# ecCodes

## GRIB Fortran 90 - Python APIs
## Practicals 1

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# Practical 1: Intro to ecCodes APIs

Get the practical's archive:

```
$ cd $SCRATCH
$ tar xvf ~trx/ecCodes/eccodes_api_practicals.tar.gz
$ cd eccodes_api_practicals/exercise1/
# select F90 or Python
$ cd F90
$ ls
Makefile  exercise.f90  exercise_eccodes.f90  exercise_grib_api.f90
exercise_mod.f90  u  v
$ make
$ ./exercise
```

*Compile/link exercise.f90 with the old version of EMOSLIB*

- The Fortran code exercise.f90 decodes two GRIB files and to compute wind field and direction. The objective is to make all the necessary changes in exercise_eccodes.f90 using ecCodes to obtain the same output.

# Practical 1: Main program

```
program exercise_eccodes
!=============================================================
  use eccodes
  use exercise_mod
  implicit none
  real (KIND=nbytes_dp),dimension(:), allocatable :: u,v, direction, speed
  call read_fields('u', u)
  call read_fields('v', v)
  call compute_fields()
  call clean_fields()
```

*You have to modify the subroutine read_fields*

```
$ grib_ls –p parameter,shortName,dataDate,numberOfCodedValues,gridType,packingType u v
parameter   shortName   dataDate    numberOfCodedValues   gridType    packingType
  131           u         20080201       4131                 regular_ll   grid_simple
...
  132           v         20080201       4131                 regular_ll   grid_simple
...
2 of 2 total grib messages in 2 files
```

# Practical 1: The objectives

- You will only have to include the ecCodes I/O statements and make the appropriate calls to codes_get in.
  - You can use the ‘codes_’ or ‘grib_’ names for the calls to ecCodes.
- Compile/link the Fortran examples with:

```
$ gfortran –o exercise_eccodes exercise_eccodes.f90  exercise_mod.f90 \
 $ECCODES_INCLUDE $ECCODES_LIB
```

```
$ gfortran –o exercise_eccodes exercise_grib_api.f90  exercise_mod.f90 \
      $ECCODES_INCLUDE $ECCODES_LIB
```

  or use the Makefile (‘make eccodes’)

- For Python, run with:

```
$ python exercise_eccodes.py
```

# Practical 1: The objectives

- Run the resulting code

```
$ ./exercise_eccodes     #  for Fortran
$ python exercise_eccodes.py # for python
```

- Compare with the output produced by ./exercise
- Now change the links for the input files to u.grib2 and v.grib2 (GRIB-2) and run the two executables again

```
$ make grib2
$ ./exercise_eccodes     #  for Fortran
```

- You can also compare the usage of ecCodes with the usage of the GRIB API:

```
$ module swap eccodes grib_api
$ make clean gribapi
$ ./exercise_grib_api
$ module swap grib_api eccodes
```

# Tips

- For C and Fortran, use make (‘make [-f <Makefile>] [clean]’)
- Documentation for ecCodes can be found at

  https://software.ecmwf.int/wiki/display/ECC/ecCodes+Home
- Error codes are listed under:

  http://download.ecmwf.int/test-data/eccodes/html/group__errors.html

- See lecture notes, ask one of us or …
- … suggested solutions are in the sub-directory ‘.solution’