td_dom, id_rho )
```

- td_var is variable structure to be changed
- td_dom is domain structure
- id_rho is a array of refinement factor following i- and j-direction

to reset coarse grid domain witouht extra bands:

```
CALL dom_clean_extra( td_dom )
```

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- add header
- use zero indice to defined cyclic or global domain

October, 2014

- use mpp file structure instead of file

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.5.2 Function/Subroutine Documentation

12.5.2.1 dom__init_file()

```
type(tdom) function dom::dom__init_file (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in), optional id_imin,
            integer(i4), intent(in), optional id_imax,
            integer(i4), intent(in), optional id_jmin,
            integer(i4), intent(in), optional id_jmax,
            character(len=*), intent(in), optional cd_card )
```

This function intialise domain structure, given open file structure, and sub domain indices.

sub domain indices are computed, taking into account coarse grid periodicity, pivot point, and East-West overlap.

Author

J.Paul

Date

June, 2013 - Initial Version
September, 2014

- add boundary index
- add ghost cell factor

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

in	*td_file*	file structure
in	*id_perio*	grid periodicity
in	*id_imin*	i-direction sub-domain lower left point indice
in	*id_imax*	i-direction sub-domain upper right point indice
in	*id_jmin*	j-direction sub-domain lower left point indice
in	*id_jmax*	j-direction sub-domain upper right point indice
in	*cd_card*	name of cardinal (for boundary)

Returns

domain structure

12.5.2.2 dom_add_extra()

```
subroutine, public dom::dom_add_extra (
            type(tdom), intent(inout) td_dom,
            integer(i4), intent(in), optional id_iext,
            integer(i4), intent(in), optional id_jext )
```

This subroutine add extra bands to coarse domain to get enough point for interpolation...

- domain periodicity is take into account.
- domain indices are changed, and size of extra bands are saved.
- optionaly, i- and j- direction size of extra bands could be specify (default=im_minext)

Author

J.Paul

Date

Parameters

Parameters

tdom

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_dom*	domain strcuture

12.5.2.4 dom_clean_extra()

```
subroutine, public dom::dom_clean_extra (
            type(tdom), intent(inout) td_dom )
```

This subroutine clean coarse grid domain structure. it remove extra point added.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_dom*	domain strcuture

12.5.2.5 dom_del_extra()

```
subroutine, public dom::dom_del_extra (
            type(tvar), intent(inout) td_var,
            type(tdom), intent(in) td_dom,
            integer(i4), dimension(:), intent(in), optional id_rho,
            logical, intent(in), optional ld_coord )
```

This subroutine delete extra band, from fine grid variable value, and dimension, taking into account refinement factor.

Note

This subroutine should be used before clean domain structure.

Warning

if work on coordinates grid, do not remove all extra point. save value on ghost cell.

Author

J.Paul

Date

November, 2013 - Initial version
September, 2014

- take into account boundary for one point size domain

December, 2014

- add special case for coordinates file.

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable strcuture
`in`	*td_dom*	domain strcuture
`in`	*id_rho*	array of refinement factor
`in`	*ld_coord*	work on coordinates file or not

12.5.2.6 dom_print()

```
subroutine, public dom::dom_print (
            type(tdom), intent(in) td_dom )
```

This subroutine print some information about domain strucutre.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_dom*	dom structure

12.6 extrap Module Reference

This module manage extrapolation.

Data Types

- interface extrap_detect
- interface extrap_fill_value

Functions/Subroutines

- subroutine, public extrap_add_extrabands (td_var, id_isize, id_jsize)

  This subroutine add to the variable (to be extrapolated) an extraband of N points at north,south,east and west boundaries.
- subroutine, public extrap_del_extrabands (td_var, id_isize, id_jsize)

  This subroutine remove of the variable an extraband of N points at north,south,east and west boundaries.

12.6.1 Detailed Description

This module manage extrapolation.

Extrapolation method to be used is specify inside variable strcuture, as array of string character.

- td_var%c_extrap(1) string character is the interpolation name choose between:
  - 'dist_weight'
  - 'min_error'

Note

Extrapolation method could be specify for each variable in namelist *namvar*, defining string character *cn_varinfo*. By default *dist_weight*.
Example:

- cn_varinfo='varname1:ext=dist_weight', 'varname2:ext=min_error'

to detect point to be extrapolated:

```
il_detect(:,:,:)=extrap_detect(td_var)
```

- il_detect(:,:,:) is 3D array of point to be extrapolated
- td_var is coarse grid variable to be extrapolated

to extrapolate variable:

```
CALL extrap_fill_value( td_var, [id_radius])
```

- td_var is coarse grid variable to be extrapolated
- id_radius is radius of the halo used to compute extrapolation [optional]

to add extraband to the variable (to be extrapolated):

```
CALL extrap_add_extrabands(td_var, [id_isize,] [id_jsize] )
```

- td_var is variable structure
- id_isize : i-direction size of extra bands [optional]
- id_jsize : j-direction size of extra bands [optional]

to delete extraband of a variable:

```
CALL extrap_del_extrabands(td_var, [id_isize,] [id_jsize] )
```

- td_var is variable structure
- id_isize : i-direction size of extra bands [optional]
- id_jsize : j-direction size of extra bands [optional]

Warning

_FillValue must not be zero (use var_chg_FillValue())

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- add header

June, 2015

- extrapolate all land points (_FillValue)
- move deriv function to math module

July, 2015

- compute extrapolation from north west to south east, and from south east to north west

Todo

- create module for each extrapolation method
- smooth extrapolated points

Note

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tvar

Author

Date

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable
`in`	*id_isize*	i-direction size of extra bands (default=im_minext)
`in`	*id_jsize*	j-direction size of extra bands (default=im_minext)

Todo
- invalid special case for grid with north fold

12.6.2.2 extrap_del_extrabands()

```
subroutine, public extrap::extrap_del_extrabands (
            type(tvar), intent(inout) td_var,
            integer(i4), intent(in), optional id_isize,
            integer(i4), intent(in), optional id_jsize )
```

This subroutine remove of the variable an extraband of N points at north,south,east and west boundaries.

optionaly you could specify size of extra bands in i- and j-direction

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable
`in`	*id_isize*	i-direction size of extra bands (default=im_minext)
`in`	*id_jsize*	j-direction size of extra bands (default=im_minext)

12.7 fct Module Reference

This module groups some basic useful function.

Data Types

- interface fct_str
- interface operator(//)

Functions/Subroutines

- integer(i4) function, public fct_getunit ()

  This function returns the next available I/O unit number.
- subroutine, public fct_err (id_status)

  This subroutine handle Fortran status.
- subroutine, public fct_pause (cd_msg)

  This subroutine create a pause statement.
- pure character(len=lc) function, public fct_concat (cd_arr, cd_sep)

  This function concatenate all the element of a character array in a character string.
- pure character(len=lc) function, public fct_lower (cd_var)

  This function convert string character upper case to lower case.
- pure character(len=lc) function, public fct_upper (cd_var)

  This function convert string character lower case to upper case.
- pure logical function, public fct_is_num (cd_var)

  This function check if character is numeric.
- pure logical function, public fct_is_real (cd_var)

  This function check if character is real number.
- pure character(len=lc) function, public fct_split (cd_string, id_ind, cd_sep)

  This function split string of character using separator character, by default '|', and return the element on index ind.
- pure character(len=lc) function, public fct_basename (cd_string, cd_sep)

  This function return basename of a filename.
- pure character(len=lc) function, public fct_dirname (cd_string, cd_sep)

  This function return dirname of a filename.

12.7.1 Detailed Description

This module groups some basic useful function.

to get free I/O unit number:

```
il_id=fct_getunit()
```

to convert "numeric" to string character:

```
cl_string=fct_str(numeric)
```

- "numeric" could be integer, real, or logical

to concatenate "numeric" to a string character:

```
cl_str=cd_char//num
```

- cd_char is the string character
- num is the numeric value (integer, real or logical)

to concatenate all the element of a character array:

```
cl_string=fct_concat(cd_arr [,cd_sep])
```

- cd_arr is a 1D array of character
- cd_sep is a separator character to add between each element of cd_arr [optional]

to convert character from lower to upper case:

```
cl_upper=fct_upper(cd_var)
```

to convert character from upper to lower case:

```
cl_lower=fct_lower(cd_var)
```

to check if character is numeric

```
ll_is_num=fct_is_num(cd_var)
```

to check if character is real

```
ll_is_real=fct_is_real(cd_var)
```

to split string into substring and return one of the element:

```
cl_str=fct_split(cd_string ,id_ind [,cd_sep])
```

- cd_string is a string of character
- id_ind is the indice of the lement to extract
- cd_sep is the separator use to split cd_string (default '|')

to get basename (name without path):

```
cl_str=fct_basename(cd_string [,cd_sep])
```

- cd_string is the string filename
- cd_sep is the separator ti be used (default '/')

to get dirname (path of the filename):

```
cl_str=fct_dirname(cd_string [,cd_sep])
```

- cd_string is the string filename
- cd_sep is the separator ti be used (default '/')

to create a pause statement:

```
CALL fct_pause(cd_msg)
```

- cd_msg : message to be added [optional]

to handle frotran error:

```
CALL fct_err(id_status)
```

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- add header

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.7.2 Function/Subroutine Documentation

12.7.2.1 fct_basename()

```
pure character(len=lc) function, public fct::fct_basename (
            character(len=*), intent(in) cd_string,
            character(len=*), intent(in), optional cd_sep )
```

This function return basename of a filename.

Actually it splits filename using sperarator '/' and return last string character.
Optionally you could specify another separator.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_string*	filename
`in`	*cd_sep*	separator character

Returns

basename (filename without path)

12.7.2.2 fct_concat()

```
pure character(len=lc) function, public fct::fct_concat (
            character(*), dimension(:), intent(in) cd_arr,
            character(*), intent(in), optional cd_sep )
```

This function concatenate all the element of a character array in a character string.

optionnally a separator could be added between each element.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_arr*	array of character
in	*cd_sep*	separator character

Returns

character

12.7.2.3 fct_dirname()

```
pure character(len=lc) function, public fct::fct_dirname (
            character(len=*), intent(in) cd_string,
            character(len=*), intent(in), optional cd_sep )
```

This function return dirname of a filename.

Actually it splits filename using sperarator '/' and return all except last string character.
Optionally you could specify another separator.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_string*	filename
in	*cd_sep*	separator character

Returns

dirname (path of the filename)

Author

Date

Parameters

Parameters

`integer(i4) function, public fct::fct_getunit ( )`

This function returns the next available I/O unit number.

Author

J.Paul

Date

November, 2013 - Initial Version

Returns

file id

12.7.2.6 fct_is_num()

```
pure logical function, public fct::fct_is_num (
            character(len=*), intent(in) cd_var )
```

This function check if character is numeric.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_var*	character

Returns

character is numeric

12.7.2.7 fct_is_real()

```
pure logical function, public fct::fct_is_real (
            character(len=*), intent(in) cd_var )
```

This function check if character is real number.

it allows exponantial and decimal number exemple : 1e6, 2.3

Author

J.Paul

Date

June, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_var*	character

Returns

character is real number

12.7.2.8 fct_lower()

```
pure character(len=lc) function, public fct::fct_lower (
            character(*), intent(in) cd_var )
```

This function convert string character upper case to lower case.

The function IACHAR returns the ASCII value of the character passed as argument. The ASCII code has the uppercase alphabet starting at code 65, and the lower case one at code 101, therefore IACHAR('a')- IACHAR('A') would be the difference between the uppercase and the lowercase codes.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_var*	character

Returns

lower case character

12.7.2.9 fct_pause()

```
subroutine, public fct::fct_pause (
            character(len=*), intent(in), optional cd_msg )
```

This subroutine create a pause statement.

Author

J.Paul

Date

November, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_msg*	optional message to be added

12.7.2.10 fct_split()

```
pure character(len=lc) function, public fct::fct_split (
            character(len=*), intent(in) cd_string,
            integer(i4), intent(in) id_ind,
            character(len=*), intent(in), optional cd_sep )
```

This function split string of character using separator character, by default '|', and return the element on index ind.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_string*	string of character
in	*id_ind*	indice
in	*cd_sep*	separator character

Returns

return the element on index id_ind

12.7.2.11 fct_upper()

```
pure character(len=lc) function, public fct::fct_upper (
            character(*), intent(in) cd_var )
```

This function convert string character lower case to upper case.

The function IACHAR returns the ASCII value of the character passed as argument. The ASCII code has the uppercase alphabet starting at code 65, and the lower case one at code 101, therefore IACHAR('a')- IACHAR('A') would be the difference between the uppercase and the lowercase codes.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]Parameters

Parameters

in	*cd_var*	character

Returns

upper case character

12.8 file Module Reference

This module manage file structure.

Data Types

- interface file_clean
- interface file_copy
- interface file_del_att
- interface file_del_var
- interface file_rename
- type tfile

Functions/Subroutines

- type(tfile) function, public file_init (cd_file, cd_type, ld_wrt, id_ew, id_perio, id_pivot, cd_grid)

  This function initialize file structure.
- character(len=lc) function, public file_get_type (cd_file)

  This function get type of file, given file name.
- logical function, public file_check_var_dim (td_file, td_var)

  This function check if variable dimension to be used have the same length that in file structure.
- subroutine, public file_add_var (td_file, td_var)

  This subroutine add a variable structure in a file structure.
  Do not overwrite, if variable already in file structure.
- subroutine, public file_move_var (td_file, td_var)

  This subroutine overwrite variable structure in file structure.
- subroutine, public file_add_att (td_file, td_att)

  This subroutine add a global attribute in a file structure.
  Do not overwrite, if attribute already in file structure.
- subroutine, public file_move_att (td_file, td_att)

  This subroutine move a global attribute structure from file structure.

- subroutine, public file_add_dim (td_file, td_dim)

  This subroutine add a dimension structure in file structure. Do not overwrite, if dimension already in file structure.
- subroutine, public file_del_dim (td_file, td_dim)

  This subroutine delete a dimension structure in file structure.
- subroutine, public file_move_dim (td_file, td_dim)

  This subroutine move a dimension structure in file structure.
- subroutine, public file_print (td_file)

  This subroutine print some information about file strucutre.
- character(len=lc) function, public file_add_suffix (cd_file, cd_type)

  This function add suffix to file name.
- integer(i4) function, public file_get_id (td_file, cd_name)

  This function return the file id, in a array of file structure, given file name.
- integer(i4) function file_get_unit (td_file)

  This function get the next unused unit in array of file structure.

12.8.1 Detailed Description

This module manage file structure.

define type TFILE:

```
TYPE(tfile) :: tl_file
```

to initialize a file structure:

```
tl_file=file_init(cd_file [,cd_type] [,ld_wrt] [,cd_grid])
```

- cd_file is the file name
- cd_type is the type of the file ('cdf', 'dimg') [optional]
- ld_wrt file in write mode or not [optional] - cd_grid is the grid type (default 'ARAKAWA-C')

to get file name:

- tl_file%c_name

to get file id (units):

- tl_file%i_id

to get the type of the file (cdf, cdf4, dimg):

- tl_file%c_type

to know if file was open in write mode:

- tl_file%l_wrt

to get the record length of the file:

- tl_file%i_recl

Files variables
to get the number of variable in the file:

- tl_file%i_nvar

to get the array of variable structure associated to the file:

- tl_file%t_var(:)

Files attributes
to get the nmber of global attributes of the file:

- tl_file%i_natt

to get the array of attributes structure associated to the file:

- tl_file%t_att(:)

Files dimensions
to get the number of dimension used in the file:

- tl_file%i_ndim

to get the array of dimension structure (4 elts) associated to the file:

- tl_file%t_dim(:)

to print information about file structure:

```
CALL file_print(td_file)
```

to clean file structure:

```
CALL file_clean(td_file)
```

to add a global attribute structure in file structure:

```
CALL file_add_att(td_file, td_att)
```

- td_att is an attribute structure

to add a dimension structure in file structure:

```
CALL file_add_dim(td_file, td_dim)
```

- td_dim is a dimension structure

to add a variable structure in file structure:

```
CALL file_add_var(td_file, td_var)
```

- td_var is a variable structure

to delete a global attribute structure in file structure:

```
CALL file_del_att(td_file, td_att)
```

- td_att is an attribute structure

to delete a dimension structure in file structure:

```
CALL file_del_dim(td_file, td_dim)
```

- td_dim is a dimension structure

to delete a variable structure in file structure:

```
CALL file_del_var(td_file, td_var)
```

- td_var is a variable structure

to overwrite one attribute structure in file structure:

```
CALL file_move_att(td_file, td_att)
```

- td_att is an attribute structure

to overwrite one dimension strucutre in file structure:

```
CALL file_move_dim(td_file, td_dim)
```

- td_dim is a dimension structure

to overwrite one variable structure in file structure:

```
CALL file_move_var(td_file, td_var)
```

- td_var is a variable structure

to check if file and variable structure share same dimension:

```
ll_check_dim = file_check_var_dim(td_file, td_var)
```

- td_var is a variable structure

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- Fix memory leaks bug

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.8.2 Function/Subroutine Documentation

12.8.2.1 file_add_att()

```
subroutine, public file::file_add_att (
            type(tfile), intent(inout) td_file,
            type(tatt), intent(in) td_att )
```

This subroutine add a global attribute in a file structure.
Do not overwrite, if attribute already in file structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

`in,out`	*td_file*	file structure
`in`	*td_att*	attribute structure

12.8.2.2 file_add_dim()

```
subroutine, public file::file_add_dim (
            type(tfile), intent(inout) td_file,
            type(tdim), intent(in) td_dim )
```

This subroutine add a dimension structure in file structure. Do not overwrite, if dimension already in file structure.

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- do not reorder dimension, before put in file

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

`in,out`	*td_file*	file structure
`in`	*td_dim*	dimension structure

Author

Date

Parameters

Parameters

Returns

12.8.2.4 file_add_var()

```
subroutine, public file::file_add_var (
            type(tfile), intent(inout) td_file,
            type(tvar), intent(inout) td_var )
```

This subroutine add a variable structure in a file structure.
Do not overwrite, if variable already in file structure.

Note

variable value is suppose to be ordered ('x','y','z','t')

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- add dimension in file if need be
- do not reorder dimension from variable, before put in file

September, 2015

- check variable dimension expected

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure
`in`	*td_var*	variable structure

12.8.2.5 file_check_var_dim()

```
logical function, public file::file_check_var_dim (
            type(tfile), intent(in) td_file,
            type(tvar), intent(in) td_var )
```

This function check if variable dimension to be used have the same length that in file structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_file*	file structure
`in`	*td_var*	variable structure

Returns

true if dimension of variable and file structure agree

12.8.2.6 file_del_dim()

```
subroutine, public file::file_del_dim (
            type(tfile), intent(inout) td_file,
            type(tdim), intent(in) td_dim )
```

This subroutine delete a dimension structure in file structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure
`in`	*td_dim*	dimension structure

12.8.2.7 file_get_id()

```
integer(i4) function, public file::file_get_id (
            type(tfile), dimension(:), intent(in) td_file,
            character(len=*), intent(in) cd_name )
```

This function return the file id, in a array of file structure, given file name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_file*	array of file structure
`in`	*cd_name*	file name

Returns

file id in array of file structure (0 if not found)

12.8.2.8 file_get_type()

```
character(len=lc) function, public file::file_get_type (
            character(len=*), intent(in) cd_file )
```

This function get type of file, given file name.

Actually it get suffix of the file name, and compare it to 'nc', 'cdf' or 'dimg'
If no suffix or suffix not identify, we assume file is dimg

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_file*	file name

Returns

type of file

12.8.2.9 file_get_unit()

```
integer(i4) function file::file_get_unit (
            type(tfile), dimension(:), intent(in) td_file )
```

This function get the next unused unit in array of file structure.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	array of file

12.8.2.10 file_init()

```
type(tfile) function, public file::file_init (
            character(len=*), intent(in) cd_file,
            character(len=*), intent(in), optional cd_type,
            logical, intent(in), optional ld_wrt,
            integer(i4), intent(in), optional id_ew,
            integer(i4), intent(in), optional id_perio,
            integer(i4), intent(in), optional id_pivot,
            character(len=*), intent(in), optional cd_grid )
```

This function initialize file structure.

If cd_type is not specify, check if file name include '.nc' or '.dimg'
Optionally, you could specify:

- write mode (default .FALSE., ld_wrt) - grid type (default: 'ARAKAWA-C')

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_file*	file name
in	*cd_type*	file type ('cdf', 'dimg')
in	*ld_wrt*	write mode (default .FALSE.)
in	*id_ew*	east-west overlap
in	*id_perio*	NEMO periodicity index
in	*id_pivot*	NEMO pivot point index F(0),T(1)
in	*cd_grid*	grid type (default 'ARAKAWA-C')

Returns

file structure

12.8.2.11 file_move_att()

```
subroutine, public file::file_move_att (
            type(tfile), intent(inout) td_file,
            type(tatt), intent(in) td_att )
```

This subroutine move a global attribute structure from file structure.

Warning

change attribute id in file structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure
in	*td_att*	attribute structure

12.8.2.12 file_move_dim()

```
subroutine, public file::file_move_dim (
            type(tfile), intent(inout) td_file,
            type(tdim), intent(in) td_dim )
```

This subroutine move a dimension structure in file structure.

Warning

change dimension order in file structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure
in	*td_dim*	dimension structure

12.8.2.13 file_move_var()

```
subroutine, public file::file_move_var (
            type(tfile), intent(inout) td_file,
            type(tvar), intent(in) td_var )
```

This subroutine overwrite variable structure in file structure.

Warning

change variable id in file structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure
`in`	*td_var*	variable structure

12.8.2.14 file_print()

```
subroutine, public file::file_print (
            type(tfile), intent(in) td_file )
```

This subroutine print some information about file strucutre.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_file*	file structure

12.9 filter Module Reference

This module is filter manager.

Data Types

- interface filter_fill_value

12.9.1 Detailed Description

This module is filter manager.

Filtering method to be used is specify inside variable strcuture, as array of string character.
td_var%c_filter(1) string character is the filter name choose between:

- 'hann'
  - rad $<$ cutoff : $filter = 0.5 + 0.5 * COS(\pi * \frac{rad}{cutoff})$
  - rad $>$ cutoff : $filter = 0$
- 'hamming'
  - rad $<$ cutoff : $filter = 0.54 + 0.46 * COS(\pi * \frac{rad}{cutoff})$
  - rad $>$ cutoff : $filter = 0$
- 'blackman'
  - rad $<$ cutoff : $filter = 0.42 + 0.5 * COS(\pi * \frac{rad}{cutoff}) + 0.08 * COS(2\pi * \frac{rad}{cutoff})$
  - rad $>$ cutoff : $filter = 0$
- 'gauss'
  - $filter = exp(-(\alpha * rad^2)/(2 * cutoff^2))$
- 'butterworth'
  - $filer = 1/(1 + (rad^2/cutoff^2)^\alpha)$ with $rad = \sqrt{(dist - radius)^2}$

td_var%c_filter(2) string character is the number of turn to be done
td_var%c_filter(3) string character is the cut-off frequency td_var%c_filter(4) string character is the halo radius (count in number of mesh grid)
td_var%c_filter(5) string character is the alpha parameter (for gauss and butterworth method)

Note

Filter method could be specify for each variable in namelist *namvar*, defining string character *cn_varinfo*. None by default.
Filter method parameters are informed inside bracket.

- α parameter is added for *gauss* and *butterworth* methods

The number of turn is specify using '$*$' separator.
Example:

- cn_varinfo='varname1:flt=2$*$hamming($cutoff, radius$)', 'varname2:flt=gauss($cutoff, radius, \alpha$)'

to filter variable value:

```
CALL filter_fill_value( td_var )
```

- td_var is variable structure

Author

J.Paul

Date

November, 2013 - Initial Version

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.10 global Module Reference

This module defines global variables and parameters.

Variables

- integer(i4), parameter, public ip_maxvar =200

  maximum number of variable
- integer(i4), parameter, public ip_maxmtx =100

  matrix variable maximum dimension (cf create_bathy)
- integer(i4), parameter, public ip_maxseg =50

  maximum number of segment for each boundary
- integer(i4), parameter, public ip_nsep =2

  number of separator listed
- character(1), dimension(ip_nsep), parameter, public cp_sep = (/'.','_'/)

  list of separator
- integer(i4), parameter, public ip_ncom =2

number of comment character listed

- character(1), dimension(ip_ncom), parameter, public cp_com = (/'#','!'/)

  list of comment character
- integer(i4), parameter, public ip_ghost =1

  number of ghost cell
- integer(i4), parameter, public **ip_ninterp** =3
- character(len=lc), dimension(ip_ninterp), parameter, public **cp_interp_list** = (/ 'nearest', 'cubic ', 'linear ' /)
- integer(i4), parameter, public **ip_nextrap** =2
- character(len=lc), dimension(ip_nextrap), parameter, public **cp_extrap_list** = (/ 'dist_weight', 'min_error ' /)
- integer(i4), parameter, public **ip_nfilter** =5
- character(len=lc), dimension(ip_nfilter), parameter, public **cp_filter_list** = (/ 'butterworth', 'blackman ', 'hamming ', 'hann ', 'gauss '/)
- real(dp), parameter dp_fill_i1 =NF90_FILL_BYTE

  byte fill value
- real(dp), parameter dp_fill_i2 =NF90_FILL_SHORT

  short fill value
- real(dp), parameter dp_fill_i4 =NF90_FILL_INT

  INT fill value.
- real(dp), parameter dp_fill_sp =NF90_FILL_FLOAT

  real fill value
- real(dp), parameter, public dp_fill =NF90_FILL_DOUBLE

  double fill value
- integer(i4), parameter, public **ip_npoint** =4
- integer(i4), parameter, public **jp_t** =1
- integer(i4), parameter, public **jp_u** =2
- integer(i4), parameter, public **jp_v** =3
- integer(i4), parameter, public **jp_f** =4
- character(len=1), dimension(ip_npoint), parameter, public **cp_grid_point** = (/ 'T', 'U', 'V', 'F' /)
- integer(i4), parameter, public **ip_maxdim** =4
- integer(i4), parameter, public **jp_i** =1
- integer(i4), parameter, public **jp_j** =2
- integer(i4), parameter, public **jp_k** =3
- integer(i4), parameter, public **jp_l** =4
- character(len=ip_maxdim), parameter, public cp_dimorder = 'xyzt'

  dimension order to output
- integer(i4), parameter, public **ip_ncard** =4
- character(len=lc), dimension(ip_ncard), parameter, public **cp_card** = (/ 'north', 'south', 'east ', 'west ' /)
- integer(i4), parameter, public **jp_north** =1
- integer(i4), parameter, public **jp_south** =2
- integer(i4), parameter, public **jp_east** =3
- integer(i4), parameter, public **jp_west** =4
- integer(i4), parameter ip_maxdum = 10

  maximum dummy variable, dimension, attribute

12.10.1 Detailed Description

This module defines global variables and parameters.

Author

J.paul

Date

November, 2013 - Initial Version
September, 2015

- define fill value for each variable type

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.11 grid Module Reference

This module is grid manager.

Data Types

- interface grid_get_coarse_index
- interface grid_get_ew_overlap
- interface grid_get_fine_offset
- interface grid_get_ghost
- interface grid_get_info
- interface grid_get_perio
- interface grid_get_pivot

Functions/Subroutines

- logical function, public grid_is_north_fold (td_lat)

  This subroutine check if there is north fold.
- subroutine, public grid_check_dom (td_coord, id_imin, id_imax, id_jmin, id_jmax)

  This subroutine check domain validity.
- logical function, public grid_is_global (td_lon, td_lat)

  This function check if grid is global or not.
- integer(i4) function, dimension(2), public grid_get_closest (dd_lon0, dd_lat0, dd_lon1, dd_lat1, cd_pos, dd←_fill)

  This function return grid indices of the closest point from point (lon1,lat1)
- real(dp) function, dimension(size(dd_lon(:,:), dim=1), size(dd_lon(:,:), dim=2)), public grid_distance (dd_lon, dd_lat, dd_lonA, dd_latA)

  This function compute the distance between a point A and grid points.
- subroutine, public grid_check_coincidence (td_coord0, td_coord1, id_imin0, id_imax0, id_jmin0, id_jmax0, id_rho)

  This subroutine check fine and coarse grid coincidence.
- subroutine, public grid_add_ghost (td_var, id_ghost)

  This subroutine add ghost cell at boundaries.
- subroutine, public grid_del_ghost (td_var, id_ghost)

  This subroutine delete ghost cell at boundaries.
- integer(i4) function, dimension(td_var%t_dim(1)%i_len, td_var%t_dim(2)%i_len), public grid_split_domain (td_var, id_level)

  This subroutine compute closed sea domain.
- subroutine, public grid_fill_small_dom (td_var, id_mask, id_minsize)

  This subroutine fill small closed sea with fill value.
- subroutine, public grid_fill_small_msk (id_mask, id_minsize)

  This subroutine fill small domain inside bigger one.

12.11.1 Detailed Description

This module is grid manager.

to get NEMO pivot point index:

```
il_pivot=grid_get_pivot(td_file)
```

- il_pivot is NEMO pivot point index F(0), T(1)
- td_file is mpp structure

to get NEMO periodicity index:

```
il_perio=grid_get_perio(td_file)
```

- il_perio is NEMO periodicity index (0,1,2,3,4,5,6)
- td_file is mpp structure

to check domain validity:

```
CALL grid_check_dom(td_coord, id_imin, id_imax, id_jmin, id_jmax)
```

- td_coord is coordinates mpp structure
- id_imin is i-direction lower left point indice
- id_imax is i-direction upper right point indice
- id_jmin is j-direction lower left point indice
- id_jmax is j-direction upper right point indice

to get closest coarse grid indices of fine grid domain:

```
il_index(:,:)=grid_get_coarse_index(td_coord0, td_coord1,
                                  [id_rho,] [cd_point])
```

or

```
il_index(:,:)=grid_get_coarse_index(td_lon0, td_lat0, td_coord1,
                                  [id_rho,] [cd_point])
```

or

```
il_index(:,:)=grid_get_coarse_index(td_coord0, td_lon1, td_lat1,
                                  [id_rho,] [cd_point])
```

or

```
il_index(:,:)=grid_get_coarse_index(td_lon0, td_lat0, td_lon1, td_lat1,
                                    [id_rho,] [cd_point])
```

- il_index(:,:) is coarse grid indices (/ (/ imin0, imax0 /), (/ jmin0, jmax0 /) /)
- td_coord0 is coarse grid coordinate mpp structure
- td_coord1 is fine grid coordinate mpp structure
- td_lon0 is coarse grid longitude variable structure
- td_lat0 is coarse grid latitude variable structure
- td_lon1 is fine grid longitude variable structure
- td_lat1 is fine grid latitude variable structure
- id_rho is array of refinment factor (default 1)
- cd_point is Arakawa grid point (default 'T')

to know if grid is global:

```
ll_global=grid_is_global(td_lon, td_lat)
```

- td_lon is longitude variable structure
- td_lat is latitude variable structure

to know if grid contains north fold:

```
ll_north=grid_is_north_fold(td_lat)
```

- td_lat is latitude variable structure

to get coarse grid indices of the closest point from one fine grid point:

```
il_index(:)=grid_get_closest(dd_lon0(:,:), dd_lat0(:,:), dd_lon1, dd_lat1
                             [,dd_fill] [,cd_pos])
```

- il_index(:) is coarse grid indices (/ i0, j0 /)
- dd_lon0 is coarse grid array of longitude value (real(8))
- dd_lat0 is coarse grid array of latitude value (real(8))
- dd_lon1 is fine grid longitude value (real(8))
- dd_lat1 is fine grid latitude value (real(8))
- dd_fill
- cd_pos

to compute distance between a point A and grid points:

```
il_dist(:,:)=grid_distance(dd_lon, dd_lat, dd_lona, dd_lata)
```

- il_dist(:,:) is array of distance between point A and grid points
- dd_lon is array of longitude value (real(8))
- dd_lat is array of longitude value (real(8))
- dd_lonA is longitude of point A (real(8))
- dd_latA is latitude of point A (real(8))

to get offset between fine grid and coarse grid:

```
il_offset(:,:)=grid_get_fine_offset(td_coord0,
                                    id_imin0, id_jmin0, id_imax0, id_jmax0,
                                    td_coord1
                                    [,id_rho] [,cd_point])
```

or

```
il_offset(:,:)=grid_get_fine_offset(dd_lon0, dd_lat0,
                                    id_imin0, id_jmin0,id_imax0, id_jmax0,
                                    td_coord1
                                    [,id_rho] [,cd_point])
```

or

```
il_offset(:,:)=grid_get_fine_offset(td_coord0,
                                    id_imin0, id_jmin0, id_imax0, id_jmax0,
                                    dd_lon1, dd_lat1
                                    [,id_rho] [,cd_point])
```

or

```
il_offset(:,:)=grid_get_fine_offset(dd_lon0, dd_lat0,
                                    id_imin0, id_jmin0, id_imax0, id_jmax0,
                                    dd_lon1, dd_lat1
                                    [,id_rho] [,cd_point])
```

- il_offset(:,:) is offset array (/ (/ i_offset_left, i_offset_right /), (/ j_offset_lower, j_offset_upper /) /)
- td_coord0 is coarse grid coordinate mpp structure
- dd_lon0 is coarse grid longitude array (real(8))
- dd_lat0 is coarse grid latitude array (real(8))
- id_imin0 is coarse grid lower left corner i-indice of fine grid domain
- id_jmin0 is coarse grid lower left corner j-indice of fine grid domain
- id_imax0 is coarse grid upper right corner i-indice of fine grid domain
- id_jmax0 is coarse grid upper right corner j-indice of fine grid domain

- td_coord1 is fine grid coordinate mpp structure
- dd_lon1 is fine grid longitude array (real(8))
- dd_lat1 is fine grid latitude array (real(8))
- id_rho is array of refinment factor (default 1)
- cd_point is Arakawa grid point (default 'T')

to check fine and coarse grid coincidence:

```
CALL grid_check_coincidence(td_coord0, td_coord1,
                            id_imin0, id_imax0, id_jmin0, id_jmax0
                            ,id_rho)
```

- td_coord0 is coarse grid coordinate mpp structure
- td_coord1 is fine grid coordinate mpp structure
- id_imin0 is coarse grid lower left corner i-indice of fine grid domain
- id_imax0 is coarse grid upper right corner i-indice of fine grid domain
- id_jmin0 is coarse grid lower left corner j-indice of fine grid domain
- id_jmax0 is coarse grid upper right corner j-indice of fine grid domain
- id_rho is array of refinement factor

to add ghost cell at boundaries:

```
CALL grid_add_ghost(td_var, id_ghost)
```

- td_var is array of variable structure
- id_ghost is 2D array of ghost cell factor

to delete ghost cell at boundaries:

```
CALL grid_del_ghost(td_var, id_ghost)
```

- td_var is array of variable structure
- id_ghost is 2D array of ghost cell factor

to get ghost cell factor (use or not):

```
il_factor(:)= grid_get_ghost( td_var )
```

or

```
il_factor(:)= grid_get_ghost( td_mpp )
```

- il_factor(:) is array of ghost cell factor (0 or 1)
- td_var is variable structure
- td_mpp is mpp sturcture

to compute closed sea domain:

```
il_mask(:,:)=grid_split_domain(td_var, [id_level])
```

- il_mask(:,:) is domain mask
- td_var is variable strucutre
- id_level is level to be used [optional]

to fill small closed sea with _FillValue:

```
CALL grid_fill_small_dom(td_var, id_mask, [id_minsize])
```

- td_var is variable structure
- id_mask is domain mask (from grid_split_domain)
- id_minsize is minimum size of sea to be kept [optional]

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- add header

October, 2014

- use mpp file structure instead of file

February, 2015

- add function grid_fill_small_msk to fill small domain inside bigger one , 2016
- improve way to check coincidence (bug fix)
- manage grid cases for T,U,V or F point, with even or odd refinment (bug fix)

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

tvar

Author

Date

Parameters

Parameters

12.11.2.2 grid_check_coincidence()

```
subroutine, public grid::grid_check_coincidence (
              type(tmpp), intent(in) td_coord0,
              type(tmpp), intent(in) td_coord1,
              integer(i4), intent(in) id_imin0,
              integer(i4), intent(in) id_imax0,
              integer(i4), intent(in) id_jmin0,
              integer(i4), intent(in) id_jmax0,
              integer(i4), dimension(:), intent(in) id_rho )
```

This subroutine check fine and coarse grid coincidence.

Author

J.Paul

Date

Parameters

Parameters

12.11.2.3 grid_check_dom()

```
subroutine, public grid::grid_check_dom (
            type(tmpp), intent(in) td_coord,
            integer(i4), intent(in) id_imin,
            integer(i4), intent(in) id_imax,
            integer(i4), intent(in) id_jmin,
            integer(i4), intent(in) id_jmax )
```

This subroutine check domain validity.

If maximum latitude greater than 88°N, program will stop.

Note

Not able to manage north fold for now.

Author

J.Paul

Date

November, 2013 - Initial Version
October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_coord*	coordinate file
`in`	*id_imin*	i-direction lower left point indice
`in`	*id_imax*	i-direction upper right point indice
`in`	*id_jmin*	j-direction lower left point indice
`in`	*id_jmax*	j-direction upper right point indice

12.11.2.4 grid_del_ghost()

```
subroutine, public grid::grid_del_ghost (
            type(tvar), intent(inout) td_var,
            integer(i4), dimension(2,2), intent(in) id_ghost )
```

This subroutine delete ghost cell at boundaries.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	array of variable structure
`in`	*id_ghost*	array of ghost cell factor

12.11.2.5 grid_distance()

```
real(dp) function, dimension(size(dd_lon(:,:),dim=1), size(dd_lon(:,:),dim=2)), public grid↩
::grid_distance (
            real(dp), dimension(:,:), intent(in) dd_lon,
            real(dp), dimension(:,:), intent(in) dd_lat,
            real(dp), intent(in) dd_lonA,
            real(dp), intent(in) dd_latA )
```

This function compute the distance between a point A and grid points.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_lon*	grid longitude array
in	*dd_lat*	grid latitude array
in	*dd_lonA*	longitude of point A
in	*dd_latA*	latitude of point A
in	*dd_fill*	

Returns

array of distance between point A and grid points.

12.11.2.6 grid_fill_small_dom()

```
subroutine, public grid::grid_fill_small_dom (
             type(tvar), intent(inout) td_var,
             integer(i4), dimension(:,:), intent(in) id_mask,
             integer(i4), intent(in), optional id_minsize )
```

This subroutine fill small closed sea with fill value.

the minimum size (number of point) of closed sea to be kept could be sepcify with id_minsize. By default only the biggest sea is preserve.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*id_mask*	domain mask (from grid_split_domain)
`in`	*id_minsize*	minimum size of sea to be kept

12.11.2.7 grid_fill_small_msk()

```
subroutine, public grid::grid_fill_small_msk (
             integer(i4), dimension(:,:), intent(inout) id_mask,
             integer(i4), intent(in) id_minsize )
```

This subroutine fill small domain inside bigger one.

the minimum size (number of point) of domain sea to be kept could be is sepcified with id_minsize. smaller domain are included in the one they are embedded.

Author

J.Paul

Date

Ferbruay, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*id_mask*	domain mask (from grid_split_domain)
`in`	*id_minsize*	minimum size of sea to be kept

12.11.2.8 grid_get_closest()

```
integer(i4) function, dimension(2), public grid::grid_get_closest (
            real(dp), dimension(:,:), intent(in) dd_lon0,
            real(dp), dimension(:,:), intent(in) dd_lat0,
            real(dp), intent(in) dd_lon1,
            real(dp), intent(in) dd_lat1,
            character(len=*), intent(in), optional cd_pos,
            real(dp), intent(in), optional dd_fill )
```

This function return grid indices of the closest point from point (lon1,lat1)

Note

overlap band should have been already removed from coarse grid array of longitude and latitude, before running this function

if you add cd_pos argument, you could choice to return closest point at

- lower left (ll) of the point
- lower right (lr) of the point
- upper left (ul) of the point
- upper right (ur) of the point
- lower (lo) of the point
- upper (up) of the point
- left (le) of the point
- right (ri) of the point

Author

J.Paul

Date

November, 2013 - Initial Version
February, 2015

- change dichotomy method to manage ORCA grid

February, 2016

- add optional use of relative position

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_lon0*	coarse grid array of longitude
in	*dd_lat0*	coarse grid array of latitude
in	*dd_lon1*	fine grid longitude
in	*dd_lat1*	fine grid latitude
in	*cd_pos*	relative position of grid point from point
in	*dd_fill*	fill value

Returns

coarse grid indices of closest point of fine grid point

12.11.2.9 grid_is_global()

```
logical function, public grid::grid_is_global (
            type(tvar), intent(in) td_lon,
            type(tvar), intent(in) td_lat )
```

This function check if grid is global or not.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_lon*	longitude structure
in	*td_lat*	latitude structure

12.11.2.10 grid_is_north_fold()

```
logical function, public grid::grid_is_north_fold (
            type(tvar), intent(in) td_lat )
```

This subroutine check if there is north fold.

check if maximum latitude greater than 88°N

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_lat*	latitude variable structure

12.11.2.11 grid_split_domain()

```
integer(i4) function, dimension(td_var%t_dim(1)%i_len, td_var%t_dim(2)%i_len ), public grid↩
::grid_split_domain (
            type(tvar), intent(in) td_var,
            integer(i4), intent(in), optional id_level )
```

This subroutine compute closed sea domain.

to each domain is associated a negative value id (from -1 to ...)
optionaly you could specify which level use (default 1)

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	variable strucutre
in	*id_level*	level

Returns

domain mask

12.12 interp Module Reference

This module manage interpolation on regular grid.

Data Types

- interface interp_detect
- interface interp_fill_value
- type tinterp

Functions/Subroutines

- subroutine, public interp_create_mixed_grid (td_var, td_mix, id_rho)

  This subroutine create mixed grid.
- subroutine, public interp_clean_mixed_grid (td_mix, td_var, id_rho, id_offset)

  This subroutine remove points added on mixed grid to compute interpolation. And save interpolated value over domain.

12.12.1 Detailed Description

This module manage interpolation on regular grid.

Interpolation method to be used is specify inside variable strcuture, as array of string character.

- td_var%c_interp(1) string character is the interpolation name choose between:
  - 'nearest'
  - 'cubic '
  - 'linear '
- td_var%c_interp(2) string character is an operation to be used on interpolated value.
  operation have to be mulitplication '∗' or division '/'.
  coefficient have to be refinement factor following i-direction 'rhoi', j-direction 'rhoj', or k-direction 'rhok'.

  Examples: '∗rhoi', '/rhoj'.

Note

Those informations are read from namelist or variable configuration file (default).
Interplation method could be specify for each variable in namelist *namvar*, defining string character *cn_varinfo*.
Example:

- cn_varinfo='varname1:int=cubic/rhoi', 'varname2:int=linear'

to create mixed grid (with coarse grid point needed to compute interpolation):

```
CALL interp_create_mixed_grid( td_var, td_mix [,id_rho] )
```

- td_var is coarse grid variable (should be extrapolated)
- td_mix is mixed grid variable structure [output]
- id_rho is array of refinment factor [optional]

to detected point to be interpolated:

```
il_detect(:,:,:)=interp_detect( td_mix [,id_rho] )
```

- il_detect(:,:,:) is 3D array of detected point to be interpolated
- td_mix is mixed grid variable
- id_rho is array of refinement factor [optional]

to interpolate variable value:

```
CALL  interp_fill_value( td_var [,id_rho] [,id_offset] )
```

- td_var is variable structure
- id_rho is array of refinement factor [optional]
- id_offset is array of offset between fine and coarse grid [optional]

to clean mixed grid (remove points added on mixed grid to compute interpolation):

```
CALL interp_clean_mixed_grid( td_mix, td_var, id_rho )
```

- td_mix is mixed grid variable structure
- td_var is variable structure [output]
- id_rho is array of refinement factor [optional]
- id_offset is array of offset between fine and coarse grid [optional]

Note

It use to work on ORCA grid, as we work only with grid indices.

Warning

due to the use of second derivative when using cubic interpolation you should add at least 2 extrabands.

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- add header
- use interpolation method modules

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

tvar
tvar

Author

Date

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_mix*	mixed grid variable structure
`out`	*td_var*	variable structure
`in`	*id_rho*	array of refinement factor (default 1)
`in`	*id_offset*	2D array of offset between fine and coarse grid

12.12.2.2 interp_create_mixed_grid()

```
subroutine, public interp::interp_create_mixed_grid (
            type(tvar), intent(in) td_var,
            type(tvar), intent(out) td_mix,
            integer(i4), dimension(:), intent(in), optional id_rho )
```

This subroutine create mixed grid.

Created grid is fine resolution grid. First and last point are coasre grid point.

A special case is done for even refinement on ARAKAWA-C grid.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	coarse grid variable (should be extrapolated)
out	*td_mix*	mixed grid variable
in	*id_rho*	array of refinment factor (default 1)

12.13 interp_cubic Module Reference

This module manage cubic interpolation on regular grid.

Functions/Subroutines

- subroutine, public interp_cubic_fill (dd_value, dd_fill, id_detect, id_rho, ld_even, ld_discont)

  This subroutine compute horizontal cubic interpolation on 4D array of value.

```
CALL interp_cubic_fill(dd_value, dd_fill, id_detect, id_rho, ld_even [,ld_discont] )
```

Author

Date

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.13.2 Function/Subroutine Documentation

12.13.2.1 interp_cubic_fill()

```
subroutine, public interp_cubic::interp_cubic_fill (
             real(dp), dimension(:,:,:,:), intent(inout) dd_value,
             real(dp), intent(in) dd_fill,
             integer(i4), dimension(:,:,:), intent(inout) id_detect,
             integer(i4), dimension(:), intent(in) id_rho,
             logical, dimension(:), intent(in) ld_even,
             logical, intent(in), optional ld_discont )
```

This subroutine compute horizontal cubic interpolation on 4D array of value.

Author

J.Paul

Date

September, 2014 - Initial Version
July, 2015

- reinitialise detect array for each level

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*dd_value*	2D array of variable value
`in`	*dd_fill*	FillValue of variable
`in,out`	*id_detect*	2D array of point to be interpolated
`in`	*id_rho*	array of refinment factor
`in`	*ld_even*	even refinment or not
`in`	*ld_discont*	longitudinal discontinuity (-180°/180°, 0°/360°) or not

12.14 interp_linear Module Reference

This module manage linear interpolation on regular grid.

Functions/Subroutines

- subroutine, public interp_linear_fill (dd_value, dd_fill, id_detect, id_rho, ld_even, ld_discont)

  This subroutine compute horizontal linear interpolation on 4D array of value.

12.14.1 Detailed Description

This module manage linear interpolation on regular grid.

to compute linear interpolation:

```
CALL interp_linear_fill(dd_value, dd_fill, id_detect, id_rho, ld_even [,ld_discont] )
```

- dd_value is 2D array of variable value
- dd_fill is the FillValue of variable
- id_detect is 2D array of point to be interpolated (see interp module)
- id_rho is array of refinment factor
- ld_even indicates even refinment or not
- ld_discont indicates longitudinal discontinuity (-180°/180°, 0°/360°) or not

Author

J.Paul

Date

September, 2014 - Initial version

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.14.2 Function/Subroutine Documentation

12.14.2.1 interp_linear_fill()

```
subroutine, public interp_linear::interp_linear_fill (
             real(dp), dimension(:,:,:,:), intent(inout) dd_value,
             real(dp), intent(in) dd_fill,
             integer(i4), dimension(:,:,:), intent(inout) id_detect,
             integer(i4), dimension(:), intent(in) id_rho,
             logical, dimension(:), intent(in) ld_even,
             logical, intent(in), optional ld_discont )
```

This subroutine compute horizontal linear interpolation on 4D array of value.

Author

J.Paul

Date

September, 2014 - Initial Version
July, 2015 - reinitialise detect array for each level

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*dd_value*	2D array of variable value
`in`	*dd_fill*	FillValue of variable
`in,out`	*id_detect*	2D array of point to be interpolated
`in`	*id_rho*	array of refinment factor
`in`	*ld_even*	even refinment or not
`in`	*ld_discont*	longitudinal discontinuity (-180°/180°, 0°/360°) or not

12.15 interp_nearest Module Reference

This module manage nearest interpolation on regular grid.

Functions/Subroutines

- subroutine, public interp_nearest_fill (dd_value, id_detect, id_rho)
  This subroutine compute horizontal nearest interpolation on 4D array of value.

12.15.1 Detailed Description

This module manage nearest interpolation on regular grid.

to compute nearest interpolation:

```
CALL interp_nearest_fill(dd_value, dd_fill, id_detect, id_rho, ld_even [,ld_discont] )
```

- dd_value is 2D array of variable value
- dd_fill is the FillValue of variable
- id_detect is 2D array of point to be interpolated (see interp module)
- id_rho is array of refinment factor
- ld_even indicates even refinment or not
- ld_discont indicates longitudinal discontinuity (-180°/180°, 0°/360°) or not

Author

J.Paul

Date

September, 2014 - Initial version

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.15.2 Function/Subroutine Documentation

12.15.2.1 interp_nearest_fill()

```
subroutine, public interp_nearest::interp_nearest_fill (
             real(dp), dimension(:,:,:,:), intent(inout) dd_value,
             integer(i4), dimension(:,:,:), intent(inout) id_detect,
             integer(i4), dimension(:), intent(in) id_rho )
```

This subroutine compute horizontal nearest interpolation on 4D array of value.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*dd_value*	2D array of variable value
`in,out`	*id_detect*	2D array of point to be interpolated
`in`	*id_rho*	array of refinment factor

12.16 iom Module Reference

Input/Output manager : Library to read input files.

Data Types

- interface iom_read_att
- interface iom_read_dim
- interface iom_read_var

Functions/Subroutines

- subroutine, public iom_open (td_file)

  This function open a file in read or write mode.
- subroutine, public iom_create (td_file)

  This function create a file.
- subroutine, public iom_close (td_file)

  This subroutine close file.
- subroutine, public iom_write_file (td_file, cd_dimorder)

  This subroutine write file structure in an opened file.

12.16.1 Detailed Description

Input/Output manager : Library to read input files.

to open file:

```
CALL iom_open(td_file)
```

- td_file is file structure

to create file:

```
CALL iom_create(td_file)
```

- td_file is file structure

to write in file:

```
CALL  iom_write_file(td_file)
```

to close file:

```
CALL iom_close(tl_file)
```

to read one dimension in file:

```
tl_dim = iom_read_dim(tl_file, id_dimid)
```

or

```
tl_dim = iom_read_dim(tl_file, cd_name)
```

- id_dimid is dimension id
- cd_name is dimension name

to read variable or global attribute in file:

```
tl_att = iom_read_att(tl_file, id_varid, id_attid)
```

or

```
tl_att = iom_read_att(tl_file, id_varid, cd_attname)
```

or

```
tl_att = iom_read_att(tl_file, cd_varname, id_attid)
```

or

```
tl_att = iom_read_att(tl_file, cd_varname, cd_attname)
```

- id_varid is variable id
- id_attid is attribute id
- cd_attname is attribute name
- cd_varname is variable name or standard name

to read one variable in file:

```
tl_var = iom_read_var(td_file, id_varid, [id_start, id_count])
```

or

```
tl_var = iom_read_var(td_file, cd_name, [id_start, [id_count,]])
```

- id_varid is variabale id
- cd_name is variabale name or standard name.
- id_start is a integer(4) 1D array of index from which the data values will be read [optional]
- id_count is a integer(4) 1D array of the number of indices selected along each dimension [optional]

Author

J.Paul

Date

November, 2013 - Initial Version

Todo
- see lbc_lnk
- see goup netcdf4

Note

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12.16.2 Function/Subroutine Documentation

12.16.2.1 iom_close()

```
subroutine, public iom::iom_close (
            type(tfile), intent(inout) td_file )
```

This subroutine close file.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

`in,out`	*td_file*	file structure

12.16.2.2 iom_create()

```
subroutine, public iom::iom_create (
            type(tfile), intent(inout) td_file )
```

This function create a file.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure

12.16.2.3 iom_open()

```
subroutine, public iom::iom_open (
            type(tfile), intent(inout) td_file )
```

This function open a file in read or write mode.

If try to open a file in write mode that did not exist, create it.

If file exist, get information about:

- the number of variables
- the number of dimensions
- the number of global attributes
- the ID of the unlimited dimension
- the file format and finally read dimensions.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure

12.16.2.4 iom_write_file()

```
subroutine, public iom::iom_write_file (
            type(tfile), intent(inout) td_file,
            character(len=*), intent(in), optional cd_dimorder )
```

This subroutine write file structure in an opened file.

optionally, you could specify dimension order (default 'xyzt')

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015 - add dimension order option

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure

12.17 iom_cdf Module Reference

NETCDF Input/Output manager : Library to read Netcdf input files.

Data Types

- interface iom_cdf_fill_var
- interface iom_cdf_read_att
- interface iom_cdf_read_dim
- interface iom_cdf_read_var

Functions/Subroutines

- subroutine, public iom_cdf_open (td_file)
  This subroutine open a netcdf file in read or write mode.
- subroutine, public iom_cdf_close (td_file)
  This subroutine close netcdf file.
- subroutine, public iom_cdf_write_file (td_file, cd_dimorder)
  This subroutine write file structure in an opened netcdf file.

12.17.1 Detailed Description

NETCDF Input/Output manager : Library to read Netcdf input files.

to open netcdf file:

```
CALL iom_cdf_open(td_file)
```

- td_file is file structure (see file)

to write in netcdf file:

```
CALL  iom_cdf_write_file(td_file)
```

to close netcdf file:

```
CALL iom_cdf_close(tl_file)
```

to read one dimension in netcdf file:

```
tl_dim = iom_cdf_read_dim(tl_file, id_dimid)
```

or

```
tl_dim = iom_cdf_read_dim(tl_file, cd_name)
```

- id_dimid is dimension id
- cd_name is dimension name

to read one attribute in netcdf file:

```
tl_att = iom_cdf_read_att(tl_file, id_varid, id_attid)
```

or

```
tl_att = iom_cdf_read_att(tl_file, id_varid, cd_name)
```

- id_varid is variable id
- id_attid is attribute id
- cd_name is attribute name

to read one variable in netcdf file:

```
tl_var = iom_cdf_read_var(td_file, id_varid, [id_start, id_count])
```

or

```
tl_var = iom_cdf_read_var(td_file, cd_name, [id_start, [id_count,]])
```

- id_varid is variabale id
- cd_name is variabale name
- id_start is a integer(4) 1D array of index from which the data values will be read [optional]
- id_count is a integer(4) 1D array of the number of indices selected along each dimension [optional]

Author

J.Paul

Date

November, 2013 - Initial Version

Note

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12.17.2 Function/Subroutine Documentation

12.17.2.1 iom_cdf_close()

```
subroutine, public iom_cdf::iom_cdf_close (
            type(tfile), intent(inout) td_file )
```

This subroutine close netcdf file.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure

12.17.2.2 iom_cdf_open()

```
subroutine, public iom_cdf::iom_cdf_open (
            type(tfile), intent(inout) td_file )
```

This subroutine open a netcdf file in read or write mode.

if try to open a file in write mode that did not exist, create it.
if file already exist, get information about0:

- the number of variables
- the number of dimensions
- the number of global attributes
- the ID of the unlimited dimension
- the file format Finally it read dimensions, and 'longitude' variable to compute East-West overlap.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure

12.17.2.3 iom_cdf_write_file()

```
subroutine, public iom_cdf::iom_cdf_write_file (
            type(tfile), intent(inout) td_file,
            character(len=*), intent(in), optional cd_dimorder )
```

This subroutine write file structure in an opened netcdf file.

optionally, you could specify dimension order (default 'xyzt')

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015

- add dimension order option

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

`in,out`	*td_file*	file structure

12.18 iom_dom Module Reference

This module allow to read domain (defined as domain structure) in a mpp files.

Data Types

- interface iom_dom_read_var

Functions/Subroutines

- subroutine, public iom_dom_open (td_mpp, td_dom, id_perio, id_ew)
  This subroutine open files composing mpp structure over domain to be used.
- subroutine, public iom_dom_close (td_mpp)
  This subroutine close files composing mpp structure.

12.18.1 Detailed Description

This module allow to read domain (defined as domain structure) in a mpp files.

to read one variable in an mpp files over domain defined as domain structure:

```
tl_var=iom_dom_read_var( td_mpp, id_varid, td_dom )
```

or

```
tl_var=iom_dom_read_var( td_mpp, cd_name, td_dom )
```

- td_mpp is a mpp structure
- id_varid is a variable id
- cd_name is variable name or standard name
- td_dom is a domain structure

Author

J.Paul

Date

October, 2014 - Initial Version

Note

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12.18.2 Function/Subroutine Documentation

12.18.2.1 iom_dom_close()

```
subroutine, public iom_dom::iom_dom_close (
            type(tmpp), intent(inout) td_mpp )
```

This subroutine close files composing mpp structure.

Author

J.Paul

Date

October, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in` *td_mpp* mpp structure

12.18.2.2 iom_dom_open()

```
subroutine, public iom_dom::iom_dom_open (
             type(tmpp), intent(inout) td_mpp,
             type(tdom), intent(in) td_dom,
             integer(i4), intent(in), optional id_perio,
             integer(i4), intent(in), optional id_ew )
```

This subroutine open files composing mpp structure over domain to be used.

Author

J.Paul

Date

October, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp structure

12.19 iom_mpp Module Reference

This module manage massively parallel processing Input/Output manager. Library to read/write mpp files.

Data Types

- interface iom_mpp_read_var

Functions/Subroutines

- subroutine, public iom_mpp_open (td_mpp, id_perio, id_ew)

  This subroutine open files composing mpp structure to be used.
- subroutine, public iom_mpp_create (td_mpp)

  This subroutine create files, composing mpp structure to be used, in write mode.
- subroutine, public iom_mpp_close (td_mpp)

  This subroutine close files composing mpp structure.
- subroutine, public iom_mpp_write_file (td_mpp, cd_dimorder)

  This subroutine write files composing mpp structure.

12.19.1 Detailed Description

This module manage massively parallel processing Input/Output manager. Library to read/write mpp files.

to open mpp files (only file to be used (see mpp_get_use) will be open):

```
CALL iom_mpp_open(td_mpp)
```

- td_mpp is a mpp structure

to creates mpp files:

```
CALL iom_mpp_create(td_mpp)
```

- td_mpp is a mpp structure

to write in mpp files :

```
CALL  iom_mpp_write_file(td_mpp)
```

- td_mpp is a mpp structure

to close mpp files:

```
CALL iom_mpp_close(td_mpp)
```

to read one variable in an mpp files:

```
tl_var=iom_mpp_read_var( td_mpp, id_varid, [id_start, id_count] [,id_ew] )
```

or

```
tl_var=iom_mpp_read_var( td_mpp, cd_name, [id_start, id_count] [,id_ew] )
```

- td_mpp is a mpp structure
- id_varid is a variable id
- cd_name is variable name or standard name
- id_start is a integer(4) 1D array of index from which the data values will be read [optional]
- id_count is a integer(4) 1D array of the number of indices selected along each dimension [optional]
- id_ew East West overlap [optional]

to fill variable value in mpp structure:

```
CALL iom_mpp_fill_var(td_mpp, id_varid, [id_start, id_count] [,id_ew] )
```

or

```
CALL iom_mpp_fill_var(td_mpp, cd_name, [id_start, id_count] [,id_ew] )
```

- td_mpp is mpp structure
- id_varid is variable id
- cd_name is variable name or standard name
- id_start is a integer(4) 1D array of index from which the data values will be read [optional]
- id_count is a integer(4) 1D array of the number of indices selected along each dimension [optional]
- id_ew East West overlap [optional]

to fill all variable in mpp structure:

```
CALL iom_mpp_fill_var(td_mpp, [id_start, id_count] [,id_ew] )
```

- td_mpp is mpp structure
- id_start is a integer(4) 1D array of index from which the data values will be read [optional]
- id_count is a integer(4) 1D array of the number of indices selected along each dimension [optional]
- id_ew East West overlap

to write files composong mpp strucutre:

```
CALL iom_mpp_write_file(td_mpp)
```

Author

J.Paul

Date

November, 2013 - Initial Version

Note

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12.19.2 Function/Subroutine Documentation

12.19.2.1 iom_mpp_close()

```
subroutine, public iom_mpp::iom_mpp_close (
            type(tmpp), intent(inout) td_mpp )
```

This subroutine close files composing mpp structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure

12.19.2.2 iom_mpp_create()

```
subroutine, public iom_mpp::iom_mpp_create (
            type(tmpp), intent(inout) td_mpp )
```

This subroutine create files, composing mpp structure to be used, in write mode.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp structure

tmpp

Author

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out` *td_mpp* mpp structure

12.19.2.4 iom_mpp_write_file()

```
subroutine, public iom_mpp::iom_mpp_write_file (
            type(tmpp), intent(inout) td_mpp,
            character(len=*), intent(in), optional cd_dimorder )
```

This subroutine write files composing mpp structure.

optionally, you could specify the dimension order (default 'xyzt')

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015 - add dimension order option

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp structure

12.20 iom_rstdimg Module Reference

This module is a library to read/write dimg file.

Data Types

- interface iom_rstdimg_read_dim
- interface iom_rstdimg_read_var

Functions/Subroutines

- subroutine, public iom_rstdimg_open (td_file)
  This subroutine open a dimg file in read or write mode.
- subroutine, public iom_rstdimg_close (td_file)
  This subroutine close dimg file.
- subroutine, public iom_rstdimg_get_mpp (td_file)
  This subroutine get sub domain decomposition in a dimg file.
- subroutine, public iom_rstdimg_write_file (td_file)
  This subroutine write dimg file from file structure.

12.20.1 Detailed Description

This module is a library to read/write dimg file.

to open dimg file (create file structure):

```
CALL iom_rstdimg_open(td_file)
```

- td_file is file structure (see file.f90)

to write in dimg file:

```
CALL  iom_rstdimg_write_file(td_file)
```

to close dimg file:

```
CALL iom_rstdimg_close(tl_file)
```

to read one dimension in dimg file:

```
tl_dim = iom_rstdimg_read_dim(tl_file, id_dimid)
```

or

```
tl_dim = iom_rstdimg_read_dim(tl_file, cd_name)
```

- id_dimid is dimension id

- cd_name is dimension name

to read one variable in dimg file:

```
tl_var = iom_rstdimg_read_var(td_file, id_varid, [id_start, id_count])
```

or

```
tl_var = iom_rstdimg_read_var(td_file, cd_name, [id_start, [id_count]])
```

- id_varid is variabale id
- cd_name is variabale name or standard name
- id_start is a integer(4) 1D array of index from which the data values will be read [optional]
- id_count is a integer(4) 1D array of the number of indices selected along each dimension [optional]

to get sub domain decomppistion in a dimg file:

```
CALL iom_rstdimg_get_mpp(td_file)
```

Author

J.Paul

Date

November, 2013 - Initial Version

Note

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12.20.2 Function/Subroutine Documentation

12.20.2.1 iom_rstdimg_close()

```
subroutine, public iom_rstdimg::iom_rstdimg_close (
            type(tfile), intent(inout) td_file )
```

This subroutine close dimg file.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure

12.20.2.2 iom_rstdimg_get_mpp()

```
subroutine, public iom_rstdimg::iom_rstdimg_get_mpp (
            type(tfile), intent(inout) td_file )
```

This subroutine get sub domain decomposition in a dimg file.

domain decomposition informations are saved in attributes.

Author

J.Paul

Date

November, 2013 - Initial Version
January, 2016

- mismatch with "halo" indices

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure

12.20.2.3 iom_rstdimg_open()

```
subroutine, public iom_rstdimg::iom_rstdimg_open (
            type(tfile), intent(inout) td_file )
```

This subroutine open a dimg file in read or write mode.

if try to open a file in write mode that did not exist, create it.
if file already exist, get information about:

- the number of variables
- the number of dimensions
- the number of global attributes
- the ID of the unlimited dimension
- the file format Finally it read dimensions, and 'longitude' variable to compute East-West overlap.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure

12.20.2.4 iom_rstdimg_write_file()

```
subroutine, public iom_rstdimg::iom_rstdimg_write_file (
            type(tfile), intent(inout) td_file )
```

This subroutine write dimg file from file structure.

dimg file have to be already opened in write mode.

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- use iom_rstdimg__get_rec

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure

12.21 kind Module Reference

This module defines the F90 kind parameter for common data types.

Variables

- integer, parameter, public sp = SELECTED_REAL_KIND(6, 37)

  single precision (real 4)
- integer, parameter, public dp = SELECTED_REAL_KIND(12, 307)

  double precision (real 8)
- integer, parameter, public wp = dp

  working precision
- integer, parameter, public i1 = SELECTED_INT_KIND(1)

  single precision (integer 1)
- integer, parameter, public i2 = SELECTED_INT_KIND(4)

  single precision (integer 2)
- integer, parameter, public i4 = SELECTED_INT_KIND(9)

  single precision (integer 4)
- integer, parameter, public i8 = SELECTED_INT_KIND(14)

  double precision (integer 8)
- integer, parameter, public lc = 256

  Length of Character strings.

12.21.1 Detailed Description

This module defines the F90 kind parameter for common data types.

Author

G. Madec

Date

June, 2006 - Initial Version
December, 2012 - G. Madec

- add a standard length of character strings

Todo
- check i8 max value

Note

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12.22 logger Module Reference

This module manage log file.

Data Types

- type tlogger

Functions/Subroutines

- subroutine, public logger_open (cd_file, cd_verbosity, id_maxerror, id_logid)

  This subroutine create a log file with default verbosity ('warning').
- subroutine, public logger_close ()

  This subroutine close a log file.
- subroutine, public logger_clean ()

  This subroutine clean a log structure.
- subroutine, public logger_flush ()

  This subroutine flushing output into log file.
- recursive subroutine, public logger_header ()

  This subroutine write header on log file.
- subroutine, public logger_footer ()

  This subroutine write footer on log file.
- subroutine, public logger_trace (cd_msg, ld_flush)

  This subroutine write trace message on log file.
- subroutine, public logger_debug (cd_msg, ld_flush)

  This subroutine write debug message on log file.
- subroutine, public logger_info (cd_msg, ld_flush)

  This subroutine write info message on log file.
- subroutine, public logger_warn (cd_msg, ld_flush)

  This subroutine write warning message on log file.
- subroutine, public logger_error (cd_msg, ld_flush)

  This subroutine write error message on log file.
- recursive subroutine, public logger_fatal (cd_msg)

  This subroutine write fatal error message on log file, close log file and stop process.

12.22.1 Detailed Description

This module manage log file.

This module create log file and fill it depending of verbosity.

verbosity could be choosen between :

- trace : Most detailed information.
- debug : Detailed information on the flow through the system.
- info : Interesting runtime events (startup/shutdown).
- warning: Use of deprecated APIs, poor use of API, 'almost' errors, other runtime situations that are undesirable or unexpected, but not necessarily "wrong".
- error : Other runtime errors or unexpected conditions.
- fatal : Severe errors that cause premature termination.
- none : to not create and write any information in logger file.
  in this case only FATAL ERROR will be detected.

Note

default verbosity is warning

If total number of error exceeded maximum number authorized, program stop.

to open/create logger file:

```
CALL logger_open(cd_file, [cd_verbosity,] [id_maxerror,] [id_loggerid])
```

- cd_file is logger file name
- cd_verbosity is verbosity to be used [optional, default 'warning']
- id_loggerid is file id [optional, use only to flush]
- id_maxerror is the maximum number of error authorized before program stop [optional, default 5]

to close logger file:

```
CALL logger_close()
```

to clean logger file:

```
CALL logger_clean()
```

to write header in logger file:

```
CALL logger_header()
```

to write footer in logger file:

```
CALL logger_footer()
```

to flushing output:

```
CALL logger_flush()
```

to write TRACE message in logger file:

```
CALL logger_trace(cd_msg [,ld_flush])
```

- cd_msg is TRACE message

- ld_flush to flush output [optional]

to write DEBUG message in logger file:

```
CALL logger_debug(cd_msg [,ld_flush])
```

- cd_msg is DEBUG message
- ld_flush to flush output [optional]

to write INFO message in logger file:

```
CALL logger_info(cd_msg [,ld_flush])
```

- cd_msg is INFO message
- ld_flush to flush output [optional]

to write WARNING message in logger file:

```
CALL logger_warn(cd_msg [,ld_flush])
```

- cd_msg is WARNING message
- ld_flush to flush output [optional]

to write ERROR message in logger file:

```
CALL logger_error(cd_msg [,ld_flush])
```

- cd_msg is ERROR message
- ld_flush to flush output [optional]

to write FATAL message in logger file:

```
CALL logger_fatal(cd_msg)
```

- cd_msg is FATAL message

Examples :

```
CALL logger_open('loggerfile.txt','info')

CALL logger_header()
CALL logger_debug('une info de debug')
CALL logger_info('une info')
CALL logger_warn('un warning')
CALL logger_error('une erreur')
CALL logger_footer()
CALL logger_close()
CALL logger_clean()
```

```
CALL logger_open('loggerfile.txt')

CALL logger_header()
CALL logger_debug('une info de debug')
CALL logger_info('une info')
CALL logger_warn('un warning')
CALL logger_error('une erreur')
CALL logger_footer()
CALL logger_close()
CALL logger_clean()
```

Author

J.Paul

Date

November, 2013 - Initial Version
February, 2015

- check verbosity validity
- add 'none' verbosity level to not used logger file

January, 2016

- add logger_clean subroutine

Note

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12.22.2 Function/Subroutine Documentation

12.22.2.1 logger_clean()

```
subroutine, public logger::logger_clean ( )
```

This subroutine clean a log structure.

Author

J.Paul

Date

January, 2016 - Initial Version

Author

Date

Author

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_msg*	message to write
`in`	*ld_flush*	flushing ouput

12.22.2.4 logger_error()

```
subroutine, public logger::logger_error (
            character(len=*), intent(in) cd_msg,
            logical, intent(in), optional ld_flush )
```

This subroutine write error message on log file.

Optionally you could flush output.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_msg*	message to write
`in`	*ld_flush*	flushing ouput

12.22.2.5 logger_fatal()

```
recursive subroutine, public logger::logger_fatal (
            character(len=*), intent(in) cd_msg )
```

This subroutine write fatal error message on log file, close log file and stop process.

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2015

- stop program for FATAL ERROR if verbosity is none

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_msg*	message to write

[redacted]

12.22.2.8 logger_header()

```
recursive subroutine, public logger::logger_header ( )
```

This subroutine write header on log file.

Author

J.Paul

Date

November, 2013 - Initial Version

12.22.2.9 logger_info()

```
subroutine, public logger::logger_info (
            character(len=*), intent(in) cd_msg,
            logical, intent(in), optional ld_flush )
```

This subroutine write info message on log file.

Optionally you could flush output.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_msg*	message to write
in	*ld_flush*	flushing ouput

12.22.2.10 logger_open()

```
subroutine, public logger::logger_open (
            character(len=*), intent(in) cd_file,
            character(len=*), intent(in), optional cd_verbosity,
            integer(i4), intent(in), optional id_maxerror,
            integer(i4), intent(in), optional id_logid )
```

This subroutine create a log file with default verbosity ('warning').

Optionally verbosity could be change to ('trace','debug','info',warning','error','fatal').
Optionally maximum number of error allowed could be change.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_file*	log file name
in	*cd_verbosity*	log file verbosity
in	*id_maxerror*	maximum number of error
in	*id_logid*	log file id (use to flush)

12.22.2.11 logger_trace()

```
subroutine, public logger::logger_trace (
            character(len=*), intent(in) cd_msg,
            logical, intent(in), optional ld_flush )
```

This subroutine write trace message on log file.

Optionally you could flush output.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_msg*	message to write
in	*ld_flush*	flushing ouput

12.22.2.12 logger_warn()

```
subroutine, public logger::logger_warn (
            character(len=*), intent(in) cd_msg,
            logical, intent(in), optional ld_flush )
```

This subroutine write warning message on log file.

Optionally you could flush output.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_msg*	message to write
`in`	*ld_flush*	flushing ouput

12.23 math Module Reference

This module groups some useful mathematical function.

Data Types

- interface math_mean
- interface math_median
- interface math_mwe

Functions/Subroutines

- pure recursive subroutine, public math_qsortc (dd_array)

  This subroutine sort a 1D array.
- pure subroutine, public math_unwrap (dd_array, dd_discont)

  This subroutine correct phase angles to produce smoother phase plots.
- real(dp) recursive function, public math_compute (cd_var)

  This function compute simple operation.
- pure real(dp) function, dimension(size(dd_value, dim=1)), public math_deriv_1d (dd_value, dd_fill, ld_discont)

  This function compute derivative of 1D array.
- real(dp) function, dimension(size(dd_value, dim=1), size(dd_value, dim=2)), public math_deriv_2d (dd_value, dd_fill, cd_dim, ld_discont)

  This function compute derivative of 2D array. you have to specify in which direction derivative have to be computed: first (I) or second (J) dimension.
- pure real(dp) function, dimension(size(dd_value, dim=1), size(dd_value, dim=2), size(dd_value, dim=3)), public math_deriv_3d (dd_value, dd_fill, cd_dim, ld_discont)

  This function compute derivative of 3D array. you have to specify in which direction derivative have to be computed: first (I), second (J) or third (K) dimension.

12.23.1 Detailed Description

This module groups some useful mathematical function.

to compute the mean of an array:

```
dl_value=math_mean( dl_value, dd_fill )
```

- dl_value is 1D or 2D array
- dd_fill is FillValue

to compute the median of an array:

```
dl_value=math_median( dl_value, dd_fill )
```

- dl_value is 1D or 2D array
- dd_fill is FillValue

to compute the mean without extremum of an array:

```
dl_value=math_mwe( dl_value, id_next, dd_fill )
```

- dl_value is 1D or 2D array
- id_next is the number of extremum to be removed
- dd_fill is FillValue

to sort an 1D array:

```
CALL math_QsortC(dl_value)
```

- dl_value is 1D array

to correct phase angles to produce smoother phase:

```
CALL math_unwrap(dl_value, [dl_discont])
```

- dl_value is 1D array
- dl_discont maximum discontinuity between values, default pi

to compute simple operation

```
dl_res=math_compute(cl_var)
```

- cl_var operation to compute (string of character)
- dl_res result of the operation, real(dp)

to compute first derivative of 1D array:

```
dl_value(:)=math_deriv_1d( dd_value(:), dd_fill, [ld_discont] )
```

- dd_value is 1D array of variable
- dd_fill is FillValue of variable
- ld_discont is logical to take into account longitudinal East-West discontinuity [optional]

to compute first derivative of 2D array:

```
dl_value(:,:)=math_deriv_2d( dd_value(:,:), dd_fill, cd_dim,
              [ld_discont] )
```

- dd_value is 2D array of variable
- dd_fill is FillValue of variable
- cd_dim is character to compute derivative on first (I) or second (J) dimension
- ld_discont is logical to take into account longitudinal East-West discontinuity [optional]

to compute first derivative of 3D array:

```
dl_value(:,:,:)=math_deriv_3d( dd_value(:,:,:), dd_fill, cd_dim,
                [ld_discont] )
```

- dd_value is 3D array of variable
- dd_fill is FillValue of variable
- cd_dim is character to compute derivative on first (I), second (J), or third (K) dimension
- ld_discont is logical to take into account longitudinal East-West discontinuity [optional]

Author

J.Paul

Date

January, 2015 - Initial version

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

Author

Date

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_var*	operation to compute (string of character)

Returns

result of the operation, real(dp)

12.23.2.2 math_deriv_1d()

```
pure real(dp) function, dimension(size(dd_value,dim=1) ), public math::math_deriv_1d (
             real(dp), dimension(:), intent(in) dd_value,
             real(dp), intent(in) dd_fill,
             logical, intent(in), optional ld_discont )
```

This function compute derivative of 1D array.

optionaly you could specify to take into account east west discontinuity (-180° 180° or 0° 360° for longitude variable)

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_value*	1D array of variable to be extrapolated
in	*dd_fill*	FillValue of variable
in	*ld_discont*	logical to take into account east west discontinuity

12.23.2.3 math_deriv_2d()

```
real(dp) function, dimension(size(dd_value,dim=1), size(dd_value,dim=2) ), public math::math↩
_deriv_2d (
             real(dp), dimension(:,:), intent(in) dd_value,
             real(dp), intent(in) dd_fill,
             character(len=*), intent(in) cd_dim,
             logical, intent(in), optional ld_discont )
```

This function compute derivative of 2D array. you have to specify in which direction derivative have to be computed: first (I) or second (J) dimension.

optionaly you could specify to take into account east west discontinuity (-180° 180° or 0° 360° for longitude variable)

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*dd_value*	2D array of variable to be extrapolated
`in`	*dd_fill*	FillValue of variable
`in`	*cd_dim*	compute derivative on first (I) or second (J) dimension
`in`	*ld_discont*	logical to take into account east west discontinuity

12.23.2.4 math_deriv_3d()

```
pure real(dp) function, dimension(size(dd_value,dim=1), size(dd_value,dim=2), size(dd_value,dim=3)),
public math::math_deriv_3d (
            real(dp), dimension(:,:,:), intent(in) dd_value,
            real(dp), intent(in) dd_fill,
            character(len=*), intent(in) cd_dim,
            logical, intent(in), optional ld_discont )
```

This function compute derivative of 3D array. you have to specify in which direction derivative have to be computed: first (I), second (J) or third (K) dimension.

optionaly you could specify to take into account east west discontinuity (-180°180° or 0°360° for longitude variable)

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*dd_value*	3D array of variable to be extrapolated
`in`	*dd_fill*	FillValue of variable
`in`	*cd_dim*	compute derivative on first (I) second (J) or third (K) dimension
`in`	*ld_discont*	logical to take into account east west discontinuity

12.23.2.5 math_qsortc()

```
pure recursive subroutine, public math::math_qsortc (
            real(dp), dimension(:), intent(inout) dd_array )
```

This subroutine sort a 1D array.

Recursive Fortran 95 quicksort routine sorts real numbers into ascending numerical order Author: Juli Rew, SCD Consulting (juliana@ucar.edu), 9/03 Based on algorithm from Cormen et al., Introduction to Algorithms, 1997 printing

Author

J.Paul

Date

January, 2015 - Rewrite with SIREN coding rules

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*dd_array*	1D array

12.23.2.6 math_unwrap()

```
pure subroutine, public math::math_unwrap (
            real(dp), dimension(:), intent(inout) dd_array,
            real(dp), intent(in), optional dd_discont )
```

This subroutine correct phase angles to produce smoother phase plots.

This code is based on numpy unwrap function

Unwrap by changing deltas between values to 2∗pi complement.

Unwrap radian phase `dd_array` by changing absolute jumps greater than `dd_discont` to their 2∗pi complement.

Note

If the discontinuity in `dd_array` is smaller than `pi`, but larger than `dd_discont`, no unwrapping is done because taking the 2∗pi complement would only make the discontinuity larger.

Author

J.Paul

Date

Marsh, 2015 - Rewrite in fortran, with SIREN coding rules

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*dd_array*	1D array
`in`	*dd_discont*	maximum discontinuity between values, default pi

12.24 mpp Module Reference

This module manage massively parallel processing.

Data Types

- interface mpp__add_proc
- interface mpp__check_dim
- interface mpp__del_proc
- interface mpp_clean
- interface mpp_copy
- interface mpp_del_att
- interface mpp_del_var
- interface mpp_get_use
- interface mpp_init
- type tlay

  domain layout structure
- type tmpp

Functions/Subroutines

- subroutine, public mpp_print (td_mpp)

  This subroutine print some information about mpp strucutre.
- subroutine, public mpp_add_var (td_mpp, td_var)

  This subroutine add variable in all files of mpp structure.
- subroutine, public mpp_move_var (td_mpp, td_var)

  This subroutine overwrite variable in mpp structure.
- subroutine, public mpp_add_dim (td_mpp, td_dim)

  This subroutine add a dimension structure in a mpp structure. Do not overwrite, if dimension already in mpp structure.
- subroutine, public mpp_del_dim (td_mpp, td_dim)

  This subroutine delete a dimension structure in a mpp structure.
- subroutine, public mpp_move_dim (td_mpp, td_dim)

  This subroutine move a dimension structure in mpp structure.
- subroutine, public mpp_add_att (td_mpp, td_att)

  This subroutine add global attribute to mpp structure.
- subroutine, public mpp_move_att (td_mpp, td_att)

  This subroutine overwrite attribute in mpp structure.
- subroutine, public mpp_get_contour (td_mpp)

  This subroutine get sub domains which form global domain border.
- integer(i4) function, dimension(4), public mpp_get_proc_index (td_mpp, id_procid)

  This function return processor indices, without overlap boundary, given processor id.
- integer(i4) function, dimension(2), public mpp_get_proc_size (td_mpp, id_procid)

  This function return processor domain size, depending of domain decompisition type, given sub domain id.
- subroutine, public mpp_get_dom (td_mpp)

  This subroutine determine domain decomposition type. (full, overlap, noverlap)
- integer(i4) function, public mpp_get_index (td_mpp, cd_name)

  This function return the mpp id, in a array of mpp structure, given mpp base name.
- type(tvar) function, public mpp_recombine_var (td_mpp, cd_name)

  This function recombine variable splitted mpp structure.

Variables

- integer(i4) **im_iumout** = 44
- logical **lm_layout** =.FALSE.

12.24.1 Detailed Description

This module manage massively parallel processing.

define type TMPP:

```
TYPE(tmpp) :: tl_mpp
```

to initialise a mpp structure:

```
tl_mpp=mpp_init( cd_file, id_mask,
                   [id_niproc,] [id_njproc,] [id_nproc,]
                   [id_preci,] [id_precj,]
                   [cd_type,] [id_ew])
```

or

```
tl_mpp=mpp_init( cd_file, td_var,
                  [id_niproc,] [id_njproc,] [id_nproc,]
                  [id_preci,] [id_precj,]
                  [cd_type] )
```

or

```
tl_mpp=mpp_init( td_file [,id_ew] )
```

- cd_file is the filename of the global domain file, in which MPP will be done (example: Bathymetry)
- td_file is the file structure of one processor file composing an MPP
- id_mask is the 2D mask of global domain [optional]
- td_var is a variable structure (on T-point) from global domain file. mask of the domain will be computed using FillValue [optional]
- id_niproc is the number of processor following I-direction to be used [optional]
- id_njproc is the number of processor following J-direction to be used [optional]
- id_nproc is the total number of processor to be used [optional]
- id_preci is the size of the overlap region following I-direction [optional]
- id_precj is the size of the overlap region following J-direction [optional]
- cd_type is the type of files composing MPP [optional]
- id_ew is east-west overlap [optional]

to get mpp name:

- tl_mpp%c_name

to get the total number of processor:

- tl_mpp%i_nproc

to get the number of processor following I-direction:

- tl_mpp%i_niproc

to get the number of processor following J-direction:

- tl_mpp%i_njproc

to get the length of the overlap region following I-direction:

- tl_mpp%i_preci

to get the length of the overlap region following J-direction:

- tl_mpp%i_precj

to get the type of files composing mpp structure:

- tl_mpp%c_type

to get the type of the global domain:

- tl_mpp%c_dom

MPP dimensions (global domain)
to get the number of dimensions to be used in mpp strcuture:

- tl_mpp%i_ndim

to get the array of dimension structure (4 elts) associated to the mpp structure:

- tl_mpp%t_dim(:)

MPP processor (files composing domain)

- tl_mpp%t_proc(:)

to clean a mpp structure:

```
CALL mpp_clean(tl_mpp)
```

to print information about mpp:

```
CALL mpp_print(tl_mpp)
```

to add variable to mpp:

```
CALL mpp_add_var(td_mpp, td_var)
```

- td_var is a variable structure

to add dimension to mpp:

```
CALL mpp_add_dim(td_mpp, td_dim)
```

- td_dim is a dimension structure

to add attribute to mpp:

```
CALL mpp_add_att(td_mpp, td_att)
```

- td_att is a attribute structure

to delete variable from mpp:

```
CALL mpp_del_var(td_mpp, td_var)
```

or

```
CALL mpp_del_var(td_mpp, cd_name)
```

- td_var is a variable structure
- cd_name is variable name or standard name

to delete dimension from mpp:

```
CALL mpp_del_dim(td_mpp, td_dim)
```

- td_dim is a dimension structure

to delete attribute from mpp:

```
CALL mpp_del_att(td_mpp, td_att)
```

or

```
CALL mpp_del_att(td_mpp, cd_name)
```

- td_att is a attribute structure
- cd_name is attribute name

to overwrite variable to mpp:

```
CALL mpp_move_var(td_mpp, td_var)
```

- td_var is a variable structure

to overwrite dimension to mpp:

```
CALL mpp_move_dim(td_mpp, td_dim)
```

- td_dim is a dimension structure

to overwrite attribute to mpp:

```
CALL mpp_move_att(td_mpp, td_att)
```

- td_att is a attribute structure

to determine domain decomposition type:

```
CALL mpp_get_dom(td_mpp)
```

to get processors to be used:

```
CALL mpp_get_use( td_mpp, id_imin, id_imax, &
&                          id_jmin, id_jmax )
```

- id_imin
- id_imax

- id_jmin
- id_jmax

to get sub domains which form global domain contour:

```
CALL mpp_get_contour( td_mpp )
```

to get global domain indices of one processor:

```
il_ind(1:4)=mpp_get_proc_index( td_mpp, id_procid )
```

- il_ind(1:4) are global domain indices (i1,i2,j1,j2)
- id_procid is the processor id

to get the processor domain size:

```
il_size(1:2)=mpp_get_proc_size( td_mpp, id_procid )
```

- il_size(1:2) are the size of domain following I and J
- id_procid is the processor id

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- Fix memory leaks bug

October, 2015

- improve way to compute domain layout

January, 2016

- allow to print layout file (use lm_layout, hard coded)
- add mpp__compute_halo and mpp__read_halo

Note

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12.24.2 Function/Subroutine Documentation

12.24.2.1 mpp_add_att()

```
subroutine, public mpp::mpp_add_att (
            type(tmpp), intent(inout) td_mpp,
            type(tatt), intent(in) td_att )
```

This subroutine add global attribute to mpp structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture
`in`	*td_att*	attribute strcuture

12.24.2.2 mpp_add_dim()

```
subroutine, public mpp::mpp_add_dim (
            type(tmpp), intent(inout) td_mpp,
            type(tdim), intent(in) td_dim )
```

This subroutine add a dimension structure in a mpp structure. Do not overwrite, if dimension already in mpp structure.

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015

- rewrite the same as way var_add_dim

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp structure
`in`	*td_dim*	dimension structure

12.24.2.3 mpp_add_var()

```
subroutine, public mpp::mpp_add_var (
            type(tmpp), intent(inout) td_mpp,
            type(tvar), intent(inout) td_var )
```

This subroutine add variable in all files of mpp structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture
`in`	*td_var*	variable strcuture

12.24.2.4 mpp_del_dim()

```
subroutine, public mpp::mpp_del_dim (
            type(tmpp), intent(inout) td_mpp,
            type(tdim), intent(in) td_dim )
```

This subroutine delete a dimension structure in a mpp structure.

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015

- rewrite the same as way var_del_dim

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp structure
`in`	*td_dim*	dimension structure

12.24.2.5 mpp_get_contour()

```
subroutine, public mpp::mpp_get_contour (
            type(tmpp), intent(inout) td_mpp )
```

This subroutine get sub domains which form global domain border.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture

12.24.2.6 mpp_get_dom()

```
subroutine, public mpp::mpp_get_dom (
            type(tmpp), intent(inout) td_mpp )
```

This subroutine determine domain decomposition type. (full, overlap, noverlap)

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture

12.24.2.7 mpp_get_index()

```
integer(i4) function, public mpp::mpp_get_index (
            type(tmpp), dimension(:), intent(in) td_mpp,
            character(len=*), intent(in) cd_name )
```

This function return the mpp id, in a array of mpp structure, given mpp base name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_file*	array of file structure
`in`	*cd_name*	file name

Returns

file id in array of file structure (0 if not found)

12.24.2.8 mpp_get_proc_index()

```
integer(i4) function, dimension(4), public mpp::mpp_get_proc_index (
            type(tmpp), intent(in) td_mpp,
            integer(i4), intent(in) id_procid )
```

This function return processor indices, without overlap boundary, given processor id.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_mpp*	mpp strcuture
`in`	*id_procid*	processor id

Returns

array of index (/ i1, i2, j1, j2 /)

12.24.2.9 mpp_get_proc_size()

```
integer(i4) function, dimension(2), public mpp::mpp_get_proc_size (
             type(tmpp), intent(in) td_mpp,
             integer(i4), intent(in) id_procid )
```

This function return processor domain size, depending of domain decompisition type, given sub domain id.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp strcuture
in	*id_procid*	sub domain id

Returns

array of index (/ isize, jsize /)

12.24.2.10 mpp_move_att()

```
subroutine, public mpp::mpp_move_att (
             type(tmpp), intent(inout) td_mpp,
             type(tatt), intent(in) td_att )
```

This subroutine overwrite attribute in mpp structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture
in	*td_att*	attribute structure

12.24.2.11 mpp_move_dim()

```
subroutine, public mpp::mpp_move_dim (
            type(tmpp), intent(inout) td_mpp,
            type(tdim), intent(in) td_dim )
```

This subroutine move a dimension structure in mpp structure.

Warning

dimension order may have changed

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp structure
in	*td_dim*	dimension structure

12.24.2.12 mpp_move_var()

```
subroutine, public mpp::mpp_move_var (
            type(tmpp), intent(inout) td_mpp,
            type(tvar), intent(in) td_var )
```

This subroutine overwrite variable in mpp structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture
in	*td_var*	variable structure

12.24.2.13 mpp_print()

```
subroutine, public mpp::mpp_print (
            type(tmpp), intent(in) td_mpp )
```

This subroutine print some information about mpp strucutre.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]Parameters

Parameters

in	*td_mpp*	mpp structure

12.24.2.14 mpp_recombine_var()

```
type(tvar) function, public mpp::mpp_recombine_var (
            type(tmpp), intent(in) td_mpp,
            character(len=*), intent(in) cd_name )
```

This function recombine variable splitted mpp structure.

Author

J.Paul

Date

Ocotber, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]Parameters

Parameters

in	*td_mpp*	mpp file structure
in	*cd_name*	variable name

Returns

variable strucutre

12.25 multi Module Reference

This module manage multi file structure.

Data Types

- interface multi_copy
- type tmulti

Functions/Subroutines

- type(tmulti) function, public multi_init (cd_varfile)

  This subroutine initialize multi file structure.
- subroutine, public multi_clean (td_multi)

  This subroutine clean multi file strucutre.
- subroutine, public multi_print (td_multi)

  This subroutine print some information about mpp strucutre.
- subroutine, public multi__add_mpp (td_multi, td_mpp)

  This subroutine add file to multi file structure.

12.25.1 Detailed Description

This module manage multi file structure.

define type TMULTI:

```
TYPE(tmulti) :: tl_multi
```

to initialize a multi-file structure:

```
tl_multi=multi_init(cd_varfile(:))
```

- cd_varfile : array of variable with file path ('var1:file1','var2:file2')
  file path could be replaced by a matrix of value.
  separators used to defined matrix are:
  - ',' for line
  - '/' for row
  - '\' for level
    Example:
    * 'var1:3,2,3/1,4,5'
    * 3,2,3/1,4,5 => $\begin{pmatrix} 3 & 2 & 3 \\ 1 & 4 & 5 \end{pmatrix}$

to get the number of mpp file in mutli file structure:

- tl_multi%i_nmpp

to get the total number of variable in mutli file structure:

- tl_multi%i_nvar

Note

number of variable and number of file could differ cause several variable could be in the same file.

to get array of mpp structure in mutli file structure:

- tl_multi%t_mpp(:)

to print information about multi structure:

```
CALL multi_print(td_multi)
```

to clean multi file strucutre:

```
CALL multi_clean(td_multi)
```

- td_multi is multi file structure

Author

J.Paul

Date

November, 2013 - Initial Version
October, 2014

- use mpp file structure instead of file

November, 2014

- Fix memory leaks bug

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.25.2 Function/Subroutine Documentation

12.25.2.1 multi__add_mpp()

```
subroutine, public multi::multi__add_mpp (
            type(tmulti), intent(inout) td_multi,
            type(tmpp), intent(in) td_mpp )
```

This subroutine add file to multi file structure.

Author

J.Paul

Date

November, 2013 - Initial Version
October, 2014

- use mpp file structure instead of file

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_multi*	multi mpp file strcuture
`in`	*td_mpp*	mpp file strcuture

Returns

mpp file id in multi mpp file structure

12.25.2.2 multi_clean()

```
subroutine, public multi::multi_clean (
            type(tmulti), intent(inout) td_multi )
```

This subroutine clean multi file strucutre.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_multi*	multi file structure

12.25.2.3 multi_init()

```
type(tmulti) function, public multi::multi_init (
            character(len=*), dimension(:), intent(in) cd_varfile )
```

This subroutine initialize multi file structure.

if variable name is 'all', add all the variable of the file in mutli file structure.

Note

if first character of filename is numeric, assume matrix is given as input.
create pseudo file named 'data-*', with matrix read as variable value.

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015

- check if variable to be read is in file

January, 2016

- read variable dimensions

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_varfile*	variable location information (from namelist)

Returns

multi file structure

12.25.2.4 multi_print()

```
subroutine, public multi::multi_print (
            type(tmulti), intent(in) td_multi )
```

This subroutine print some information about mpp strucutre.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_multi*	multi file structure

12.26 phycst Module Reference

This module defines physical constant.

Variables

- real(wp), public **rday** = 24.∗60.∗60.
- real(wp), public **rsiyea**
- real(wp), public **rsiday**
- real(dp), parameter, public **dp_pi** = 3.14159274101257_dp
- real(dp), parameter, public **dp_eps** = EPSILON(1._dp)
- real(dp), parameter, public **dp_rearth** = 6371229._dp
- real(dp), parameter, public **dp_deg2rad** = dp_pi/180.0
- real(dp), parameter, public **dp_rad2deg** = 180.0/dp_pi
- real(dp), parameter, public **dp_day** = 24.∗60.∗60.
- real(dp), parameter, public **dp_siyea** = 365.25_wp ∗ dp_day ∗ 2._wp ∗ dp_pi / 6.283076_dp
- real(dp), parameter, public **dp_siday** = dp_day / (1._wp + dp_day / dp_siyea)
- real(dp), parameter, public **dp_delta** =1.e-6
- real(dp), parameter, public **dp_omega** = 2._dp ∗ dp_pi / dp_siday

12.26.1 Detailed Description

This module defines physical constant.

Author

J.paul

Date

November, 2013 - Initial Version
September, 2015

- add physical constant to compute meshmask

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.27 var Module Reference

This module manage variable structure.

Data Types

- type tvar
- interface var_add_att
- interface var_add_dim
- interface var_add_value
- interface var_clean
- interface var_copy
- interface var_del_att
- interface var_init
- interface var_print

Functions/Subroutines

- type(tvar) function, public var_concat (td_var1, td_var2, DIM)

  This function concatenate variable value following DIM direction.
- subroutine, public var_move_att (td_var, td_att)

  This subroutine move an attribute structure from variable structure.
- subroutine, public var_del_dim (td_var, td_dim)

  This subroutine delete a dimension structure in a variable structure.
- subroutine, public var_move_dim (td_var, td_dim)

  This subroutine move a dimension structure in variable structure.
- subroutine, public var_del_value (td_var)

  This subroutine remove variable value in a variable structure.
- integer(i4) function, public var_get_index (td_var, cd_name, cd_stdname)

  This function return the variable index, in a array of variable structure, given variable name or standard name.

- integer(i4) function, public var_get_id (td_var, cd_name, cd_stdname)

    This function return the variable id, given variable name or standard name.
- integer(i4) function, dimension(td_var%t_dim(1)%i_len, td_var%t_dim(2)%i_len, td_var%t_dim(3)%i_len), public var_get_mask (td_var)

    This function return the mask 3D of variable, given variable structure.
- subroutine, public var_chg_fillvalue (td_var, dd_fill)

    This subroutine change FillValue of the variable to standard NETCDF FillValue.
- subroutine, public var_def_extra (cd_file)

    This subroutine read variable configuration file. And save global array of variable structure with extra information: tg_varextra.
- subroutine, public var_chg_extra (cd_varinfo)

    This subroutine add variable information get from namelist in global array of variable structure with extra information: tg_varextra.
- subroutine, public var_read_matrix (td_var, cd_matrix)

    This subroutine read matrix value from character string in namelist and fill variable strucutre value.
- type(tdim) function, dimension(ip_maxdim), public var_max_dim (td_var)

    This function search and save the biggest dimensions use in an array of variable structure.
- subroutine, public var_limit_value (td_var)

    This subroutine forced minimum and maximum value of variable, with value of variable structure attribute d_min and d_max.
- subroutine, public var_chg_unit (td_var)

    This subroutine replace unit name of the variable, and apply unit factor to the value of this variable.
- subroutine, public var_check_dim (td_var)

    This subroutine check variable dimension expected, as defined in file 'variable.cfg'.
- subroutine, public var_reorder (td_var, cd_dimorder)

    This subroutine reshape variable value and dimension in variable structure.
- integer(i4) function, public var_get_unit (td_var)

    This function get the next unused unit in array of variable structure.
- type(tdate) function, public var_to_date (td_var)

    This function convert a time variable structure in date structure.
- subroutine, public var_get_dummy (cd_dummy)

    This subroutine fill dummy variable array.
- logical function, public var_is_dummy (td_var)

    This function check if variable is defined as dummy variable in configuraton file.

Variables

- type(tvar), dimension(:), allocatable, public tg_varextra

    array of variable structure with extra information. fill when running var_def_extra()

12.27.1 Detailed Description

This module manage variable structure.

define type TVAR:

```
TYPE(tvar) :: tl_var
```

Note

the variable value inside structure will always be 4D array of real(8).
However the variable value could be initialised with array of real(4), real(8), integer(4) or integer(8).

to initialise a variable structure:

```
tl_var=var_init( cd_name, [value,] [id_start, [id_count,]] [id_type,] [td_dim,] [td_att]... )
```

- cd_name is the variable name
- value is a 1D,2D,3D or 4D array, see var_init for more information [optional]
- id_start is a integer(4) 1D array of index from which the data values will be read [optional]
- id_count is a integer(4) 1D array of the number of indices selected along each dimension [optional]
- id_type is the type of the variable to be used [optional]
- td_dim is the array of dimension structure [optional]
- td_att is the array of attribute structure [optional] Note:

- others optionals arguments could be added, see var_init.
- to put variable 0D, use td_dim with all dimension unused (td_dim(:)l_use=.FALSE.)

to print information about variable structure:

```
CALL var_print(td_var [,ld_more])
```

- td_var is the variable structure
- ld_more to print more infomration about variable

to clean variable structure:

```
CALL var_clean(tl_var)
```

to copy variable structure in another one (using different memory cell):

```
tl_var2=var_copy(tl_var1)
```

Note

as we use pointer for the value array of the variable structure, the use of the assignment operator (=) to copy variable structure create a pointer on the same array. This is not the case with this copy function.

to get variable name:

- tl_var%c_name

to get grid point of the variable:

- tl_var%c_point

to get EW overlap:

- tl_var%i_ew

to get variable value:

- tl_var%d_value(:,:,:,:)

to get the type number (based on NETCDF type constants) of the variable (as define initially or read in file):

- tl_var%i_type

to get variable id (read from a file):

- tl_var%i_id

Variable dimension
to get the number of dimension used in the variable:

- tl_var%i_ndim

to get the array of dimension structure (4 elts) associated to the variable:

- tl_var%t_dim(:)

Variable attributes

Note

attribue value are always character or real(8) 1D array.

to get the number of attributes of the variable:

- tl_var%i_natt

to get the array of attribute structure associated to the variable:

- tl_var%t_att(:)

Some attribute are highlight, to be easily used. to get variable standard name:

- tl_var%c_stdname

to get variable longname:

- tl_var%c_longname

to get variable units:

- tl_var%c_units

to get variable axis:

- tl_var%c_axis

to get variable scale factor:

- tl_var%d_scf

to get variable add offset:

- tl_var%d_ofs

to get variable FillValue:

- tl_var%d_fill

to add value to a variable structure:

```
CALL var_add_value(tl_var, value, [id_type,] [id_start, [id_count]])
```

- value : 4D array of value (real(4), real(8), integer(1), integer(2), integer(4), integer(8))
- id_type is the type of the variable to be used (default is the type of array value)
- id_start : 1D array of the index in the variable from which the data values will be read (integer(4), optional)
- id_count : 1D array of the number of indices selected along each dimension (integer(4), optional)

to add attribute to a variable structure:

```
CALL var_add_att(tl_var, td_att)
```

- td_att is an attribute structure, or array of attribute structure

to add dimension to a variable structure:

```
CALL var_add_dim(tl_var, td_dim)
```

- td_dim is a dimension structure, or array of dimension structure

to delete value of a variable structure:

```
CALL var_del_value(tl_var)
```

to delete one attribute of a variable structure:

```
CALL var_del_att(tl_var, td_att)
```

- td_att is an attribute structure or

  ```
  CALL var_del_att(tl_var, cd_name)
  ```

- cd_name is attribute name

to delete one dimension of a variable structure:

```
CALL var_del_dim(tl_var, td_dim)
```

- td_dim is a dimension structure

to overwrite one attribute structure in variable structure:

```
CALL var_move_att(tl_var, td_att)
```

- td_att is an attribute structure

to overwrite one dimension structure in variable structure:

```
CALL var_move_dim(tl_var, td_dim)
```

- td_dim is a dimension structure

to get the mask of a variable strucutre, (based on its FillValue):

```
mask(:,:)=var_get_mask(tl_var)
```

to change FillValue to standard NETCDF Fill Value:

```
CALL  var_chg_FillValue(tl_var, [dd_fill])
```

- dd_fill is the FillValue to be used [optional]

to concatenate two variables:

```
tl_var=var_concat(tl_var1, tl_var2, [dim])
```

- tl_var1 : variable structure
- tl_var2 : variable structure
- DIM : number of the dimension following which concatenate (1=>I, 2=>J, 3=>Z, 4=>T) [optional, default=4]

to forced min and max value of a variable:
define min and max value of the variable:
tl_var%d_min=min
tl_var%d_max=max
then

```
CALL  var_limit_value( tl_var )
```

- min and max : real(8) value

to get the biggest dimensions use in a array of variable:

```
tl_dim(:)=var_max_dim(tl_var(:))
```

- tl_var(:) : array of variable structure
- tl_dim(:) : array (4 elts) of dimension structure

to reorder dimension of a variable (default 'x','y','z','t'):

```
CALL var_reorder( td_var, cd_dimorder )
```

- td_var is variable structure
- cd_dimorder string character(LEN=4) of dimension order to be used (example: 'yxzt') [optional]

to get variable index, in an array of variable structure:

```
il_index=var_get_index( td_var, cd_name )
```

- td_var array of variable structure
- cd_name variable name

to get variable id, read from a file:

```
il_id=var_get_id( td_var, cd_name )
```

- td_var array of variable structure
- cd_name variable name

to get free variable unit in an array of variable structure:

```
il_unit=var_get_unit(td_var)
```

- td_var array of variable structure

to convert time variable structure in date structure:

```
tl_date=var_to_date(td_var)
```

- td_var is time variable structure

- tl_date is date structure

to read matrix value from character string in namelist

```
CALL var_read_matrix(td_var, cd_matrix)
```

- td_var is variable structure
- cd_matrix is matrix value

to read variable configuration file ('variable.cfg') and fill global array of variable structure:

```
CALL var_def_extra( cd_file )
```

- cd_file is filename

to add variable information get from namelist, in global array of variable structure:

```
CALL var_chg_extra( cd_varinfo )
```

- cd_varinfo is variable information from namelist

to check variable dimension expected, as defined in file 'variable.cfg':

```
CALL var_check_dim( td_var )
```

- td_var is variable structure

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014
  - add var_reorder

November, 2014
  - Fix memory leaks bug

June, 2015
  - change way to get variable information in namelist

July, 2015
  - add subroutine var_chg_unit to change unit of output variable

Spetember, 2015
  - manage useless (dummy) variable

Note

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12.27.2 Function/Subroutine Documentation

12.27.2.1 var_check_dim()

```
subroutine, public var::var_check_dim (
            type(tvar), intent(inout) td_var )
```

This subroutine check variable dimension expected, as defined in file 'variable.cfg'.

compare dimension used in variable structure with string character axis from configuration file.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_var*	variable structure

12.27.2.2 var_chg_extra()

```
subroutine, public var::var_chg_extra (
            character(len=*), dimension(:), intent(in) cd_varinfo )
```

This subroutine add variable information get from namelist in global array of variable structure with extra information: tg_varextra.

string character format must be :
"varname:int=interp; flt=filter; ext=extrap; min=min; max=max"
you could specify only interpolation, filter or extrapolation method, whatever the order. you could find more information about available method in interp, filter, and extrap module.
Examples: cn_varinfo='Bathymetry:flt=2*hamming(2,3); min=10.' cn_varinfo='votemper:int=cubic; ext=dist_weight; max=40.'

Warning

variable should be define in tg_varextra (ie in configuration file, to be able to add information from namelist

Note

If you do not specify a method which is required, default one is apply.

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015

- get unit and unit factor (to change unit)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_varinfo*	variable information from namelist

12.27.2.3 var_chg_fillvalue()

```
subroutine, public var::var_chg_fillvalue (
             type(tvar), intent(inout) td_var,
             real(dp), intent(in), optional dd_fill )
```

This subroutine change FillValue of the variable to standard NETCDF FillValue.

optionally, you could specify a dummy _FillValue to be used

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	array of variable structure
`in`	*dd_fill*	_FillValue to be used

12.27.2.4 var_chg_unit()

```
subroutine, public var::var_chg_unit (
            type(tvar), intent(inout) td_var )
```

This subroutine replace unit name of the variable, and apply unit factor to the value of this variable.

new unit name (unt) and unit factor (unf) are read from the namelist.

Note

the variable value should be already read.

Author

J.Paul

Date

June, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_var*	variable structure

12.27.2.5 var_concat()

```
type(tvar) function, public var::var_concat (
            type(tvar), intent(in) td_var1,
            type(tvar), intent(in) td_var2,
            integer(i4), intent(in), optional DIM )
```

This function concatenate variable value following DIM direction.

By default variable are concatenate following time dimension. To concatenate following another dimension, specify DIM=x where x is the dimension number (jp_I, jp_J,jp_K, jp_L).

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var1*	variable structure
in	*td_var2*	variable structure
in	*DIM*	dimension following which concatenate

Returns

variable structure

12.27.2.6 var_def_extra()

```
subroutine, public var::var_def_extra (
            character(len=*), intent(in) cd_file )
```

This subroutine read variable configuration file. And save global array of variable structure with extra information: tg_varextra.

Author

J.Paul

Date

November, 2013 - Initial Version
June, 2015

- new namelist format to get extra information (interpolation,...)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_file*	configuration file of variable

12.27.2.7 var_del_dim()

```
subroutine, public var::var_del_dim (
            type(tvar), intent(inout) td_var,
            type(tdim), intent(in) td_dim )
```

This subroutine delete a dimension structure in a variable structure.

Warning

delete variable value too.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

`in,out`	*td_var*	variable structure
`in`	*td_dim*	dimension structure

12.27.2.8 var_del_value()

```
subroutine, public var::var_del_value (
            type(tvar), intent(inout) td_var )
```

This subroutine remove variable value in a variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

`in,out`	*td_var*	variable structure

12.27.2.9 var_get_dummy()

```
subroutine, public var::var_get_dummy (
            character(len=*), intent(in) cd_dummy )
```

This subroutine fill dummy variable array.

Author

J.Paul

Date

September, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_dummy*	dummy configuration file

12.27.2.10 var_get_id()

```
integer(i4) function, public var::var_get_id (
            type(tvar), dimension(:), intent(in) td_var,
            character(len=*), intent(in) cd_name,
            character(len=*), intent(in), optional cd_stdname )
```

This function return the variable id, given variable name or standard name.

Author

J.Paul

Date

November, 2013 - Initial Version
July, 2015

- check long name

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	array of variable structure
in	*cd_name*	variable name
in	*cd_stdname*	variable standard name

Returns

variable id in array of variable structure (0 if not found)

12.27.2.11 var_get_index()

```
integer(i4) function, public var::var_get_index (
            type(tvar), dimension(:), intent(in) td_var,
            character(len=*), intent(in) cd_name,
            character(len=*), intent(in), optional cd_stdname )
```

This function return the variable index, in a array of variable structure, given variable name or standard name.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	array of variable structure
in	*cd_name*	variable name
in	*cd_stdname*	variable standard name

Returns

variable index in array of variable structure (0 if not found)

12.27.2.12 var_get_mask()

```
integer(i4) function, dimension(td_var%t_dim(1)%i_len, td_var%t_dim(2)%i_len, td_var%t_↩
dim(3)%i_len ), public var::var_get_mask (
            type(tvar), intent(in) td_var )
```

This function return the mask 3D of variable, given variable structure.

Author

J.Paul

Date

Parameters

Parameters

Returns

`tvar`

Author

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in` *td_var* array of variable structure

Returns

free variable id

12.27.2.14 var_is_dummy()

```
logical function, public var::var_is_dummy (
            type(tvar), intent(in) td_var )
```

This function check if variable is defined as dummy variable in configuraton file.

Author

J.Paul

Date

September, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_var*	variable structure

Returns

true if variable is dummy variable

12.27.2.15 var_limit_value()

```
subroutine, public var::var_limit_value (
            type(tvar), intent(inout) td_var )
```

This subroutine forced minimum and maximum value of variable, with value of variable structure attribute d_min and d_max.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure

12.27.2.16 var_max_dim()

```
type(tdim) function, dimension(ip_maxdim), public var::var_max_dim (
            type(tvar), dimension(:), intent(in) td_var )
```

This function search and save the biggest dimensions use in an array of variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_var*	array of variable structure

Returns

array of dimension

12.27.2.17 var_move_att()

```
subroutine, public var::var_move_att (
            type(tvar), intent(inout) td_var,
            type(tatt), intent(in) td_att )
```

This subroutine move an attribute structure from variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*td_att*	attribute structure

tvar
tdim

Warning

Author

Date

Parameters

Parameters

12.27.2.19 var_read_matrix()

```
subroutine, public var::var_read_matrix (
            type(tvar), intent(inout) td_var,
            character(len=*), intent(in) cd_matrix )
```

This subroutine read matrix value from character string in namelist and fill variable strucutre value.

to split matrix, separator use are:

- ',' for line
- '/' for row
- '\' for level
  Example:
  3,2,3/1,4,5 => $\left(\begin{array}{ccc} 3 & 2 & 3 \\ 1 & 4 & 5 \end{array}\right)$

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_var*	variable structure
in	*cd_matrix*	matrix value

12.27.2.20 var_reorder()

```
subroutine, public var::var_reorder (
            type(tvar), intent(inout) td_var,
            character(len=ip_maxdim), intent(in), optional cd_dimorder )
```

This subroutine reshape variable value and dimension in variable structure.

output dimension will be ordered as defined in input array of dimension Optionaly you could specify output dimension order with string character of dimension

Author

J.Paul

Date

August, 2014 - Initial Version
July 2015

- do not use dim_disorder anymore

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_var*	variable structure
in	*cd_dimorder*	string character of dimension order to be used

12.27.2.21 var_to_date()

```
type(tdate) function, public var::var_to_date (
            type(tvar), intent(in) td_var )
```

This function convert a time variable structure in date structure.

Author

J.Paul

Date

November, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	time variable structure

Returns

date structure

12.28 vgrid Module Reference

This module manage vertical grid.

Functions/Subroutines

- subroutine, public vgrid_zgr_z (dd_gdepw, dd_gdept, dd_e3w, dd_e3t, dd_e3w_1d, dd_e3t_1d, dd_ppkth, dd_ppkth2, dd_ppacr, dd_ppacr2, dd_ppdzmin, dd_pphmax, dd_pp_to_be_computed, dd_ppa0, dd_ppa1, dd_ppa2, dd_ppsur)

  This subroutine set the depth of model levels and the resulting vertical scale factors.
- subroutine vgrid_zgr_bat (dd_bathy, dd_gdepw, dd_hmin, dd_fill)

  This subroutine.
- subroutine, public vgrid_zgr_zps (id_mbathy, dd_bathy, id_jpkmax, dd_gdepw, dd_e3t, dd_e3zps_min, dd↩_e3zps_rat, dd_fill)

  This subroutine set the depth and vertical scale factor in partial step z-coordinate case.
- subroutine, public vgrid_zgr_bat_ctl (id_mbathy, id_jpkmax, id_jpk)

  This subroutine check the bathymetry in levels.
- type(tvar) function, dimension(ip_npoint), public vgrid_get_level (td_bathy, cd_namelist, td_dom, id_nlevel)

  This function compute bathy level in T,U,V,F point, and return them as array of variable structure.

12.28.1 Detailed Description

This module manage vertical grid.

to set the depth of model levels and the resulting vertical scale factors:

```
CALL vgrid_zgr_z(dd_gdepw(:), dd_gdept(:), dd_e3w(:), dd_e3t(:),
                 dd_ppkth, dd_ppkth2, dd_ppacr, dd_ppacr2,
                 dd_ppdzmin, dd_pphmax, dd_pp_to_be_computed,
                 dd_ppa0, dd_ppa1, dd_ppa2, dd_ppsur)
```

- dd_gdepw is array of depth value on W point
- dd_gdept is array of depth value on T point
- dd_e3w is array of vertical mesh size on W point
- dd_e3t is array of vertical mesh size on T point
- dd_ppkth see NEMO documentation
- dd_ppkth2 see NEMO documentation
- dd_ppacr see NEMO documentation
- dd_ppdzmin see NEMO documentation
- dd_pphmax see NEMO documentation
- dd_pp_to_be_computed see NEMO documentation
- dd_ppa1 see NEMO documentation
- dd_ppa2 see NEMO documentation
- dd_ppa0 see NEMO documentation
- dd_ppsur see NEMO documentation

```
to set the depth and vertical scale factor in partial step z-coordinate
```

case:

```
CALL vgrid_zgr_zps(id_mbathy(:,:), dd_bathy(:,:), id_jpkmax, dd_gdepw(:),
                   dd_e3t(:), dd_e3zps_min, dd_e3zps_rat)
```

- id_mbathy is array of bathymetry level
- dd_bathy is array of bathymetry
- id_jpkmax is the maximum number of level to be used
- dd_gdepw is array of vertical mesh size on W point
- dd_e3t is array of vertical mesh size on T point
- dd_e3zps_min see NEMO documentation
- dd_e3zps_rat see NEMO documentation

to check the bathymetry in levels:

```
CALL vgrid_zgr_bat_ctl(id_mbathy, id_jpkmax, id_jpk)
```

- id_mbathy is array of bathymetry level
- id_jpkmax is the maximum number of level to be used
- id_jpk is the number of level

to compute bathy level in T,U,V,F point from Bathymetry file:

```
tl_level(:)=vgrid_get_level(td_bathy, [cd_namelist,] [td_dom,] [id_nlevel])
```

- td_bathy is Bathymetry file structure
- cd_namelist is namelist [optional]
- td_dom is domain structure [optional]
- id_nlevel is number of lelvel to be used [optional]

Author

J.Paul

Date

November, 2013 - Initial Version
Spetember, 2014

- add header

June, 2015 - update subroutine with NEMO 3.6

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

12.28.2 Function/Subroutine Documentation

12.28.2.1 vgrid_get_level()

```
type(tvar) function, dimension(ip_npoint), public vgrid::vgrid_get_level (
             type(tmpp), intent(in) td_bathy,
             character(len=*), intent(in), optional cd_namelist,
             type(tdom), intent(in), optional td_dom,
             integer(i4), intent(in), optional id_nlevel )
```

This function compute bathy level in T,U,V,F point, and return them as array of variable structure.

Bathymetry is read on Bathymetry file, then bathy level is computed on T point, and finally fit to U,V,F point.

you could specify :

- namelist where find parameter to set the depth of model levels (default use GLORYS 75 levels parameters)
- domain structure to specify on e area to work on
- number of level to be used

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_bathy*	Bathymetry file structure
in	*cd_namelist*	namelist
in	*td_dom*	domain structure
in	*id_nlevel*	number of lelvel to be used

Returns

array of level on T,U,V,F point (variable structure)

Todo

Parameters

Parameters

12.28.2.3 vgrid_zgr_bat_ctl()

```
subroutine, public vgrid::vgrid_zgr_bat_ctl (
            integer(i4), dimension(:,:), intent(inout) id_mbathy,
            integer(i4), intent(inout) id_jpkmax,
            integer(i4), intent(inout) id_jpk )
```

This subroutine check the bathymetry in levels.

$**$ Method : The array mbathy is checked to verified its consistency with the model options. in particular: mbathy must have at least 1 land grid-points (mbathy$<=$0) along closed boundary. mbathy must be cyclic IF jperio=1. mbathy must be lower or equal to jpk-1. isolated ocean grid points are suppressed from mbathy since they are only connected to remaining ocean through vertical diffusion. C A U T I O N : mbathy will be modified during the initializa- tion phase to become the number of non-zero w-levels of a water column, with a minimum value of 1.

$**$ Action : - update mbathy: level bathymetry (in level index)

- update bathy : meter bathymetry (in meters)

Author

G.Madec

Date

Marsh, 2008 - Original code

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*id_mbathy*
in	*id_jpkmax*
in	*id_jpk*

12.28.2.4 vgrid_zgr_z()

```
subroutine, public vgrid::vgrid_zgr_z (
            real(dp), dimension(:), intent(inout) dd_gdepw,
            real(dp), dimension(:), intent(inout) dd_gdept,
            real(dp), dimension(:), intent(inout) dd_e3w,
            real(dp), dimension(:), intent(inout) dd_e3t,
            real(dp), dimension(:), intent(inout) dd_e3w_1d,
            real(dp), dimension(:), intent(inout) dd_e3t_1d,
            real(dp), intent(in) dd_ppkth,
            real(dp), intent(in) dd_ppkth2,
            real(dp), intent(in) dd_ppacr,
            real(dp), intent(in) dd_ppacr2,
            real(dp), intent(in) dd_ppdzmin,
            real(dp), intent(in) dd_pphmax,
            real(dp), intent(in) dd_pp_to_be_computed,
            real(dp), intent(in) dd_ppa0,
            real(dp), intent(in) dd_ppa1,
            real(dp), intent(in) dd_ppa2,
            real(dp), intent(in) dd_ppsur )
```

This subroutine set the depth of model levels and the resulting vertical scale factors.

$**$ Method : z-coordinate system (use in all type of coordinate) The depth of model levels is defined from an analytical function the derivative of which gives the scale factors. both depth and scale factors only depend on k (1d arrays). <> w-level: gdepw = fsdep(k) <> e3w(k) = dk(fsdep)(k) = fse3(k) <> t-level: gdept = fsdep(k+0.5) <> e3t(k) = dk(fsdep)(k+0.5) = fse3(k+0.5) <>

$**$ Action : - gdept, gdepw : depth of T- and W-point (m) <>

- e3t, e3w : scale factors at T- and W-levels (m) <>

Author

G. Madec

Date

Marsh,2008 - F90: Free form and module

Note

Reference : Marti, Madec & Delecluse, 1992, JGR, 97, No8, 12,763-12,766.

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*dd_gdepw*
`in,out`	*dd_gedpt*
`in,out`	*dd_e3w*
`in,out`	*dd_e2t*
`in`	*dd_ppkth*
`in`	*dd_ppkth2*
`in`	*dd_ppacr*
`in`	*dd_ppacr2*
`in`	*dd_ppdzmin*
`in`	*dd_pphmax*
`in`	*dd_pp_to_be_computed*
`in`	*dd_ppa1*
`in`	*dd_ppa2*
`in`	*dd_ppa0*
`in`	*dd_ppsur*

[redacted]

- 1 $<$ mbathy $<$ jpkm1
- bathy $>$ gdepw(jpk) =$>$ mbathy = jpkm1

Then, for each case, we find the new depth at t- and w- levels and the new vertical scale factors at t-, u-, v-, w-, uw-, vw- and f-points.

This routine is given as an example, it must be modified following the user s desiderata. nevertheless, the output as well as the way to compute the model levels and scale factors must be respected in order to insure second order accuracy schemes.

Warning

- gdept, gdepw and e3 are positives
- gdept_ps, gdepw_ps and e3_ps are positives

Author

A. Bozec, G. Madec

Date

February, 2009 - F90: Free form and module
February, 2009

- A. de Miranda : rigid-lid + islands

Note

Reference : Pacanowsky & Gnanadesikan 1997, Mon. Wea. Rev., 126, 3248-3270.

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*id_mbathy*
`in,out`	*dd_bathy*
`in,out`	*id_jpkmax*
`in`	*dd_gdepw*
`in`	*dd_e3t*
`in`	*dd_e3zps_min*
`in`	*dd_e3zps_rat*
`in`	*dd_fill*

Chapter 13

Class Documentation

13.1 att::att_clean Interface Reference

Public Member Functions

- subroutine att__clean_unit (td_att)

  This subroutine clean attribute strcuture.
- subroutine att__clean_arr (td_att)

  This subroutine clean array of attribute strcuture.

13.1.1 Member Function/Subroutine Documentation

13.1.1.1 att__clean_arr()

```
subroutine att::att_clean::att__clean_arr (
            type(tatt), dimension(:), intent(inout) td_att )
```

This subroutine clean array of attribute strcuture.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_att*	attribute strcuture

13.1.1.2 att__clean_unit()

```
subroutine att::att_clean::att__clean_unit (
            type(tatt), intent(inout) td_att )
```

This subroutine clean attribute strcuture.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_att*	attribute strcuture

The documentation for this interface was generated from the following file:

- src/attribute.f90

13.2 att::att_copy Interface Reference

Public Member Functions

- type(tatt) function att__copy_unit (td_att)

  This subroutine copy an attribute structure in another one.
- type(tatt) function, dimension(size(td_att(:))) att__copy_arr (td_att)

  This subroutine copy a array of attribute structure in another one.

13.2.1 Member Function/Subroutine Documentation

13.2.1.1 att__copy_arr()

```
type(tatt) function, dimension(size(td_att(:)))  att::att_copy::att__copy_arr (
            type(tatt), dimension(:), intent(in) td_att )
```

This subroutine copy a array of attribute structure in another one.

see att__copy_unit

Warning

do not use on the output of a function who create or read an attribute (ex: tl_att=att_copy(att_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_att*	array of attribute structure

Returns

copy of input array of attribute structure

13.2.1.2 att__copy_unit()

```
type(tatt) function att::att_copy::att__copy_unit (
              type(tatt), intent(in) td_att )
```

This subroutine copy an attribute structure in another one.

attribute value are copied in a temporary array, so input and output attribute structure value do not point on the same "memory cell", and so on are independant.

Warning

do not use on the output of a function who create or read an attribute (ex: tl_att=att_copy(att_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_att*	attribute structure

Returns

copy of input attribute structure

The documentation for this interface was generated from the following file:

- src/attribute.f90

13.3 att::att_init Interface Reference

Public Member Functions

- type(tatt) function att__init_c (cd_name, cd_value)

  This function initialize an attribute structure with character value.
- type(tatt) function att__init_dp (cd_name, dd_value, id_type)

  This function initialize an attribute structure with array of real(8) value.
- type(tatt) function att__init_dp_0d (cd_name, dd_value, id_type)

  This function initialize an attribute structure with real(8) value.
- type(tatt) function att__init_sp (cd_name, rd_value, id_type)

  This function initialize an attribute structure with array of real(4) value.
- type(tatt) function att__init_sp_0d (cd_name, rd_value, id_type)

  This function initialize an attribute structure with real(4) value.
- type(tatt) function att__init_i1 (cd_name, bd_value, id_type)

  This function initialize an attribute structure with array of integer(1) value.
- type(tatt) function att__init_i1_0d (cd_name, bd_value, id_type)

  This function initialize an attribute structure with integer(1) value.
- type(tatt) function att__init_i2 (cd_name, sd_value, id_type)

  This function initialize an attribute structure with array of integer(2) value.
- type(tatt) function att__init_i2_0d (cd_name, sd_value, id_type)

  This function initialize an attribute structure with integer(2) value.
- type(tatt) function att__init_i4 (cd_name, id_value, id_type)

  This function initialize an attribute structure with array of integer(4) value.
- type(tatt) function att__init_i4_0d (cd_name, id_value, id_type)

  This function initialize an attribute structure with integer(4) value.
- type(tatt) function att__init_i8 (cd_name, kd_value, id_type)

  This function initialize an attribute structure with array of integer(8) value.
- type(tatt) function att__init_i8_0d (cd_name, kd_value, id_type)

  This function initialize an attribute structure with integer(8) value.

13.3.1 Member Function/Subroutine Documentation

13.3.1.1 att__init_c()

```
type(tatt) function att::att_init::att__init_c (
            character(len=*), intent(in) cd_name,
            character(len=*), intent(in) cd_value )
```

This function initialize an attribute structure with character value.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_name*	attribute name
in	*cd_value*	attribute value

Returns

attribute structure

13.3.1.2 att__init_dp()

```
type(tatt) function att::att_init::att__init_dp (
            character(len=*), intent(in) cd_name,
            real(dp), dimension(:), intent(in) dd_value,
            integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with array of real(8) value.

Optionaly you could specify the type of the variable to be saved.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_name*	attribute name
in	*dd_value*	attribute value
in	*id_type*	type of the variable to be saved

Returns

attribute structure

[redacted]

Returns

attribute structure

13.3.1.4 att__init_i1()

```
type(tatt) function att::att_init::att__init_i1 (
              character(len=*), intent(in) cd_name,
              integer(i1), dimension(:), intent(in) bd_value,
              integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with array of integer(1) value.

Optionaly you could specify the type of the variable to be saved.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_name*	attribute name
`in`	*bd_value*	attribute value
`in`	*id_type*	type of the variable to be saved

Returns

attribute structure

13.3.1.5 att__init_i1_0d()

```
type(tatt) function att::att_init::att__init_i1_0d (
             character(len=*), intent(in) cd_name,
             integer(i1), intent(in) bd_value,
             integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with integer(1) value.

Optionaly you could specify the type of the variable to be saved.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_name*	attribute name
`in`	*bd_value*	attribute value
`in`	*id_type*	type of the variable to be saved

Returns

attribute structure

[redacted]

in *id_type* type of the variable to be saved

Returns

attribute structure

13.3.1.7 att__init_i2_0d()

```
type(tatt) function att::att_init::att__init_i2_0d (
              character(len=*), intent(in) cd_name,
              integer(i2), intent(in) sd_value,
              integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with integer(2) value.

Optionaly you could specify the type of the variable to be saved.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_name*	attribute name
`in`	*sd_value*	attribute value
`in`	*id_type*	type of the variable to be saved

Returns

attribute structure

13.3.1.8 att__init_i4()

```
type(tatt) function att::att_init::att__init_i4 (
              character(len=*), intent(in) cd_name,
              integer(i4), dimension(:), intent(in) id_value,
              integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with array of integer(4) value.

Optionaly you could specify the type of the variable to be saved.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_name*	attribute name
`in`	*id_value*	attribute value
`in`	*id_type*	type of the variable to be saved

Returns

attribute structure

[redacted]

Returns

attribute structure

13.3.1.10 att__init_i8()

```
type(tatt) function att::att_init::att__init_i8 (
              character(len=*), intent(in) cd_name,
              integer(i8), dimension(:), intent(in) kd_value,
              integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with array of integer(8) value.

Optionaly you could specify the type of the variable to be saved.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_name*	attribute name
`in`	*kd_value*	attribute value
`in`	*id_type*	type of the variable to be saved

Returns

attribute structure

13.3.1.11 att__init_i8_0d()

```
type(tatt) function att::att_init::att__init_i8_0d (
              character(len=*), intent(in) cd_name,
              integer(i8), intent(in) kd_value,
              integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with integer(8) value.

Optionaly you could specify the type of the variable to be saved.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_name*	attribute name
`in`	*kd_value*	attribute value
`in`	*id_type*	type of the variable to be saved

Returns

attribute structure

[redacted]

in *id_type* type of the variable to be saved

Returns

attribute structure

13.3.1.13 att__init_sp_0d()

```
type(tatt) function att::att_init::att__init_sp_0d (
              character(len=*), intent(in) cd_name,
              real(sp), intent(in) rd_value,
              integer(i4), intent(in), optional id_type )
```

This function initialize an attribute structure with real(4) value.

Optionaly you could specify the type of the variable to be saved.

Author

Date

Parameters

Parameters

Returns

- src/attribute.f90

13.4 att::att_print Interface Reference

Public Member Functions

- subroutine att__print_unit (td_att)

  This subroutine print attribute information.
- subroutine att__print_arr (td_att)

  This subroutine print informations of an array of attribute.

13.4.1 Member Function/Subroutine Documentation

13.4.1.1 att__print_arr()

```
subroutine att::att_print::att__print_arr (
            type(tatt), dimension(:), intent(in) td_att )
```

This subroutine print informations of an array of attribute.

Author

J.Paul

Date

June, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_att*	array of attribute structure

13.4.1.2 att__print_unit()

```
subroutine att::att_print::att__print_unit (
            type(tatt), intent(in) td_att )
```

This subroutine print attribute information.

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- take into account type of attribute.

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_att*	attribute structure

The documentation for this interface was generated from the following file:

- src/attribute.f90

13.5 boundary::boundary_clean Interface Reference

Public Member Functions

- subroutine boundary__clean_unit (td_bdy)

  This subroutine clean boundary structure.
- subroutine boundary__clean_arr (td_bdy)

  This subroutine clean array of boundary structure.

13.5.1 Member Function/Subroutine Documentation

13.5.1.1 boundary__clean_arr()

```
subroutine boundary::boundary_clean::boundary__clean_arr (
             type(tbdy), dimension(:), intent(inout) td_bdy )
```

This subroutine clean array of boundary structure.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in,out	*td_bdy*	boundary strucutre

13.5.1.2 boundary__clean_unit()

```
subroutine boundary::boundary_clean::boundary__clean_unit (
             type(tbdy), intent(inout) td_bdy )
```

This subroutine clean boundary structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_bdy*	boundary strucutre

The documentation for this interface was generated from the following file:

- src/boundary.f90

13.6 boundary::boundary_copy Interface Reference

Public Member Functions

- type(tbdy) function boundary__copy_unit (td_bdy)

  This subroutine copy boundary structure in another one.
- type(tbdy) function, dimension(size(td_bdy(:))) boundary__copy_arr (td_bdy)

  This subroutine copy a array of boundary structure in another one.

13.6.1 Member Function/Subroutine Documentation

13.6.1.1 boundary__copy_arr()

```
type(tbdy) function, dimension(size(td_bdy(:)))  boundary::boundary_copy::boundary__copy_arr (
            type(tbdy), dimension(:), intent(in) td_bdy )
```

This subroutine copy a array of boundary structure in another one.

Warning

do not use on the output of a function who create or read an attribute (ex: tl_bdy=boundary_copy(boundary←
_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_bdy*	array of boundary structure

Returns

copy of input array of boundary structure

13.6.1.2 boundary__copy_unit()

```
type(tbdy) function boundary::boundary_copy::boundary__copy_unit (
            type(tbdy), intent(in) td_bdy )
```

This subroutine copy boundary structure in another one.

Warning

do not use on the output of a function who create or read an attribute (ex: tl_bdy=boundary_copy(boundary←
_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_bdy*	boundary structure

Returns

copy of input boundary structure

The documentation for this interface was generated from the following file:

- src/boundary.f90

13.7 boundary::boundary_init Interface Reference

Public Member Functions

- type(tbdy) function, dimension(ip_ncard) boundary__init_wrapper (td_var, ld_north, ld_south, ld_east, ld_↩ west, cd_north, cd_south, cd_east, cd_west, ld_oneseg)

  This function initialise a boundary structure.

13.7.1 Member Function/Subroutine Documentation

tbdy
tvar

Author

Date

September, 2014

- add boolean to use only one segment for each boundary
- check boundary width

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	variable structure
in	*ld_north*	use north boundary or not
in	*ld_south*	use south boundary or not
in	*ld_east*	use east boundary or not

in	*ld_west*	use west boundary or not
in	*cd_north*	north boundary description
in	*cd_south*	south boundary description
in	*cd_east*	east boundary description
in	*cd_west*	west boundary description
in	*ld_oneseg*	force to use only one segment for each boundary

Returns

boundary structure

The documentation for this interface was generated from the following file:

- src/boundary.f90

13.8 boundary::boundary_print Interface Reference

Public Member Functions

- subroutine boundary__print_unit (td_bdy)

  This subroutine print information about one boundary.
- subroutine boundary__print_arr (td_bdy)

  This subroutine print information about a array of boundary.

13.8.1 Member Function/Subroutine Documentation

13.8.1.1 boundary__print_arr()

```
subroutine boundary::boundary_print::boundary__print_arr (
             type(tbdy), dimension(:), intent(in) td_bdy )
```

This subroutine print information about a array of boundary.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_bdy*	boundary structure

13.8.1.2 boundary__print_unit()

```
subroutine boundary::boundary_print::boundary__print_unit (
            type(tbdy), intent(in) td_bdy )
```

This subroutine print information about one boundary.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_bdy*	boundary structure

The documentation for this interface was generated from the following file:

- src/boundary.f90

13.9 date::date_init Interface Reference

Public Member Functions

- type(tdate) function date__init_jd (dd_jd, td_dateo)
  This function initialized date structure from julian day.
- type(tdate) function date__init_nsec (kd_nsec, td_dateo)
  This function initialized date structure from number of second since julian day origin.
- type(tdate) function date__init_ymd (id_year, id_month, id_day, id_hour, id_min, id_sec, td_dateo)
  This function initialized date structure form year month day and optionnaly hour min sec.
- type(tdate) function date__init_fmtdate (cd_datetime, td_dateo)
  This function initialized date structure from a character date with format YYYY-MM-DD hh:mm:ss.

13.9.1 Member Function/Subroutine Documentation

tdate

tdate

Author

Date

Parameters

Parameters

Returns

date structure

13.9.1.2 date__init_jd()

```
type(tdate) function date::date_init::date__init_jd (
             real(dp), intent(in) dd_jd,
             type(tdate), intent(in), optional td_dateo )
```

This function initialized date structure from julian day.

Optionaly create pseudo julian day with new origin.
julian day origin is 17 Nov 1858 at 00:00:00

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_jd*	julian day
in	*td_dateo*	new date origin for pseudo julian day

Returns

date structure of julian day

13.9.1.3 date__init_nsec()

```
type(tdate) function date::date_init::date__init_nsec (
            integer(i8), intent(in) kd_nsec,
            type(tdate), intent(in), optional td_dateo )
```

This function initialized date structure from number of second since julian day origin.

Optionaly create pseudo julian day with new origin.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*kd_nsec*	number of second since julian day origin
in	*td_dateo*	new date origin for pseudo julian day

Returns

date structure of julian day

13.9.1.4 date__init_ymd()

```
type(tdate) function date::date_init::date__init_ymd (
            integer(i4), intent(in) id_year,
            integer(i4), intent(in) id_month,
            integer(i4), intent(in) id_day,
            integer(i4), intent(in), optional id_hour,
            integer(i4), intent(in), optional id_min,
            integer(i4), intent(in), optional id_sec,
            type(tdate), intent(in), optional td_dateo )
```

This function initialized date structure form year month day and optionnaly hour min sec.

Optionaly create pseudo julian day with new origin.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*id_year*	
in	*id_month*	
in	*id_day*	
in	*id_hour*	
in	*id_min*	
in	*id_sec*	
in	*td_dateo*	new date origin for pseudo julian day

Returns

date structure of year month day

The documentation for this interface was generated from the following file:

- src/date.f90

13.10 dim::dim_clean Interface Reference

Public Member Functions

- subroutine dim__clean_unit (td_dim)

  This subroutine clean dimension structure.
- subroutine dim__clean_arr (td_dim)

  This subroutine clean array of dimension structure.

13.10.1 Member Function/Subroutine Documentation

13.10.1.1 dim__clean_arr()

```
subroutine dim::dim_clean::dim__clean_arr (
            type(tdim), dimension(:), intent(inout) td_dim )
```

This subroutine clean array of dimension structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_dim*	array of dimension strucutre

13.10.1.2 dim__clean_unit()

```
subroutine dim::dim_clean::dim__clean_unit (
            type(tdim), intent(inout) td_dim )
```

This subroutine clean dimension structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_dim*	dimension strucutre

The documentation for this interface was generated from the following file:

- src/dimension.f90

13.11 dim::dim_copy Interface Reference

Public Member Functions

- type(tdim) function dim__copy_unit (td_dim)

  This subroutine copy an dimension structure in another one.
- type(tdim) function, dimension(size(td_dim(:))) dim__copy_arr (td_dim)

  This subroutine copy a array of dimension structure in another one.

13.11.1 Member Function/Subroutine Documentation

13.11.1.1 dim__copy_arr()

```
type(tdim) function, dimension(size(td_dim(:)))  dim::dim_copy::dim__copy_arr (
            type(tdim), dimension(:), intent(in) td_dim )
```

This subroutine copy a array of dimension structure in another one.

see dim__copy_unit

Warning

do not use on the output of a function who create or read an structure (ex: tl_dim=dim_copy(dim_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_dim*	array of dimension structure

Returns

copy of input array of dimension structure

13.11.1.2 dim__copy_unit()

```
type(tdim) function dim::dim_copy::dim__copy_unit (
            type(tdim), intent(in) td_dim )
```

This subroutine copy an dimension structure in another one.

dummy function to get the same use for all structure

Warning

do not use on the output of a function who create or read an structure (ex: tl_dim=dim_copy(dim_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_dim*	dimension structure

Returns

copy of input dimension structure

The documentation for this interface was generated from the following file:

- src/dimension.f90

13.12 dim::dim_print Interface Reference

Public Member Functions

- subroutine dim__print_unit (td_dim)

  This subrtoutine print dimension information.
- subroutine dim__print_arr (td_dim)

  This subroutine print informations of an array of dimension.

13.12.1 Member Function/Subroutine Documentation

13.12.1.1 dim__print_arr()

```
subroutine dim::dim_print::dim__print_arr (
            type(tdim), dimension(:), intent(in) td_dim )
```

This subroutine print informations of an array of dimension.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_dim*	array of dimension structure

13.12.1.2 dim__print_unit()

```
subroutine dim::dim_print::dim__print_unit (
            type(tdim), intent(in) td_dim )
```

This subrtoutine print dimension information.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_dim*	dimension structure

The documentation for this interface was generated from the following file:

- src/dimension.f90

13.13 dim::dim_reorder_2xyzt Interface Reference

Public Member Functions

- integer(i4) function, dimension(ip_maxdim) dim__reorder_2xyzt_i4 (td_dim, id_arr)

  This function reordered integer(4) 1D array to be suitable with dimension ordered as defined in dim_reorder.
- character(len=lc) function, dimension(ip_maxdim) dim__reorder_2xyzt_c (td_dim, cd_arr)

  This function reordered string 1D array to be suitable with dimension ordered as defined in dim_reorder.
- logical function, dimension(ip_maxdim) dim__reorder_2xyzt_l (td_dim, ld_arr)

  This function reordered logical 1D array to be suitable with dimension ordered as defined in dim_reorder.

13.13.1 Member Function/Subroutine Documentation

13.13.1.1 dim__reorder_2xyzt_c()

```
character(len=lc) function, dimension(ip_maxdim) dim::dim_reorder_2xyzt::dim__reorder_2xyzt_c
(
            type(tdim), dimension(:), intent(in) td_dim,
            character(len=*), dimension(:), intent(in) cd_arr )
```

This function reordered string 1D array to be suitable with dimension ordered as defined in dim_reorder.

Note

you must have run dim_reorder before use this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_dim*	array of dimension structure
in	*cd_arr*	array of value to reordered

Returns

array of value reordered

tdim

Note

Author

Date

Parameters

Parameters

Returns

array of value reshaped

13.13.1.3 dim__reorder_2xyzt_l()

```
logical function, dimension(ip_maxdim) dim::dim_reorder_2xyzt::dim__reorder_2xyzt_l (
            type(tdim), dimension(:), intent(in) td_dim,
            logical, dimension(:), intent(in) ld_arr )
```

This function reordered logical 1D array to be suitable with dimension ordered as defined in dim_reorder.

Note

you must have run dim_reorder before use this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_dim*	array of dimension structure
`in`	*ld_arr*	array of value to reordered

Returns

array of value reordered

The documentation for this interface was generated from the following file:

- src/dimension.f90

13.14 dim::dim_reorder_xyzt2 Interface Reference

Public Member Functions

- integer(i4) function, dimension(ip_maxdim) dim__reorder_xyzt2_i4 (td_dim, id_arr)

  This function disordered integer(4) 1D array to be suitable with initial dimension order (ex: dimension read in file).
- character(len=lc) function, dimension(ip_maxdim) dim__reorder_xyzt2_c (td_dim, cd_arr)

  This function disordered string 1D array to be suitable with initial dimension order (ex: dimension read in file).
- logical function, dimension(ip_maxdim) dim__reorder_xyzt2_l (td_dim, ld_arr)

  This function disordered logical 1D array to be suitable with initial dimension order (ex: dimension read in file).

13.14.1 Member Function/Subroutine Documentation

13.14.1.1 dim__reorder_xyzt2_c()

```
character(len=lc) function, dimension(ip_maxdim) dim::dim_reorder_xyzt2::dim__reorder_xyzt2_c
(
            type(tdim), dimension(:), intent(in) td_dim,
            character(len=*), dimension(:), intent(in) cd_arr )
```

This function disordered string 1D array to be suitable with initial dimension order (ex: dimension read in file).

Note

you must have run dim_reorder before use this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_dim*	array of dimension structure
in	*cd_arr*	array of value to reordered

Returns

array of value reordered

13.14.1.2 dim__reorder_xyzt2_i4()

```
integer(i4) function, dimension(ip_maxdim) dim::dim_reorder_xyzt2::dim__reorder_xyzt2_i4 (
            type(tdim), dimension(:), intent(in) td_dim,
            integer(i4), dimension(:), intent(in) id_arr )
```

This function disordered integer(4) 1D array to be suitable with initial dimension order (ex: dimension read in file).

Note

you must have run dim_reorder before use this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

in	*td_dim*	array of dimension structure
in	*id_arr*	array of value to reshape

Returns

array of value reshaped

13.14.1.3 dim__reorder_xyzt2_l()

```
logical function, dimension(ip_maxdim) dim::dim_reorder_xyzt2::dim__reorder_xyzt2_l (
            type(tdim), dimension(:), intent(in) td_dim,
            logical, dimension(:), intent(in) ld_arr )
```

This function disordered logical 1D array to be suitable with initial dimension order (ex: dimension read in file).

Note

you must have run dim_reorder before use this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

in	*td_dim*	array of dimension structure
in	*ld_arr*	array of value to reordered

Returns

array of value reordered

The documentation for this interface was generated from the following file:

- src/dimension.f90

13.15 dim::dim_reshape_2xyzt Interface Reference

Public Member Functions

- real(dp) function, dimension(td_dim(1)%i_len, td_dim(2)%i_len, td_dim(3)%i_len, td_dim(4)%i_len) dim__↩ reshape_2xyzt_dp (td_dim, dd_value)

  This function reshape real(8) 4D array to an ordered array, as defined by dim_reorder.

13.15.1 Member Function/Subroutine Documentation

13.15.1.1 dim__reshape_2xyzt_dp()

```
real(dp) function, dimension(td_dim(1)%i_len, td_dim(2)%i_len, td_dim(3)%i_len, td_dim(4)%i_↩
len) dim::dim_reshape_2xyzt::dim__reshape_2xyzt_dp (
            type(tdim), dimension(:), intent(in) td_dim,
            real(dp), dimension(:,:,:,:), intent(in) dd_value )
```

This function reshape real(8) 4D array to an ordered array, as defined by dim_reorder.

Example: (/'z','x','t','y'/) => (/'x','y','z','t'/)

Note

you must have run dim_reorder before use this subroutine

Warning

output array dimension differ from input array dimension

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

in	*td_dim*	array of dimension structure
in	*dd_value*	array of value to reshape

Returns

array of value reshaped

The documentation for this interface was generated from the following file:

- src/dimension.f90

13.16 dim::dim_reshape_xyzt2 Interface Reference

Public Member Functions

- real(dp) function, dimension(td_dim(td_dim(1)%i_xyzt2)%i_len, td_dim(td_dim(2)%i_xyzt2)%i_len, td_↩ dim(td_dim(3)%i_xyzt2)%i_len, td_dim(td_dim(4)%i_xyzt2)%i_len) dim__reshape_xyzt2_dp (td_dim, dd_↩ value)

    This function reshape ordered real(8) 4D array with dimension (/'x','y','z','t'/) to an "disordered" array.

13.16.1 Member Function/Subroutine Documentation

13.16.1.1 dim__reshape_xyzt2_dp()

```
real(dp) function, dimension(td_dim(td_dim(1)%i_xyzt2)%i_len, td_dim(td_dim(2)%i_xyzt2)%i↩
_len, td_dim(td_dim(3)%i_xyzt2)%i_len, td_dim(td_dim(4)%i_xyzt2)%i_len) dim::dim_reshape_↩
xyzt2::dim__reshape_xyzt2_dp (
            type(tdim), dimension(:), intent(in) td_dim,
            real(dp), dimension(:,:,:,:), intent(in) dd_value )
```

This function reshape ordered real(8) 4D array with dimension (/'x','y','z','t'/) to an "disordered" array.

Example: (/'x','y','z','t'/) => (/'z','x','t','y'/)

Note

you must have run dim_reorder before use this subroutine

Warning

output array dimension differ from input array dimension

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_dim*	array of dimension structure
`in`	*dd_value*	array of value to reshape

Returns

array of value reshaped

The documentation for this interface was generated from the following file:

- src/dimension.f90

13.17 dom::dom_copy Interface Reference

Public Member Functions

- type(tdom) function dom__copy_unit (td_dom)
  This subroutine copy an domain structure in another one.

13.17.1 Member Function/Subroutine Documentation

13.17.1.1 dom__copy_unit()

```
type(tdom) function dom::dom_copy::dom__copy_unit (
            type(tdom), intent(in) td_dom )
```

This subroutine copy an domain structure in another one.

dummy function to get the same use for all structure

Warning

do not use on the output of a function who create or read an structure (ex: tl_dom=dom_copy(dom_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_dom*	domain structure

Returns

copy of input domain structure

The documentation for this interface was generated from the following file:

- src/domain.f90

13.18 dom::dom_init Interface Reference

Public Member Functions

- type(tdom) function dom__init_file (td_file, id_imin, id_imax, id_jmin, id_jmax, cd_card)

  This function intialise domain structure, given open file structure, and sub domain indices.
- type(tdom) function dom__init_mpp (td_mpp, id_imin, id_imax, id_jmin, id_jmax, cd_card)

  This function intialise domain structure, given open file structure, and sub domain indices.

13.18.1 Member Function/Subroutine Documentation

13.18.1.1 dom__init_file()

```
type(tdom) function dom::dom_init::dom__init_file (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in), optional id_imin,
            integer(i4), intent(in), optional id_imax,
            integer(i4), intent(in), optional id_jmin,
            integer(i4), intent(in), optional id_jmax,
            character(len=*), intent(in), optional cd_card )
```

This function intialise domain structure, given open file structure, and sub domain indices.

sub domain indices are computed, taking into account coarse grid periodicity, pivot point, and East-West overlap.

Author

J.Paul

Date

June, 2013 - Initial Version
September, 2014

- add boundary index
- add ghost cell factor

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_file*	file structure
in	*id_perio*	grid periodicity
in	*id_imin*	i-direction sub-domain lower left point indice
in	*id_imax*	i-direction sub-domain upper right point indice
in	*id_jmin*	j-direction sub-domain lower left point indice
in	*id_jmax*	j-direction sub-domain upper right point indice
in	*cd_card*	name of cardinal (for boundary)

Returns

domain structure

13.18.1.2 dom__init_mpp()

```
type(tdom) function dom::dom_init::dom__init_mpp (
             type(tmpp), intent(in) td_mpp,
             integer(i4), intent(in), optional id_imin,
             integer(i4), intent(in), optional id_imax,
             integer(i4), intent(in), optional id_jmin,
             integer(i4), intent(in), optional id_jmax,
             character(len=*), intent(in), optional cd_card )
```

This function intialise domain structure, given open file structure, and sub domain indices.

sub domain indices are computed, taking into account coarse grid periodicity, pivot point, and East-West overlap.

Author

J.Paul

Date

June, 2013 - Initial Version
September, 2014

- add boundary index
- add ghost cell factor

October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure
in	*id_perio*	grid periodicity
in	*id_imin*	i-direction sub-domain lower left point indice
in	*id_imax*	i-direction sub-domain upper right point indice
in	*id_jmin*	j-direction sub-domain lower left point indice
in	*id_jmax*	j-direction sub-domain upper right point indice
in	*cd_card*	name of cardinal (for boundary)

Returns

domain structure

The documentation for this interface was generated from the following file:

- src/domain.f90

13.19 extrap::extrap_detect Interface Reference

Public Member Functions

- integer(i4) function, dimension(td_var%t_dim(1)%i_len, td_var%t_dim(2)%i_len, td_var%t_dim(3)%i_len) extrap__detect_wrapper (td_var)

  This function sort variable to be extrapolated, depending on number of dimentsion, then detected point to be extrapolated.
- **detected**
- **point**
- **to**
- **be**
- **extrapolated**

13.19.1 Member Function/Subroutine Documentation

13.19.1.1 extrap__detect_wrapper()

```
integer(i4) function, dimension(td_var%t_dim(1)%i_len, td_var%t_dim(2)%i_len, td_var%t_↩
dim(3)%i_len ) extrap::extrap_detect::extrap__detect_wrapper (
            type(tvar), intent(in) td_var )
```

This function sort variable to be extrapolated, depending on number of dimentsion, then detected point to be extrapolated.

Author

J.Paul

Date

November, 2013 - Initial Version
June, 2015

- select all land points for extrapolation

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_var*	coarse grid variable to extrapolate

Returns

3D array of point to be extrapolated

The documentation for this interface was generated from the following file:

- src/extrap.f90

13.20 extrap::extrap_fill_value Interface Reference

Public Member Functions

- subroutine extrap__fill_value_wrapper (td_var, id_radius)

  This subroutine select method to be used for extrapolation. If need be, increase number of points to be extrapolated. Finally launch extrap__fill_value.
- **detected**
- **point**
- **to**
- **be**
- **interpolated**

13.20.1 Member Function/Subroutine Documentation

13.20.1.1 extrap__fill_value_wrapper()

```
subroutine extrap::extrap_fill_value::extrap__fill_value_wrapper (
            type(tvar), intent(inout) td_var,
            integer(i4), intent(in), optional id_radius )
```

This subroutine select method to be used for extrapolation. If need be, increase number of points to be extrapolated. Finally launch extrap__fill_value.

optionaly, you could specify :

- refinment factor (default 1)
- offset between fine and coarse grid (default compute from refinment factor as offset=(rho-1)/2)
- number of point to be extrapolated in each direction (default im_minext)
- radius of the halo used to compute extrapolation
- maximum number of iteration

Author

J.Paul

Date

November, 2013 - Initial Version
June, 2015
- select all land points for extrapolation

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*id_radius*	radius of the halo used to compute extrapolation

The documentation for this interface was generated from the following file:

- src/extrap.f90

13.21 fct::fct_str Interface Reference

Public Member Functions

- pure character(len=lc) function fct__i1_str (bd_var)

  This function convert integer(1) to string character.
- pure character(len=lc) function fct__i2_str (sd_var)

  This function convert integer(2) to string character.
- pure character(len=lc) function fct__i4_str (id_var)

  This function convert integer(4) to string character.
- pure character(len=lc) function fct__i8_str (kd_var)

  This function convert integer(8) to string character.
- pure character(len=lc) function fct__r4_str (rd_var)

  This function convert real(4) to string character.
- pure character(len=lc) function fct__r8_str (dd_var)

  This function convert real(8) to string character.
- pure character(len=lc) function fct__l_str (ld_var)

  This function convert logical to string character.

13.21.1 Member Function/Subroutine Documentation

13.21.1.1 fct__i1_str()

```
pure character(len=lc) function fct::fct_str::fct__i1_str (
            integer(i1), intent(in) bd_var )
```

This function convert integer(1) to string character.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*bd_var*	integer(1) variable

Returns

character of this integer variable

13.21.1.2 fct__i2_str()

```
pure character(len=lc) function fct::fct_str::fct__i2_str (
            integer(i2), intent(in) sd_var )
```

This function convert integer(2) to string character.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*sd_var*	integer(2) variable

Returns

character of this integer variable

13.21.1.3 fct__i4_str()

```
pure character(len=lc) function fct::fct_str::fct__i4_str (
            integer(i4), intent(in) id_var )
```

This function convert integer(4) to string character.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*id_var*	integer(4) variable

Returns

character of this integer variable

13.21.1.4 fct__i8_str()

```
pure character(len=lc) function fct::fct_str::fct__i8_str (
            integer(i8), intent(in) kd_var )
```

This function convert integer(8) to string character.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*kd_var*	integer(8) variable

Returns

character of this integer variable

13.21.1.5 fct__l_str()

```
pure character(len=lc) function fct::fct_str::fct__l_str (
            logical, intent(in) ld_var )
```

This function convert logical to string character.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*ld_var*	logical variable

Returns

character of this integer variable

13.21.1.6 fct__r4_str()

```
pure character(len=lc) function fct::fct_str::fct__r4_str (
            real(sp), intent(in) rd_var )
```

This function convert real(4) to string character.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in` *rd_var* real(4) variable

Returns

character of this real variable

13.21.1.7 fct__r8_str()

```
pure character(len=lc) function fct::fct_str::fct__r8_str (
            real(dp), intent(in) dd_var )
```

This function convert real(8) to string character.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in` *dd_var* real(8) variable

Returns

character of this real variable

The documentation for this interface was generated from the following file:

- src/function.f90

13.22 file::file_clean Interface Reference

Public Member Functions

- subroutine file__clean_unit (td_file)

  This subroutine clean file strcuture.
- subroutine file__clean_arr (td_file)

  This subroutine clean file array of file strcuture.

13.22.1 Member Function/Subroutine Documentation

13.22.1.1 file__clean_arr()

```
subroutine file::file_clean::file__clean_arr (
            type(tfile), dimension(:), intent(inout) td_file )
```

This subroutine clean file array of file strcuture.

Author

J.Paul

Date

Marsh, 2014 - Inital version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out` *td_file* array file strcuture

13.22.1.2 file__clean_unit()

```
subroutine file::file_clean::file__clean_unit (
            type(tfile), intent(inout) td_file )
```

This subroutine clean file strcuture.

Author

J.Paul

Date

November, 2013 - Inital version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file strcuture

The documentation for this interface was generated from the following file:

- src/file.f90

13.23 file::file_copy Interface Reference

Public Member Functions

- type(tfile) function file__copy_unit (td_file)

  This subroutine copy file structure in another one.
- type(tfile) function, dimension(size(td_file(:))) file__copy_arr (td_file)

  This subroutine copy a array of file structure in another one.

13.23.1 Member Function/Subroutine Documentation

13.23.1.1 file__copy_arr()

```
type(tfile) function, dimension(size(td_file(:)))  file::file_copy::file__copy_arr (
            type(tfile), dimension(:), intent(in) td_file )
```

This subroutine copy a array of file structure in another one.

file variable and attribute value are copied in a temporary array, so input and output file structure value do not point on the same "memory cell", and so on are independant.

Note

new file is assume to be closed.

Warning

do not use on the output of a function who create or read an structure (ex: tl_file=file_copy(file_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure

Returns

copy of input array of file structure

13.23.1.2 file__copy_unit()

```
type(tfile) function file::file_copy::file__copy_unit (
            type(tfile), intent(in) td_file )
```

This subroutine copy file structure in another one.

file variable and attribute value are copied in a temporary array, so input and output file structure value do not point on the same "memory cell", and so on are independant.

Note

new file is assume to be closed.

Warning

do not use on the output of a function who create or read an structure (ex: tl_file=file_copy(file_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure

Returns

copy of input file structure

The documentation for this interface was generated from the following file:

- src/file.f90

file__del_att_name

file__del_att_str

`tfile`

Author

Date

November, 2013 - Initial Version
February, 2015

- define local attribute structure to avoid mistake with pointer

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure
`in`	*cd_name*	attribute name

13.24.1.2 file__del_att_str()

```
subroutine file::file_del_att::file__del_att_str (
            type(tfile), intent(inout) td_file,
            type(tatt), intent(in) td_att )
```

This subroutine delete a global attribute structure from file structure, given attribute structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure
`in`	*td_att*	attribute structure

The documentation for this interface was generated from the following file:

- src/file.f90

13.25 file::file_del_var Interface Reference

Public Member Functions

- subroutine file__del_var_name (td_file, cd_name)

  This subroutine delete a variable structure in file structure, given variable name or standard name.
- subroutine file__del_var_str (td_file, td_var)

  This subroutine delete a variable structure in file structure, given variable structure.

13.25.1 Member Function/Subroutine Documentation

13.25.1.1 file__del_var_name()

```
subroutine file::file_del_var::file__del_var_name (
            type(tfile), intent(inout) td_file,
            character(len=*), intent(in) cd_name )
```

This subroutine delete a variable structure in file structure, given variable name or standard name.

Author

J.Paul

Date

November, 2013 - Initial Version
February, 2015

- define local variable structure to avoid mistake with pointer

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure
in	*cd_name*	variable name or standard name

13.25.1.2 file__del_var_str()

```
subroutine file::file_del_var::file__del_var_str (
            type(tfile), intent(inout) td_file,
            type(tvar), intent(in) td_var )
```

This subroutine delete a variable structure in file structure, given variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_file*	file structure
in	*td_var*	variable structure

The documentation for this interface was generated from the following file:

- src/file.f90

13.26 file::file_rename Interface Reference

Public Member Functions

- character(len=lc) function file__rename_char (cd_file, id_num)

    This function rename file name, given processor number.
- type(tfile) function file__rename_str (td_file, id_num)

    This function rename file name, given file structure.

13.26.1 Member Function/Subroutine Documentation

13.26.1.1 file__rename_char()

```
character(len=lc) function file::file_rename::file__rename_char (
             character(len=*), intent(in) cd_file,
             integer(i4), intent(in), optional id_num )
```

This function rename file name, given processor number.

If no processor number is given, return file name without number If processor number is given, return file name with new number

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_file*	file structure
in	*id_num*	processor number (start to 1)

Returns

file name

13.26.1.2 file__rename_str()

```
type(tfile) function file::file_rename::file__rename_str (
             type(tfile), intent(in) td_file,
             integer(i4), intent(in), optional id_num )
```

This function rename file name, given file structure.

If no processor number is given, return file name without number I processor number is given, return file name with new number

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_num*	processor number (start to 1)

Returns

file structure

The documentation for this interface was generated from the following file:

- src/file.f90

13.27 filter::filter_fill_value Interface Reference

Public Member Functions

- subroutine filter__fill_value_wrapper (td_var)
  This subroutine filter variable value.

13.27.1 Member Function/Subroutine Documentation

13.27.1.1 filter__fill_value_wrapper()

```
subroutine filter::filter_fill_value::filter__fill_value_wrapper (
            type(tvar), intent(inout) td_var )
```

This subroutine filter variable value.

it checks if filtering method is available, gets parameter value, and launch filter__fill_value

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure

The documentation for this interface was generated from the following file:

- src/filter.f90

13.28 grid::grid_get_coarse_index Interface Reference

Public Member Functions

- integer(i4) function, dimension(2, 2) grid__get_coarse_index_ff (td_coord0, td_coord1, id_rho, cd_point)

  This function get closest coarse grid indices of fine grid domain.
- integer(i4) function, dimension(2, 2) grid__get_coarse_index_cf (td_lon0, td_lat0, td_coord1, id_rho, cd_↩ point)

  This function get closest coarse grid indices of fine grid domain.
- integer(i4) function, dimension(2, 2) grid__get_coarse_index_fc (td_coord0, td_lon1, td_lat1, id_rho, cd_↩ point)

  This function get closest coarse grid indices of fine grid domain.
- integer(i4) function, dimension(2, 2) grid__get_coarse_index_cc (td_lon0, td_lat0, td_lon1, td_lat1, id_rho, cd_point)

  This function get closest coarse grid indices of fine grid domain.

13.28.1 Member Function/Subroutine Documentation

13.28.1.1 grid__get_coarse_index_cc()

```
integer(i4) function, dimension(2,2) grid::grid_get_coarse_index::grid__get_coarse_index_cc (
             type(tvar), intent(in) td_lon0,
             type(tvar), intent(in) td_lat0,
             type(tvar), intent(in) td_lon1,
             type(tvar), intent(in) td_lat1,
             integer(i4), dimension(:), intent(in), optional id_rho,
             character(len=*), intent(in), optional cd_point )
```

This function get closest coarse grid indices of fine grid domain.

it use coarse and fine grid array of longitude and latitude. optionaly, you could specify the array of refinment factor (default 1.) optionally, you could specify on which Arakawa grid point you want to work (default 'T')

Note

do not use ghost cell

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- check grid point
- take into account EW overlap

February, 2016

- use delta (lon or lat)
- manage cases for T,U,V or F point, with even or odd refinment

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_lon0*	coarse grid longitude
in	*td_lat0*	coarse grid latitude
in	*td_lon1*	fine grid longitude
in	*td_lat1*	fine grid latitude
in	*id_rho*	array of refinment factor
in	*cd_point*	Arakawa grid point ('T','U','V','F')

Returns

coarse grid indices (/(/imin0, imax0/), (/jmin0, jmax0/)/)

Todo -check case boundary domain on overlap band

13.28.1.2 grid__get_coarse_index_cf()

```
integer(i4) function, dimension(2,2) grid::grid_get_coarse_index::grid__get_coarse_index_cf (
            type(tvar ), intent(in) td_lon0,
            type(tvar ), intent(in) td_lat0,
            type(tmpp ), intent(in) td_coord1,
            integer(i4), dimension(:), intent(in), optional id_rho,
            character(len=*), intent(in), optional cd_point )
```

This function get closest coarse grid indices of fine grid domain.

it use coarse array of longitude and latitude and fine grid coordinates file. optionaly, you could specify the array of refinment factor (default 1.) optionally, you could specify on which Arakawa grid point you want to work (default 'T')

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- use grid point to read coordinates variable.

October, 2014

- work on mpp file structure instead of file structure

February, 2015

- use longitude or latitude as standard name, if can not find longitude_T, latitude_T...

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|Parameters

Parameters

in	*td_longitude0*	coarse grid longitude
in	*td_latitude0*	coarse grid latitude
in	*td_coord1*	fine grid coordinate mpp structure
in	*id_rho*	array of refinment factor
in	*cd_point*	Arakawa grid point (default 'T')

Returns

coarse grid indices (/(/imin0, imax0/), (/jmin0, jmax0/)/)

13.28.1.3 grid__get_coarse_index_fc()

```
integer(i4) function, dimension(2,2) grid::grid_get_coarse_index::grid__get_coarse_index_fc (
            type(tmpp ), intent(in) td_coord0,
            type(tvar ), intent(in) td_lon1,
            type(tvar ), intent(in) td_lat1,
            integer(i4), dimension(:), intent(in), optional id_rho,
            character(len=*), intent(in), optional cd_point )
```

This function get closest coarse grid indices of fine grid domain.

it use coarse grid coordinates file and fine grid array of longitude and latitude. optionaly, you could specify the array of refinment factor (default 1.) optionally, you could specify on which Arakawa grid point you want to work (default 'T')

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- use grid point to read coordinates variable.

October, 2014

- work on mpp file structure instead of file structure

February, 2015

- use longitude or latitude as standard name, if can not find longitude_T, latitude_T...

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_coord0*	coarse grid coordinate mpp structure
in	*td_lon1*	fine grid longitude
in	*td_lat1*	fine grid latitude
in	*id_rho*	array of refinment factor (default 1.)
in	*cd_point*	Arakawa grid point (default 'T')

Returns

coarse grid indices (/(/imin0, imax0/), (/jmin0, jmax0/)/)

13.28.1.4 grid__get_coarse_index_ff()

```
integer(i4) function, dimension(2,2) grid::grid_get_coarse_index::grid__get_coarse_index_ff (
            type(tmpp), intent(in) td_coord0,
            type(tmpp), intent(in) td_coord1,
            integer(i4), dimension(:), intent(in), optional id_rho,
            character(len=*), intent(in), optional cd_point )
```

This function get closest coarse grid indices of fine grid domain.

it use coarse and fine grid coordinates files. optionally, you could specify the array of refinment factor (default 1.) optionally, you could specify on which Arakawa grid point you want to work (default 'T')

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- use grid point to read coordinates variable.

October, 2014

- work on mpp file structure instead of file structure

February, 2015

- use longitude or latitude as standard name, if can not find longitude_T, latitude_T...

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_coord0*	coarse grid coordinate mpp structure
in	*td_coord1*	fine grid coordinate mpp structure
in	*id_rho*	array of refinment factor (default 1.)
in	*cd_point*	Arakawa grid point (default 'T').

Returns

coarse grid indices(/(/imin0, imax0/), (/jmin0, jmax0/)/)

The documentation for this interface was generated from the following file:

- src/grid.f90

13.29 grid::grid_get_ew_overlap Interface Reference

Public Member Functions

- integer(i4) function grid__get_ew_overlap_mpp (td_mpp)

    This function get East-West overlap.
- integer(i4) function grid__get_ew_overlap_file (td_file)

    This function get East-West overlap.
- integer(i4) function grid__get_ew_overlap_var (td_var)

    This function get East-West overlap.

13.29.1 Member Function/Subroutine Documentation

13.29.1.1 grid__get_ew_overlap_file()

```
integer(i4) function grid::grid_get_ew_overlap::grid__get_ew_overlap_file (
            type(tfile), intent(inout) td_file )
```

This function get East-West overlap.

If no East-West wrap return -1, else return the size of the ovarlap band. East-West overlap is computed comparing longitude value of the South" part of the domain, to avoid north fold boundary.

Author

J.Paul

Date

October, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure

Returns

East West overlap

13.29.1.2 grid__get_ew_overlap_mpp()

```
integer(i4) function grid::grid_get_ew_overlap::grid__get_ew_overlap_mpp (
            type(tmpp), intent(inout) td_mpp )
```

This function get East-West overlap.

If no East-West wrap return -1, else return the size of the ovarlap band. East-West overlap is computed comparing longitude value of the South" part of the domain, to avoid north fold boundary.

Author

J.Paul

Date

November, 2013 - Initial Version
October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_mpp*	mpp structure

Returns

East West overlap

13.29.1.3 grid__get_ew_overlap_var()

```
integer(i4) function grid::grid_get_ew_overlap::grid__get_ew_overlap_var (
            type(tvar), intent(inout) td_var )
```

This function get East-West overlap.

If no East-West wrap return -1, else return the size of the ovarlap band. East-West overlap is computed comparing longitude value of the South" part of the domain, to avoid north fold boundary.

Author

J.Paul

Date

November, 2013 - Initial Version
October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]Parameters

Parameters

in	*td_lon*	longitude variable structure

Returns

East West overlap

The documentation for this interface was generated from the following file:

- src/grid.f90

13.30 grid::grid_get_fine_offset Interface Reference

Public Member Functions

- integer(i4) function, dimension(2, 2) grid__get_fine_offset_ff (td_coord0, id_imin0, id_jmin0, id_imax0, id_↩ jmax0, td_coord1, id_rho, cd_point)

  This function get offset between fine grid and coarse grid.
- integer(i4) function, dimension(2, 2) grid__get_fine_offset_fc (td_coord0, id_imin0, id_jmin0, id_imax0, id_↩ jmax0, dd_lon1, dd_lat1, id_rho, cd_point)

  This function get offset between fine grid and coarse grid.
- integer(i4) function, dimension(2, 2) grid__get_fine_offset_cf (dd_lon0, dd_lat0, id_imin0, id_jmin0, id_imax0, id_jmax0, td_coord1, id_rho, cd_point)

  This function get offset between fine grid and coarse grid.
- integer(i4) function, dimension(2, 2) grid__get_fine_offset_cc (dd_lon0, dd_lat0, id_imin0, id_jmin0, id_imax0, id_jmax0, dd_lon1, dd_lat1, id_rho, cd_point)

  This function get offset between fine grid and coarse grid.

13.30.1 Member Function/Subroutine Documentation

13.30.1.1 grid__get_fine_offset_cc()

```
integer(i4) function, dimension(2,2) grid::grid_get_fine_offset::grid__get_fine_offset_cc (
            real(dp), dimension(:,:), intent(in) dd_lon0,
            real(dp), dimension(:,:), intent(in) dd_lat0,
            integer(i4), intent(in) id_imin0,
            integer(i4), intent(in) id_jmin0,
            integer(i4), intent(in) id_imax0,
            integer(i4), intent(in) id_jmax0,
            real(dp), dimension(:,:), intent(in) dd_lon1,
            real(dp), dimension(:,:), intent(in) dd_lat1,
            integer(i4), dimension(:), intent(in) id_rho,
            character(len=*), intent(in), optional cd_point )
```

This function get offset between fine grid and coarse grid.

offset value could be 0,1,..,rho-1

Author

J.Paul

Date

November, 2013 - Initial Version
September, 2014

- rename from grid_get_fine_offset

May, 2015

- improve way to find offset

July, 2015

- manage case close to greenwich meridian

February, 2016

- use grid_get_closest to assess offset
- use delta (lon or lat)
- manage cases for T,U,V or F point, with even or odd refinment
- check lower left(upper right) fine grid point inside lower left(upper right) coarse grid cell.

Todo check case close from North fold.

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_lon0*	coarse grid longitude array
in	*dd_lat0*	coarse grid latitude array

in	*id_imin0*	coarse grid lower left corner i-indice of fine grid domain
in	*id_jmin0*	coarse grid lower left corner j-indice of fine grid domain
in	*id_imax0*	coarse grid upper right corner i-indice of fine grid domain
in	*id_jmax0*	coarse grid upper right corner j-indice of fine grid domain
in	*dd_lon1*	fine grid longitude array
in	*dd_lat1*	fine grid latitude array
in	*id_rho*	array of refinement factor
in	*cd_point*	Arakawa grid point

Returns

offset array (/ (/i_offset_left,i_offset_right/),(/j_offset_lower,j_offset_upper/) /)

13.30.1.2 grid__get_fine_offset_cf()

```
integer(i4) function, dimension(2,2) grid::grid_get_fine_offset::grid__get_fine_offset_cf (
             real(dp), dimension(:,:), intent(in) dd_lon0,
             real(dp), dimension(:,:), intent(in) dd_lat0,
             integer(i4), intent(in) id_imin0,
             integer(i4), intent(in) id_jmin0,
             integer(i4), intent(in) id_imax0,
             integer(i4), intent(in) id_jmax0,
             type(tmpp), intent(in) td_coord1,
             integer(i4), dimension(:), intent(in), optional id_rho,
             character(len=*), intent(in), optional cd_point )
```

This function get offset between fine grid and coarse grid.

optionally, you could specify on which Arakawa grid point you want to work (default 'T') offset value could be 0,1,..,rho-1

Author

J.Paul

Date

September, 2014 - Initial Version
October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_lon0*	coarse grid longitude array
in	*dd_lat0*	coarse grid latitude array
in	*id_imin0*	coarse grid lower left corner i-indice of fine grid domain
in	*id_jmin0*	coarse grid lower left corner j-indice of fine grid domain
in	*id_imax0*	coarse grid upper right corner i-indice of fine grid domain
in	*id_jmax0*	coarse grid upper right corner j-indice of fine grid domain
in	*td_coord1*	fine grid coordinate
in	*id_rho*	array of refinement factor
in	*cd_point*	Arakawa grid point

Returns

offset array (/ (/i_offset_left,i_offset_right/),(/j_offset_lower,j_offset_upper/) /)

13.30.1.3 grid__get_fine_offset_fc()

```
integer(i4) function, dimension(2,2) grid::grid_get_fine_offset::grid__get_fine_offset_fc (
                type(tmpp), intent(in) td_coord0,
                integer(i4), intent(in) id_imin0,
                integer(i4), intent(in) id_jmin0,
                integer(i4), intent(in) id_imax0,
                integer(i4), intent(in) id_jmax0,
                real(dp), dimension(:,:), intent(in) dd_lon1,
                real(dp), dimension(:,:), intent(in) dd_lat1,
                integer(i4), dimension(:), intent(in), optional id_rho,
                character(len=*), intent(in), optional cd_point )
```

This function get offset between fine grid and coarse grid.

optionally, you could specify on which Arakawa grid point you want to work (default 'T') offset value could be 0,1,..,rho-1

Author

J.Paul

Date

September, 2014 - Initial Version
October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_coord0*	coarse grid coordinate
in	*id_imin0*	coarse grid lower left corner i-indice of fine grid domain
in	*id_jmin0*	coarse grid lower left corner j-indice of fine grid domain
in	*id_imax0*	coarse grid upper right corner i-indice of fine grid domain
in	*id_jmax0*	coarse grid upper right corner j-indice of fine grid domain
in	*dd_lon1*	fine grid longitude array
in	*dd_lat1*	fine grid latitude array
in	*id_rho*	array of refinement factor
in	*cd_point*	Arakawa grid point

Returns

offset array (/ (/i_offset_left,i_offset_right/),(/j_offset_lower,j_offset_upper/) /)

13.30.1.4 grid__get_fine_offset_ff()

```
integer(i4) function, dimension(2,2) grid::grid_get_fine_offset::grid__get_fine_offset_ff (
             type(tmpp), intent(in) td_coord0,
             integer(i4), intent(in) id_imin0,
             integer(i4), intent(in) id_jmin0,
             integer(i4), intent(in) id_imax0,
             integer(i4), intent(in) id_jmax0,
             type(tmpp), intent(in) td_coord1,
             integer(i4), dimension(:), intent(in), optional id_rho,
             character(len=*), intent(in), optional cd_point )
```

This function get offset between fine grid and coarse grid.

optionally, you could specify on which Arakawa grid point you want to work (default 'T') offset value could be 0,1,..,rho-1

Author

J.Paul

Date

September, 2014 - Initial Version
October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_coord0*	coarse grid coordinate
in	*id_imin0*	coarse grid lower left corner i-indice of fine grid domain
in	*id_jmin0*	coarse grid lower left corner j-indice of fine grid domain
in	*id_imax0*	coarse grid upper right corner i-indice of fine grid domain
in	*id_jmax0*	coarse grid upper right corner j-indice of fine grid domain
in	*td_coord1*	fine grid coordinate
in	*id_rho*	array of refinement factor
in	*cd_point*	Arakawa grid point

Returns

offset array (/ (/i_offset_left,i_offset_right/),(/j_offset_lower,j_offset_upper/) /)

The documentation for this interface was generated from the following file:

- src/grid.f90

13.31 grid::grid_get_ghost Interface Reference

Public Member Functions

- integer(i4) function, dimension(2, 2) grid__get_ghost_var (td_var)

  This function check if ghost cell are used or not, and return ghost cell factor (0,1) in horizontal plan.
- integer(i4) function, dimension(2, 2) grid__get_ghost_mpp (td_mpp)

  This function check if ghost cell are used or not, and return ghost cell factor (0,1) in i- and j-direction.

13.31.1 Member Function/Subroutine Documentation

13.31.1.1 grid__get_ghost_mpp()

```
integer(i4) function, dimension(2,2) grid::grid_get_ghost::grid__get_ghost_mpp (
             type(tmpp), intent(in) td_mpp )
```

This function check if ghost cell are used or not, and return ghost cell factor (0,1) in i- and j-direction.

get longitude an latitude array, then check if domain is global, and if there is an East-West overlap

Author

J.Paul

Date

September, 2014 - Initial Version
October, 2014

- work on mpp file structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file sturcture

Returns

array of ghost cell factor

13.31.1.2 grid__get_ghost_var()

```
integer(i4) function, dimension(2,2) grid::grid_get_ghost::grid__get_ghost_var (
            type(tvar), intent(in) td_var )
```

This function check if ghost cell are used or not, and return ghost cell factor (0,1) in horizontal plan.

check if domain is global, and if there is an East-West overlap.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	variable sturcture

Returns

array of ghost cell factor

The documentation for this interface was generated from the following file:

- src/grid.f90

13.32 grid::grid_get_info Interface Reference

Public Member Functions

- subroutine grid__get_info_mpp (td_mpp)
  This subroutine get information about global domain, given mpp strucutre.
- subroutine grid__get_info_file (td_file)
  This subroutine get information about global domain, given file strucutre.

13.32.1 Member Function/Subroutine Documentation

13.32.1.1 grid__get_info_file()

```
subroutine grid::grid_get_info::grid__get_info_file (
            type(tfile), intent(inout) td_file )
```

This subroutine get information about global domain, given file strucutre.

open edge files then:

- compute NEMO pivot point
- compute NEMO periodicity
- compute East West overlap

Note

need all processor files to be there

Author

J.Paul

Date

October, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure

13.32.1.2 grid__get_info_mpp()

```
subroutine grid::grid_get_info::grid__get_info_mpp (
            type(tmpp), intent(inout) td_mpp )
```

This subroutine get information about global domain, given mpp strucutre.

open edge files then:

- compute NEMO pivot point
- compute NEMO periodicity
- compute East West overlap

Note

need all processor files

Author

J.Paul

Date

October, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure

The documentation for this interface was generated from the following file:

- src/grid.f90

13.33 grid::grid_get_perio Interface Reference

Public Member Functions

- integer(i4) function grid__get_perio_mpp (td_mpp, id_pivot)

  This subroutine search NEMO periodicity given mpp structure and optionaly pivot point index.
- integer(i4) function grid__get_perio_file (td_file, id_pivot)

  This subroutine search NEMO periodicity index given file structure, and optionaly pivot point index.
- integer(i4) function grid__get_perio_var (td_var, id_pivot)

  This subroutine search NEMO periodicity index given variable structure and pivot point index.

13.33.1 Member Function/Subroutine Documentation

tfile

Warning

grid_get_pivot

Author

Date

Parameters

Parameters

in	*td_file*	file structure
in	*id_pivot*	pivot point index

13.33.1.2 grid__get_perio_mpp()

```
integer(i4) function grid::grid_get_perio::grid__get_perio_mpp (
            type(tmpp), intent(in) td_mpp,
            integer(i4), intent(in), optional id_pivot )
```

This subroutine search NEMO periodicity given mpp structure and optionaly pivot point index.

The variable used must be on T point.

0: closed boundaries 1: cyclic east-west boundary 2: symmetric boundary condition across the equator 3: North fold boundary (with a T-point pivot) 4: North fold boundary (with a T-point pivot) and cyclic east-west boundary 5: North fold boundary (with a F-point pivot) 6: North fold boundary (with a F-point pivot) and cyclic east-west boundary

Warning

pivot point should have been computed before run this script. see grid_get_pivot.

Author

J.Paul

Date

October, 2014 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp file structure
in	*id_pivot*	pivot point index

13.33.1.3 grid__get_perio_var()

```
integer(i4) function grid::grid_get_perio::grid__get_perio_var (
            type(tvar), intent(in) td_var,
            integer(i4), intent(in) id_pivot )
```

This subroutine search NEMO periodicity index given variable structure and pivot point index.

The variable must be on T point.

0: closed boundaries 1: cyclic east-west boundary 2: symmetric boundary condition across the equator 3: North fold boundary (with a T-point pivot) 4: North fold boundary (with a T-point pivot) and cyclic east-west boundary 5: North fold boundary (with a F-point pivot) 6: North fold boundary (with a F-point pivot) and cyclic east-west boundary

Warning

pivot point should have been computed before run this script. see grid_get_pivot.

Author

J.Paul

Date

November, 2013 - Initial version
October, 2014

- work on variable structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	variable structure
in	*id_pivot*	pivot point index

The documentation for this interface was generated from the following file:

- src/grid.f90

13.34 grid::grid_get_pivot Interface Reference

Public Member Functions

- integer(i4) function grid__get_pivot_mpp (td_mpp)

  This function compute NEMO pivot point index from input mpp variable.
- integer(i4) function grid__get_pivot_file (td_file)

  This function compute NEMO pivot point index from input file variable.
- integer(i4) function grid__get_pivot_var (td_var)

  This function compute NEMO pivot point index of the input variable.

13.34.1 Member Function/Subroutine Documentation

tfile

Warning

Author

Date

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_file*	file structure

Returns

pivot point index

13.34.1.2 grid__get_pivot_mpp()

```
integer(i4) function grid::grid_get_pivot::grid__get_pivot_mpp (
            type(tmpp), intent(in) td_mpp )
```

This function compute NEMO pivot point index from input mpp variable.

- F-point : 0
- T-point : 1

check north points of latitude grid (indices jpj to jpj-3) depending on which grid point (T,F,U,V) variable is defined

Warning

- do not work with ORCA2 grid (T-point)

Author

J.Paul

Date

October, 2014 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp file structure

Returns

pivot point index

13.34.1.3 grid__get_pivot_var()

```
integer(i4) function grid::grid_get_pivot::grid__get_pivot_var (
            type(tvar), intent(in) td_var )
```

This function compute NEMO pivot point index of the input variable.

- F-point : 0
- T-point : 1

check north points of latitude grid (indices jpj to jpj-3) depending on which grid point (T,F,U,V) variable is defined

Note

variable must be at least 2D variable, and should not be coordinate variable (i.e lon, lat)

Warning

- do not work with ORCA2 grid (T-point)

Author

J.Paul

Date

November, 2013 - Initial version
September, 2014

- add dummy loop in case variable not over right point.

October, 2014

- work on variable structure instead of file structure

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_lat*	latitude variable structure
in	*td_var*	variable structure

Returns

pivot point index

The documentation for this interface was generated from the following file:

- src/grid.f90

13.35 interp::interp_detect Interface Reference

Public Member Functions

- integer(i4) function, dimension(td_mix%t_dim(1)%i_len, td_mix%t_dim(2)%i_len, td_mix%t_dim(3)%i_len) interp__detect_wrapper (td_mix, id_rho)

  This function detected point to be interpolated.

13.35.1 Member Function/Subroutine Documentation

13.35.1.1 interp__detect_wrapper()

```
integer(i4) function, dimension(td_mix%t_dim(1)%i_len, td_mix%t_dim(2)%i_len, td_mix%t_↩
dim(3)%i_len ) interp::interp_detect::interp__detect_wrapper (
            type(tvar), intent(in) td_mix,
            integer(i4), dimension(:), intent(in), optional id_rho )
```

This function detected point to be interpolated.

Actually it checks, the number of dimension used for this variable and launch interp__detect which detected point to be interpolated.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mix*	mixed grid variable (to interpolate)
in	*id_rho*	array of refinement factor

Returns

3D array of detected point to be interpolated

The documentation for this interface was generated from the following file:

- src/interp.f90

13.36 interp::interp_fill_value Interface Reference

Public Member Functions

- subroutine interp__fill_value_wrapper (td_var, id_rho, id_offset)

  This subroutine interpolate variable value.

13.36.1 Member Function/Subroutine Documentation

13.36.1.1 interp__fill_value_wrapper()

```
subroutine interp::interp_fill_value::interp__fill_value_wrapper (
            type(tvar), intent(inout) td_var,
            integer(i4), dimension(:), intent(in), optional id_rho,
            integer(i4), dimension(:,:), intent(in), optional id_offset )
```

This subroutine interpolate variable value.

Actually it checks, the number of dimension used for this variable and launch interp__fill_value.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_var*	variable structure
in	*id_rho*	array of refinement factor
in	*id_offset*	2D array of offset between fine and coarse grid

The documentation for this interface was generated from the following file:

- src/interp.f90

13.37 iom_cdf::iom_cdf_fill_var Interface Reference

Public Member Functions

- subroutine iom_cdf__fill_var_id (td_file, id_varid, id_start, id_count)

  This subroutine fill variable value in an opened netcdf file, given variable id.
- subroutine iom_cdf__fill_var_name (td_file, cd_name, id_start, id_count)

  This subroutine fill variable value in an opened netcdf file, given variable name or standard name.
- subroutine iom_cdf__fill_var_all (td_file, id_start, id_count)

  This subroutine fill all variable value from an opened netcdf file.

13.37.1 Member Function/Subroutine Documentation

13.37.1.1 iom_cdf__fill_var_all()

```
subroutine iom_cdf::iom_cdf_fill_var::iom_cdf__fill_var_all (
            type(tfile), intent(inout) td_file,
            integer(i4), dimension(:), intent(in), optional id_start,
            integer(i4), dimension(:), intent(in), optional id_count )
```

This subroutine fill all variable value from an opened netcdf file.

Optionaly, start indices and number of indices selected along each dimension could be specify in a 4 dimension array (/'x','y','z','t'/)

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_file*	file structure
`in`	*id_start*	index in the variable from which the data values will be read
`in`	*id_count*	number of indices selected along each dimension

tfile

Author

Date

Parameters

Parameters

_

in	*id_count*	number of indices selected along each dimension

13.37.1.3 iom_cdf__fill_var_name()

```
subroutine iom_cdf::iom_cdf_fill_var::iom_cdf__fill_var_name (
            type(tfile), intent(inout) td_file,
            character(len=*), intent(in) cd_name,
            integer(i4), dimension(:), intent(in), optional id_start,
            integer(i4), dimension(:), intent(in), optional id_count )
```

This subroutine fill variable value in an opened netcdf file, given variable name or standard name.

Optionaly, start indices and number of indices selected along each dimension could be specify in a 4 dimension array (/'x','y','z','t'/)

look first for variable name. If it doesn't exist in file, look for variable standard name.

Author

Date

Parameters

Parameters

- src/iom_cdf.f90

13.38 iom_cdf::iom_cdf_read_att Interface Reference

Public Member Functions

- type(tatt) function iom_cdf__read_att_id (td_file, id_varid, id_attid)

  This function read variable or global attribute in an opened netcdf file, given attribute id.
- type(tatt) function iom_cdf__read_att_name (td_file, id_varid, cd_name)

  This function read variable or global attribute in an opened netcdf file, given attribute name.

13.38.1 Member Function/Subroutine Documentation

13.38.1.1 iom_cdf__read_att_id()

```
type(tatt) function iom_cdf::iom_cdf_read_att::iom_cdf__read_att_id (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in) id_varid,
            integer(i4), intent(in) id_attid )
```

This function read variable or global attribute in an opened netcdf file, given attribute id.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_varid*	variable id. use NF90_GLOBAL to read global attribute in a file
in	*id_attid*	attribute id

Returns

attribute structure

13.38.1.2 iom_cdf__read_att_name()

```
type(tatt) function iom_cdf::iom_cdf_read_att::iom_cdf__read_att_name (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in) id_varid,
            character(len=*), intent(in) cd_name )
```

This function read variable or global attribute in an opened netcdf file, given attribute name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_varid*	variable id. use NF90_GLOBAL to read global attribute in a file
in	*cd_name*	attribute name

Returns

attribute structure

The documentation for this interface was generated from the following file:

- src/iom_cdf.f90

13.39 iom_cdf::iom_cdf_read_dim Interface Reference

Public Member Functions

- type(tdim) function iom_cdf__read_dim_id (td_file, id_dimid)

    This function read one dimension in an opened netcdf file, given dimension id.
- type(tdim) function iom_cdf__read_dim_name (td_file, cd_name)

    This function read one dimension in an opened netcdf file, given dimension name.

13.39.1 Member Function/Subroutine Documentation

13.39.1.1 iom_cdf__read_dim_id()

```
type(tdim) function iom_cdf::iom_cdf_read_dim::iom_cdf__read_dim_id (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in) id_dimid )
```

This function read one dimension in an opened netcdf file, given dimension id.

Author

J.Paul

Date

November, 2013 - Initial Version
February, 2015 - create unused dimension, when reading dimension of length less or equal to zero

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_dimid*	dimension id

Returns

dimension structure

13.39.1.2 iom_cdf__read_dim_name()

```
type(tdim) function iom_cdf::iom_cdf_read_dim::iom_cdf__read_dim_name (
            type(tfile), intent(in) td_file,
            character(len=*), intent(in) cd_name )
```

This function read one dimension in an opened netcdf file, given dimension name.

Author

J.Paul

Date

Parameters

Parameters

Returns

13.40 iom_cdf::iom_cdf_read_var Interface Reference

Public Member Functions

- type(tvar) function iom_cdf__read_var_id (td_file, id_varid, id_start, id_count)

  This function read variable value in an opened netcdf file, given variable id.
- type(tvar) function iom_cdf__read_var_name (td_file, cd_name, id_start, id_count)

  This function read variable value in an opened netcdf file, given variable name or standard name.

13.40.1 Member Function/Subroutine Documentation

13.40.1.1 iom_cdf__read_var_id()

```
type(tvar) function iom_cdf::iom_cdf_read_var::iom_cdf__read_var_id (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in) id_varid,
            integer(i4), dimension(:), intent(in), optional id_start,
            integer(i4), dimension(:), intent(in), optional id_count )
```

This function read variable value in an opened netcdf file, given variable id.

Optionaly, start indices and number of indices selected along each dimension could be specify in a 4 dimension array (/'x','y','z','t'/)

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_varid*	variable id
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

13.40.1.2 iom_cdf__read_var_name()

```
type(tvar) function iom_cdf::iom_cdf_read_var::iom_cdf__read_var_name (
            type(tfile), intent(in) td_file,
            character(len=*), intent(in), optional cd_name,
            integer(i4), dimension(:), intent(in), optional id_start,
            integer(i4), dimension(:), intent(in), optional id_count )
```

This function read variable value in an opened netcdf file, given variable name or standard name.

Optionaly, start indices and number of indices selected along each dimension could be specify in a 4 dimension array (/'x','y','z','t'/)

look first for variable name. If it doesn't exist in file, look for variable standard name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*cd_name*	variable name or standard name.
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

The documentation for this interface was generated from the following file:

- src/iom_cdf.f90

13.41 iom_dom::iom_dom_read_var Interface Reference

Public Member Functions

- type(tvar) function iom_dom__read_var_id (td_mpp, id_varid, td_dom)

  This function read variable value in opened mpp files, given variable id and domain strcuture.
- type(tvar) function iom_dom__read_var_name (td_mpp, cd_name, td_dom)

  This function read variable value in opened mpp files, given variable name or standard name, and domain structure.

13.41.1 Member Function/Subroutine Documentation

13.41.1.1 iom_dom__read_var_id()

```
type(tvar) function iom_dom::iom_dom_read_var::iom_dom__read_var_id (
            type(tmpp), intent(in) td_mpp,
            integer(i4), intent(in) id_varid,
            type(tdom), intent(in) td_dom )
```

This function read variable value in opened mpp files, given variable id and domain strcuture.

Optionally start indices and number of point to be read could be specify. as well as East West ovelap of the global domain.

Author

J.Paul

Date

October, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure
in	*id_varid*	variable id
in	*td_dom*	domain structure

Returns

variable structure

13.41.1.2 iom_dom__read_var_name()

```
type(tvar) function iom_dom::iom_dom_read_var::iom_dom__read_var_name (
            type(tmpp), intent(in) td_mpp,
            character(len=*), intent(in) cd_name,
            type(tdom), intent(in) td_dom )
```

This function read variable value in opened mpp files, given variable name or standard name, and domain structure.

Optionally start indices and number of point to be read could be specify. as well as East West ovelap of the global domain.

look first for variable name. If it doesn't exist in file, look for variable standard name.
If variable name is not present, check variable standard name.

Author

J.Paul

Date

October, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure
in	*cd_name*	variable name
in	*td_dom*	domain structure

Returns

variable structure

The documentation for this interface was generated from the following file:

- src/iom_dom.f90

13.42 iom_mpp::iom_mpp_read_var Interface Reference

Public Member Functions

- type(tvar) function iom_mpp__read_var_id (td_mpp, id_varid, id_start, id_count)
  This function read variable value in opened mpp files, given variable id.
- type(tvar) function iom_mpp__read_var_name (td_mpp, cd_name, id_start, id_count)
  This function read variable value in opened mpp files, given variable name or standard name.

13.42.1 Member Function/Subroutine Documentation

13.42.1.1 iom_mpp__read_var_id()

```
type(tvar) function iom_mpp::iom_mpp_read_var::iom_mpp__read_var_id (
             type(tmpp), intent(in) td_mpp,
             integer(i4), intent(in) id_varid,
             integer(i4), dimension(:), intent(in), optional id_start,
             integer(i4), dimension(:), intent(in), optional id_count )
```

This function read variable value in opened mpp files, given variable id.

Optionally start indices and number of point to be read could be specify. as well as East West ovelap of the global domain.

Author

J.Paul

Date

November, 2013 - Initial Version
October, 2014

- use start and count array instead of domain structure.

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure
in	*id_varid*	variable id
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

13.42.1.2 iom_mpp__read_var_name()

```
type(tvar) function iom_mpp::iom_mpp_read_var::iom_mpp__read_var_name (
              type(tmpp), intent(in) td_mpp,
              character(len=*), intent(in) cd_name,
              integer(i4), dimension(:), intent(in), optional id_start,
              integer(i4), dimension(:), intent(in), optional id_count )
```

This function read variable value in opened mpp files, given variable name or standard name.

Optionally start indices and number of point to be read could be specify. as well as East West ovelap of the global domain.

look first for variable name. If it doesn't exist in file, look for variable standard name.
If variable name is not present, check variable standard name.

Author

J.Paul

Date

November, 2013 - Initial Version
October, 2014

- use start and count array instead of domain structure.

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure
in	*cd_name*	variable name
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

The documentation for this interface was generated from the following file:

- src/iom_mpp.f90

13.43 iom::iom_read_att Interface Reference

Public Member Functions

- type(tatt) function iom__read_att_varname_id (td_file, cd_varname, id_attid)

  This function read attribute (of variable or global) in an opened file, given variable name or standard name and attribute id.
- **given**
- **variable**
- **name**
- **or**
- **standard**
- **name**
- **and**
- **attribute**
- **id**
- type(tatt) function iom__read_att_varid_id (td_file, id_varid, id_attid)

  This function read attribute (of variable or global) in an opened file, given variable id and attribute id.
- **given**
- **variable**
- **id**
- **and**
- **attribute**
- **id**
- type(tatt) function iom__read_att_varname_name (td_file, cd_varname, cd_attname)

  This function read attribute (of variable or global) in an opened file, given variable name or standard name, and attribute name.
- **given**
- **variable**
- **name**
- **or**
- **standard**
- **name**
- **and**
- **attribute**
- **name**
- type(tatt) function iom__read_att_varid_name (td_file, id_varid, cd_attname)

  This function read attribute (of variable or global) in an opened file, given variable id and attribute name.
- **given**
- **variable**
- **id**
- **and**
- **attribute**
- **name**

13.43.1 Member Function/Subroutine Documentation

13.43.1.1 iom__read_att_varid_id()

```
type(tatt) function iom::iom_read_att::iom__read_att_varid_id (
             type(tfile), intent(in) td_file,
             integer(i4), intent(in) id_varid,
             integer(i4), intent(in) id_attid )
```

This function read attribute (of variable or global) in an opened file, given variable id and attribute id.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_file*	file structure
`in`	*id_varid*	variable id. use NF90_GLOBAL to read global attribute in a file
`in`	*id_attid*	attribute id

Returns

attribute structure

13.43.1.2 iom__read_att_varid_name()

```
type(tatt) function iom::iom_read_att::iom__read_att_varid_name (
             type(tfile), intent(in) td_file,
             integer(i4), intent(in) id_varid,
             character(len=*), intent(in) cd_attname )
```

This function read attribute (of variable or global) in an opened file, given variable id and attribute name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_varid*	variable id. use NF90_GLOBAL to read global attribute in a file
in	*cd_attname*	attribute name

Returns

attribute structure

13.43.1.3 iom__read_att_varname_id()

```
type(tatt) function iom::iom_read_att::iom__read_att_varname_id (
            type(tfile), intent(in) td_file,
            character(len=lc), intent(in) cd_varname,
            integer(i4), intent(in) id_attid )
```

This function read attribute (of variable or global) in an opened file, given variable name or standard name and attribute id.

- to get global attribute use 'GLOBAL' as variable name.

  Author

  J.Paul

  Date

  November, 2013 - Initial Version

  =1mm

  spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

  Parameters

in	*td_file*	file structure
in	*cd_varname*	variable name. use 'GLOBAL' to read global attribute in a file
in	*id_attid*	attribute id

  Returns

  attribute structure

13.43.1.4 iom__read_att_varname_name()

```
type(tatt) function iom::iom_read_att::iom__read_att_varname_name (
            type(tfile), intent(in) td_file,
            character(len=*), intent(in) cd_varname,
            character(len=*), intent(in) cd_attname )
```

This function read attribute (of variable or global) in an opened file, given variable name or standard name, and attribute name.

- to get global attribute use 'GLOBAL' as variable name.

  Author

  J.Paul

  Date

  November, 2013 - Initial Version

  =1mm

  spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*cd_varname*	variable name or standard name. use 'GLOBAL' to read global attribute in a file
in	*cd_attname*	attribute name

Returns

attribute structure

The documentation for this interface was generated from the following file:

- src/iom.f90

13.44 iom::iom_read_dim Interface Reference

Public Member Functions

- type(tdim) function iom__read_dim_id (td_file, id_dimid)

  This function read one dimension in an opened file, given dimension id.
- type(tdim) function iom__read_dim_name (td_file, cd_name)

  This function read one dimension in an opened netcdf file, given dimension name.

13.44.1 Member Function/Subroutine Documentation

13.44.1.1 iom__read_dim_id()

```
type(tdim) function iom::iom_read_dim::iom__read_dim_id (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in) id_dimid )
```

This function read one dimension in an opened file, given dimension id.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_dimid*	dimension id

Returns

dimension structure

13.44.1.2 iom__read_dim_name()

```
type(tdim) function iom::iom_read_dim::iom__read_dim_name (
            type(tfile), intent(in) td_file,
            character(len=*), intent(in) cd_name )
```

This function read one dimension in an opened netcdf file, given dimension name.

Author

J.Paul

Date

Parameters

Parameters

Returns

13.45 iom::iom_read_var Interface Reference

Public Member Functions

- type(tvar) function iom__read_var_id (td_file, id_varid, id_start, id_count)

  This function read variable value in an opened file, given variable id.
- type(tvar) function iom__read_var_name (td_file, cd_name, id_start, id_count)

  This function read variable value in an opened file, given variable name or standard name.

13.45.1 Member Function/Subroutine Documentation

13.45.1.1 iom__read_var_id()

```
type(tvar) function iom::iom_read_var::iom__read_var_id (
             type(tfile), intent(in) td_file,
             integer(i4), intent(in) id_varid,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_start,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_count )
```

This function read variable value in an opened file, given variable id.

start indices and number of indices selected along each dimension could be specify in a 4 dimension array (/'x','y','z','t'/)

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_varid*	variable id
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

13.45.1.2 iom__read_var_name()

```
type(tvar) function iom::iom_read_var::iom__read_var_name (
              type(tfile), intent(in) td_file,
              character(len=*), intent(in) cd_name,
              integer(i4), dimension(:), intent(in), optional id_start,
              integer(i4), dimension(:), intent(in), optional id_count )
```

This function read variable value in an opened file, given variable name or standard name.

start indices and number of indices selected along each dimension could be specify in a 4 dimension array (/'x','y','z','t'/)

look first for variable name. If it doesn't exist in file, look for variable standard name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*cd_name*	variable name or standard name
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

The documentation for this interface was generated from the following file:

- src/iom.f90

13.46 iom_rstdimg::iom_rstdimg_read_dim Interface Reference

Public Member Functions

- type(tdim) function iom_rstdimg__read_dim_id (td_file, id_dimid)
  This function read one dimension in an opened netcdf file, given dimension id.
- type(tdim) function iom_rstdimg__read_dim_name (td_file, cd_name)
  This function read one dimension in an opened netcdf file, given dimension name.

13.46.1 Member Function/Subroutine Documentation

13.46.1.1 iom_rstdimg__read_dim_id()

```
type(tdim) function iom_rstdimg::iom_rstdimg_read_dim::iom_rstdimg__read_dim_id (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in) id_dimid )
```

This function read one dimension in an opened netcdf file, given dimension id.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*id_dimid*	dimension id

Returns

dimension structure

13.46.1.2 iom_rstdimg__read_dim_name()

```
type(tdim) function iom_rstdimg::iom_rstdimg_read_dim::iom_rstdimg__read_dim_name (
            type(tfile), intent(in) td_file,
            character(len=*), intent(in) cd_name )
```

This function read one dimension in an opened netcdf file, given dimension name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*cd_name*	dimension name

Returns

dimension structure

The documentation for this interface was generated from the following file:

- src/iom_rstdimg.f90

13.47 iom_rstdimg::iom_rstdimg_read_var Interface Reference

Public Member Functions

- type(tvar) function iom_rstdimg__read_var_id (td_file, id_varid, id_start, id_count)
  This function read variable value in an opened dimg file, given variable id.
- type(tvar) function iom_rstdimg__read_var_name (td_file, cd_name, id_start, id_count)
  This function read variable value in an opened dimg file, given variable name or standard name.

13.47.1 Member Function/Subroutine Documentation

tvar
tfile

Author

Date

Parameters

Parameters

in	*td_file*	file structure
in	*id_varid*	variable id
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

13.47.1.2 iom_rstdimg__read_var_name()

```
type(tvar) function iom_rstdimg::iom_rstdimg_read_var::iom_rstdimg__read_var_name (
            type(tfile), intent(in) td_file,
            character(len=*), intent(in) cd_name,
            integer(i4), dimension(:), intent(in), optional id_start,
            integer(i4), dimension(:), intent(in), optional id_count )
```

This function read variable value in an opened dimg file, given variable name or standard name.

Optionaly, start indices and number of indices selected along each dimension could be specify in a 4 dimension array (/'x','y','z','t'/) look first for variable name. If it doesn't exist in file, look for variable standard name.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_file*	file structure
in	*cd_name*	variable name or standard name
in	*id_start*	index in the variable from which the data values will be read
in	*id_count*	number of indices selected along each dimension

Returns

variable structure

The documentation for this interface was generated from the following file:

- src/iom_rstdimg.f90

13.48 math::math_mean Interface Reference

Public Member Functions

- pure real(dp) function math__mean_1d (dd_array, dd_fill)

  This function compute the mean of a 1D array.
- pure real(dp) function math__mean_2d (dd_array, dd_fill)

  This function compute the mean of a 2D array.

13.48.1 Member Function/Subroutine Documentation

13.48.1.1 math__mean_1d()

```
pure real(dp) function math::math_mean::math__mean_1d (
            real(dp), dimension(:), intent(in) dd_array,
            real(dp), intent(in), optional dd_fill )
```

This function compute the mean of a 1D array.

Author

J.Paul

Date

January, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_array*	1D array
in	*dd_fill*	fillValue

Returns

mean value, real(dp)

13.48.1.2 math__mean_2d()

```
pure real(dp) function math::math_mean::math__mean_2d (
            real(dp), dimension(:,:), intent(in) dd_array,
            real(dp), intent(in), optional dd_fill )
```

This function compute the mean of a 2D array.

Author

J.Paul

Date

January, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_array*	2D array
in	*dd_fill*	fillValue

Returns

mean value, real(dp)

The documentation for this interface was generated from the following file:

- src/math.f90

13.49 math::math_median Interface Reference

Public Member Functions

- pure real(dp) function math__median_1d (dd_array, dd_fill)

  This function compute the median of a 1D array.
- pure real(dp) function math__median_2d (dd_array, dd_fill)

  This function compute the median of a 2D array.

13.49.1 Member Function/Subroutine Documentation

13.49.1.1 math__median_1d()

```
pure real(dp) function math::math_median::math__median_1d (
             real(dp), dimension(:), intent(in) dd_array,
             real(dp), intent(in), optional dd_fill )
```

This function compute the median of a 1D array.

Author

J.Paul

Date

January, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*dd_array*	1D array
`in`	*dd_fill*	fillValue

Returns

median value, real(dp)

13.49.1.2 math__median_2d()

```
pure real(dp) function math::math_median::math__median_2d (
             real(dp), dimension(:,:), intent(in) dd_array,
             real(dp), intent(in), optional dd_fill )
```

This function compute the median of a 2D array.

Author

J.Paul

Date

[redacted]

Parameters

[redacted]

Parameters

[redacted]

Returns

[redacted]

13.50 math::math_mwe Interface Reference

Public Member Functions

- pure real(dp) function math__mwe_1d (dd_array, id_next, dd_fill)

    This function compute the mean without extremum of a 1D array.
- pure real(dp) function math__mwe_2d (dd_array, id_next, dd_fill)

    This function compute the mean without extremum of a 2D array.

13.50.1 Member Function/Subroutine Documentation

13.50.1.1 math__mwe_1d()

```
pure real(dp) function math::math_mwe::math__mwe_1d (
             real(dp), dimension(:), intent(in) dd_array,
             integer(i4), intent(in), optional id_next,
             real(dp), intent(in), optional dd_fill )
```

This function compute the mean without extremum of a 1D array.

Author

J.Paul

Date

January, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*dd_array*	1D array
`in`	*id_next*	number of extremum to be removed
`in`	*dd_fill*	fillValue

Returns

median value, real(dp)

13.50.1.2 math__mwe_2d()

```
pure real(dp) function math::math_mwe::math__mwe_2d (
             real(dp), dimension(:,:), intent(in) dd_array,
             integer(i4), intent(in), optional id_next,
             real(dp), intent(in), optional dd_fill )
```

This function compute the mean without extremum of a 2D array.

Author

J.Paul

Date

January, 2015 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*dd_array*	2D array
in	*id_next*	number of extremum to be removed
in	*dd_fill*	fillValue

Returns

median value, real(dp)

The documentation for this interface was generated from the following file:

- src/math.f90

13.51 mpp::mpp__add_proc Interface Reference

Public Member Functions

- subroutine mpp__add_proc_unit (td_mpp, td_proc)

13.51.1 Member Function/Subroutine Documentation

13.51.1.1 mpp__add_proc_unit()

```
subroutine mpp::mpp__add_proc::mpp__add_proc_unit (
            type(tmpp), intent(inout) td_mpp,
            type(tfile), intent(in) td_proc )
```

This subroutine add processor to mpp structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture
in	*td_proc*	processor strcuture

Todo

- check proc type

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.52 mpp::mpp__check_dim Interface Reference

Public Member Functions

- logical function mpp__check_proc_dim (td_mpp, td_proc)

  This function check if variable and mpp structure use same dimension.
- **check**
- **if**
- **processor**
- **and**
- **mpp**
- **structure**
- **use**
- **same**
- **dimension**
- logical function mpp__check_var_dim (td_mpp, td_var)

  This function check if variable and mpp structure use same dimension.
- **check**
- **if**
- **variable**
- **and**
- **mpp**
- **structure**
- **use**
- **same**
- **dimension**

tmpp
tfile

Author

Date

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_mpp*	mpp structure
`in`	*td_proc*	processor structure

Returns

dimension of processor and mpp structure agree (or not)

13.52.1.2 mpp__check_var_dim()

```
logical function mpp::mpp__check_dim::mpp__check_var_dim (
            type(tmpp), intent(in) td_mpp,
            type(tvar), intent(in) td_var )
```

This function check if variable and mpp structure use same dimension.

Author

J.Paul

Date

November, 2013 - Initial Version
September 2015

- do not check used dimension here

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure
in	*td_var*	variable structure

Returns

dimension of variable and mpp structure agree (or not)

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.53 mpp::mpp__del_proc Interface Reference

Public Member Functions

- subroutine mpp__del_proc_id (td_mpp, id_procid)
  This subroutine delete processor in mpp structure, given processor id.
- subroutine mpp__del_proc_str (td_mpp, td_proc)
  This subroutine delete processor in mpp structure, given processor structure.

13.53.1 Member Function/Subroutine Documentation

13.53.1.1 mpp__del_proc_id()

```
subroutine mpp::mpp__del_proc::mpp__del_proc_id (
             type(tmpp), intent(inout) td_mpp,
             integer(i4), intent(in) id_procid )
```

This subroutine delete processor in mpp structure, given processor id.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture
`in`	*id_procid*	processor id

13.53.1.2 mpp__del_proc_str()

```
subroutine mpp::mpp__del_proc::mpp__del_proc_str (
             type(tmpp), intent(inout) td_mpp,
             type(tfile), intent(in) td_proc )
```

This subroutine delete processor in mpp structure, given processor structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	: mpp strcuture
`in`	*td_proc*	: file/processor structure

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.54 mpp::mpp_clean Interface Reference

Public Member Functions

- subroutine mpp__clean_unit (td_mpp)

  This subroutine clean mpp strcuture.
- subroutine mpp__clean_arr (td_mpp)

  This subroutine clean mpp strcuture.

13.54.1 Member Function/Subroutine Documentation

13.54.1.1 mpp__clean_arr()

```
subroutine mpp::mpp_clean::mpp__clean_arr (
            type(tmpp), dimension(:), intent(inout) td_mpp )
```

This subroutine clean mpp strcuture.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture

13.54.1.2 mpp__clean_unit()

```
subroutine mpp::mpp_clean::mpp__clean_unit (
             type(tmpp), intent(inout) td_mpp )
```

This subroutine clean mpp strcuture.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.55 mpp::mpp_copy Interface Reference

Public Member Functions

- type(tmpp) function mpp__copy_unit (td_mpp)

  This subroutine copy mpp structure in another one.
- type(tmpp) function, dimension(size(td_mpp(:))) mpp__copy_arr (td_mpp)

  This subroutine copy an array of mpp structure in another one.

13.55.1 Member Function/Subroutine Documentation

13.55.1.1 mpp__copy_arr()

```
type(tmpp) function, dimension(size(td_mpp(:)))  mpp::mpp_copy::mpp__copy_arr (
            type(tmpp), dimension(:), intent(in) td_mpp )
```

This subroutine copy an array of mpp structure in another one.

mpp file are copied in a temporary array, so input and output mpp structure do not point on the same "memory cell", and so on are independant.

Warning

do not use on the output of a function who create or read an structure (ex: tl_file=file_copy(file_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_mpp*	mpp structure

Returns

copy of input array of mpp structure

13.55.1.2 mpp__copy_unit()

```
type(tmpp) function mpp::mpp_copy::mpp__copy_unit (
              type(tmpp), intent(in) td_mpp )
```

This subroutine copy mpp structure in another one.

mpp file are copied in a temporary array, so input and output mpp structure do not point on the same "memory cell", and so on are independant.

Warning

do not use on the output of a function who create or read an structure (ex: tl_file=file_copy(file_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_mpp*	mpp structure

Returns

copy of input mpp structure

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.56 mpp::mpp_del_att Interface Reference

Public Member Functions

- subroutine mpp__del_att_name (td_mpp, cd_name)
  This subroutine delete attribute in mpp structure, given attribute name.
- subroutine mpp__del_att_str (td_mpp, td_att)
  This subroutine delete attribute in mpp structure, given attribute structure.

13.56.1 Member Function/Subroutine Documentation

13.56.1.1 mpp__del_att_name()

```
subroutine mpp::mpp_del_att::mpp__del_att_name (
             type(tmpp), intent(inout) td_mpp,
             character(len=*), intent(in) cd_name )
```

This subroutine delete attribute in mpp structure, given attribute name.

Author

J.Paul

Date

November, 2013 - Initial version
February, 2015

- define local attribute structure to avoid mistake with pointer

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture
in	*cd_name*	attribute name

13.56.1.2 mpp__del_att_str()

```
subroutine mpp::mpp_del_att::mpp__del_att_str (
             type(tmpp), intent(inout) td_mpp,
             type(tatt), intent(in) td_att )
```

This subroutine delete attribute in mpp structure, given attribute structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture
`in`	*td_att*	attribute strcuture

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.57 mpp::mpp_del_var Interface Reference

Public Member Functions

- subroutine mpp__del_var_name (td_mpp, cd_name)
  This subroutine delete variable in mpp structure, given variable name.
- subroutine mpp__del_var_str (td_mpp, td_var)
  This subroutine delete variable in mpp structure, given variable structure.
- subroutine mpp__del_var_mpp (td_mpp)
  This subroutine delete all variable in mpp strcuture.

13.57.1 Member Function/Subroutine Documentation

13.57.1.1 mpp__del_var_mpp()

```
subroutine mpp::mpp_del_var::mpp__del_var_mpp (
            type(tmpp), intent(inout) td_mpp )
```

This subroutine delete all variable in mpp strcuture.

Author

J.Paul

Date

October, 2014 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture

13.57.1.2 mpp__del_var_name()

```
subroutine mpp::mpp_del_var::mpp__del_var_name (
            type(tmpp), intent(inout) td_mpp,
            character(len=*), intent(in) cd_name )
```

This subroutine delete variable in mpp structure, given variable name.

Author

J.Paul

Date

November, 2013 - Initial version
February, 2015

- define local variable structure to avoid mistake with pointer

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture
`in`	*cd_name*	variable name

13.57.1.3 mpp__del_var_str()

```
subroutine mpp::mpp_del_var::mpp__del_var_str (
            type(tmpp), intent(inout) td_mpp,
            type(tvar), intent(in) td_var )
```

This subroutine delete variable in mpp structure, given variable structure.

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_mpp*	mpp strcuture
`in`	*td_var*	variable strcuture

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.58 mpp::mpp_get_use Interface Reference

Public Member Functions

- subroutine mpp__get_use_unit (td_mpp, id_imin, id_imax, id_jmin, id_jmax)
  This subroutine get sub domains which cover "zoom domain".

13.58.1 Member Function/Subroutine Documentation

13.58.1.1 mpp__get_use_unit()

```
subroutine mpp::mpp_get_use::mpp__get_use_unit (
            type(tmpp), intent(inout) td_mpp,
            integer(i4), intent(in), optional id_imin,
            integer(i4), intent(in), optional id_imax,
            integer(i4), intent(in), optional id_jmin,
            integer(i4), intent(in), optional id_jmax )
```

This subroutine get sub domains which cover "zoom domain".

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_mpp*	mpp strcuture
in	*id_imin*	i-direction lower indice
in	*id_imax*	i-direction upper indice
in	*id_jmin*	j-direction lower indice
in	*id_jmax*	j-direction upper indice

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.59 mpp::mpp_init Interface Reference

Public Member Functions

- type(tmpp) function mpp__init_mask (cd_file, id_mask, id_niproc, id_njproc, id_nproc, id_preci, id_precj, cd↩ _type, id_ew, id_perio, id_pivot, td_dim)

  This function initialise mpp structure, given file name, and optionaly mask and number of processor following I and J .
- type(tmpp) function mpp__init_var (cd_file, td_var, id_niproc, id_njproc, id_nproc, id_preci, id_precj, cd_type, id_perio, id_pivot)

  This function initialise mpp structure, given variable strcuture and optionaly number of processor following I and J .
- type(tmpp) function mpp__init_file (td_file, id_ew, id_perio, id_pivot)

  This function initalise a mpp structure given file structure.

13.59.1 Member Function/Subroutine Documentation

13.59.1.1 mpp__init_file()

```
type(tmpp) function mpp::mpp_init::mpp__init_file (
            type(tfile), intent(in) td_file,
            integer(i4), intent(in), optional id_ew,
            integer(i4), intent(in), optional id_perio,
            integer(i4), intent(in), optional id_pivot )
```

This function initalise a mpp structure given file structure.

It reads restart dimg files, or some netcdf files.

Warning

netcdf file must contains some attributes:

- DOMAIN_number_total
- DOMAIN_size_global
- DOMAIN_number
- DOMAIN_position_first
- DOMAIN_position_last
- DOMAIN_halo_size_start
- DOMAIN_halo_size_end or the file is assume to be no mpp file.

Author

J.Paul

Date

November, 2013 - Initial Version
January, 2016

- mismatch with "halo" indices, use mpp__compute_halo

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_file*	file strcuture
in	*id_ew*	east-west overlap
in	*id_perio*	NEMO periodicity index
in	*id_pivot*	NEMO pivot point index F(0),T(1)

Returns

mpp structure

13.59.1.2 mpp__init_mask()

```
type(tmpp) function mpp::mpp_init::mpp__init_mask (
              character(len=*), intent(in) cd_file,
              integer(i4), dimension(:,:), intent(in) id_mask,
              integer(i4), intent(in), optional id_niproc,
              integer(i4), intent(in), optional id_njproc,
              integer(i4), intent(in), optional id_nproc,
              integer(i4), intent(in), optional id_preci,
              integer(i4), intent(in), optional id_precj,
              character(len=*), intent(in), optional cd_type,
              integer(i4), intent(in), optional id_ew,
              integer(i4), intent(in), optional id_perio,
              integer(i4), intent(in), optional id_pivot,
              type(tdim), dimension(ip_maxdim), intent(in), optional td_dim )
```

This function initialise mpp structure, given file name, and optionaly mask and number of processor following I and J .

- If no total number of processor is defined (id_nproc), optimize the domain decomposition (look for the domain decomposition with the most land processor to remove)
- length of the overlap region (id_preci, id_precj) could be specify in I and J direction (default value is 1)

Author

J.Paul

Date

November, 2013 - Initial version
September, 2015

- allow to define dimension with array of dimension structure

Date

January, 2016

- use RESULT to rename output
- mismatch with "halo" indices =1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_file*	file name of one file composing mpp domain
in	*id_mask*	domain mask
in	*id_niproc*	number of processors following i
in	*id_njproc*	number of processors following j
in	*id_nproc*	total number of processors
in	*id_preci*	i-direction overlap region
in	*id_precj*	j-direction overlap region
in	*cd_type*	type of the files (cdf, cdf4, dimg)
in	*id_ew*	east-west overlap
in	*id_perio*	NEMO periodicity index
in	*id_pivot*	NEMO pivot point index F(0),T(1)
in	*td_dim*	array of dimension structure

Returns

mpp structure

13.59.1.3 mpp__init_var()

```
type(tmpp) function mpp::mpp_init::mpp__init_var (
            character(len=*), intent(in) cd_file,
            type(tvar), intent(in) td_var,
            integer(i4), intent(in), optional id_niproc,
            integer(i4), intent(in), optional id_njproc,
            integer(i4), intent(in), optional id_nproc,
            integer(i4), intent(in), optional id_preci,
            integer(i4), intent(in), optional id_precj,
            character(len=*), intent(in), optional cd_type,
            integer(i4), intent(in), optional id_perio,
            integer(i4), intent(in), optional id_pivot )
```

This function initialise mpp structure, given variable strcuture and optionaly number of processor following I and J .

- If no total number of processor is defined (id_nproc), optimize the domain decomposition (look for the domain decomposition with the most land processor to remove)
- length of the overlap region (id_preci, id_precj) could be specify in I and J direction (default value is 1)

Author

J.Paul

Date

November, 2013 - Initial version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_file*	file name of one file composing mpp domain
in	*td_var*	variable structure
in	*id_niproc*	number of processors following i
in	*id_njproc*	number of processors following j
in	*id_nproc*	total number of processors
in	*id_preci*	i-direction overlap region
in	*id_precj*	j-direction overlap region
in	*cd_type*	type of the files (cdf, cdf4, dimg)
in	*id_perio*	NEMO periodicity index
in	*id_pivot*	NEMO pivot point index F(0),T(1)

Returns

mpp structure

The documentation for this interface was generated from the following file:

- src/mpp.f90

13.60 multi::multi_copy Interface Reference

Public Member Functions

- type(tmulti) function multi__copy_unit (td_multi)

  This function copy multi mpp structure in another one.

13.60.1 Member Function/Subroutine Documentation

13.60.1.1 multi__copy_unit()

```
type(tmulti) function multi::multi_copy::multi__copy_unit (
            type(tmulti), intent(in) td_multi )
```

This function copy multi mpp structure in another one.

file variable value are copied in a temporary array, so input and output file structure value do not point on the same "memory cell", and so on are independant.

Warning

do not use on the output of a function who create or read an attribute (ex: tl_att=att_copy(att_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_multi*	mpp structure

Returns

copy of input multi structure

The documentation for this interface was generated from the following file:

- src/multi.f90

13.61 date::operator(+) Interface Reference

Public Member Functions

- type(tdate) function date__addnday (td_date, dd_nday)

  This function add nday to a date: date2 = date1 + nday.

13.61.1 Member Function/Subroutine Documentation

13.61.1.1 date__addnday()

```
type(tdate) function date::operator(+)::date__addnday (
            type(tdate), intent(in) td_date,
            real(dp), intent(in) dd_nday )
```

This function add nday to a date: date2 = date1 + nday.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_date*	date strutcutre
in	*dd_nday*	number of day

Returns

date strutcutre of date + nday

The documentation for this interface was generated from the following file:

- src/date.f90

13.62 date::operator(-) Interface Reference

Public Member Functions

- type(tdate) function date__subnday (td_date, dd_nday)

  This function substract nday to a date: date2 = date1 - nday.
- real(dp) function date__diffdate (td_date1, td_date2)

  This function compute number of day between two dates: nday= date1 - date2.

13.62.1 Member Function/Subroutine Documentation

13.62.1.1 date__diffdate()

```
real(dp) function date::operator(-)::date__diffdate (
            type(tdate), intent(in) td_date1,
            type(tdate), intent(in) td_date2 )
```

This function compute number of day between two dates: nday= date1 - date2.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_date1*	first date strutcutre
in	*td_date2*	second date strutcutre

Returns

nday

13.62.1.2 date__subnday()

```
type(tdate) function date::operator(-)::date__subnday (
             type(tdate), intent(in) td_date,
             real(dp), intent(in) dd_nday )
```

This function substract nday to a date: date2 = date1 - nday.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]Parameters

Parameters

in	*td_date*	date strutcutre
in	*dd_nday*	number of day

Returns

date strutcutre of date - nday

The documentation for this interface was generated from the following file:

- src/date.f90

13.63 fct::operator(//) Interface Reference

Public Member Functions

- pure character(len=lc) function fct__i1_cat (cd_char, bd_val)

  This function concatenate character and integer(1) (as character).
- pure character(len=lc) function fct__i2_cat (cd_char, sd_val)

  This function concatenate character and integer(2) (as character).
- pure character(len=lc) function fct__i4_cat (cd_char, id_val)

  This function concatenate character and integer(4) (as character).
- pure character(len=lc) function fct__i8_cat (cd_char, kd_val)

  This function concatenate character and integer(8) (as character).
- pure character(len=lc) function fct__r4_cat (cd_char, rd_val)

  This function concatenate character and real(4) (as character).
- pure character(len=lc) function fct__r8_cat (cd_char, dd_val)

  This function concatenate character and real(8) (as character).
- pure character(len=lc) function fct__l_cat (cd_char, ld_val)

  This function concatenate character and logical (as character).

13.63.1 Member Function/Subroutine Documentation

13.63.1.1 fct__i1_cat()

```
pure character(len=lc) function fct::operator(//)::fct__i1_cat (
            character(len=lc), intent(in) cd_char,
            integer(i1), intent(in) bd_val )
```

This function concatenate character and integer(1) (as character).

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_char*	string character
`in`	*bd_val*	integer(1) variable value

Returns

string character

13.63.1.2 fct__i2_cat()

```
pure character(len=lc) function fct::operator(//)::fct__i2_cat (
             character(len=lc), intent(in) cd_char,
             integer(i2), intent(in) sd_val )
```

This function concatenate character and integer(2) (as character).

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_char*	string character
`in`	*sd_val*	integer(2) variable value

Returns

string character

13.63.1.3 fct__i4_cat()

```
pure character(len=lc) function fct::operator(//)::fct__i4_cat (
             character(len=lc), intent(in) cd_char,
             integer(i4), intent(in) id_val )
```

This function concatenate character and integer(4) (as character).

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_char*	string character
`in`	*id_val*	integer(4) variable value

Returns

string character

13.63.1.4 fct__i8_cat()

```
pure character(len=lc) function fct::operator(//)::fct__i8_cat (
             character(len=lc), intent(in) cd_char,
             integer(i8), intent(in) kd_val )
```

This function concatenate character and integer(8) (as character).

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_char*	string character
in	*kd_val*	integer(8) variable value

Returns

string character

13.63.1.5 fct__l_cat()

```
pure character(len=lc) function fct::operator(//)::fct__l_cat (
             character(len=lc), intent(in) cd_char,
             logical, intent(in) ld_val )
```

This function concatenate character and logical (as character).

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*cd_char*	string character
in	*ld_val*	logical variable value

Returns

string character

13.63.1.6 fct__r4_cat()

```
pure character(len=lc) function fct::operator(//)::fct__r4_cat (
             character(len=lc), intent(in) cd_char,
             real(sp), intent(in) rd_val )
```

This function concatenate character and real(4) (as character).

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_char*	string character
`in`	*rd_val*	real(4) variable value

Returns

string character

13.63.1.7 fct__r8_cat()

```
pure character(len=lc) function fct::operator(//)::fct__r8_cat (
             character(len=lc), intent(in) cd_char,
             real(dp), intent(in) dd_val )
```

This function concatenate character and real(8) (as character).

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_char*	string character
`in`	*dd_val*	real(8) variable value

Returns

string character

The documentation for this interface was generated from the following file:

- src/function.f90

13.64 boundary::seg__clean Interface Reference

Public Member Functions

- subroutine seg__clean_unit (td_seg)

  This subroutine clean segment structure.
- subroutine seg__clean_arr (td_seg)

  This subroutine clean segment structure.

13.64.1 Member Function/Subroutine Documentation

13.64.1.1 seg__clean_arr()

```
subroutine boundary::seg__clean::seg__clean_arr (
             type(tseg), dimension(:), intent(inout) td_seg )
```

This subroutine clean segment structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_seg*	array of segment structure

13.64.1.2 seg__clean_unit()

```
subroutine boundary::seg__clean::seg__clean_unit (
            type(tseg), intent(inout) td_seg )
```

This subroutine clean segment structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_seg*	segment structure

The documentation for this interface was generated from the following file:

- src/boundary.f90

13.65 boundary::seg__copy Interface Reference

Public Member Functions

- type(tseg) function seg__copy_unit (td_seg)

  This subroutine copy segment structure in another one.
- type(tseg) function, dimension(size(td_seg(:))) seg__copy_arr (td_seg)

  This subroutine copy segment structure in another one.

13.65.1 Member Function/Subroutine Documentation

13.65.1.1 seg__copy_arr()

```
type(tseg) function, dimension(size(td_seg(:))) boundary::seg__copy::seg__copy_arr (
            type(tseg), dimension(:), intent(in) td_seg )
```

This subroutine copy segment structure in another one.

Warning

do not use on the output of a function who create or read a structure (ex: tl_seg=seg__copy(seg__init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_seg*	segment structure

Returns

copy of input array of segment structure

13.65.1.2 seg__copy_unit()

```
type(tseg) function boundary::seg__copy::seg__copy_unit (
            type(tseg), intent(in) td_seg )
```

This subroutine copy segment structure in another one.

Warning

do not use on the output of a function who create or read a structure (ex: tl_seg=seg__copy(seg__init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_seg*	segment structure

Returns

copy of input segment structure

The documentation for this interface was generated from the following file:

- src/boundary.f90

13.66 att::tatt Type Reference

Public Attributes

- character(len=lc) c_name = ''
  attribute name
- integer(i4) i_id = 0
  attribute id
- integer(i4) i_type = 0
  attribute type
- integer(i4) i_len = 0
  number of value store in attribute
- character(len=lc) c_value = 'none'
  attribute value if type CHAR
- real(dp), dimension(:), pointer d_value => NULL()
  attribute value if type SHORT,INT,FLOAT or DOUBLE

The documentation for this type was generated from the following file:

- src/attribute.f90

13.67 boundary::tbdy Type Reference

boundary structure

Public Attributes

- character(len=lc) c_card = ''
  boundary cardinal
- logical l_use = .FALSE.
  boundary use or not
- logical l_nam = .FALSE.
  boundary get from namelist
- integer(i4) i_nseg = 0
  number of segment in boundary
- type(tseg), dimension(:), pointer t_seg => NULL()
  array of segment structure

13.67.1 Detailed Description

boundary structure

The documentation for this type was generated from the following file:

- src/boundary.f90

13.68 date::tdate Type Reference

Public Attributes

- integer(i4) i_year = 1858
  year
- integer(i4) i_month = 11
  month
- integer(i4) i_day = 17
  day
- integer(i4) i_hour = 0
  hour
- integer(i4) i_min = 0
  min
- integer(i4) i_sec = 0
  sec
- integer(i4) i_dow = 0
  day of week
- integer(i4) i_lday = 0
  last day of the month
- real(dp) d_jd = 0
  julian day (origin : 1858/11/17 00:00:00)

- real(dp) d_jc = 0

  CNES julian day or pseudo julian day with new date origin.
- integer(i8) k_jdsec = 0

  number of seconds since julian day origin
- integer(i8) k_jcsec = 0

  number of seconds since CNES or pseudo julian day origin

The documentation for this type was generated from the following file:

- src/date.f90

13.69 dim::tdim Type Reference

Public Attributes

- character(len=lc) c_name = ''

  dimension name
- character(len=lc) c_sname = 'u'

  dimension short name
- integer(i4) i_id = 0

  dimension id
- integer(i4) i_len = 1

  dimension length
- logical l_uld = .FALSE.

  dimension unlimited or not
- logical l_use = .FALSE.

  dimension used or not
- integer(i4) i_2xyzt = 0

  indices to reshape array to ('x','y','z','t')
- integer(i4) i_xyzt2 = 0

  indices to reshape array from ('x','y','z','t')

The documentation for this type was generated from the following file:

- src/dimension.f90

13.70 dom::tdom Type Reference

Public Attributes

- type(tdim), dimension(ip_maxdim) t_dim0

  global domain dimension
- type(tdim), dimension(ip_maxdim) t_dim

  sub domain dimension
- integer(i4) i_perio0

  NEMO periodicity index of global domain.

- integer(i4) i_ew0

  East-West overlap of global domain.
- integer(i4) i_perio

  NEMO periodicity index of sub domain.
- integer(i4) i_pivot

  NEMO pivot point index F(0),T(1)
- integer(i4) i_imin = 0

  i-direction sub-domain lower left point indice
- integer(i4) i_imax = 0

  i-direction sub-domain upper right point indice
- integer(i4) i_jmin = 0

  j-direction sub-domain lower left point indice
- integer(i4) i_jmax = 0

  j-direction sub-domain upper right point indice
- integer(i4) i_bdy = 0

  boundary index : 0 = no boundary 1 = north 2 = south 3 = east 4 = west
- integer(i4), dimension(2, 2) i_ghost0 = 0

  array of ghost cell factor of global domain
- integer(i4), dimension(2, 2) i_ghost = 0

  array of ghost cell factor of sub domain
- integer(i4), dimension(2) i_iextra = 0

  i-direction extra point
- integer(i4), dimension(2) i_jextra = 0

  j-direction extra point

The documentation for this type was generated from the following file:

- src/domain.f90

13.71 file::tfile Type Reference

Public Attributes

- character(len=lc) c_name = ""

  file name
- character(len=lc) c_type = ""

  type of the file (cdf, cdf4, dimg)
- integer(i4) i_id = 0

  file id
- logical l_wrt = .FALSE.

  read or write mode
- integer(i4) i_nvar = 0

  number of variable
- type(tvar), dimension(:), pointer t_var => NULL()

  file variables
- character(len=lc) c_grid = 'ARAKAWA-C'

  grid type
- integer(i4) i_ew =-1

east-west overlap
- integer(i4) i_perio =-1

  NEMO periodicity index.
- integer(i4) i_pivot =-1

  NEMO pivot point index F(0),T(1)
- integer(i4) i_depthid = 0

  variable id of depth
- integer(i4) i_timeid = 0

  variable id of time
- integer(i4) i_ndim = 0

  number of dimensions used in the file
- integer(i4) i_natt = 0

  number of global attributes in the file
- integer(i4) i_uldid = 0

  id of the unlimited dimension in the file
- logical l_def = .FALSE.

  define mode or not
- type(tatt), dimension(:), pointer t_att => NULL()

  global attributes
- type(tdim), dimension(ip_maxdim) t_dim

  dimension structure
- integer(i4) i_recl = 0

  record length (binary file)
- integer(i4) i_n0d = 0

  number of scalar variable
- integer(i4) i_n1d = 0

  number of 1D variable
- integer(i4) i_n2d = 0

  number of 2D variable
- integer(i4) i_n3d = 0

  number of 3D variable
- integer(i4) i_rhd = 0

  record of the header infos (last record)
- integer(i4) i_pid = -1

  processor id (start to 1)
- integer(i4) i_impp = 0

  i-indexes for mpp-subdomain left bottom
- integer(i4) i_jmpp = 0

  j-indexes for mpp-subdomain left bottom
- integer(i4) i_lci = 0

  i-dimensions of subdomain
- integer(i4) i_lcj = 0

  j-dimensions of subdomain
- integer(i4) i_ldi = 0

  first indoor i-indices
- integer(i4) i_ldj = 0

  first indoor j-indices
- integer(i4) i_lei = 0

  last indoor i-indices
- integer(i4) i_lej = 0

  last indoor j-indices

- logical l_ctr = .FALSE.

  domain is on border
- logical l_use = .FALSE.

  domain is used
- integer(i4) i_iind = 0

  i-direction indices
- integer(i4) i_jind = 0

  j-direction indices

The documentation for this type was generated from the following file:

- src/file.f90

13.72 interp::tinterp Type Reference

Public Attributes

- character(len=lc) c_name = ''

  interpolation method name
- character(len=lc) c_factor = ''

  interpolation factor
- character(len=lc) c_divisor = ''

  interpolation divisor

The documentation for this type was generated from the following file:

- src/interp.f90

13.73 mpp::tlay Type Reference

domain layout structure

Public Attributes

- integer(i4) i_niproc = 0

  number of processors following i
- integer(i4) i_njproc = 0

  number of processors following j
- integer(i4) i_nland = 0

  number of land processors
- integer(i4) i_nsea = 0

  number of sea processors
- integer(i4) i_mean = 0

  mean sea point per proc
- integer(i4) i_min = 0

min sea point per proc
- integer(i4) i_max = 0

  max sea point per proc
- integer(i4), dimension(:,:), pointer i_msk => NULL()

  sea/land processor mask
- integer(i4), dimension(:,:), pointer i_impp => NULL()

  i-indexes for mpp-subdomain left bottom
- integer(i4), dimension(:,:), pointer i_jmpp => NULL()

  j-indexes for mpp-subdomain left bottom
- integer(i4), dimension(:,:), pointer i_lci => NULL()

  i-dimensions of subdomain
- integer(i4), dimension(:,:), pointer i_lcj => NULL()

  j-dimensions of subdomain

13.73.1 Detailed Description

domain layout structure

The documentation for this type was generated from the following file:

- src/mpp.f90

13.74 logger::tlogger Type Reference

Public Attributes

- integer(i4) i_id = 0

  log file id
- logical l_use =.TRUE.

  use logger or not
- character(len=lc) c_name

  log file name
- character(len=lc) c_verbosity = "warning"

  verbosity choose
- character(len=lc) c_verb = ""

  array of "verbosities" to used
- integer(i4) i_nerror = 0

  number of error
- integer(i4) i_nfatal = 0

  number of fatal error
- integer(i4) i_maxerror = 5

  maximum number of error before stoping program

The documentation for this type was generated from the following file:

- src/logger.f90

13.75 mpp::tmpp Type Reference

Public Attributes

- character(len=lc) c_name = ''
  base name
- integer(i4) i_id = 0
  mpp id
- integer(i4) i_niproc = 0
  number of processors following i
- integer(i4) i_njproc = 0
  number of processors following j
- integer(i4) i_nproc = 0
  total number of proccessors used
- integer(i4) i_preci = 1
  i-direction overlap region length
- integer(i4) i_precj = 1
  j-direction overlap region length
- integer(i4) i_ew = -1
  east-west overlap
- integer(i4) i_perio = -1
  NEMO periodicity index.
- integer(i4) i_pivot = -1
  NEMO pivot point index F(0),T(1)
- character(len=lc) c_type = ''
  type of the files (cdf, cdf4, dimg)
- character(len=lc) c_dom = ''
  type of domain (full, noextra, nooverlap)
- integer(i4) i_ndim = 0
  number of dimensions used in mpp
- type(tdim), dimension(ip_maxdim) t_dim
  global domain dimension
- type(tfile), dimension(:), pointer t_proc => NULL()
  files/processors composing mpp

The documentation for this type was generated from the following file:

- src/mpp.f90

13.76 multi::tmulti Type Reference

Public Attributes

- integer(i4) i_nmpp = 0
  number of mpp files
- integer(i4) i_nvar = 0
  total number of variables
- type(tmpp), dimension(:), pointer t_mpp => NULL()
  mpp files composing multi

The documentation for this type was generated from the following file:

- src/multi.f90

13.77 boundary::tseg Type Reference

Public Attributes

- integer(i4) i_index = 0

  segment index
- integer(i4) i_width = 0

  segment width
- integer(i4) i_first = 0

  segment first indice
- integer(i4) i_last = 0

  segment last indices

The documentation for this type was generated from the following file:

- src/boundary.f90

13.78 var::tvar Type Reference

Public Attributes

- character(len=lc) c_name = ''

  variable name
- character(len=lc) c_point = 'T'

  ARAKAWA C-grid point name (T,U,V,F)
- integer(i4) i_id = 0

  variable id
- integer(i4) i_ew = -1

  east-west overlap
- real(dp), dimension(:,:,:,:), pointer d_value => NULL()

  variable value
- integer(i4) i_type = 0

  variable type
- integer(i4) i_natt = 0

  number of attributes
- integer(i4) i_ndim = 0

  number of dimensions
- type(tatt), dimension(:), pointer t_att => NULL()

  variable attributes
- type(tdim), dimension(ip_maxdim) t_dim

  variable dimension
- logical l_file = .FALSE.

  variable read in a file
- character(len=lc) c_stdname = ''

  variable standard name
- character(len=lc) c_longname = ''

  variable long name
- character(len=lc) c_units = ''

variable units

- character(len=lc) c_axis = ''

  variable axis
- real(dp) d_scf = 1.

  scale factor
- real(dp) d_ofs = 0.

  offset
- real(dp) d_fill = 0.

  fill value ! NF90_FILL_DOUBLE
- real(dp) d_min = dp_fill

  minimum value
- real(dp) d_max = dp_fill

  maximum value
- character(len=lc) c_unt = ''

  new variables units (linked to units factor)
- real(dp) d_unf = 1._dp

  units factor
- logical l_contiguous = .FALSE.

  use contiguous storage or not
- logical l_shuffle = .FALSE.

  shuffle filter is turned on or not
- logical l_fletcher32 = .FALSE.

  fletcher32 filter is turned on or not
- integer(i4) i_deflvl = 0

  deflate level from 0 to 9, 0 indicates no deflation is in use
- integer(i4), dimension(ip_maxdim) i_chunksz = (/1,1,1,1/)

  chunk size
- integer(i4) i_rec = 0

  record number
- character(len=lc), dimension(2) c_interp = ''

  interpolation method
- character(len=lc), dimension(1) c_extrap = ''

  extrapolation method
- character(len=lc), dimension(5) c_filter = ''

  filter method

The documentation for this type was generated from the following file:

- src/variable.f90

13.79 var::var_add_att Interface Reference

Public Member Functions

- subroutine var__add_att_unit (td_var, td_att)

  This subroutine add an attribute structure in a variable structure.
- subroutine var__add_att_arr (td_var, td_att)

  This subroutine add an array of attribute structure in a variable structure.

13.79.1 Member Function/Subroutine Documentation

13.79.1.1 var__add_att_arr()

```
subroutine var::var_add_att::var__add_att_arr (
            type(tvar), intent(inout) td_var,
            type(tatt), dimension(:), intent(in) td_att )
```

This subroutine add an array of attribute structure in a variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version
June, 2015

- add all element of the array in the same time

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*td_att*	array of attribute structure

13.79.1.2 var__add_att_unit()

```
subroutine var::var_add_att::var__add_att_unit (
            type(tvar), intent(inout) td_var,
            type(tatt), intent(in) td_att )
```

This subroutine add an attribute structure in a variable structure.

Author

J.Paul

Date

Parameters

Parameters

[var__add_dim_unit](#)

[var__add_dim_arr](#)

This subroutine add an array of dimension structure in a variable structure.

13.80.1 Member Function/Subroutine Documentation

13.80.1.1 var__add_dim_arr()

```
subroutine var::var_add_dim::var__add_dim_arr (
             type(tvar), intent(inout) td_var,
             type(tdim), dimension(:), intent(in) td_dim )
```

This subroutine add an array of dimension structure in a variable structure.

- number of dimension in variable can't be greater than 4
- dimension can't be already uses in variable structure

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*td_dim*	dimension structure

13.80.1.2 var__add_dim_unit()

```
subroutine var::var_add_dim::var__add_dim_unit (
            type(tvar), intent(inout) td_var,
            type(tdim), intent(in) td_dim )
```

This subroutine add one dimension in a variable structure.

- number of dimension in variable can't be greater than 4
- dimension can't be already uses in variable structure

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*td_dim*	dimension structure

The documentation for this interface was generated from the following file:

- src/variable.f90

var__add_value_dp

var__add_value_rp

var__add_value_i1

var__add_value_i2

var__add_value_i4

var__add_value_i8

13.81.1.1 var__add_value_dp()

```
subroutine var::var_add_value::var__add_value_dp (
             type(tvar), intent(inout) td_var,
             real(dp), dimension(:,:,:,:), intent(in) dd_value,
             integer(i4), intent(in), optional id_type,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_start,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_count )
```

This subroutine add a 4D array of real(8) value in a variable structure. Dimension of the array must be ordered as ('x','y','z','t')

Optionally, you could specify the type of the variable to be used (default real(8)), and indices of the variable where value will be written with start and count array.

Author

J.Paul

Date

Parameters

Parameters

[redacted]

```
            integer(i1), dimension(:,:,:,:), intent(in) bd_value,
            integer(i4), intent(in), optional id_type,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_start,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_count )
```

This subroutine add a 4D array of integer(1) value in a variable structure. Dimension of the array must be ordered as ('x','y','z','t')

Optionally, you could specify the type of the variable to be used (default integer(1)), and indices of the variable where value will be written with start and count array.

Note

variable type is forced to BYTE

Author

J.Paul

Date

Parameters

Parameters

```
                    tvar
             integer(i2), dimension(:,:,:,:), intent(in) sd_value,
             integer(i4), intent(in), optional id_type,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_start,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_count )
```

This subroutine add a 4D array of integer(2) value in a variable structure. Dimension of the array must be ordered as ('x','y','z','t')

Optionally, you could specify the type of the variable to be used (default integer(2)), and indices of the variable where value will be written with start and count array.

Note

variable type is forced to SHORT

Author

J.Paul

Date

Parameters

Parameters

```
                   tvar
            integer(i4), dimension(:,:,:,:), intent(in) id_value,
            integer(i4), intent(in), optional id_type,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_start,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_count )
```

This subroutine add a 4D array of integer(4) value in a variable structure. Dimension of the array must be ordered as ('x','y','z','t')

Optionally, you could specify the type of the variable to be used (default integer(4)), and indices of the variable where value will be written with start and count array.

Note

variable type is forced to INT

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

`in,out`	*td_var*	variabele structure
`in`	*id_value*	array of variable value
`in`	*id_type*	type of the variable to be used (default integer(4))
`in`	*id_start*	start indices of the variable where data values will be read
`in`	*id_count*	number of indices selected along each dimension

13.81.1.5 var__add_value_i8()

```
subroutine var::var_add_value::var__add_value_i8 (
            type(tvar), intent(inout) td_var,
            integer(i8), dimension(:,:,:,:), intent(in) kd_value,
            integer(i4), intent(in), optional id_type,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_start,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_count )
```

This subroutine add a 4D array of integer(8) value in a variable structure. Dimension of the array must be ordered as ('x','y','z','t')

Optionally, you could specify the type of the variable to be used (default integer(4)), and indices of the variable where value will be written with start and count array.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*kd_value*	array of variable value
`in`	*id_type*	type of the variable to be used (default integer(8))
`in`	*id_start*	start indices of the variable where data values will be read
`in`	*id_count*	number of indices selected along each dimension

13.81.1.6 var__add_value_rp()

```
subroutine var::var_add_value::var__add_value_rp (
            type(tvar), intent(inout) td_var,
            real(sp), dimension(:,:,:,:), intent(in) rd_value,
            integer(i4), intent(in), optional id_type,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_start,
            integer(i4), dimension(ip_maxdim), intent(in), optional id_count )
```

This subroutine add a 4D array of real(4) value in a variable structure. Dimension of the array must be ordered as ('x','y','z','t')

Optionally, you could specify the type of the variable to be used (default real(4)), and indices of the variable where value will be written with start and count array.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*rd_value*	array of variable value
`in`	*id_type*	type of the variable to be used (default real(4))
`in`	*id_start*	start indices of the variable where data values will be written
`in`	*id_count*	number of indices selected along each dimension

The documentation for this interface was generated from the following file:

- src/variable.f90

var__clean_unit

var__clean_arr_1d

var__clean_arr_2d

var__clean_arr_3d

`tvar`

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	array of variable strucutre

13.82.1.2 var__clean_arr_2d()

```
subroutine var::var_clean::var__clean_arr_2d (
            type(tvar), dimension(:,:), intent(inout) td_var )
```

This subroutine clean 2D array of variable structure.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	array of variable strucutre

13.82.1.3 var__clean_arr_3d()

```
subroutine var::var_clean::var__clean_arr_3d (
            type(tvar), dimension(:,:,:), intent(inout) td_var )
```

This subroutine clean 3D array of variable structure.

Author

J.Paul

Date

September, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	array of variable strucutre

13.82.1.4 var__clean_unit()

```
subroutine var::var_clean::var__clean_unit (
            type(tvar), intent(inout) td_var )
```

This subroutine clean variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable strucutre

The documentation for this interface was generated from the following file:

- src/variable.f90

13.83 var::var_copy Interface Reference

Public Member Functions

- type(tvar) function var__copy_unit (td_var)

  This subroutine copy variable structure in another one.
- type(tvar) function, dimension(size(td_var(:))) var__copy_arr (td_var)

  This subroutine copy a array of variable structure in another one.

13.83.1 Member Function/Subroutine Documentation

13.83.1.1 var__copy_arr()

```
type(tvar) function, dimension(size(td_var(:)))  var::var_copy::var__copy_arr (
            type(tvar), dimension(:), intent(in) td_var )
```

This subroutine copy a array of variable structure in another one.

see var__copy_unit

Warning

do not use on the output of a function who create or read an structure (ex: tl_var=var_copy(var_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	array of variable structure

Returns

copy of input array of variable structure

13.83.1.2 var__copy_unit()

```
type(tvar) function var::var_copy::var__copy_unit (
            type(tvar), intent(in) td_var )
```

This subroutine copy variable structure in another one.

variable value are copied in a temporary array, so input and output variable structure value do not point on the same "memory cell", and so are independant.

Warning

do not use on the output of a function who create or read an structure (ex: tl_var=var_copy(var_init()) is forbidden). This will create memory leaks.
to avoid infinite loop, do not use any function inside this subroutine

Author

J.Paul

Date

November, 2013 - Initial Version
November, 2014

- use function instead of overload assignment operator (to avoid memory leak)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

in	*td_var*	variable structure

Returns

copy of input variable structure

The documentation for this interface was generated from the following file:

- src/variable.f90

13.84 var::var_del_att Interface Reference

Public Member Functions

- subroutine var__del_att_name (td_var, cd_name)

  This subroutine delete an attribute from variable structure.
- subroutine var__del_att_str (td_var, td_att)

  This subroutine delete an attribute from variable structure.

13.84.1 Member Function/Subroutine Documentation

13.84.1.1 var__del_att_name()

```
subroutine var::var_del_att::var__del_att_name (
            type(tvar), intent(inout) td_var,
            character(len=*), intent(in) cd_name )
```

This subroutine delete an attribute from variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version
February, 2015

- define local attribute structure to avoid mistake with pointer

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in,out	*td_var*	variable structure
in	*cd_name*	attribute name

13.84.1.2 var__del_att_str()

```
subroutine var::var_del_att::var__del_att_str (
            type(tvar), intent(inout) td_var,
            type(tatt), intent(in) td_att )
```

This subroutine delete an attribute from variable structure.

Author

J.Paul

Date

November, 2013- Initial Version
February, 2015

- delete highlight attribute too, when attribute is deleted

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

`in,out` *td_var* variable structure

`in` *td_att* attribute structure

The documentation for this interface was generated from the following file:

- src/variable.f90

13.85 var::var_init Interface Reference

Public Member Functions

- type(tvar) function var__init (cd_name, id_type, td_dim, td_att, dd_fill, cd_units, cd_axis, cd_stdname, cd_↩ longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_↩ fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, given variable name.
- type(tvar) function var__init_dp (cd_name, dd_value, id_start, id_count, id_type, td_dim, td_att, dd_fill, cd↩ _units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(8) 4D array of value.
- type(tvar) function var__init_1d_dp (cd_name, dd_value, id_start, id_count, id_type, td_dim, td_att, dd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(8) 1D array of value.
- type(tvar) function var__init_2d_dp (cd_name, dd_value, id_start, id_count, id_type, td_dim, td_att, dd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(8) 2D array of value. optionally could be added:
- type(tvar) function var__init_3d_dp (cd_name, dd_value, id_start, id_count, id_type, td_dim, td_att, dd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(8) 3D array of value.

- type(tvar) function var__init_sp (cd_name, rd_value, id_start, id_count, id_type, td_dim, td_att, rd_fill, cd_↩ units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(4) 4D array of value.
- type(tvar) function var__init_1d_sp (cd_name, rd_value, id_start, id_count, id_type, td_dim, td_att, rd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(4) 1D array of value.
- type(tvar) function var__init_2d_sp (cd_name, rd_value, id_start, id_count, id_type, td_dim, td_att, rd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(4) 2D array of value.
- type(tvar) function var__init_3d_sp (cd_name, rd_value, id_start, id_count, id_type, td_dim, td_att, rd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a real(4) 3D array of value.
- type(tvar) function var__init_i1 (cd_name, bd_value, id_start, id_count, id_type, td_dim, td_att, bd_fill, cd_↩ units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a integer(1) 4D array of value.
- type(tvar) function var__init_1d_i1 (cd_name, bd_value, id_start, id_count, id_type, td_dim, td_att, bd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a integer(1) 1D array of value.
- type(tvar) function var__init_2d_i1 (cd_name, bd_value, id_start, id_count, id_type, td_dim, td_att, bd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a integer(1) 2D array of value.
- type(tvar) function var__init_3d_i1 (cd_name, bd_value, id_start, id_count, id_type, td_dim, td_att, bd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a integer(1) 3D array of value.
- type(tvar) function var__init_i2 (cd_name, sd_value, id_start, id_count, id_type, td_dim, td_att, sd_fill, cd_↩ units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a integer(2) 4D array of value.
- type(tvar) function var__init_1d_i2 (cd_name, sd_value, id_start, id_count, id_type, td_dim, td_att, sd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a integer(2) 1D array of value.
- type(tvar) function var__init_2d_i2 (cd_name, sd_value, id_start, id_count, id_type, td_dim, td_att, sd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

  This function initialize a variable structure, with a integer(2) 2D array of value.
- type(tvar) function var__init_3d_i2 (cd_name, sd_value, id_start, id_count, id_type, td_dim, td_att, sd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩ _max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

This function initialize a variable structure, with a integer(2) 3D array of value.

- type(tvar) function var__init_i4 (cd_name, id_value, id_start, id_count, id_type, td_dim, td_att, id_fill, cd_↩
units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(4) 4D array of value.
- type(tvar) function var__init_1d_i4 (cd_name, id_value, id_start, id_count, id_type, td_dim, td_att, id_fill, cd↩
_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(4) 1D array of value.
- type(tvar) function var__init_2d_i4 (cd_name, id_value, id_start, id_count, id_type, td_dim, td_att, id_fill, cd↩
_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(4) 2D array of value.
- type(tvar) function var__init_3d_i4 (cd_name, id_value, id_start, id_count, id_type, td_dim, td_att, id_fill, cd↩
_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(4) 3D array of value.
- type(tvar) function var__init_i8 (cd_name, kd_value, id_start, id_count, id_type, td_dim, td_att, kd_fill, cd_↩
units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(8) 4D array of value.
- type(tvar) function var__init_1d_i8 (cd_name, kd_value, id_start, id_count, id_type, td_dim, td_att, kd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩
_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(8) 1D array of value.
- type(tvar) function var__init_2d_i8 (cd_name, kd_value, id_start, id_count, id_type, td_dim, td_att, kd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩
_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(8) 2D array of value.
- type(tvar) function var__init_3d_i8 (cd_name, kd_value, id_start, id_count, id_type, td_dim, td_att, kd_fill, cd_units, cd_axis, cd_stdname, cd_longname, cd_point, id_id, id_ew, dd_scf, dd_ofs, id_rec, dd_min, dd↩
_max, ld_contiguous, ld_shuffle, ld_fletcher32, id_deflvl, id_chunksz, cd_interp, cd_extrap, cd_filter, cd_unt, dd_unf)

    This function initialize a variable structure, with a integer(8) 3D array of value.

13.85.1 Member Function/Subroutine Documentation

13.85.1.1 var__init()

```
type(tvar) function var::var_init::var__init (
            character(len=*), intent(in) cd_name,
            integer(i4), intent(in), optional id_type,
            type(tdim), dimension(:), intent(in), optional td_dim,
            type(tatt), dimension(:), intent(in), optional td_att,
            real(dp), intent(in), optional dd_fill,
            character(len=*), intent(in), optional cd_units,
            character(len=*), intent(in), optional cd_axis,
            character(len=*), intent(in), optional cd_stdname,
character(len=*), intent(in), optional cd_longname,
character(len=*), intent(in), optional cd_point,
integer(i4), intent(in), optional id_id,
integer(i4), intent(in), optional id_ew,
real(dp), intent(in), optional dd_scf,
real(dp), intent(in), optional dd_ofs,
integer(i4), intent(in), optional id_rec,
real(dp), intent(in), optional dd_min,
real(dp), intent(in), optional dd_max,
logical, intent(in), optional ld_contiguous,
logical, intent(in), optional ld_shuffle,
logical, intent(in), optional ld_fletcher32,
integer(i4), intent(in), optional id_deflvl,
integer(i4), dimension(ip_maxdim), intent(in), optional id_chunksz,
character(len=*), dimension(2), intent(in), optional cd_interp,
character(len=*), dimension(1), intent(in), optional cd_extrap,
character(len=*), dimension(5), intent(in), optional cd_filter,
character(len=*), intent(in), optional cd_unt,
real(dp), intent(in), optional dd_unf )
```

This function initialize a variable structure, given variable name.

Optionally you could add 1D,2D,3D or 4D array of value, see var__init_1D_dp, var__init_2D_dp... for more information.

you could also add more information with the following optional arguments:

- id_type : integer(4) variable type, (as defined by NETCDF type constants).
- td_dim : array of dimension structure.
- td_att : array of attribute structure.
- dd_fill : real(8) variable FillValue. if none NETCDF FillValue will be used.
- cd_units : string character of units.
- cd_axis : string character of axis expected to be used
- cd_stdname : string character of variable standard name.
- cd_longname : string character of variable long name.
- cd_point : one character for ARAKAWA C-grid point name (T,U,V,F).
- id_id : variable id (read from a file).
- id_ew : number of point composing east west wrap band.
- dd_unf : real(8) value for units factor attribute.
- dd_scf : real(8) value for scale factor attribute.
- dd_ofs : real(8) value for add offset attribute.
- id_rec : record id (for rstdimg file).
- dd_min : real(8) value for minimum value.
- dd_max : real(8) value for maximum value.
- ld_contiguous : use contiguous storage or not (for netcdf4).
- ld_shuffle : shuffle filter is turned on or not (for netcdf4).

- ld_fletcher32 : fletcher32 filter is turned on or not (for netcdf4).
- id_deflvl : deflate level from 0 to 9, 0 indicates no deflation is in use (for netcdf4).
- id_chunksz : chunk size (for netcdf4).
- cd_interp : a array of character defining interpolation method.
- cd_extrap : a array of character defining extrapolation method.
- cd_filter : a array of character defining filtering method.
- cd_unt : a string character to define output unit
- dd_unf : real(8) factor applied to change unit

Note

most of these optionals arguments will be inform automatically, when reading variable from a file, or using confiuguration file variable.cfg.

Author

J.Paul

Date

November, 2013 - Initial Version
February, 2015

- Bug fix: conversion of the FillValue type (float case)

June, 2015

- add unit factor (to change unit)

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*cd_name*	variable name
`in`	*id_type*	variable type
`in`	*td_dim*	array of dimension structure
`in`	*td_att*	array of attribute structure
`in`	*dd_fill*	fill value
`in`	*cd_units*	units

in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor
in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

13.85.1.2 var__init_1d_dp()

```
type(tvar) function var::var_init::var__init_1d_dp (
             character(len=*), intent(in) cd_name,
             real(dp), dimension(:), intent(in) dd_value,
             integer(i4), intent(in), optional id_start,
             integer(i4), intent(in), optional id_count,
             integer(i4), intent(in), optional id_type,
             type(tdim), intent(in), optional td_dim,
             type(tatt), dimension(:), intent(in), optional td_att,
             real(dp), intent(in), optional dd_fill,
             character(len=*), intent(in), optional cd_units,
             character(len=*), intent(in), optional cd_axis,
             character(len=*), intent(in), optional cd_stdname,
             character(len=*), intent(in), optional cd_longname,
             character(len=*), intent(in), optional cd_point,
             integer(i4), intent(in), optional id_id,
             integer(i4), intent(in), optional id_ew,
             real(dp), intent(in), optional dd_scf,
             real(dp), intent(in), optional dd_ofs,
             integer(i4), intent(in), optional id_rec,
             real(dp), intent(in), optional dd_min,
             real(dp), intent(in), optional dd_max,
             logical, intent(in), optional ld_contiguous,
             logical, intent(in), optional ld_shuffle,
             logical, intent(in), optional ld_fletcher32,
             integer(i4), intent(in), optional id_deflvl,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_chunksz,
             character(len=*), dimension(2), intent(in), optional cd_interp,
             character(len=*), dimension(1), intent(in), optional cd_extrap,
             character(len=*), dimension(5), intent(in), optional cd_filter,
             character(len=*), intent(in), optional cd_unt,
             real(dp), intent(in), optional dd_unf )
```

This function initialize a variable structure, with a real(8) 1D array of value.

Optionally could be added:

- dimension structure.
- attribute structure. Dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

Parameters

Parameters

in	*dd_fill*	fill value
in	*cd_units*	units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor

`in`	*dd_ofs*	add offset
`in`	*id_rec*	record id (for rstdimg file)
`in`	*dd_min*	minimum value
`in`	*dd_max*	maximum value
`in`	*ld_contiguous*	use contiguous storage or not
`in`	*ld_shuffle*	shuffle filter is turned on or not
`in`	*ld_fletcher32*	fletcher32 filter is turned on or not
`in`	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
`in`	*id_chunksz*	chunk size
`in`	*cd_interp*	interpolation method
`in`	*cd_extrap*	extrapolation method
`in`	*cd_filter*	filter method
`in`	*cd_unt*	new units (linked to units factor)
`in`	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

Parameters

Parameters

`in` *bd_fill*	fill value
`in` *cd_units*	units
`in` *cd_axis*	axis expected to be used
`in` *cd_stdname*	variable standard name
`in` *cd_longname*	variable long name
`in` *cd_point*	point on Arakawa-C grid (T,U,V,F)
`in` *id_id*	variable id
`in` *id_ew*	east west wrap
`in` *dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

in	*cd_units*	units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor

`in`	*dd_ofs*	add offset
`in`	*id_rec*	record id (for rstdimg file)
`in`	*dd_min*	minimum value
`in`	*dd_max*	maximum value
`in`	*ld_contiguous*	use contiguous storage or not
`in`	*ld_shuffle*	shuffle filter is turned on or not
`in`	*ld_fletcher32*	fletcher32 filter is turned on or not
`in`	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
`in`	*id_chunksz*	chunk size
`in`	*cd_interp*	interpolation method
`in`	*cd_extrap*	extrapolation method
`in`	*cd_filter*	filter method
`in`	*cd_unt*	new units (linked to units factor)
`in`	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

[redacted]

`in`	*id_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

[redacted]

in *kd_fill* : fill value

in *cd_units* : units

in *cd_axis* axis expected to be used

in *cd_stdname* : variable standard name

in *cd_longname* : variable long name

in *cd_point* : point on Arakawa-C grid (T,U,V,F)

in *id_id* : variable id

in *id_ew* : east west wrap

in *dd_scf* : scale factor

`in`	*dd_ofs*	: add offset
`in`	*id_rec*	: record id (for rstdimg file)
`in`	*dd_min*	: minimum value
`in`	*dd_max*	: maximum value
`in`	*ld_contiguous*	: use contiguous storage or not
`in`	*ld_shuffle*	: shuffle filter is turned on or not
`in`	*ld_fletcher32*	: fletcher32 filter is turned on or not
`in`	*id_deflvl*	: deflate level from 0 to 9, 0 indicates no deflation is in use
`in`	*id_chunksz*	: chunk size
`in`	*cd_interp*	interpolation method
`in`	*cd_extrap*	extrapolation method
`in`	*cd_filter*	filter method
`in`	*cd_unt*	new units (linked to units factor)
`in`	*dd_unf*	units factor

Returns

variable structure

tvar

tdim
tatt

optionally could be added:

- dimension structure.
- attribute structure.

dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

Parameters

Parameters

in	*rd_fill*	fill value
in	*cd_units*	units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

13.85.1.8 var__init_2d_dp()

```
type(tvar) function var::var_init::var__init_2d_dp (
             character(len=*), intent(in) cd_name,
             real(dp), dimension(:,:), intent(in) dd_value,
             integer(i4), dimension(:), intent(in), optional id_start,
             integer(i4), dimension(:), intent(in), optional id_count,
             integer(i4), intent(in), optional id_type,
             type(tdim), dimension(:), intent(in), optional td_dim,
             type(tatt), dimension(:), intent(in), optional td_att,
             real(dp), intent(in), optional dd_fill,
             character(len=*), intent(in), optional cd_units,
             character(len=*), intent(in), optional cd_axis,
             character(len=*), intent(in), optional cd_stdname,
             character(len=*), intent(in), optional cd_longname,
             character(len=*), intent(in), optional cd_point,
             integer(i4), intent(in), optional id_id,
             integer(i4), intent(in), optional id_ew,
             real(dp), intent(in), optional dd_scf,
             real(dp), intent(in), optional dd_ofs,
             integer(i4), intent(in), optional id_rec,
             real(dp), intent(in), optional dd_min,
             real(dp), intent(in), optional dd_max,
             logical, intent(in), optional ld_contiguous,
             logical, intent(in), optional ld_shuffle,
             logical, intent(in), optional ld_fletcher32,
             integer(i4), intent(in), optional id_deflvl,
             integer(i4), dimension(ip_maxdim), intent(in), optional id_chunksz,
             character(len=*), dimension(2), intent(in), optional cd_interp,
             character(len=*), dimension(1), intent(in), optional cd_extrap,
             character(len=*), dimension(5), intent(in), optional cd_filter,
             character(len=*), intent(in), optional cd_unt,
             real(dp), intent(in), optional dd_unf )
```

This function initialize a variable structure, with a real(8) 2D array of value. optionally could be added:

- dimension structure.
- attribute structure.

array of 2 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

Parameters

Parameters

`in`	*td_att*	array of attribute structure
`in`	*dd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap

in	*dd_scf*	scale factor
in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

tvar

tdim
tatt

optionally could be added:

- dimension structure.
- attribute structure.

array of 2 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

`in`	*bd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

array of 2 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

tvar

tdim
tatt

optionally could be added:

- dimension structure.
- attribute structure.

array of 2 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

in	*id_fill*	fill value
in	*cd_units*	units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor

`in` *dd_ofs* add offset

`in` *id_rec* record id (for rstdimg file)

`in` *dd_min* minimum value

`in` *dd_max* maximum value

`in` *ld_contiguous* use contiguous storage or not

`in` *ld_shuffle* shuffle filter is turned on or not

`in` *ld_fletcher32* fletcher32 filter is turned on or not

`in` *id_deflvl* deflate level from 0 to 9, 0 indicates no deflation is in use

`in` *id_chunksz* chunk size

`in` *cd_interp* interpolation method

`in` *cd_extrap* extrapolation method

`in` *cd_filter* filter method

`in` *cd_unt* new units (linked to units factor)

`in` *dd_unf* units factor

Returns

variable structure

```
    tvar



              tdim
              tatt
```

optionally could be added:

- dimension structure.
- attribute structure.

array of 2 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

`in`	*kd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

tvar

tdim
tatt

optionally could be added:

- dimension structure.
- attribute structure.

array of 2 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

in *rd_fill* : fill value

in *cd_units* : units

in *cd_axis* axis expected to be used

in *cd_stdname* : variable standard name

in *cd_longname* : variable long name

in *cd_point* : point on Arakawa-C grid (T,U,V,F)

in *id_id* : variable id

in *id_ew* : east west wrap

in *dd_scf* : scale factor

in	*dd_ofs*	: add offset
in	*id_rec*	: record id (for rstdimg file)
in	*dd_min*	: minimum value
in	*dd_max*	: maximum value
in	*ld_contiguous*	: use contiguous storage or not
in	*ld_shuffle*	: shuffle filter is turned on or not
in	*ld_fletcher32*	: fletcher32 filter is turned on or not
in	*id_deflvl*	: deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	: chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

tvar

tdim

tatt

optionally could be added:

- dimension structure.
- attribute structure.

array of 3 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

`in`	*dd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

`in`	*dd_ofs*	add offset
`in`	*id_rec*	record id (for rstdimg file)
`in`	*dd_min*	minimum value
`in`	*dd_max*	maximum value
`in`	*ld_contiguous*	use contiguous storage or not
`in`	*ld_shuffle*	shuffle filter is turned on or not
`in`	*ld_fletcher32*	fletcher32 filter is turned on or not
`in`	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
`in`	*id_chunksz*	chunk size
`in`	*cd_interp*	interpolation method
`in`	*cd_extrap*	extrapolation method
`in`	*cd_filter*	filter method
`in`	*cd_unt*	new units (linked to units factor)
`in`	*dd_unf*	units factor

Returns

variable structure

```
    tvar

                  tdim
                  tatt
```

optionally could be added:

- dimension structure.
- attribute structure.

array of 3 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

in	*bd_fill*	fill value
in	*cd_units*	units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

array of 3 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

[redacted]

`in`	*sd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

```
    tvar

              tdim
              tatt
```

optionally could be added:

- dimension structure.
- attribute structure.

array of 3 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

Parameters

Parameters

`in`	*id_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

`in` *dd_ofs* add offset

`in` *id_rec* record id (for rstdimg file)

`in` *dd_min* minimum value

`in` *dd_max* maximum value

`in` *ld_contiguous* use contiguous storage or not

`in` *ld_shuffle* shuffle filter is turned on or not

`in` *ld_fletcher32* fletcher32 filter is turned on or not

`in` *id_deflvl* deflate level from 0 to 9, 0 indicates no deflation is in use

`in` *id_chunksz* chunk size

`in` *cd_interp* interpolation method

`in` *cd_extrap* extrapolation method

`in` *cd_filter* filter method

`in` *cd_unt* new units (linked to units factor)

`in` *dd_unf* units factor

Returns

variable structure

```
tvar

tdim
tatt
```

optionally could be added:

- dimension structure.
- attribute structure.

array of 3 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

`in`	*kd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

`in` *dd_ofs* add offset

`in` *id_rec* record id (for rstdimg file)

`in` *dd_min* minimum value

`in` *dd_max* maximum value

`in` *ld_contiguous* use contiguous storage or not

`in` *ld_shuffle* shuffle filter is turned on or not

`in` *ld_fletcher32* fletcher32 filter is turned on or not

`in` *id_deflvl* deflate level from 0 to 9, 0 indicates no deflation is in use

`in` *id_chunksz* chunk size

`in` *cd_interp* interpolation method

`in` *cd_extrap* extrapolation method

`in` *cd_filter* filter method

`in` *cd_unt* new units (linked to units factor)

`in` *dd_unf* units factor

Returns

variable structure

```
tvar

tdim
tatt
```

optionally could be added:

- dimension structure.
- attribute structure.

array of 3 dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

in	*cd_units*	: units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	: variable standard name
in	*cd_longname*	: variable long name
in	*cd_point*	: point on Arakawa-C grid (T,U,V,F)
in	*id_id*	: variable id
in	*id_ew*	: east west wrap
in	*dd_scf*	: scale factor

in	*dd_ofs*	: add offset
in	*id_rec*	: record id (for rstdimg file)
in	*dd_min*	: minimum value
in	*dd_max*	: maximum value
in	*ld_contiguous*	: use contiguous storage or not
in	*ld_shuffle*	: shuffle filter is turned on or not
in	*ld_fletcher32*	: fletcher32 filter is turned on or not
in	*id_deflvl*	: deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	: chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

Dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z','t') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

`in`	*dd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

tvar

tdim
tatt

optionally could be added:

- dimension structure.
- attribute structure.

Dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z','t') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

Parameters

Parameters

`in`	*bd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

Dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z','t') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

`in`	*sd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

Dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z','t') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

in	*id_fill*	fill value
in	*cd_units*	units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor

`in` *dd_ofs* add offset

`in` *id_rec* record id (for rstdimg file)

`in` *dd_min* minimum value

`in` *dd_max* maximum value

`in` *ld_contiguous* use contiguous storage or not

`in` *ld_shuffle* shuffle filter is turned on or not

`in` *ld_fletcher32* fletcher32 filter is turned on or not

`in` *id_deflvl* deflate level from 0 to 9, 0 indicates no deflation is in use

`in` *id_chunksz* chunk size

`in` *cd_interp* interpolation method

`in` *cd_extrap* extrapolation method

`in` *cd_filter* filter method

`in` *cd_unt* new units (linked to units factor)

`in` *dd_unf* units factor

Returns

variable structure

tvar

tdim
tatt

optionally could be added:

- dimension structure.
- attribute structure.

Dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z','t') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

Parameters

in	*kd_fill*	fill value
in	*cd_units*	units
in	*cd_axis*	axis expected to be used
in	*cd_stdname*	variable standard name
in	*cd_longname*	variable long name
in	*cd_point*	point on Arakawa-C grid (T,U,V,F)
in	*id_id*	variable id
in	*id_ew*	east west wrap
in	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

[redacted]

optionally could be added:

- dimension structure.
- attribute structure.

Dimension structure is needed to put value in variable structure. If none is given, we assume array is ordered as ('x','y','z','t') and we use array size as lentgh dimension.

indices in the variable where value will be written could be specify if start and count array are given. Dimension structure is needed in that case.

Author

J.Paul

Date

[redacted]

Parameters

[redacted]

Parameters

[redacted]

`in`	*rd_fill*	fill value
`in`	*cd_units*	units
`in`	*cd_axis*	axis expected to be used
`in`	*cd_stdname*	variable standard name
`in`	*cd_longname*	variable long name
`in`	*cd_point*	point on Arakawa-C grid (T,U,V,F)
`in`	*id_id*	variable id
`in`	*id_ew*	east west wrap
`in`	*dd_scf*	scale factor

in	*dd_ofs*	add offset
in	*id_rec*	record id (for rstdimg file)
in	*dd_min*	minimum value
in	*dd_max*	maximum value
in	*ld_contiguous*	use contiguous storage or not
in	*ld_shuffle*	shuffle filter is turned on or not
in	*ld_fletcher32*	fletcher32 filter is turned on or not
in	*id_deflvl*	deflate level from 0 to 9, 0 indicates no deflation is in use
in	*id_chunksz*	chunk size
in	*cd_interp*	interpolation method
in	*cd_extrap*	extrapolation method
in	*cd_filter*	filter method
in	*cd_unt*	new units (linked to units factor)
in	*dd_unf*	units factor

Returns

variable structure

The documentation for this interface was generated from the following file:

- src/variable.f90

13.86 var::var_print Interface Reference

Public Member Functions

- subroutine var__print_unit (td_var, ld_more)

  This subroutine print variable information.
- subroutine var__print_arr (td_var)

  This subroutine print informations of an array of variables.

13.86.1 Member Function/Subroutine Documentation

13.86.1.1 var__print_arr()

```
subroutine var::var_print::var__print_arr (
            type(tvar), dimension(:), intent(in) td_var )
```

This subroutine print informations of an array of variables.

Author

J.Paul

Date

June, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	array of variables structure

13.86.1.2 var__print_unit()

```
subroutine var::var_print::var__print_unit (
            type(tvar), intent(in) td_var,
            logical, intent(in), optional ld_more )
```

This subroutine print variable information.

If ld_more is TRUE (default), print information about variable dimensions and variable attributes.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	variable structure
in	*ld_more*	print more infomration about variable

The documentation for this interface was generated from the following file:

- src/variable.f90

Chapter 14

File Documentation

14.1 src/create_bathy.f90 File Reference

This program creates fine grid bathymetry file.

Functions/Subroutines

- program create_bathy
- type(tvar) function create_bathy_matrix (td_var, td_coord)

  This function create variable, filled with matrix value.
- type(tvar) function create_bathy_extract (td_var, td_mpp, td_coord)

  This function extract variable from file over coordinate domain and return variable structure.
- type(tvar) function create_bathy_get_var (td_var, td_mpp, id_imin, id_jmin, id_imax, id_jmax, id_offset, id_↩ rho)

  This function get coarse grid variable, interpolate variable, and return variable structure over fine grid.
- subroutine create_bathy_interp (td_var, id_rho, id_offset, id_iext, id_jext)

  This subroutine interpolate variable.
- subroutine create_bathy_check_depth (td_mpp, td_depth)

  This subroutine get depth variable value in an open mpp structure and check if agree with already input depth variable.
- subroutine create_bathy_check_time (td_mpp, td_time)

  This subroutine get date and time in an open mpp structure and check if agree with date and time already read.

14.1.1 Detailed Description

This program creates fine grid bathymetry file.

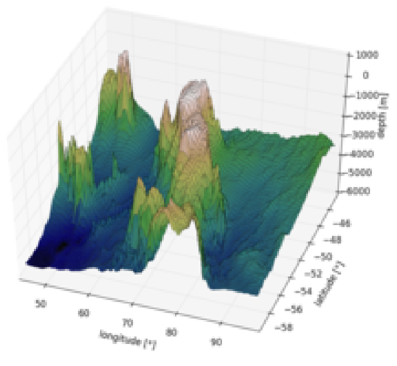
14.1.2 method

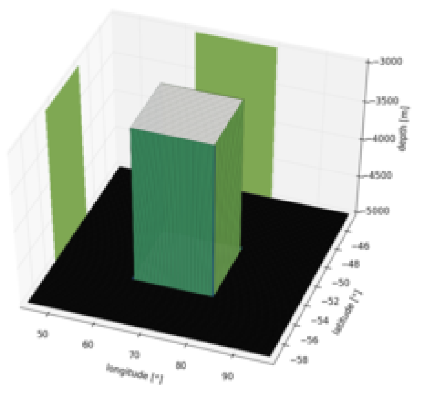
Bathymetry could be extracted from fine grid Bathymetry file, interpolated from coarse grid Bathymetry file, or manually written.

14.1.3 how to

to create fine grid bathymetry file:

```
./SIREN/bin/create_bathy create_bathy.nam
```





Note

you could find a template of the namelist in templates directory.

create_bathy.nam contains 7 namelists:

- logger namelist (namlog)
- config namelist (namcfg)
- coarse grid namelist (namcrs)
- fine grid namelist (namfin)
- variable namelist (namvar)
- nesting namelist (namnst)
- output namelist (namout)

logger namelist (namlog):

- cn_logfile : log filename
- cn_verbosity : verbosity ('trace','debug','info', 'warning','error','fatal','none')

- in_maxerror : maximum number of error allowed

config namelist (namcfg):

- cn_varcfg : variable configuration file (see ./SIREN/cfg/variable.cfg)
- cn_dumcfg : useless (dummy) configuration file, for useless dimension or variable (see ./SIRE↩ N/cfg/dummy.cfg).

coarse grid namelist (namcrs):

- cn_coord0 : coordinate file
- in_perio0 : NEMO periodicity index (see Model Boundary Condition in `NEMO documentation`)

fine grid namelist (namfin):

- cn_coord1 : coordinate file
- in_perio1 : periodicity index
- ln_fillclosed : fill closed sea or not (default is .TRUE.)

variable namelist (namvar):

- cn_varfile : list of variable, and corresponding file.
  cn_varfile is the path and filename of the file where find variable.

  Note

  cn_varfile could be a matrix of value, if you want to filled manually variable value.
  the variable array of value is split into equal subdomain.
  Each subdomain is filled with the corresponding value of the matrix.
  separators used to defined matrix are:
    - ',' for line
    - '/' for row Example:
      3,2,3/1,4,5 => $\begin{pmatrix} 3 & 2 & 3 \\ 1 & 4 & 5 \end{pmatrix}$

  Examples:

  - 'Bathymetry:gridT.nc'
  - 'Bathymetry:5000,5000,5000/5000,3000,5000/5000,5000,5000'

- cn_varinfo : list of variable and extra information about request(s) to be used.
  each elements of *cn_varinfo* is a string character (separated by ',').
  it is composed of the variable name follow by ':', then request(s) to be used on this variable.
  request could be:

  - int = interpolation method
  - ext = extrapolation method

- flt = filter method
- min = minimum value
- max = maximum value
- unt = new units
- unf = unit scale factor (linked to new units)

  requests must be separated by ';'.
  order of requests does not matter.

informations about available method could be find in interp, extrap and filter modules.
Example: 'Bathymetry: flt=2∗hamming(2,3); min=0'

Note

If you do not specify a method which is required, default one is apply.

Warning

variable name must be **Bathymetry** here.

nesting namelist (namnst):

- in_rhoi : refinement factor in i-direction
- in_rhoj : refinement factor in j-direction

Note

coarse grid indices will be deduced from fine grid coordinate file.

output namelist (namout):

- cn_fileout : output bathymetry file

Author

J.Paul

14.1.4 Function/Subroutine Documentation

14.1.4.1 create_bathy()

```
program create_bathy ( )
```

Date

November, 2013 - Initial Version
Sepember, 2014

- add header for user
- Bug fix, compute offset depending of grid point

June, 2015

- extrapolate all land points.
- allow to change unit.

September, 2015

- manage useless (dummy) variable, attributes, and dimension

January,2016

- add create_bathy_check_depth as in create_boundary
- add create_bathy_check_time as in create_boundary

February, 2016

- do not closed sea for east-west cyclic domain

Todo

- check tl_multi is not empty

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

14.1.4.2 create_bathy_check_depth()

```
subroutine create_bathy::create_bathy_check_depth (
            type(tmpp), intent(in) td_mpp,
            type(tvar), intent(inout) td_depth )
```

This subroutine get depth variable value in an open mpp structure and check if agree with already input depth variable.

Author

J.Paul

Date

January, 2016 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]Parameters

Parameters

in	*td_mpp*	mpp structure
in,out	*td_depth*	depth variable structure

14.1.4.3 create_bathy_check_time()

```
subroutine create_bathy::create_bathy_check_time (
            type(tmpp), intent(in) td_mpp,
            type(tvar), intent(inout) td_time )
```

This subroutine get date and time in an open mpp structure and check if agree with date and time already read.

Author

J.Paul

Date

January, 2016 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_mpp*	mpp structure
`in,out`	*td_time*	time variable structure

14.1.4.4 create_bathy_extract()

```
type(tvar) function create_bathy::create_bathy_extract (
            type(tvar), intent(in) td_var,
            type(tmpp), intent(in) td_mpp,
            type(tmpp), intent(in) td_coord )
```

This function extract variable from file over coordinate domain and return variable structure.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_var*	variable structure
`in`	*td_mpp*	mpp file structure
`in`	*td_coord*	coordinate file structure

Returns

variable structure

14.1.4.5 create_bathy_get_var()

```
type(tvar) function create_bathy::create_bathy_get_var (
             type(tvar), intent(in) td_var,
             type(tmpp), intent(in) td_mpp,
             integer(i4), intent(in) id_imin,
             integer(i4), intent(in) id_jmin,
             integer(i4), intent(in) id_imax,
             integer(i4), intent(in) id_jmax,
             integer(i4), dimension(:,:), intent(in) id_offset,
             integer(i4), dimension(:), intent(in) id_rho )
```

This function get coarse grid variable, interpolate variable, and return variable structure over fine grid.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*td_var*	variable structure
in	*td_mpp*	mpp file structure
in	*id_imin*	i-direction lower left corner indice
in	*id_imax*	i-direction upper right corner indice
in	*id_jmin*	j-direction lower left corner indice
in	*id_jmax*	j-direction upper right corner indice
in	*id_offset*	offset between fine grid and coarse grid
in	*id_rho*	array of refinement factor

Returns

variable structure

14.1.4.6 create_bathy_interp()

```
subroutine create_bathy::create_bathy_interp (
             type(tvar), intent(inout) td_var,
             integer(i4), dimension(:), intent(in) id_rho,
             integer(i4), dimension(:,:), intent(in) id_offset,
             integer(i4), intent(in), optional id_iext,
             integer(i4), intent(in), optional id_jext )
```

This subroutine interpolate variable.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*id_rho*	array of refinment factor
`in`	*id_offset*	array of offset between fine and coarse grid
`in`	*id_iext*	i-direction size of extra bands (default=im_minext)
`in`	*id_jext*	j-direction size of extra bands (default=im_minext)

14.1.4.7 create_bathy_matrix()

```
type(tvar) function create_bathy::create_bathy_matrix (
             type(tvar), intent(in) td_var,
             type(tmpp), intent(in) td_coord )
```

This function create variable, filled with matrix value.

A variable is create with the same name that the input variable, and with dimension of the coordinate file.
Then the variable array of value is split into equal subdomain. Each subdomain is filled with the corresponding value of the matrix.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_var*	variable structure
`in`	*td_coord*	coordinate file structure

Returns

variable structure

14.2 src/create_coord.f90 File Reference

This program creates fine grid coordinate file.

Functions/Subroutines

- program create_coord
- integer(i4) function, dimension(2, 2, ip_npoint) create_coord_get_offset (id_rho)

  This function compute offset over Arakawa grid points, given refinement factor.
- subroutine create_coord_interp (td_var, id_rho, id_offset, id_iext, id_jext)

  This subroutine interpolate variable, given refinment factor.

14.2.1 Detailed Description

This program creates fine grid coordinate file.

14.2.2 method

All variables from the input coordinates coarse grid file, are extracted and interpolated to create fine grid coordinates files.

Note

interpolation method could be different for each variable.

14.2.3 how to

to create fine grid coordinates files:

```
./SIREN/bin/create_coord create_coord.nam
```

Note

you could find a template of the namelist in templates directory.

create_coord.nam contains 6 namelists:

- logger namelist (namlog)
- config namelist (namcfg)
- coarse grid namelist (namcrs)
- variable namelist (namvar)
- nesting namelist (namnst)
- output namelist (namout)

logger namelist (namlog):

- cn_logfile : log filename
- cn_verbosity : verbosity ('trace','debug','info', 'warning','error','fatal','none')
- in_maxerror : maximum number of error allowed

config namelist (namcfg):

- cn_varcfg : variable configuration file (see ./SIREN/cfg/variable.cfg)
- cn_dumcfg : useless (dummy) configuration file, for useless dimension or variable (see ./SIRE↩
N/cfg/dummy.cfg).

coarse grid namelist (namcrs):

- cn_coord0 : coordinate file
- in_perio0 : NEMO periodicity index (see Model Boundary Condition in `NEMO documentation`)

variable namelist (namvar):

- cn_varinfo : list of variable and extra information about request(s) to be used.
  each elements of *cn_varinfo* is a string character (separated by ',').
  it is composed of the variable name follow by ':', then request(s) to be used on this variable.
  request could be:

  - int = interpolation method
  - ext = extrapolation method

    requests must be separated by ';' .
    order of requests does not matter.

  informations about available method could be find in interp, extrap and filter modules.

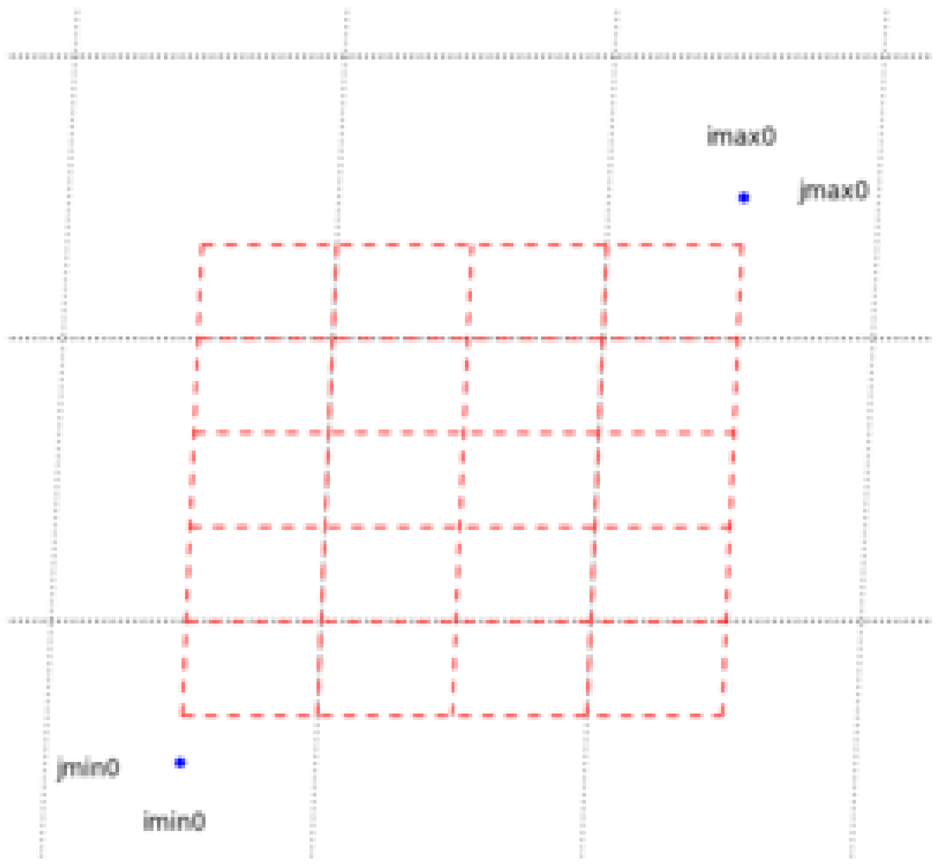
  Example: 'glamt: int=linear; ext=dist_weight', 'e1t: int=cubic/rhoi'

  Note

  If you do not specify a method which is required, default one is applied.

nesting namelist (namnst):

- in_imin0 : i-direction lower left point indice of coarse grid subdomain to be used
- in_imax0 : i-direction upper right point indice of coarse grid subdomain to be used
- in_jmin0 : j-direction lower left point indice of coarse grid subdomain to be used
- in_jmax0 : j-direction upper right point indice of coarse grid subdomain to be used
- in_rhoi : refinement factor in i-direction
- in_rhoj : refinement factor in j-direction



- *output namelist (namout)*:
  - cn_fileout : output coordinate file name

Author

J.Paul

14.2.4 Function/Subroutine Documentation

14.2.4.1 create_coord()

```
program create_coord ( )
```

Date

November, 2013 - Initial Version
September, 2014

- add header for user
- compute offset considering grid point
- add global attributes in output file

September, 2015

- manage useless (dummy) variable, attributes, and dimension

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

14.2.4.2 create_coord_get_offset()

```
integer(i4) function, dimension(2,2,ip_npoint) create_coord::create_coord_get_offset (
            integer(i4), dimension(:), intent(in) id_rho )
```

This function compute offset over Arakawa grid points, given refinement factor.

Author

J.Paul

Date

August, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

in	*id_rho*	array of refinement factor

Returns

array of offset

14.2.4.3 create_coord_interp()

```
subroutine create_coord::create_coord_interp (
            type(tvar), intent(inout) td_var,
            integer(i4), dimension(:), intent(in) id_rho,
            integer(i4), dimension(:,:), intent(in) id_offset,
            integer(i4), intent(in), optional id_iext,
            integer(i4), intent(in), optional id_jext )
```

This subroutine interpolate variable, given refinment factor.

Optionaly, you could specify number of points to be extrapolated in i- and j-direction.
variable mask is first computed (using _FillValue) and interpolated.
variable is then extrapolated, and interpolated.
Finally interpolated mask is applied on refined variable.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable strcuture
`in`	*id_rho*	array of refinement factor
`in`	*id_offset*	offset between fine grid and coarse grid
`in`	*id_iext*	number of points to be extrapolated in i-direction
`in`	*id_jext*	number of points to be extrapolated in j-direction

Todo check if mask is really needed

14.3 src/create_restart.f90 File Reference

This program creates restart file.

Functions/Subroutines

- program create_restart
- type(tvar) function create_restart_matrix (td_var, td_coord, id_nlevel, id_xghost)

  This function create variable, filled with matrix value.
- subroutine create_restart_mask (td_var, td_mask)

  This subroutine use mask to filled land point with _FillValue.
- subroutine create_restart_interp (td_var, id_rho, id_offset, id_iext, id_jext)

  This subroutine interpolate variable.
- subroutine create_restart_check_depth (td_mpp, td_depth)

  This subroutine get depth variable value in an open mpp structure and check if agree with already input depth variable.
- subroutine create_restart_check_time (td_mpp, td_time)

  This subroutine get date and time in an open mpp structure and check if agree with date and time already read.

14.3.1 Detailed Description

This program creates restart file.

14.3.2 method

Variables could be extracted from fine grid file, interpolated from coarse grid file or restart file. Variables could also be manually written.
Then they are split over new layout.

Note

method could be different for each variable.

14.3.3 how to

to create restart file:

```
./SIREN/bin/create_restart create_restart.nam
```

Note

you could find a template of the namelist in templates directory.

create_restart.nam contains 9 namelists:

- logger namelist (namlog)
- config namelist (namcfg)
- coarse grid namelist (namcrs)
- fine grid namelist (namfin)
- vertical grid namelist (namzgr)
- partial step namelist (namzps)
- variable namelist (namvar)
- nesting namelist (namnst)
- output namelist (namout)

logger namelist (namlog):

- cn_logfile : log filename
- cn_verbosity : verbosity ('trace','debug','info', 'warning','error','fatal','none')
- in_maxerror : maximum number of error allowed

config namelist (namcfg):

- cn_varcfg : variable configuration file (see ./SIREN/cfg/variable.cfg)
- cn_dumcfg : useless (dummy) configuration file, for useless dimension or variable (see ./SIRE↩ N/cfg/dummy.cfg).

_coarse grid namelist (namcrs):

- cn_coord0 : coordinate file
- in_perio0 : NEMO periodicity index (see Model Boundary Condition in `NEMO documentation`)

fine grid namelist (namfin):

- cn_coord1 : coordinate file
- cn_bathy1 : bathymetry file
- in_perio1 : NEMO periodicity index

vertical grid namelist (namzgr):

- dn_pp_to_be_computed :
- dn_ppsur :
- dn_ppa0 :
- dn_ppa1 :
- dn_ppa2 :
- dn_ppkth :
- dn_ppkth2 :
- dn_ppacr :
- dn_ppacr2 :
- dn_ppdzmin :
- dn_pphmax :
- in_nlevel : number of vertical level

partial step namelist (namzps):

- dn_e3zps_min :
- dn_e3zps_rat :

variable namelist (namvar):

- cn_varfile : list of variable, and associated file
  cn_varfile is the path and filename of the file where find variable.

Note

cn_varfile could be a matrix of value, if you want to filled manually variable value.
the variable array of value is split into equal subdomain.
Each subdomain is filled with the corresponding value of the matrix.
separators used to defined matrix are:

- ',' for line
- '/' for row
- '\' for level
  Example:
  3,2,3/1,4,5 => $\begin{pmatrix} 3 & 2 & 3 \\ 1 & 4 & 5 \end{pmatrix}$

Examples:

- 'votemper:gridT.nc', 'vozocrtx:gridU.nc'
- 'votemper:10\25', 'vozocrtx:gridU.nc'

to get all variable from one file:

- 'all:restart.dimg'

- cn_varinfo : list of variable and extra information about request(s) to be used.
  each elements of *cn_varinfo* is a string character (separated by ',').
  it is composed of the variable name follow by ':', then request(s) to be used on this variable.
  request could be:

  - int = interpolation method
  - ext = extrapolation method
  - flt = filter method
  - min = minimum value
  - max = maximum value
  - unt = new units
  - unf = unit scale factor (linked to new units)

  requests must be separated by ';'.
  order of requests does not matter.

  informations about available method could be find in interp, extrap and filter.
  Example: 'votemper: int=linear; flt=hann; ext=dist_weight', 'vosaline: int=cubic'

  Note

  If you do not specify a method which is required, default one is apply.

nesting namelist (namnst):

- in_rhoi : refinement factor in i-direction
- in_rhoj : refinement factor in j-direction

Note

coarse grid indices will be computed from fine grid coordinate file.

output namelist (namout):

- cn_fileout : output file
- ln_extrap : extrapolate land point or not
- in_niproc : number of processor in i-direction
- in_njproc : number of processor in j-direction
- in_nproc : total number of processor to be used
- cn_type : output format ('dimg', 'cdf')

Author

J.Paul

14.3.4 Function/Subroutine Documentation

14.3.4.1 create_restart()

```
program create_restart ( )
```

Date

November, 2013 - Initial Version
September, 2014

- add header for user
- offset computed considering grid point
- add attributes in output variable

June, 2015

- extrapolate all land points, and add ln_extrap in namelist.
- allow to change unit.

September, 2015

- manage useless (dummy) variable, attributes, and dimension

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

14.3.4.2 create_restart_check_depth()

```
subroutine create_restart::create_restart_check_depth (
            type(tmpp), intent(in) td_mpp,
            type(tvar), intent(inout) td_depth )
```

This subroutine get depth variable value in an open mpp structure and check if agree with already input depth variable.

Author

J.Paul

Date

November, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_mpp*	mpp structure
`in,out`	*td_depth*	depth variable structure

14.3.4.3 create_restart_check_time()

```
subroutine create_restart::create_restart_check_time (
            type(tmpp), intent(in) td_mpp,
            type(tvar), intent(inout) td_time )
```

This subroutine get date and time in an open mpp structure and check if agree with date and time already read.

Author

J.Paul

Date

November, 2014 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_mpp*	mpp structure
`in,out`	*td_time*	time variable structure

[redacted]

Parameters

`in,out`	*td_var*	variable structure
`in`	*id_rho*	array of refinment factor
`in`	*id_offset*	array of offset between fine and coarse grid
`in`	*id_iext*	i-direction size of extra bands (default=im_minext)
`in`	*id_jext*	j-direction size of extra bands (default=im_minext)

tvar
tvar

Author

Date

Parameters

Parameters

14.3.4.6 create_restart_matrix()

```
type(tvar) function create_restart::create_restart_matrix (
             type(tvar), intent(in) td_var,
             type(tmpp), intent(in) td_coord,
             integer(i4), intent(in) id_nlevel,
             integer(i4), dimension(:,:), intent(in) id_xghost )
```

This function create variable, filled with matrix value.

A variable is create with the same name that the input variable, and with dimension of the coordinate file.
Then the variable array of value is split into equal subdomain. Each subdomain is filled with the associated value of the matrix.

Author

J.Paul

Date

November, 2013 - Initial Version
June, 2015

- do not use level anymore

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]**Parameters**

Parameters

`in`	*td_var*	variable structure
`in`	*td_coord*	coordinate file structure
`in`	*id_nlevel*	number of vertical level
`in`	*id_xghost*	ghost cell array

Returns

variable structure

14.4 src/merge_bathy.f90 File Reference

This program merges bathymetry file at boundaries.

Functions/Subroutines

- program merge_bathy
- subroutine merge_bathy_get_boundary (td_bathy0, td_bathy1, td_bdy, id_rho, dd_refined, dd_weight, dd_fill)

  This subroutine compute refined bathymetry on boundary from coarse grid.
- subroutine merge_bathy_interp (td_var, id_rho, id_offset, id_iext, id_jext)

  This subroutine interpolate variable.

14.4.1 Detailed Description

This program merges bathymetry file at boundaries.

14.4.2 method

Coarse grid Bathymetry is interpolated on fine grid (nearest interpolation method is used). Then fine Bathymetry and refined coarse bathymetry are merged at boundaries.

$$BathyFine = Weight * BathyCoarse + (1 - Weight) * BathyFine$$

The weight function used is :

$$Weight = 0.5 + 0.5 * COS(\frac{\pi * dist}{width})$$

with

- dist : number of point to border
- width : boundary size

14.4.3 how to

to merge bathymetry file:

```
./SIREN/bin/merge_bathy merge_bathy.nam
```

Note

you could find a template of the namelist in templates directory.

merge_bathy.nam contains 7 namelists:

- logger namelist (namlog)
- config namelist (namcfg)
- coarse grid namelist (namcrs)
- fine grid namelist (namfin)

14.4.4 Function/Subroutine Documentation

14.4.4.1 merge_bathy()

```
program merge_bathy ( )
```

- nesting namelist (namnst)
- boundary namelist (nambdy)
- output namelist (namout)

logger namelist (namlog):

- cn_logfile : logger filename
- cn_verbosity : verbosity ('trace','debug','info', 'warning','error','fatal','none')
- in_maxerror : maximum number of error allowed

config namelist (namcfg):

- cn_varcfg : variable configuration file (see ./SIREN/cfg/variable.cfg)
- cn_dumcfg : useless (dummy) configuration file, for useless dimension or variable (see ./SIRE↩ N/cfg/dummy.cfg).

coarse grid namelist (namcrs):

- cn_bathy0 : bathymetry file
- in_perio0 : NEMO periodicity index (see Model Boundary Condition in `NEMO documentation`)

fine grid namelist (namfin):

- cn_bathy1 : bathymetry file
- in_perio1 : NEMO periodicity index ∗ *nesting namelist (namnst)*:
- in_rhoi : refinement factor in i-direction
- in_rhoj : refinement factor in j-direction

boundary namelist (nambdy):

- ln_north : use north boundary or not
- ln_south : use south boundary or not
- ln_east : use east boundary or not
- ln_west : use west boundary or not
- cn_north : north boundary indices on fine grid
  cn_north is a string character defining boundary segmentation.
  segments are separated by '|'.
  each segments of the boundary is composed of:
  - indice of velocity (orthogonal to boundary .ie. for north boundary, J-indice).
  - indice of segment start (I-indice for north boundary)
  - indice of segment end (I-indice for north boundary)
    indices must be separated by ':' .
  - optionally, boundary size could be added between '(' and ')' in the first segment defined.

Note

boundary size is the same for all segments of one boundary.

Examples:

- cn_north='index1,first1:last1(width)'
- cn_north='index1(width),first1:last1|index2,first2:last2'

- cn_south : south boundary indices on fine grid
- cn_east : east boundary indices on fine grid
- cn_west : west boundary indices on fine grid
- ln_oneseg: use only one segment for each boundary or not

output namelist (namout):

- cn_fileout : merged bathymetry file

Author

J.Paul

Date

November, 2013 - Initial Version
Sepember, 2014

- add header for user

July, 2015

- extrapolate all land points
- add attributes with boundary string character (as in namelist)

September, 2015

- manage useless (dummy) variable, attributes, and dimension

Note

Software governed by the CeCILL licence (NEMOGCM/NEMO_CeCILL.txt)

14.4.4.2 merge_bathy_get_boundary()

```
subroutine merge_bathy::merge_bathy_get_boundary (
            type(tmpp), intent(in) td_bathy0,
            type(tmpp), intent(in) td_bathy1,
            type(tbdy), intent(in) td_bdy,
            integer(i4), dimension(:), intent(in) id_rho,
            real(dp), dimension(:,:,:,:), intent(inout) dd_refined,
            real(dp), dimension(:,:,:,:), intent(inout) dd_weight,
            real(dp), intent(in) dd_fill )
```

This subroutine compute refined bathymetry on boundary from coarse grid.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in`	*td_bathy0*	coarse grid bathymetry file structure
`in`	*td_bathy1*	fine grid bathymetry file structure
`in`	*td_bdy*	boundary structure
`in`	*id_rho*	array of refinement factor
`in,out`	*dd_refined*	array of refined bathymetry
`in,out`	*dd_weight*	array of weight
`in`	*dd_fill*	fillValue

Todo improve boundary weight function

14.4.4.3 merge_bathy_interp()

```
subroutine merge_bathy::merge_bathy_interp (
             type(tvar), intent(inout) td_var,
             integer(i4), dimension(:), intent(in) id_rho,
             integer(i4), dimension(:,:), intent(in) id_offset,
             integer(i4), intent(in), optional id_iext,
             integer(i4), intent(in), optional id_jext )
```

This subroutine interpolate variable.

Author

J.Paul

Date

November, 2013 - Initial Version

=1mm

spread 0pt [l]|X[-1,l]|X[-1,l]|X[-1,l]|**Parameters**

Parameters

`in,out`	*td_var*	variable structure
`in`	*id_rho*	array of refinment factor
`in`	*id_offset*	array of offset between fine and coarse grid
`in`	*id_iext*	i-direction size of extra bands (default=im_minext)
`in`	*id_jext*	j-direction size of extra bands (default=im_minext)