ECMWF training course - 2014
Advanced MARS usage
Practical examples.

N O T E S:

1.   You can run MARS either on ecgate or your local desktop.
2.   For compilations of fortran programs to decode the data, you will have to use ecgate. Work interactively or in batch mode (using llsubmit).
3.   See handouts or online documentation under:

   http://www.ecmwf.int/publications/manuals/mars/guide/

4.   Some job examples are available under:

   http://www.ecmwf.int/services/computing/job_examples/ecgate/

5.   Create a subdirectory for this practical session, eg.

      % cd $SCRATCH
      % tar xvf ~trx/mars_advanced/practicals.tar
      % cd mars_advanced

EXERCISE 1 (multiple target)

Take a MARS request like in

   http://www.ecmwf.int/publications/manuals/mars/guide/Data_Storage_keywords.html

e.g.,

```
retrieve,
    type        = an,
    expver      = 1,
    levtype     = pl,
    levelist    = 1000/850/700/500/400/300,
    param       = 129,
    date        = -2,
    time        = 0000/0600/1200/1800,
    target      = "analysis.[time]"
```

Can you modify it to store each field in a separate target file, i.e. geopotential at 1000hPa and for 00Z in one file, etc …
Run the modified request and check if you produce the right target files. The file 'multi_target.req' contains the above request.

EXERCISE 2 (List)

Based on the above request and **WITHOUT EXTRACTING THE DATA,** can you estimate what volume is occupied by **all** the operational analysis for one recent week on pressure levels? Check the number of fields, the number of tapes …

You can also use the MARS browser under

http://www.ecmwf.int/services/archive/d/catalog/

Alternatively a sample mars request is available in 'ops_1week_pl.req'.
You could similarly check what has been archived for one week, for the ERA-15 project (1978-1994), for ERA-40 (1957-2002) or for ERA-interim (1979-2014).

EXERCISE 3 (MARS Computations)

Using the MARS browser (Data finder, …), can you isolate the **operational forecast precipitation field** available in MARS. Knowing from:

http://www.ecmwf.int/publications/manuals/d/gribapi/param/search=precipitation/

that these fields are accumulated from the start of each forecast, how could you create one field with the Total Precipitation forecast for today, between 00:00 and 24:00, based on yesterday's forecast starting at 12:00. The file 'compute_total_daily_precip.req' contains the mars request to extract the fields needed.

EXERCISE 4 (Concluding quiz on reasonable size of MARS requests)

You have to extract all ERA interim analysis data on pressure levels for one year (or more). Considering the volumes seen in exercise 2, knowing the restrictions on disk space, keeping in mind the architecture of MARS, the ability to restart your task, which option would be the most suitable to use:

   A. One request like shown with "xv year.gif" (run this command in a local terminal)
   B. 12 requests like shown with "xv mars_adv/month.gif"
   C. (Number of levels * Number of times * Number of days * Number of params) requests (148920) requests with the content of "xv day.gif"
   D. Other?

Check the number of fields, look at the volumes extracted, ….

What other factors should you take into account?